THE CADMUS GROUP, INC.

Final Report

Process Evaluation of 2006-2008 IDEEA & InDEE Programs

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THE CADMUS GROUP, INC.

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Prepared by:
Ben Bronfman, PhD
Anne West
Jessica Aiona
Jim Stewart
The Cadmus Group, Inc.

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The Cadmus Group, Inc.

Executive Summary

The Cadmus Group, Inc. evaluated six programs within the suite of Southern California Edison's 2006-2008 InDEE/IDEEA programs. The IDEEA Program involved annual competitive solicitation for innovative energy-efficiency program proposals across all market sectors and customer segments. SCE's intent is to identify, fund, and test the best ideas that explore innovative technologies, measures, program design and implementation approaches.

These process evaluations were completed in mid-2008, prior to the end of the program cycle. The evaluations report on progress through the early stages of the program launch and implementation, and provided recommendations. Each evaluation is built upon the findings from the earlier Evaluability Assessment. The program theory, logic model, and process flow charts support the evaluation. Underlying market assumptions and market barriers are also examined. The process evaluations discuss interim program changes during the 2006-2008 program cycle.

The six process evaluations were conducted for:

- SCE 2532 - Coin Operated Laundry Program
- SCE 2537 - Management Affiliates Partnership Program
- SCE 2557 – Transforming the Market for ENERGY STAR® Manufactured Homes
- SCE 2558 - Automated Energy Review for Schools (AERS)
- SCE 2559 - Lighting Energy-Efficiency Par 38/30
- SCE 2561 - Energy-Efficiency Program for Entertainment Centers

Each of the six programs are summarized below, and include recommendations discussed in the evaluation reports.

SCE 2532 - Coin-Operated Commercial Laundries

The Coin-Operated Commercial Laundries Program sought to increase the number of commercial, energy-efficient washing machines by offering rebates to commercial and multifamily facilities (for purchase or lease of high efficiency washers). A joint utility program, it also provided free lighting upgrades and pipe wrap to increase efficiency. The program was implemented by a third party, UCONS.

An estimated 10,000 commercial laundry machines are supplied by electrically heated water in the SCE service territory, thus implementers estimated there are 2,450 potential participants. Implementers also proposed to replace 16,500 inefficient washers with gas-heated water.

The program was based on the supposition that site managers tend to be unaware of potential energy savings from high efficiency (typically front-loading) washers. Collaboratively marketing with utilities and water agencies were seen as a way to increase awareness and educational

opportunities. Participation from water agencies would help identify and enroll customers. Further, a significant portion of electric water heaters exists in the coin-operated laundry market.

The list of approved clothes washers was based on the Center for Energy Efficiency (CEE) list; as their standards changed it increased energy efficiency thresholds and eligibility standards for this program. Implementers found that in practice, few commercial clothes washers used electrically heated water and the program was not able to meet their goals. In addition, each time the CEE requirements change, the inventory of lesser-efficiency models remains. Manufacturers discounted their inventory of top-loading machines and machines of lesser-efficiency to sell these before moving on to the higher efficiency models. The discounted machines adversely affected program participation.

Because anticipated electric savings from washers would not be realized, SCE achieved electric savings through additional lighting upgrades. Utilities and implementers changed the goal for gas-heated washer installation in the fourth quarter of 2007 to address the predominance of gas heated washers in the target market.

As a joint utility program, SCE was the lag utility and Southern California Gas (SCG) was the lead. SCG worked directly with implementers and received invoices from them. SCG then sent SCE an invoice for the electric portion of the incentives. As a joint utility program, the data-sharing processes and communications are vital to smooth operations. Communication issues between utilities arose from database problems and staff turnover. Rebate checks were not reaching participants fast enough, which affected customer satisfaction. As the lag utility, SCE had no control over incentive payments. It appeared the recommendations stemming from the early Evaluability Assessment were not integrated into final planning and implementation. Complete participant tracking databases were not shared with evaluators.

The program was implemented as designed, but at the time the evaluation terminated in July 2008, it had fallen short of ex-ante kWh and KW goals.

This evaluation produced the following key recommendations:

- ***Recommendation:*** Do not target commercial laundries to generate electricity savings via high efficiency clothes washers. Implementers found there were few commercial washers with electrically heated washers.

- ***Recommendation:*** Before launching the joint utility programs, test and debug data collection and transfer tools and processes from the implementer through transfer from lead to lag utility**.** Smoothly operating joint programs require data management and reporting systems that meet the needs of implementers and both utilities. Regardless of the program implemented, the underlying structure should be tested and in place before joint program launching.

- ***Recommendation:*** Communicate the purpose and value of evaluations. Ensure administrators and implementers understand; so the appropriate data are collected at the right time. Incorporate an Evaluability Assessment in the program design phase and

follow up with implementers and program managers on identified issues, test the database, and exercise the data early.

➡ ***Recommendation:*** Should another program of this nature be implemented, additional means are needed to reach commercial washing facility's site managers. Use existing channels including route operators and distributors for marketing, and increase their efforts in reaching site managers**.**

➡ ***Recommendation:*** As with all programs, rebate processing efficiency is a critical component of customer satisfaction. In upstream programs, implementers require reasonable turn-around to meet their expenses and continue to implement the program as designed. Implementers and management should speed the rebate payment process.

SCE 2537 - Management Affiliates Partnership Program

The Management Affiliates Partnership Program encouraged commercial property management companies to install emerging but proven energy-efficiency technologies in (or supporting) commercial office buildings and structures, including parking garages, retail department stores, and other buildings from 20,000 to 1M sq. ft. The implementer was the Energy Innovation Group (EIG).

The program was designed to address specific market barriers, including the lack of strong access to decision makers and split incentives. Building managers largely remain unaware of the technologies promoted through this program. Though they respond to savings opportunities when contacted, they typically will not install efficiency measures unless incentives are offered.

The original technologies offered by the program were: Lighting Power Regulator; CO Sensors for Garages; HVAC Cycle Manager; CO2 Sensors (DCV); and TurboCor Oil-free compressors. Three change orders resulted in increased funding. Incentives, however, were reduced. The program adjustments led to increased savings expectations of 8.06 MW and 29,867 MWh. The new technologies added were: Fan Wall for HVAC; Hotel Key Card; Delta Pressure Independent Valve System; and Daylight Harvesting and Dimmable Ballasts.

The program's premise and basic operations were sound, and the program was implemented largely as planned. An efficient division of labor allowed EIG (primary implementer and marketer) and Intergy (the installation contractor) to focus on their strengths to provide superior customer service, an important consideration as conducting business face-to-face is of great value in the commercial office building market. By the evaluation's close in mid-2008, customers requested technologies that were not on the MAP menu. When EIG pursued these offerings, SCE was responsive in researching products and developing a white paper, but this took many months to review and approve. Projects went on hold during the review process. Once the new measures and associated change orders were approved, incentives for all measure were reduced. As the incentives make energy-efficiency technologies more affordable and appealing, the reduction in incentives led to some projects dropping out.

Overall, EIG was responsive to the evaluator's needs. They were, however, unprepared for the evaluation workload related to M & V in the impact evaluation (a separate evaluation from this

process evaluation). The Evaluability Assessment recommended collecting and retaining nonparticipant contact data, but implementers could not easily access these data when needed.

This evaluation produced the following key recommendations:

- ***Recommendation:*** Consider making MAP a regular offering and advocating its adoption on a statewide basis.

- ***Recommendation:*** Encourage collaborating entities to undertake what they do best when implementing the program. Continue program delivery by two complementary implementation contractors: one a marketer and the other an installer.

- ***Recommendation:*** Use direct marketing to both building management companies and building managers. Continue direct, face-to-face marketing, building personal relationships with the target market, and expand of the targeted contacts to include building engineers.

- ***Recommendation:*** Accelerate the process for establishing savings calculation methods and granting approval for proposed, mid-program modifications to the list of offered measures.

- ***Recommendation:*** Assess effectiveness of the lower incentive levels implemented during the previous program cycle.

- ***Recommendation:*** Communicate with participants about the program's expectations for their cooperation with program evaluators. Clearly explain evaluation expectations to implementers.

- ***Recommendation:*** Conduct Evaluability Assessments early and follow up to assure implementation. Communicate with implementers regarding the program's expectations for the collection and retention of data about participants and about others contacted by the program. Follow up with implementers and program managers on identified issues, test the database, and exercise the data early.

SCE 2557 - Transforming the Market for New ENERGY STAR® Manufactured Homes

Transforming the Market for New ENERGY STAR® Manufactured Homes offered strategic upstream incentives for the manufacture and sale of ENERGY STAR® manufactured homes. The incentives were designed to move the market from basic energy construction (HUD standards) to high-performance ENERGY STAR® standards. The Manufactured Housing Research Alliance developed and implemented the program.

The program was designed to provide incentives to key stakeholders to produce ENERGY STAR® manufactured homes. A $400 manufacturer's incentive and a $1,000 federal tax credit covered most of the incremental manufacturing costs. Manufacturers reported the $1000 federal tax credit was sufficient to motivate them to retool and certify their plants to build homes to

Energy Star® standards. The $400 incentive was not the tipping point to manufacture ENERGY STAR® homes. Manufacturers interviewed suggested shifting the $400 incentives to retailers to encourage sales of the more energy efficient homes.

However, the program also required right-sized heat pumps for the home to qualify for incentives. This proved to be a major stumbling block. Homeowners choose and purchase cooling equipment from HVAC dealers but not necessarily the retailers when ordering their manufactured homes; they can also add cooling equipment later. Certifying the proper equipment was installed after the home was sited on the lot proved difficult.

The market structure currently in place is designed to introduce the industry to ENERGY STAR®-manufactured homes and increase their sales. Other underlying market assumptions appear to be mistaken, probably because appropriate market research was not done. At the close of the evaluation in mid-2008, the rebate structure and payment process did not work properly, and the incentive structure was not optimal. By mid-2008, MHRA worked to change the incentive structure to focus on retailers rather than manufacturers. Program goals changed from 1,250 installed homes to 750 to reflect the slowing housing market.

Other issues affected the program including the availability of right-sized heat pumps for air conditioning. Approximately 100 to 200 homes were sold as ENERGY STAR® homes, but the plant was not certified (likely due to communication issues). Further, 75% of participating retailers did not know the difference between HUD standards and ENERGY STAR® standards and some stated the HUD standards were more energy efficient. In addition, the evaluation found recording and tracking homebuyer information, and obtaining it from implementers for the evaluation, to be difficult for the 2006-08 program cycle.

The key recommendations from this evaluation follow:

- ***Recommendation:*** The market chain and structure for manufactured homes are ready for a new construction program. Continue the program structure to recruit both manufacturers and retailers.

- ***Recommendation:*** Conduct market research to identify the process by which HVAC equipment is marketed, purchased, and installed. Include HVAC contractors among the program's targeted market actors. Alternatively, remove the program requirement that the home include a right-sized electric heat pump to qualify.

- ***Recommendation:*** Establish means for systematic, scheduled home site inspection once the homes are installed on the buyers' property. Verify the incented manufactured homes meet Energy Star® and program requirements.

- ***Recommendation:*** Create additional material and discussions about the benefits of Energy Star® homes, and about the differences between Energy Star® homes and homes built to HUD standards

- ***Recommendation:*** Expand the manufacturer and retailer outreach to increase overall awareness and understanding of Energy Star® manufactured homes. Strengthen information and support materials, focusing on the value to the retailer of making the

sale to the homebuyer. Increase outreach and marketing to the home buyers and include them in the

- ***Recommendation:*** Conduct more research on incentive structures and determine which market actors, including HVAC contractors and homebuyers, are the most appropriate recipients of rebates.

- ***Recommendation:*** Establish processes to verify participating manufacturers have Energy Star® certification.

- ***Recommendation:*** Record and track customer data and information on parties receiving incentives.

SCE 2558 - Automatic Energy Review for Schools

The Automatic Energy Review for Schools Program (AERS) sought to increase the energy efficiency of school building projects that only meet (or marginally exceed) Title 24 building standards. This takes advantage of a narrow window of opportunity during a review by the Division of the State Architect's (DSA) to identify schools that did not participate in Savings By Design. In fact, this is the last opportunity to increase energy savings via the building design process before plans are permitted.

In general, the program was implemented as designed, and no significant modifications were undertaken. However, the implementation plan indicated The Benningfield Group (the third party implementer) would set up an automatic referral system in which DSA would screen for projects eligible for AERS. Instead, the implementer identified potential projects by manually mining the DSA, which was resource intensive. Having an automated process remains a desirable addition.

The program used an effective program tracking database and the implementer conducted good recordkeeping. Although the design appears sound, at the time the evaluation was completed in July 2008, the program was behind schedule to meet its goals, and some underlying market assumptions appeared to be mistaken. Notably, in specialized implementation areas, an important market actor can have a significant impact (one uncooperative architectural firm represented many projects and was responsible for a majority of refusals). By mid-2008, the program had not effectively overcome critical market barriers. Its design teams have weak incentives to recommend participation because they often bear additional redesign costs as well as added time demands. The major barrier in this program is that it comes too late in the design and permitting process for many of potential participants. Further, implementers need to find a better means to automate the selection and review process.

Market research, marketing, and incentives were the themes of recommendations.

- ***Recommendation:*** Market research should be conducted to determine how best to assist projects late in the design and permitting phases. The 2006-08 program encountered unexpected market barriers regarding the timing of its interventions in school projects,

regarding schools' decision-making processes, and regarding the willingness of architects and designers to support late-stage design changes.

- ***Recommendation:*** Improve the marketing to increase program participation by educating market actors about the benefits of participation.
- ***Recommendation:*** Communicate the program's objectives, eligibility, and benefits to diminish customer confusion with other programs, and to enhance customers' and market actors' willingness to participate in the program.
- ***Recommendation:*** Reach out one-on-one to architectural firms to address their concerns and to increase their willingness to encourage client participation in the program.
- ***Recommendation:*** Further cultivate the relationship with the Department of State Architects (DSA) and explore other means to improve the efficiency with which the DSA database is mined.

SCE 2559 - SCE Lighting Energy-Efficiency PAR 38/30 CFL

EnergySolve Demand Response, LLC, developed and implemented the Lighting Energy-Efficiency PAR 38/30 CFL Program to introduce new commercial CFL technologies to the retail sector for downlighting and display lighting. The program sought to demonstrate that aluminum PAR lamps provide the same amount and quality of light as halogen PAR lamps while saving energy and maintenance costs. The Lighting Energy-Efficiency program initially promoted a Westinghouse product that cannot be purchased off the shelf.

Educating retail customers about the superior quality of light from aluminum PAR CFLs seeks to overcome their resistance to using these technologies. Retail customers will be further motivated by the savings and maintenance benefits, and providing the new technology at low (or no) initial cost will most efficiently transform the market.

By mid-2008, the program design had changed several times from its December 2006 inception. First, customers' capital costs for bulbs were removed (along with the original funding mechanism, which included a six-year service contract). Other changes involved using a different marketing approach, expanding the target market, and adding a GE PAR product to the offering.

The original target market also narrowly focused on a retail market sector reluctant to adopt new lighting technologies. The program design wrongly assumed RETEX (a retail buying co-op with 2,800 members) would provide a ready-made marketing arm. After the program was fielded, implementers found competitors offered similar bulbs for less. The market could not distinguish differences between products. Nonparticipants lacked knowledge about the program and lighting. Marketing materials were described variously as "overwhelming" and "inadequate." Establishing a system for customer feedback could be instrumental to shaping the marketing effort. Concerns arose about customers ordering the wrong bulbs or installing the bulbs incorrectly (e.g., installing non-dimmable bulbs in dimming applications).

The Evaluability Assessment recommendations may not have been integrated into planning and implementation. Further, complete databases were not shared with evaluators, though the need for the databases were discussed during the Evaluability Assessment and Evaluation.

The following key recommendations emerged from this evaluation:

- ***Recommendation:*** Conduct thorough market research regarding availability and cost of similar available lighting technologies, marketing channels, and market potential.
- ***Recommendation:*** Run multiple, complementary marketing approaches concurrently to avoid depending on a single marketing channel.
- ***Recommendation:*** Confirm the program is not being undercut by competition from other utility or industry programs.
- ***Recommendation:*** Clearly differentiate product differences in the marketing materials. Avoid too narrowly targeting the market.
- ***Recommendation:*** Test the marketing materials for clarity.
- ***Recommendation:*** Provide a convenient, Web-based tool for customer feedback.
- ***Recommendation:*** Ensure administrators and implementers understand the evaluations' purpose and value; so the appropriate data are collected at the right time; and incorporate Evaluability Assessment recommendations. Follow up with implementers and program managers on identified issues, test the database, and exercise the data early.
- ***Recommendation:*** Consider using a direct-install approach.

SCE 2561 - Energy Efficiency Program for Entertainment Centers

The Energy Efficiency Program for Entertainment Centers offered retrofits to commercial movie theater complexes by providing coil cleaning services and optimized demand-controlled ventilation (DCV) with CO2 sensors. The sensors and controls were offered at a discounted price. Matrix Energy implemented the program.

Theater complexes offer a large potential for DCV retrofits because of their high density but variable occupancy. Implementers assumed that contact information for the theater decision-maker was readily available and that large chains would provide the majority of DCV installations. A two-pronged collaborative marketing effort was planned to reach both large and small theater complexes.

The program became a joint utility offering, fielded late October 2007. Its late start and low participation levels led to changes in the first quarter of 2008. Four climate zones (CZ 13, 14, 15,

and 16) were added to the original four (CZ 6, 8, 9, 10). Heat pumps were also added and marketing efforts were expanded.

The Evaluability Assessment revealed a thorough and comprehensive proposed baseline, and recommended an early Measurement and Verification (M&V) and tracking database to support program evaluation. Finalization of the joint utility partnership proved too slow and affected the program's success rate. Although the program design appeared sound, the program was behind schedule in achieving its goals as of mid-2008, largely due to the late start and difficulty identifying and reaching decision-makers. Communication between utility account representatives and implementers could be improved. The $1,500 to $3,000 potential cost (multiple HVACs) presented an impediment sufficient to lead some to forgo installation of approximately $15,000 to $30,000 in energy-efficiency equipment, plus the benefits of future energy savings. The evaluation effort could not be completed as planned; notably, the implementer requested that evaluators not contact uncommitted theatres where participation negotiations were ongoing.

There are four key recommendations from this evaluation:

- ***Recommendation:*** Have all utility partners on board and all funding sources determined before conducting the program kickoff and fielding.

- ***Recommendation:*** Improve communication between all parties, utility program managers, implementers, and potential participants.

- ***Recommendation:*** Provide better marketing and outreach. Consider utilizing two implementation teams, and separate the marketing functions from the implementation functions.

- ***Recommendation:*** Conduct surveys with uncommitted and committed theaters at end of the program's 2006–2008 cycle to assess satisfaction and market barriers.

SCE 2532: Coin Operated Laundry Program

Program Overview

The Coin Operated Laundry Partnership Program (the Program) is included in Southern California Edison's (Edison) suite of constituent programs in the 2006-2008 InDEE/IDEEA program offerings. The Laundry Partnership Program offers rebates to commercial and multifamily facilities for the purchase or lease of energy efficient commercial washing machines. The Program also provides free lighting upgrades and pipe wrap to increase efficiency.

Implementers estimated 10,000 commercial laundry machines are supplied by electrically heated water in Edison's service territory, and anticipated 2,450 potential participants with electrically heated water.[1] Commercial Laundromats offered opportunity for saving energy and is a market segment not typically served. As proposed, this Program was a good fit for the InDEE/IDEEA Portfolio, filling a gap in an underserved market.

The Laundry Partnership Program is a joint utility program sponsored by Southern California Gas (SCG), the lead utility, and Southern California Edison (Edison), the lag utility. CAL-UCONS, Inc. (UCONS) is the Program's implementer and is responsible for all marketing, installations and inspections.

The Coin Operated Laundry Partnership Program has three key elements.

- **The Laundry Partnership Program targets those who provide and those who utilize coin-operated laundry machines**. This market sector includes distributors, route operators, and facility operators who own or lease commercial washers. Education and marketing included each of these market actors.
- **The Program encouraged early retirement, replacing washers prior to termination of lease agreements.** Joint efforts of gas, electric, and water utilities enabled Program implementers to leverage incentives and offer multi-utility rebates to participants.
- **The Program also encouraged replacing washers at the end of their lease with Energy Star or CEE qualified commercial washers.** Again, education and leveraged incentives were offered to recruit participants.

The Program has a joint utility budget of $6,530,182 with Edison responsible for no more than $930,011[2] (Table 1). Original Program goals are 16,500 commercial washer installations served by natural gas heated water and 2,450 served by electrically heated water, approximately 2,300 Energy Star CFLs and 799 T-8 with electronic ballast retrofits, and a maximum of 9,600 pipe

[1] Cal-UCONS, Inc. Scope of Work, SCG and SCE. June 21, 2006. See also: Stage 2 Submittal, Multi Family and Small Commercial Coin Operated Laundry Program, Oct. 2005. Implementers also proposed replacing 16,500 inefficient washers with gas heated water.

[2] Cal-UCONS, Inc. Standard Service Agreement with Southern California Gas, Aug. 7, 2006. Page 29.

wrap installations. Total net energy savings are estimated to be 3,472,860 kWh and total net peak demand savings are estimated to be 746 kW.[3] Water consumption is expected to decrease by more than 50,000,000 gallons annually.

Table 1. Total Budget

	Combined SCG-Edison 2006-2008 Budgets		Edison 2006-2008 Budgets	
	Budget Amount ($)	Percent of Total (percent)	Budget Amount ($)	Percent of Total (percent)
Administrative Costs	$5,441,951	83%	$808,555	87%
Installation	$309,833	5%	$40,058	4%
Marketing	$778,398	12%	$81,398	9%
Total Program Budget	$6,530,182	100%	$93,0011	100%

Source: Standard Service Agreement with Southern California Gas, Aug. 7, 2006

This process evaluation only applies to activities in the Edison service territory.

Program Design

The commercial laundry market has a surplus of inefficient washing machines. Laundromat operators typically lease commercial washers, replacing them with less expensive--and less efficient--washers when the lease expires. The Program introduces energy efficient washers (identified via the CEE list) by educating market actors, providing incentives, and facilitating the early retirement of existing leased and owned equipment. Energy efficient washers promoted in this Program use less electricity during operation, fewer gallons of water per load, and primarily, less energy to heat the water. This, combined with direct installation of lighting upgrades and pipe insulation offered through the Program, can greatly decrease commercial washing facilities' utility bills.

For this Program, the Consortium for Energy Efficiency (CEE) qualifying product list of commercial washers identified the clothes washers that could replace existing machines and qualify for Program incentives.[4] Before the Program was implemented, Laundromats installed inefficient washers that did not make the list. It is important to note that CEE changed their

[3] Ibid. Page 14.

[4] Ibid. Page 13. Commercial washers are defined by the Department of Energy (DOE) in 10 CFR Part 431 Subpart I as part of the Federal standard for commercial clothes washers promulgated January 1, 2007. Until January 1, 2007, the basis used to distinguish between conventional or standard-efficiency and high-efficiency clothes washers is provided in databases listing high-efficiency equipment models, their energy performance, and their respective manufacturer. The ENERGY STAR® program and the CEE publish these lists. Participation and listing in the ENERGY STAR® and CEE programs is voluntary and relies on the manufacturers self-certifying and submitting efficiency data on their machines given the Federal Trade Commission does not currently require commercial-washer testing and labeling. See <www.energystar.gov/index.cfm?fuseaction=clotheswash.display_commercial_cw> and the Consortium for Energy Efficiency <http://www.cee1.org/com/cwsh/cwshspec.pdf>.

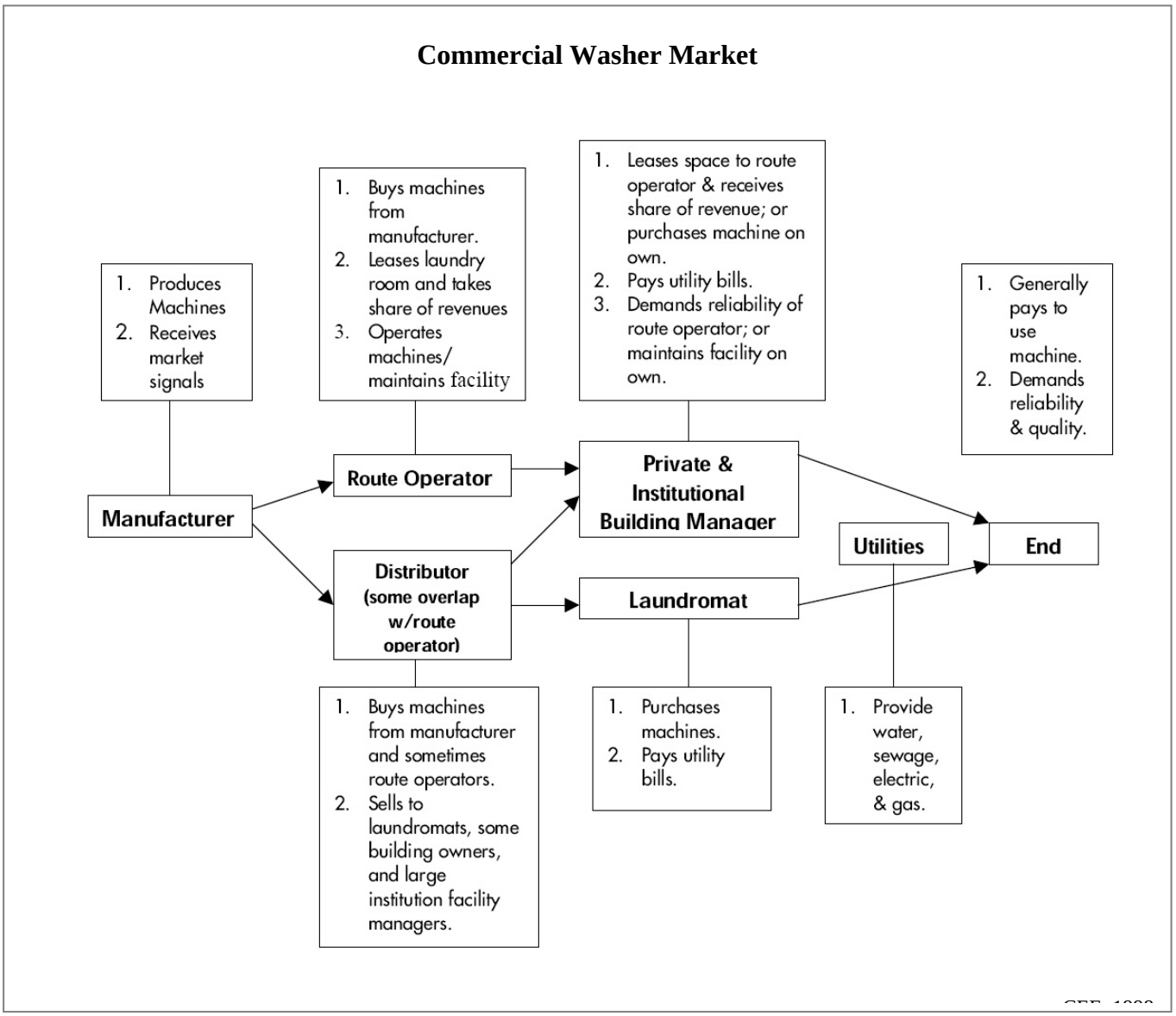
requirements for qualified machines and removed all top loading models from the list of qualified washers soon after the Program's onset, in February 2007. The top loading, vertical axis, machines in distributors' inventory, which were qualified via the initial CEE list, no longer qualified for Program incentives.

The commercial laundry market consists of several key players, all of whom are engaged in this Program.

- Manufacturers produce and sell commercial washing machines to route operators and distributors.
- Route operators lease laundry room space from multi-family property owners, and own and maintain the laundry equipment.
- Distributors sell equipment to multi-family property owners that do not enlist the services of route operators, and coin operated Laundromats owners. In some cases distributors also act as route operators.
- Property owners and Laundromat owners either purchase their own equipment or sign a lease agreement with a route operator and pay utilities and water agencies for their energy and water usage.

Figure 1, on the following page, shows the relationships between various market actors in the commercial laundry market.

Figure 1. Commercial Laundry Market



Source: UCONS, Coin-Op Washer Program; Concept & Overview.

Implementers planned a multi-pronged marketing approach to offer individualized marketing materials for each market actor to optimize adoption rates. Individualized marketing approaches are needed because equipment leasing companies, the end users, and the property managers have different economic needs.

Implementers proposed that an innovative piece of this Program involved understanding the financial and business needs of each party and developing appropriate lease terms for each

party.[5] "*The process requires repeated one-on-one discussions amongst the primary decision makers to develop terms which mutually benefit all parties: leasing companies wish to increase length of lease period and thus have some incentives to discount newer machines in exchange for extended lease arrangements; users of coin-operated laundry machines typically pay all utility bills (including electricity, gas, sewer and water). Current rebate incentives have not substantially moved this market because incentives alone are not the market barriers.*"

UCONS, the primary third party implementer, subcontracted with several other companies to create the "Laundry Team." Two subcontractors were responsible for marketing: Intergy Corporation worked closely with water agencies to market the Program to their customers, and Resource Management Corporation specialized in one-on-one meetings with route operators, distributors and site managers to educate them about the benefits of the Program. American Synergy Company was responsible for installing all the direct lighting and pipe wrap measures. Finally, Battelle Pacific Northwest Laboratory completes inspections of the installed equipment and conducts metering. Together, these companies are referenced as "implementers" in this report.

According to UCONS, commercial energy efficient front loading machines typically cost around $1300. The Program helps to offset this initial cost by offering an energy rebate of $130 per washer. The utility rebate is offered to either the route operator or the property owner. Distributors do not receive the rebate, but they benefit because the early replacement of inefficient washers generates sales.

In addition to the $130 electric and/or gas utility rebate, supplemental rebates ranging from $200-$630 are offered to property owners by more than 40 participating water districts.

Installation criteria include:

Consortium for Energy Efficiency (CEE) approved models[6]

Not installed in a single-family home

Replace a less efficient model

Edison, SCG, PG&E or SDG&E customer[7]

The Joint Utility Process

Joint utility programs offer a means for utilities to combine funding and effort to generate savings for all contributors. Joint utility programs are headed by the lead utility which provides the primary funding. The lead utility has the primary relationship with the implementer and is responsible for paying contractors' invoices. The lag utility provides funding for the Program and is invoiced by the lead utility for their portion of the program's incentives. The lag utility has limited risk in participating, providing less funding. Implementers report to both utilities. Joint

[5] Cal UCONS, Inc., Proposal to Edison, Innovative Coin-Operated Laundry Partnership Program. Page 3.

[6] <http://www.cee1.org/com/cwsh/cwshspec.pdf>

[7] This process evaluation applies to the Program as implemented in Edison's service territory

utilities typically negotiate marketing and other aspects of the Program. The lead utility bears the responsibility to collect all the data required to document installations, program activity and savings, and input the data into SMART. The lead utility is responsible for sharing the data with the lag utility, so that the lag utility can tie their payments to actual installations. In addition, the lead utility is responsible for the distribution of customer rebates.

In the first quarter of 2005, UCONS developed the program in coordination with input from So Cal Gas, Edison and Metropolitan Water District before being submitted to the Southern California PAG in April 2005, at which time the Template was approved. UCONS was encouraged by the IOUs to submit this innovative program as a partnership program (as submitted previously to the Program Advisory Group [PAG]), but also as a stand-alone, electric-only program (in the event utilities may need to contract differently or separately). [8]

The PAG identified the Program as a good candidate for a joint utility effort. In the Commercial Laundry Program, SCG acted as the lead utility and Edison acted as the lag utility. The joint utility agreement was signed in the first quarter of 2006, as was originally planned for the Program.

Market Assumptions

A number of key assumptions underlie the Commercial Laundry Program.[9]

Site managers are usually not aware of the potential energy savings associated with front-loading washers. Despite CEE and Energy Star lists, many site managers are not aware of the energy and water savings from efficient commercial washers Many site managers assume a tradeoff exists between savings and customer ease and satisfaction.

The collaborative marketing with utilities and water agencies will increase awareness and educational opportunities for route operators, distributors, and site managers. By enlisting several utilities and water agencies in the marketing process, route operators and distributors will have several sources for information and saturate the market with educational material.

Participation from water agencies will help identify and enroll customers to meet Program goals. Water agencies have access to contact information and provide another avenue to reach potential customers.

A significant portion of electric water heaters exists in the coin-operated laundry market. In order to make the Program successful for both Edison and SCG there needs to be a significant number of electric water heaters in the market. Prior UCONS research indicated significant numbers of electric water heaters.

[8] UCONS, Inc., Request for Proposals, Stage 2 Submittal, Multi Family and Small Commercial Coin Operated Laundry Program. Page 4. Oct. 2005.

[9] Ibid. Page 6.

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Coin Operated Laundry Partnership Program. The purpose of the process evaluation is to document the Program design and its development, examine barriers and opportunities and to make recommendations for program improvement. The evaluation involved document review, the development of a Program logic model, researchable issues and indicators, a process flow, and discussions with Program managers and implementers, key market actors, participants and nonparticipants.

Process Evaluation Methodology

The process evaluation focused on how the key market actors experienced the Program. In-depth interviews were conducted with the UCONS Program Implementer and Edison's Program Manager. The Implementer interview focused on overarching program goals, marketing strategy, implementation, the joint utility process, customer response and potential improvements.

The Edison Program Manager interview discussed the overarching goals of IDEEA/InDEE, Program process, changes to the Program, including the joint utility agreement, improvements to the Program, and its future. The interview also addressed two key questions: was the Program implemented as designed, according to the original proposal and scope of work, and as reflected in the initial logic model and process flow diagram, and what are the lasting effects of the Program? The Program Manager also identified key issues for discussion with the implementer, participants and nonparticipants.

We interviewed the SCG Program Manager to explore the joint utility process. The goal was to examine the dynamics of a joint utility program specifically with regards to Edison and SCG. We asked about the relationship between the utilities, communication strategies, differences in responsibility and any lessons that can be learned from administering joint programs.

The UCONS Implementer interview focused on overarching Program goals, marketing strategy, implementation, the joint utility process, customer response, long-term Program effects, and potential Program improvements. Interviews were also conducted with the Program's marketing contact at ASC, and with Battelle, the inspection and metering subcontractor. These interviews provided feedback for the final logic model and process flow shown below.

Participating route operators and distributors were contacted by phone to discuss their decision-making process, incentives, satisfaction, and market characteristics.

Surveys were also conducted with key decision makers, such as managers or owners from participating sites. They were asked about their decision-making process, level of participation, satisfaction, free ridership and market effects.

Surveys were planned for nonparticipating route operators or distributors, and nonparticipating site managers to discuss decision-making and reasons for nonparticipation. None were conducted because Implementers and their subcontractors did not provide contact information.

Interview Sample Development and Disposition

Cadmus conducted interviews with the Program Manager, Implementer, participants and market actors. We based survey sample sizes on information from Edison and UCONS about the total population of each respondent group. We developed an interview guide or survey for each group.

We based survey sample sizes on Program target goals and information from Edison and UCONS about the total market population. Table 2 shows the evaluation team's survey and interview goals and the number of interviews actually completed by each Program group.

Table 2. Survey Sample Goals and Achievements

Task	Goal	Achieved
Edison Program Manager	1	1
SCG Program Manager	2	2
Implementer	1	3
Participant Market Actor (route operators and distributors)	2	2
Nonparticipant Market Actor (route operators and distributors)	2	none identified
Participant (site managers)	5	5
Nonparticipant (site managers)	10	none identified; not tracked
Total	23	13

The interviews took place between January and May 2008. Before interviewing participants, interviewers confirmed that the respondent was involved in the decision to participate in the Program and/or were directly involved and knowledgeable about the Program.

No nonparticipating route operators or distributors were identified for interview because implementers did not track nonparticipants. UCONS explained that all route operators and distributors were classified as participants. In addition, UCONS did not track nonparticipant site managers.

Table 3 on the following page, shows the sequence and results of survey attempts with participating site managers Calls are listed as ineligible if the number was disconnected, an incorrect number, if the respondent was not a laundry facility, or they were never approached about the Program. UCONS identified fourteen participant site managers and five were interviewed.

Table 3. Site Manager Survey Call Disposition

Disposition	Number
Total population	14
Ineligible	4
No answer	4
Refused	1
Completed interviews	5

While Implementers reported retaining databases recording contacts with participants and nonparticipants, databases were not made available to evaluators. Evaluators worked with SCG and Edison, signing non-disclosure agreements, and requested tracking databases. However, in the end, implementers released contact information for only 14 they identified as participants.

Process Evaluation Results

Program Theory

The program theory for the Coin Operated Laundry Partnership Program can be summarized as follows:

> When leasing agents, and route operators of commercial and multifamily housing laundries are educated about energy and water efficient commercial washing machines, they will market the efficient units to commercial owners, managers, Commercial facilities will retire older washers and install the efficient units, resulting in energy (gas or electric) and water savings. Additional electricity savings will be achieved through lighting upgrades to efficient CFL and T-8 lighting. In the longer term, more efficient equipment will become standard practice for this market segment.

Logic Model

The Program logic model shown in Figure 2 highlights the key features of the Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The elements of the logic model are:

Activities that the program undertakes. The primary activities involve inter-utility coordination; identifying the market actors, including water districts and route operators and distributors; and, informing them about the Program. Marketing materials are prepared and presented to potential participants. Market actors recruit commercial Laundromats, multifamily residences and eligible institutions.

Outputs produced by program activities. The marketing and outreach activities result in outputs including production of marketing materials and outreach to all audiences, market actors and property owners/managers educated about the benefits of energy efficient washers and available rebates, customer agreements, equipment installation, pipe wrap and lighting upgrades.

Outcomes that result**:**

In the **short term**, outcomes include energy and demand savings from installed measures.

Intermediate outcomes include increases in awareness and demand for the technology, experience gained by the implementers, installers and Edison in new market approaches resulting in future Programs. These outcomes reduce market barriers and increase product availability.

The **long term** outcomes include changes in the commercial washing machine market, adding energy efficient washers to product lines.

The final logic model presented here reflects the Program after the approved design changes described above. It does not include the pending changes suggested by UCONS, such as the solar component and the early mailing of rebate checks.

Figure 2. Commercial Laundry Logic Model

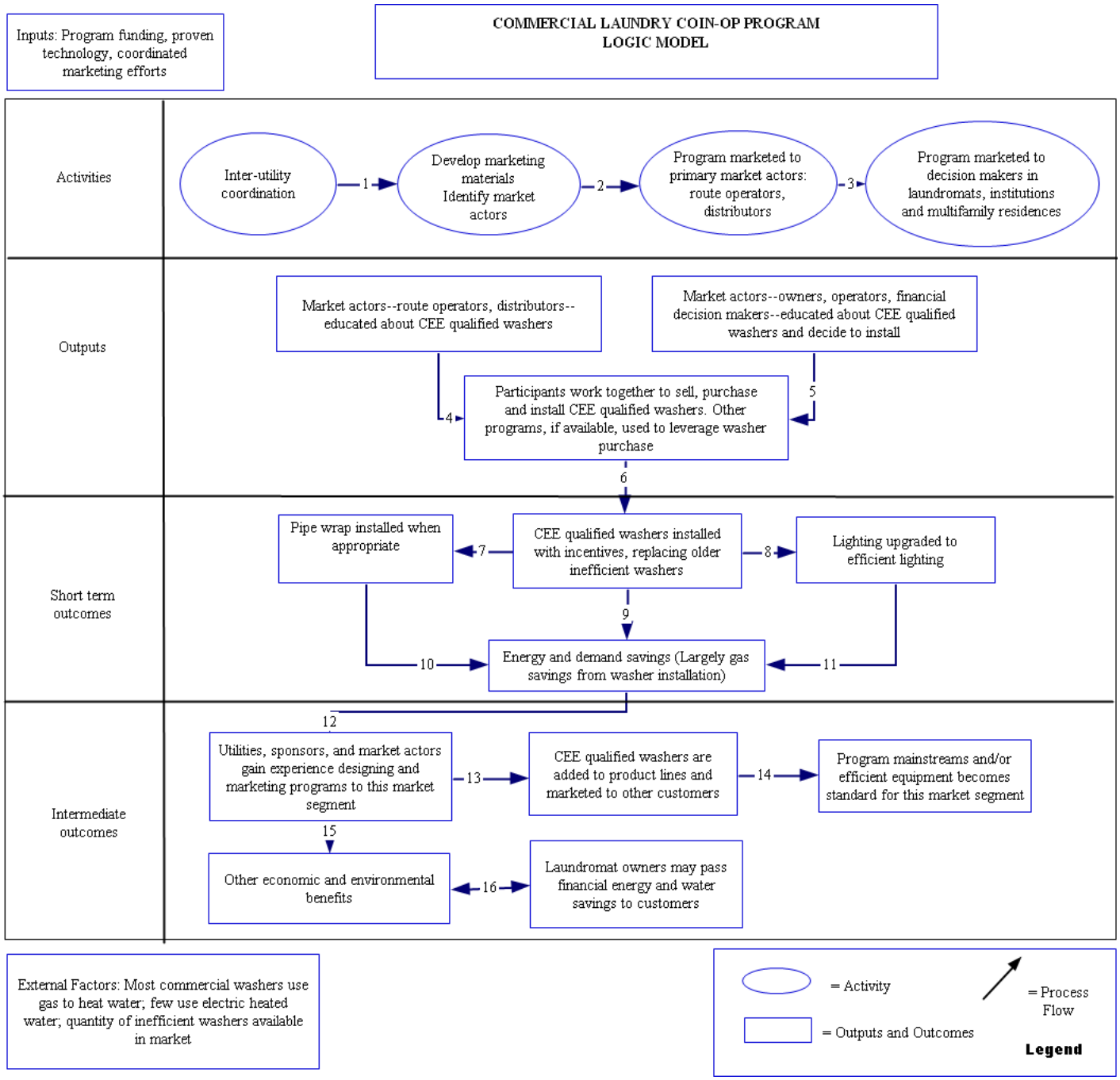


Table 4. Coin Operated Laundry Partnership Program Logic Model Links: Researchable Issues and Indicators

Link	Researchable Issues	Indicators
1	Inter-utility coordination ensures that the program is a consistent, state-wide activity and that utility efforts are coordinated. Market actors identified.	Meetings scheduled; work papers; agreements; program changes.
2	Marketing materials developed and market actors identified, addressing information barriers	Utility satisfaction with marketing materials developed. Number of market actors identified.
3	Outreach and marketing to route operators and distributors increases program awareness and availability of market channels; outreach addresses information barrier and raises awareness	Satisfaction with the program, the marketing materials; increased awareness about CEE qualified washers
3	Outreach and marketing to Owners, operators, financial decision makers increases program awareness and addresses information barrier and raises awareness	Satisfaction with the program, the marketing materials; end-users increased awareness about CEE qualified washers. Customers increase knowledge of benefits.
4	Route operators and distributors educated about CEE qualified washers work to sell, purchase, and install CEE qualified washers. Incentives leverage washer purchases.	More efficient washers purchased. First cost, performance uncertainty, knowledge and awareness. Increased product line and product availability.
5	Owners, operators, educated about CEE qualified washers install washers, leverage incentives. Customer market barriers decreased with increased knowledge and awareness.	More efficient washers purchased. First cost, performance uncertainty, knowledge and awareness.
6	Program incentives reduce the price of available measures, efficient washers are installed, Early retirement of older units encouraged.	Comparison of price for qualified washers and standard washers. Number of washers installed; number of rebates processed.
7	Pipe wrap installed	Number of Laundromats where pipe wrap installed.
8	Lighting measures installed	Number and type of efficient lights installed.
9 / 10 / 11	Energy and demand savings	Reduced energy use from washer, lighting and pipe wrap.
12	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment.	First cost; performance uncertainty; knowledge and awareness. Key program players' apply knowledge of the market; program strategies evolve to address remaining market barriers.
13	Increase knowledge and awareness increases demand for CEE qualified washing machines. CEE units are added to product lines	Number of better models increases; sales of less efficient washers decrease
14	Increased demand for product, increased awareness of benefits mainstreams program or product offering; Increased availability lowers costs on a permanent basis.	Nonparticipant retailer price differential decreased; non-participating product price differential approaches zero
15	Market adoption leads to long-term energy and environmental impacts.	Reduced energy use; reduced emissions.
16	Financial savings from efficient measures passed onto Laundromat customers.	Lower prices for Laundromat customers due to the program. Increased product awareness and customer satisfaction.

Process Flow

The Program process flow diagram is shown in Table 4. UCONS markets to route operators and distributors and coordinates with water districts. Water districts interested in the Program fund supplemental water rebates paid directly to property owners. Currently, the Contra County Water District, the Metropolitan Water District of Southern California and the Bay Area Water Supply and Conservation Agency, encompassing more than 40 cities and water districts, offer rebates ranging from $200-$630.

Route operators and distributors work with UCONS to market the Program. Distributors market the benefits of energy efficient washers to multifamily housing complex owners and Laundromat owners that purchase their own equipment. Route operators market to multifamily housing complexes that do not own their own equipment, and encourage renegotiating the terms of their lease to include the high efficiency washers. In some cases, distributors and route operators are one and the same, and market to both owners and leasers.

Once a site owner decides to participate, implementers record their information in a database and install the energy efficient washers. If participants are interested and eligible, implementers install pipe wrap and lighting retrofits.

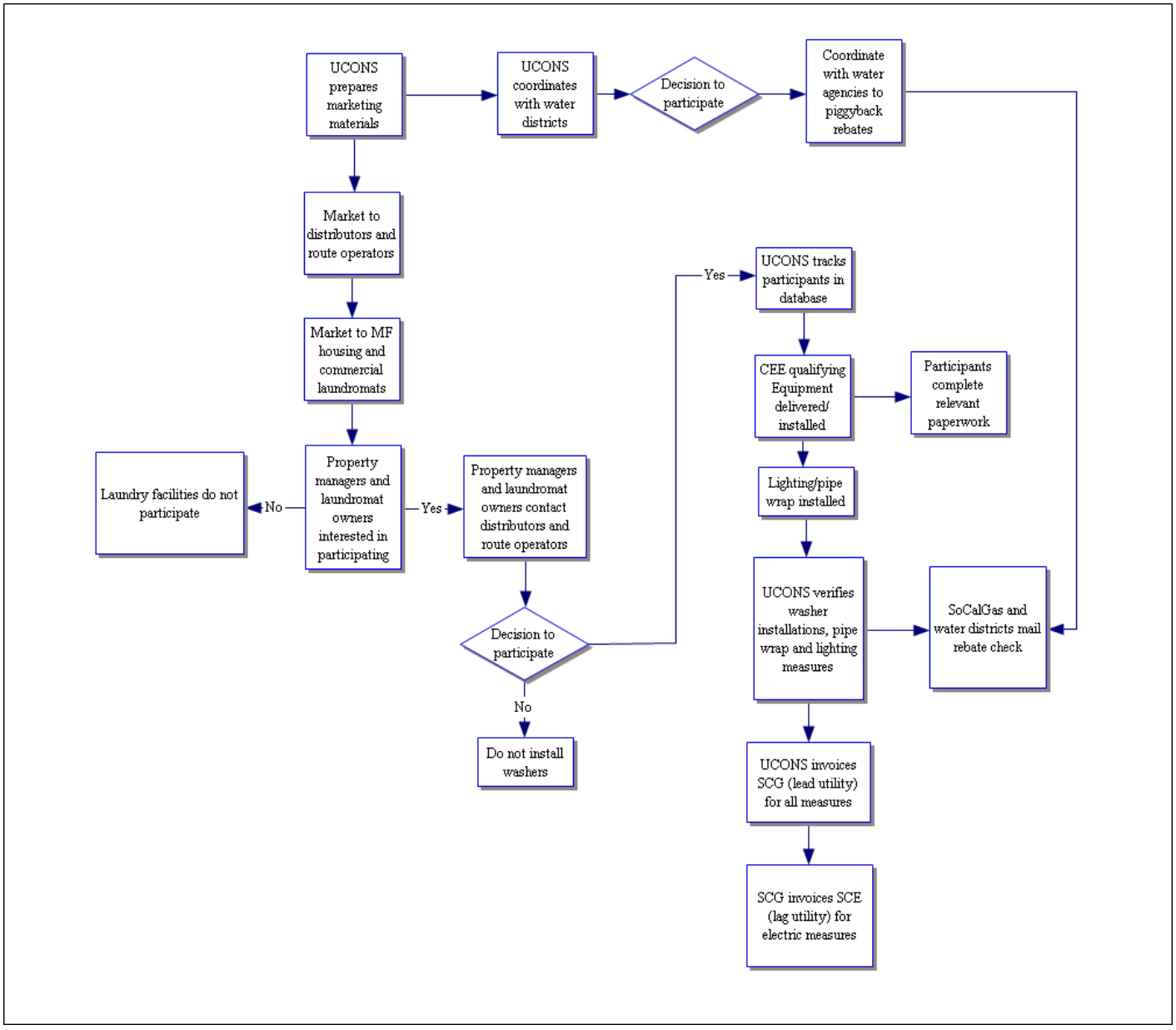
After installation, multifamily housing complex owners and Laundromat owners complete paperwork and receive their water rebates. Implementers inspect and verify a portion of washers at each of the sites to ensure customer satisfaction and proper functioning (Table 5).

Table 5. Inspection Requirements

Number of Clothes Washers Installed at Site	Inspection Sample Size
Less than 10	All Clothes Washers
11 - 20	40%
21 - 50	20%
51 - 100	15%
100+	10%

After verification, UCONS invoices SCG for all measures installed, including washers, lighting retrofits, CFLs and pipe wrapping. The owner of the washer, route operator, a multifamily housing complex owner or the Laundromat owner receives a $130 rebate from SCG. SCG invoices Edison for all lighting measures and any washers installed that use electric heated water.

Figure 3. Commercial Laundry Process Flow



As of June 2008, there were 43 route operators and distributors, and 142 site managers that participated in the Program. Most washers installed, 6,809, used gas to heat water, and only 61 washers were electrically heated. Of the participant sites, 543 installed pipe wrap, all were gas water heaters. Lighting retrofits were installed, including 6,701 T-12 to T-8 retrofits, 1,729 interior CFLs and 1,540 exterior CFLs.

Evaluability Assessment

An Evaluability Assessment conducted for Edison in the first half of 2007, during early Program efforts, listed potential issues that could affect Program evaluability.[10] These issues were initially explored through interviews with Program Managers and Implementers. Significant issues identified during the Evaluability Assessment were largely baseline data collection issues, and were typical of new program database tracking issues. However, some data collection issues were not resolved.

Significant issues identified, primarily baseline or monitoring issues, included the following.

Issue 1: There are few electrically heated commercial washers. Electric savings will occur largely from lighting retrofits. Contractors have not been collecting baseline data for existing fixtures (wattage, hours of operation). Only the replacement fixture data was recorded and verified.

> ***Resolution 1.*** Edison is aware that few electrically heated commercial washers have been identified and is working with implementers to change incentive allocations from washers to lighting.
>
> Collecting baseline data is an issue for the impact evaluation. The Evaluability Assessment suggested that the installers collect baseline lighting information (existing lighting type and wattage was not recorded). The lighting contractor understood the need for baseline lighting data and stated they could have the installers collect that information.

Issue 2: Battelle is conducting baseline monitoring of a sample of the gas heated washers (the first round and report have been completed) but will not be monitoring electric washer retrofits. Only 33 electrically heated washers had been installed by June 2007. Implementers do collect baseline washer characteristics including washer type and vintage so that savings can be estimated. (Battelle notes that they completed metering of efficient washers for Edison in the late 1990s; this data may be useful to the impact evaluation.)

> ***Resolution 2:*** M & V using telephone data downloads were initially proposed but cost and hassle led to a change in plan. Data is downloaded manually once per month and is coordinated with the installers. Metering locations were chosen where an attendant was present or the laundry room locked to avoid possible equipment vandalism. No further action was needed regarding metering.

Issue 3: Implementers report that sales reps may be a market barrier. Salesmen must be convinced to market the efficient washers to their customers and to replace washers in Laundromats they operate.

[10] Quantec, LLC. Early Assessment of 2006-2008 InDEE/IDEEA Programs, Nov. 2007.

Resolution 3: Market barriers will be an important area to explore in the process evaluation, including barriers to selling or purchasing the washers perceived by upstream and downstream market actors.

Issue 4: Tracking participants and nonparticipants is handled by the subcontractors. The prime marketing subcontractor is working with another firm marketing to the route operators and distributors. The subcontractors retain lists of contacts that will be needed to contact nonparticipants. All owners/potential participants who submit applications either complete installations or don't. These people will be easily tracked for future contact.

Resolution 4: Marketing subcontractors interviewed stated they could provide lists of their marketing contacts and that nonparticipants could be identified for process evaluation surveys. Lists of all who have been contacted and not participated will be needed to discuss market barriers. However, no lists were provided for the process evaluation when requested.

Additional Issues: Implementers identified an unanticipated potential programmatic issue and potential market barrier: Replacement washers are slightly wider than existing washers and sometimes a one-to-one replacement is not possible because of space limitations. One less machine means less revenue. Implementers reported that some operators choose not to replace washers for this reason.

Program Modifications

Joint Utility Offering

The design changed since Program inception in 2006. The major changes came from additional sponsorship by utilities and water agencies. The Program was designed to be as inclusive as possible and create cooperation between water, gas and electric utilities, but did not begin with all parties.

The Program became a joint utility offering with SCG during the first quarter of 2006 before the Program kickoff. By the third quarter of 2006 the Metropolitan Water District of Southern California and its member agencies joined the Program with their *"Save Water Save a Buck"* rebate campaign, offering rebates from $200-$630 to property owners. Water rebates increased again in the first quarter of 2007 when the Department of Water and Power joined the Program.

CEE Qualified Washers

CEE changed their list of qualified washers. The clothes washers approved for installation through the Program changed over time as CEE updated their lists. CEE lists brands and models of washers rated by their modified energy factor (MEF), a measurement of energy use per load of laundry, and their water factor (WF), a measurement of gallons of water used per cubic foot of laundry. The washers are divided into two tiers based on their MEF and WF. Washers listed on Tier 2 are relatively more efficient, however all washers on the CEE list are highly energy efficient. CEE offers a more comprehensive rating system than Energy Star, with a tiered rating system and a water consumption component. Therefore, the CEE list was chosen as the basis of Program eligibility.

In the fourth quarter of 2006, CEE updated their 2007 MEF tier requirements for energy efficient commercial washers. As of January 1, 2007, Tier 1 washers have a MEF of 1.8 and a WF of 7.5 and Tier 2 washers have a MEF of 2 and a WF of 6. This change effectively eliminated top loading efficient washers from the qualified list and required implementers to retool the Program offerings.

To deal with the change in qualified machines, Program implementers altered some marketing materials and increased education for route operators and distributors. This change meant that there was a surplus of top loading machines in the market that did not qualify for the rebate. This adversely affected participation, with reductions in installations and processed rebates by March 2007. Both UCONS and Edison's Program Manager stated the surplus of top loading machines in the market as problematic.

Edison Funding Reallocated

Implementers proposed diverting the majority of Edison funds to lighting measures. In the third quarter of 2007, implementers determined that electric savings were not being realized because of the high prevalence of gas water heaters. While the electric savings anticipated from washers would not be realized, Edison decided to continue with the Program, to help out the Program, filling out electric savings through lighting.

Marketing was changed to emphasize the free lighting measures. Free lighting acted as an entry for offering the washer rebate portion of the Program, but the lighting retrofits would not be dependent on the purchase of energy efficient washers. The Program modification form shows the new electric measures installation goals (Table 6).

Table 6. Original Electric Measure Program Goals vs. Modified Program Goals

Measure Mix for the Coin-Op/Commercial Laundry Program comparing the original mix versus the modified mix	Original E3-Measure Mix	Installed through June 30, 2007	Modified or Revised E3 Measure Mix
Nonresidential Washing Machine Replacement	2,450	40	200
Energy Star Common Interior CFL's	1,000	1,383	3,429
Energy Star Common Exterior CFL's	1,000	1,342	2,509
T-8 Ballast change out Common Area Variety of Sizes. (This category description is replaced by the more detailed T-8 retrofit descriptions in the new E3 calculator)	779	1,076	0
T-8 Ballast change out Common Area 4' 2-lamp			2,511
T-8 Ballast change out Common Area 4' 4-lamp			2,511
T-8 Ballast change out Common Area 8' 2-lamp			2,961
T-8 Ballast change out Common Area 8' 3-lamp			2,011

Source: Edison program notes

Additional Changes

The utilities and implementers changed the number of gas heated washer installation goals during the fourth quarter of 2007 to address three observations made through the first year of the Program. Implementer's reports suggest the change in goals put the Program on target.

Manufacturers were heavily discounting top loaders, resisting the change-over to more efficient front loaders.

There were a large number of top loaders in inventory before the Program, and even more with the CEE's change in their qualified product list.

Energy rebates (gas and electric) required more reporting and auditing than was required for water rebates, and these differences needed simplification for the end-use customer.

Implementers documented several complaints that the electric rebate mailings were lagging far behind the water rebates. In addition, two participating site managers interviewed complained that they had not received their rebates after several months. This lag occurs because water rebates are mailed immediately after the participant files paperwork, but energy rebates depend on UCONS inspecting and verifying the installed measures. To remedy this problem UCONS proposed, in the first quarter of 2008, that SCG and Edison mail rebates before installation verification inspections were complete. This proposal was under review in June 2008.

Implementers suggested additional Program design changes to increase future energy savings. The proposals were in the design and approval process in June 2008, but could be implemented before the Program ends December 2008.

Adding a solar-thermal element to displace energy in Laundromats;

Including a multi-load, large commercial washer; and,

Adding a new construction element.

Overall, the implemented design changes appear to have increased the Program's effectiveness. Adding more Program sponsors increased the territory in which the Program is available, increased the total rebate amount available to the participant, and allowed the Program to appeal to potential customers on multiple levels. Identifying the minimal electrical savings mid-way through the Program resulted in the shift of Edison monies and marketing efforts toward lighting measures. Finally, adjusting Program goals put the Program on target, but the original ex-ante savings will not be met.

Marketing and Participation Decisions

Awareness

One of the primary market assumptions is lack of awareness. Three of the five participating property managers that were interviewed stated they did not know about the energy efficient washers. The respondents heard about the Program and energy efficient washers before they began thinking about installing energy efficient washers. One also noted that property managers are not aware of utility sponsored programs and lack of information is a market barrier. While this sample is small, more than half were not aware of energy efficient washers.

Marketing

Implementers used a comprehensive marketing strategy to target the key players in the commercial laundry market. Face-to-face meetings brought several utilities and water districts on

board, including Edison, SCG, SDG&E, PG&E, Metropolitan Water District of Southern California, Contra Costa Water District, and the Bay Area Water Supply and Conservation Agency. As implementers finalized these partnerships, educational meetings were held with route operators and distributors.

Implementers developed marketing materials to demonstrate the separate economic advantages to both leasing companies and to property managers to make two substantial changes in current lease agreements for commercial laundry machines:[11]

1. To replace washers prior to termination of lease agreements;
2. To not replace with lower cost washers, but to replace with Energy Star or CEE qualified commercial washers.

Route operators and distributors were identified both as potential Program participants and as marketers of the Program to site managers and property owners. Brochures and applications were provided to route operators and distributors so they could promote the Program to their customers. Route operators and distributors made educational material available to site managers and explained the benefits of energy efficient washers and the Program. Implementers marketed the Program to site managers and property owners through mailings, phone calls, tradeshows and personalized meetings.

Throughout the Program, implementers adapted their marketing strategy to combat resistance to energy efficient washers in the commercial laundry market. Manufacturers, an original marketing target, opposed pushing sales of the CEE qualified front loading machines over the more prevalent conventional top-loading models. UCONS responded to this preference, and the surplus of conventional top-loading machines in the market, by changing their materials to highlight the advantages of front-loading over top-loading models[12], and redistributed the materials to all end users and market actors. UCONS, in conjunction with the utility and water district sponsors, also created a reminder campaign with consolidated marketing materials to explain all available rebates in a single seamless form to fight lagging participation.

To assess the effectiveness of the marketing process, we surveyed one route operator and one distributor and five participating site managers. The route operator heard about the Program from the UCONS "Laundry Team" and the distributor learned about the Program from her involvement with Edison. Four of the five participating site managers said they heard about the Program from their commercial laundry distributors and one site manager was informed by his plumbing distributor (Table 7). Overall, site managers heard about the Program from their distributors.

[11] Ibid. Pages 7-8.

[12] The advantage actually lies in the washer design: horizontal axis washers are more efficient than vertical axis washers. Most horizontal axis washers are front-loading washers, and not top-loading washers.

Table 7. Source of Program Information

	Participant site managers (N=5)	Participant route operator (N=1)	Participant distributors (N=1)
Source of Information	Frequency	Frequency	Frequency
Implementer's marketing contractor	0	1	0
Edison	0	0	1
Distributor	4	0	0
Plumbing Distributor	1	0	0

Decision Making

Route operators and distributors were asked why they chose to participate and the benefits of being involved in the Program. The route operator was motivated by energy savings, and thought it was beneficial to show the customers the importance of energy efficiency. The distributor chose to participate in the Program so she could offer the rebates, $130 from the utilities plus $200-$630 for eligible water districts, to the customer and thought that financial savings were a benefit of the Program. The site managers were asked the same questions about their decision-making processes and their perceived Program benefits. Table 8 and Table 9 summarize responses; multiple responses were allowed. It is clear that energy and monetary incentives were the greatest influences on participation.

Table 8. Reason for Participation

	Participant site managers (N=5)	Participant route operator (N=1)	Participant distributors (N=1)
Reason	Frequency	Frequency	Frequency
Monetary savings (bills, rebates etc)	4	0	1
Energy savings	3	1	0
Cost of machines	3	0	0
Water savings	1	0	0
Environmental concerns	1	0	0

Multiple responses allowed.

Table 9. Perceived Benefits

	Participant site managers (N=5)	Participant route operator (N=1)	Participant distributors (N=1)
Benefits	Frequency	Frequency	Frequency
Energy savings	4	1	0
Financial savings	2	0	1
Water savings	1	0	0
Customer satisfaction	1	0	0
Incentivizes companies to do the right thing; shows customers the importance of energy savings	1	1	0

Multiple responses allowed.

Incentives

In joint utility programs, the lead utility is responsible for distributing customer rebates. Therefore, in this Program, SCG was responsible for paying the rebates. SCG invoiced Edison for their portion of the rebates paid for electricity savings.

Since utilities generally pay energy rebates to the owner of the washing machine and water rebates are paid to the property owner, the availability of incentives was not uniform across participants. The route operator received an incentive, while the distributor did not, but both offered incentives to their customers. The route operator said that the incentive amount offered to the customer varied, that it was sponsored by the utilities, and it did not cover a substantial portion of the cost of the machine. The distributor said that the energy incentive offered to the customer was $130, was sponsored by the utility, and the water district sponsored incentives varied in amount. The distributor thought that the available incentives covered a substantial portion of the cost of the machines.

Four of the five participating site managers received an incentive to participate in the Program. Three of the four site managers thought that the rebate did not cover a substantial portion of the overall cost, while the only one who did received a much larger incentive. Three of the four site managers who received an incentive said that it was instrumental to their decision to participate, while one said it was only secondary. Table 10, on the following page, summarizes findings regarding the incentive.

Table 10. Incentives

	Received an incentive?	Offered an incentive to customer?	Incentive amount	Covered substantial portion of overall cost?	Incentive Sponsor	Instrumental to decision?
Route Operator	Yes	Yes	Varies	No	Edison, SCG, PG&E	n/a
Distributor	No	Yes	$130 energy & Water Rebate	Yes	Utility, Water Districts	n/a
Site Manager	No	n/a	n/a	n/a	n/a	n/a
Site Manager	Yes	n/a	$130	No	SCG, Edison	No
Site Manager	Yes	n/a	$115	No	SCG, Water District	Yes
Site Manager	Yes	n/a	$650	Yes	Utility, Water agency	Yes
Site Manager	Yes	n/a	$130	No	Don't Know	Yes

* Cells marked "n/a" did not pertain to the specific respondent.

In summary, marketing proved effective in some areas, but fell short in others.

UCONS brought several utilities and water agencies together to increase rebate levels, which was integral to many site managers' participation.

Route operators and distributors were an effective marketing arm, with the majority of site managers hearing about the Program from them.

UCONS also was able to convey the benefits of the front loading washers, including energy and monetary savings, to participants.

Based on the survey responses it appears that none of the participating site managers were initially contacted by UCONS, and the "on-foot" marketing method may not be effective.

Program Delivery and Implementation

Neither the route operator nor the distributor cited any problems associated with delivery and implementation. However, there were two complaints from site managers. Both noted that they installed machines and filed appropriate paperwork in December 2007 and had not yet received their rebate checks five months later. One specifically noted that she contacted UCONS via phone and e-mail on several occasions and never received any replies. The implementer states they addressed the problem. Customers do not always understand why they need to wait until after verification and contractor payment to receive their rebate.

The Program included direct-install lighting and pipe wrap components to increase energy efficiency at participating sites. Of the five participants surveyed, two took advantage of the extra measures and installed lighting measures. A third respondent was uncertain of the specific measures installed but thought something was installed.

As mentioned earlier CEE changed their requirements for qualified machines and removed top loading models from the list of qualified washers at the Program's onset. The top loading, vertical axis, machines in distributors' inventory no longer qualified for Program incentives. Implementers report the surplus of top loaders caused manufacturers, route operators and distributors to highly discount that product. The CEE qualified horizontal axis washers on the revised lists were also more expensive than units at the Program's outset. The unexpected

reduction in price of the top loaders increased competition for the front-loading horizontal axis machines, making them look comparatively unattractive. In addition to the implementer, the distributor noted a surplus of top-loading washers in the market. She added that customers perceive top loaders as traditional and therefore prefer them. In her opinion, these two factors hamper the sale of front loaders. One participating site manager also stated that front loaders are not readily available, presumably as a result of the surplus of top loaders.

Implementers altered marketing materials and increased marketing efforts toward end users, with the hopes of shifting demand away from top loaders. This method appeared to be partially effective; installations increased after the extreme drop in the beginning of 2007. However, implementers were unable to get the Program back on track and at the end of 2007 they reduced their finals goals to keep the Program on course.

The lead utility Program Managers felt that the joint utility process was especially beneficial to customers because all the Program information is contained with one utility. The SCG Program Manager stated that Edison and SCG had been able to compromise well and find a good midpoint between the savings levels for each utility, noting that neither lighting nor washers had dominated the savings.

According to one Program Manager, SCG and Edison communicate about once or twice a month. One utility Manager noted that the differences in their internal requirements and computer systems presented challenges to the joint effort that caused delays. The frequency of Program Manger staffing changes compounded challenges. Edison's Program Manager also felt that there were communication problems between the two utilities. Communication was not an issue noted by SCG's Program Manager, but the SCG staff interviewed was new to the Program and not involved in the early stages.

Program Managers at Edison and SCG, as well as the implementer, reported problems with the SMART program tracking database that were taking a long time to fix. Some issues appear to be technical and others may be managerial issues falling on SCG as the lead utility.. The SMART developer offered training, covering topics including inputting the financial and measures files, and how to upload successfully. Issues with SMART data transfer were particularly frustrating for Edison because the lag utility depends on the lead utility for reports. SCG was unable to invoice Edison for any electric measures. Without the invoicing information it is hard for Edison to make decisions regarding Program changes, such as UCONS' suggestion to add a solar component. Edison requested the SMART uploads but did not receive them. Because of the technical and managerial issues, neither utility was able to claim savings until the issues were resolved. In addition, Edison's knowledge of was limited to the information presented in monthly invoices from the implementer to SCG and the monthly narratives.

The implementer did not create flat files for the SMART database and the utility entered the implementer's data manually. This made it impossible to regularly update the data and duplicate the process and the system suffered from data problems. Issues with SMART, however, did not affect UCONS' ability to implement the Program.

Market Barriers

Edison's portfolio of IDEEA and InDEE programs focus on overcoming market barriers in new market segments. The Coin-Operated Laundry Program offers incentives to reduce the cost of purchasing or leasing more efficient washers, and provide marketing and educational processes tailored to the potential participants' needs

Market barriers defined in the 1996 market transformation scoping study by Eto et al[13] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[14]

The Program was designed to address several major barriers, including those explicitly and implicitly stated by Implementers:

1. Information or search costs
2. Hassle or transaction costs
3. Asymmetric information and opportunism
4. Bounded rationality
5. Organization practices or custom
6. Product or service unavailability

UCONS designed Program strategies to affect lasting change in the marketplace. The Program focused on increasing product availability, changing standard practice, and educating market actors to increase demand for the energy efficient commercial washers. Primary approaches to overcoming the market barriers included: (1) financial incentives to route operators or owners; and (2) training and education for market actors. When asked about market barriers, respondents cited (unprompted) information, availability and economic conditions as the primary barriers (see Table 11).

Several assumptions illustrate the market barriers this Program addressed.

1. **The low dollar amount of the initial rebates did not cause site managers or route operators and distributors to retire leases or machines earlier than scheduled.**

This assumption illustrates barriers including organizational practices or custom, bounded rationality, and lack of information.

Without education about how leasing companies and property managers can benefit from an early replacement of washers, washers are typically not retired early. It is also not customary, at

[13] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996.

[14] Ibid. Page 12.

the end of a lease, to replace washers with more costly efficient models. UCONS addressed this barrier by facilitating cooperation among several utilities and water districts to raise rebate levels. Increasing the incentive will encourage distributors, route managers and operators to renegotiate lease agreements and retire equipment early in order to install the CEE approved washers.

2. "One size fits all" programs are not effective in the commercial laundry market because of their diversity.

Market barriers included in this assumption include information or search costs, and hassle or transaction costs.

The commercial laundry market encompasses route operators and distributors, multifamily housing complexes and Laundromats, equipment owners and equipment leasers, and electric, gas and water bill payers. Lease and purchase agreements can vary substantially from one Laundromat operator to another. UCONS worked with multiple stakeholders, including site managers, route operators and distributors, to incorporate key players into the Program. UCONS believed that a *"marketing and educational process involving both decision makers is required to help each party achieve a "win" from the issue of new leases with new equipment."*[15]

3. There is a lack of presence of a comprehensive rebate program, offering both energy and water based incentives and an overall efficiency plan, for commercial laundry sites.

The market barrier underlying this assumption includes asymmetric information, lack of information, and product unavailability.

Asymmetric information refers to the fact that sellers of efficiency products have more information about their offerings than consumers do. From the consumers' point of view, obtaining information to assess performance claims may be costly. The horizontal axis washers promoted through this Program offered both energy (gas and/or electricity) and water savings. UCONS approached this market barrier by designing a comprehensive Program that targets electric, gas and water savings, and involves all utilities. They aggressively marketed the Program to water agencies and utilities to educate them about the benefits and bring them on board as Program sponsors to increase the rebates offered to participants.

Of the five participating site managers/operators interviewed, only two identified market barriers (Table 11). One cited lack of product availability, and the other thought there was a lack of information in the general marketplace. The route operator and distributor noted the recession was a barrier to participation.

[15] UCONS, Inc., Purchase Order Agreement with Sempra Energy. Page 33.

Table 11. Market Barriers Listed by Respondents

	Participant site managers N=5	Participant route operator N=1	Participant distributor N=1
Market Barriers	Frequency	Frequency	Frequency
No barriers	3	0	0
Lack of information	1	0	0
Washers not readily available	1	0	0
Recession	0	0	1

Participant Experience with the Program and the Technology

Satisfaction

Overall, the participants, including the route operator, distributor, and site managers, rated the technology highly, but they rated the Program on a whole less favorably. Participants were asked to rate their perception of customer's satisfaction with the newly installed washers, on a scale of 0 to 10 with 0 being "*not at all satisfied*" and 10 being "*very satisfied*." This question elicited an overwhelmingly positive response, shown in Table 12. Four of the five site managers interviewed stated they experienced either water or energy savings with the new washers. The fifth site was recently built and the washers were new installations.

Table 12. Customer Satisfaction with Machines

Respondent	Level of Satisfaction
Route Operator	9
Distributor	8
Site Manager	10
Site Manager	10
Site Manager	8-9
Site Manager	8
Site Manager	8

When asked about their satisfaction with the Program overall, the route operator and the distributor had a better experience than site managers, shown in Table 13. Only two site managers, with the satisfaction ratings of 3 and 5, cited problems with the Program. Both noted that after five months they still had not received their rebates, with one stating he had been contacting the implementers and did not have time to chase them down. The two site managers suggested mailing the rebate checks sooner and requested better customer service. The other two suggestions were to increase availability of educational materials to increase participation, and, to have more water districts participating in the Program.

Table 13. End User Satisfaction with Program

Respondent	Level of Satisfaction	Suggestion for Program Improvement
Route Operator	10	Include Maytag model
Distributor	9	Include large capacity front loader
Site Manager	10	None
Site Manager	3	Better follow up by UCONS, respond to their e-mails
Site Manager	5	Send rebate checks sooner
Site Manager	10	Increase awareness
Site Manager	7	Increase water district participation

Other suggestions for improvement came from both the route operator and the distributor. They wanted more commercial models approved for rebate, specifically, a Maytag model and large capacity front loaders.

Edison reported that the lighting installations and corresponding electric savings exceeded goals, while savings from electrically heated washers fell far short.

Free Riders

To determine the net to gross ratio (NTG) for energy savings, we assessed free ridership of participating site managers. Participants were asked if they had planned or considered installing energy efficient washers before hearing about the Program. They were also asked if they would have installed the machines in the absence of the Program.

Two of the five participants interviewed said they were considering energy efficient washers before they heard about the Program. Participants were specifically asked to rate their likelihood of installing exactly the same equipment without the availability of the Program on a scale of 0 to 10, with 0 being *not at all likely* and 10 being *extremely likely*. (Table 14) For these two participants, the likelihood of installing energy efficient washers in the absence of the Program was *fairly likely*. One rated likelihood at 8 and one at 7.

Of the two participants considering the efficient washers before the Program, and who were likely to install the measures without the Program, one stated the incentive was instrumental in his decision and would not likely purchase the machines without a monetary incentive. This person is not a free rider. The second said incentives were not instrumental, they were a secondary benefit, and it was *"nice to have them."* This respondent should be classified as an 80-percent free rider. Note that he rated the likelihood of installing exactly the same machine as 8, not a 10. Since one in five is an 80-percent free rider, the NTG is .84 and only 84 percent of the energy savings should be attributed to the Program.

While the number of units replaced is not a factor determining free ridership, it is interesting to note that both respondents considering the washers prior to the Program replaced all units at their facility. The person receiving no incentives replaced the fewest units.

Table 14. Commercial Laundry Free Rider Matrix

Free-Ridership Score	Considering washer before Program	Would have installed exactly the same washer without the Program (likelihood rating)	Incentive instrumental to the decision to participate	Total number of washers at facility	Number of washers installed through Program
80%	Yes	Yes (likelihood = 8)	No; secondary - nice to have it	11	11
0%	Yes	Yes (likelihood = 7)	Yes; would not install without it	3	3
0%	No	Yes (likelihood = 7)	No incentives	200	3
0%	No	No (likelihood = 5)	Yes	3	3
0%	No	No (likelihood = 1)	Yes	60	30

Analysis of Market Assumptions

This section discusses original market assumptions presented earlier, and the assessment of their salience given what was found in the process evaluation.

1. **Site managers are usually not aware of the potential energy savings associated with front loading washers**. Despite CEE and ENERGY STAR lists many site managers are not aware of the energy and water savings that can be realized with front loaders. Many site managers assume a tradeoff exists between savings and customer ease and satisfaction.

   This assumption proved to be true. A large portion of the market was not aware of the potential savings, with three of the five surveyed participating site managers were not considering purchasing efficient washers before they heard about the Program. Although no site managers specifically mentioned top loaders, the distributor said that many customers think that top loaders are more traditional and prefer them to front loaders. One participant specifically stated there was a lack of information in the marketplace.

2. **The collaborative marketing with utilities and water agencies will increase awareness and educational opportunities for route operators and distributors and site managers.** By enlisting several utilities and water agencies in the marketing process route operators and distributors will have several sources for information and saturate the market with educational material.

   The joint marketing process did increase education and awareness about the benefits of efficient front loading washers. All three water agency sponsors have their own ad campaign with sections of their website dedicated to the Program. Both the route operator and the distributor interviewed learned about the Program from a utility, and all five site managers learned about the Program from their distributor. The majority of survey respondents stated the incentive made possible through the collaborative efforts was integral to their decision to participate.

3. **Participation from water agencies will help identify and enroll customers to meet Program goals.** Water agencies have access to contact information and provide another avenue to reach potential customers.

This assumption proved to partially correct. Water agencies did provide contact information and helped enroll customers. For example, the distributor and two of the site managers said they received a rebate from a water agency. Participating water agencies also created marketing materials, including websites. More than 40 cities and water districts are sponsoring the Program and offering rebates ranging from $200-$630. While the Program goals have not been met despite this involvement, it cannot be attributed to a lack of water agency involvement. Other problems such as a surplus of top loading machines and a lack of electric water heaters in the market affected enrollment.

4. **A significant portion of electric water heaters exists in the coin-operated market.** In order to make the Program successful for both Edison and SCG there needs to be significant portion of electric water heaters in the market. UCONS estimated there were 10,000 electrically heated washers in Edison's service territory.

UCONS overestimated the prevalence of commercial Laundromats and multifamily housing complexes with electrically heated water. The Program's original goal was to install 2,450 washers using electrically heated water, or about 13% of the total target of 18,950 installations. However, UCONS reports that only 61 washers installed and inspected use electrically heated water as of May 2008, whereas 6,809 washers using gas heated water were installed and inspected. Electric washers made up less than 1% of the total washer installations. This shortfall caused Edison to rely mostly on lighting retrofits and CFL installations to produce their energy savings. Currently, the UCONS report (Table 15) shows that the Program has not reached installation goals and Edison's May 2008 data report on EEGA shows 0 net kWh installed savings. Based on this information the Program will not meet its electric savings goals.

Table 15. Electric Units Installed

Number of Unites Installed	Total	Net Annual kWh Reduction	Net Annual kW Reduction
Electric High Efficiency Washers	61	76,926.37	14.64
Common Interior CFL	1,729	289,313.57	72.62
Common Exterior CFL	1,540	277,816.00	0.00
T-12 to T-8 Retrofit	6,701	238,233.95	53.61
TOTAL		882,289.89	140.87

Source: UCONS, SCG_SCE Laundry Cumulative PTD_Unit report. May 2008.

Conclusions and Recommendations

Conclusion 1

The Program was implemented as designed but has fallen short of ex-ante kWh and KW goals because few washers use electrically heated water. Edison will claim few savings from participating in this joint utility Program. The presence of electrically heated washers was greatly overestimated; original proposals estimated 10,000. Because few electrically heated washers were identified, Edison redirected their funds to lighting measures. As noted by Edison's Program Manager, the utility did not need another program filling a lighting niche.

Recommendation 1

Edison should not target commercial laundry applications to generate electricity savings. There are too few electric water heaters in multifamily housing and Laundromats.

Conclusion 2

The joint utility approach including gas, electric and water utilities was an integral component in Program marketing. Behind the scenes however, there were communication issues between Edison and SCG, in part due to changing staff. The SMART database did not work correctly nor did SCG successfully use the SMART database for intended purposes. Edison did not receive requested reports or invoices from SCG, and could not claim savings, nor verify charges or data presented by the lead utility. Without reports and invoices, it was also difficult for Edison to plan ahead.

Recommendation 2

Communications and tools critical to Program operations and administration must be in place. Before launching the joint programs, data collection and transfer, via SMART or other tools, should be tested and debugged. If problems with the SMART database continue, or the lead utility does not use the SMART system as intended, the lead utility should employ another method for timely reporting and invoicing. This will allow utilities to claim savings and other decision making can proceed.

Conclusion 3

Manufacturers discounted top loading machines, saturating distributors' inventories, adversely affecting program participation. The surplus of top loading machines in the market impacts distributors and route operators and they are less likely to market Program-approved units.

Recommendation 3

UCONS should continue to use route operators and distributors as a marketing arm, but should increase their efforts, including "on-foot" efforts, in reaching site managers. UCONS should aggressively market to site managers to help counteract the influence of manufacturers, route operators and distributors with large top loading inventories.

Conclusion 4

Rebate checks are not reaching participants fast enough, affecting customer satisfaction. Participants claimed lack of follow up after contact, and rebates not yet paid after five months.

Recommendation 4

Implementers and management should speed the rebate payment process. If rebate checks cannot be mailed before installation verification, implementers should educate their customers about the rebate process logistics and timing. Implementers should address the lack of follow up and customer service complaints.

Conclusion 5

In order to evaluate the Program, Cadmus needed the contact information for all Program participants and nonparticipants. While conducting the process evaluation, implementers were reluctant to release the contact information. This resulted in incomplete information about nonparticipants which led to an inability to contact them. We made several requests for the tracking database, but only received contact information for a small number of participants. Contradictory statements make it unclear whether implementers track all contacts and responses, and whether they could identify nonparticipants.

Recommendation 5

All parties participating in the Program administration and evaluation need to understand the purpose and value of program evaluations, whether process or impact, and the importance of cooperation and the timely and complete exchange of information.

Conclusion 6

The prior Cadmus Evaluability Assessment review and recommendations do not appear to have been integrated into the Program planning and implementation.

Recommendation 6

Evaluability Assessment should be integrated into program design. Future program offerings should reinforce the need to track participant and nonparticipant contact information which will be needed for both process and impact evaluations. Collecting baseline data (e.g., existing lighting configuration) is important to the impact evaluation in order to determine electric savings.

SCE 2537: Management Affiliates Partnership Program

Program Overview

The Management Affiliates Partnership (MAP) Program targets commercial property management companies to encourage the installation of emerging but proven energy efficiency technologies in commercial office buildings, retail department stores, and other buildings from 20,000 to 1 million square feet. Property managers are key decision makers but traditionally have been hard for energy efficiency Programs to reach. The Program implementer, Energy Innovation Group (EIG), is using its own customer list and Southern California Edison (Edison) account representatives to forge relationships with property managers.

Customers/clients of management companies include commercial office buildings, retail department stores and similar buildings ranging in size from 20,000 square feet to over 1 million square feet and ranging from single building owners to major chains.

The MAP Program's primary focus is to expand the use of emerging technologies with proven performance or enhancements of existing technologies, but which are not yet in general use in the market It does not provide rebates to companies for conventional energy projects, such as a lighting retrofit, HVAC upgrade, or high efficiency motors; SPC or Express Efficiency rebates or other appropriate third party programs are used for such projects.

As an incentive for participation, MAP offers rebates to customers who install the Program technologies. As first proposed, MAP offered rebates of $0.154 per estimated kWh of savings for the installation of five technologies:

Lighting Power Regulator,

HVAC Cycle Manager,

CO Sensing System,

CO_2 Sensing system for Demand Controlled Ventilation (DCV), and

Turbocor Oil-Free Compressor.

Table 16. Original Program Budget*

Item	Budget Amount ($)	Percent of Total (%)
Administrative Costs	$210,000	12%
Marketing/Outreach Costs	$60,000	3%
Direct Implementation Costs	$1,530,000	85%
Total	$1,800,000	100%

Table 17. Ex Ante Energy Savings

Installation Goals	Period 1	Period 2	Period 3	Period 4	Period 5	Total
Gross Energy Savings (kWh)	607,020	2,418750	2,423,752	2,520,001	700,000	8,669,523

Source: EIG, Technical Proposal/Cost Proposal Stage 2 Commercial Real Estate Management Affiliates Partnership Energy Efficiency Program (MAP Energy Program), October 21, 2005, page 22.

Period 1: Jun 1-Aug 31 2006; Period 2: Sep 1-Nov 30 2006; Period 3: Dec 1-Feb 28 2007; Period 4: Mar 1-May 31 2007; Period 5: Jun 2007

The Program implementer proposed adding technologies to the Program menu very early in the Program. After funding for the Program was renewed in September 2007, MAP reduced the incentive but expanded the menu of technologies to include the

Daylight Harvesting / Dimmable Ballast,

Hotel Keycard Energy Control System,

Fan Wall, and

DeltaP Pressure Independent Water Flow Control Valves.

Program Design

Lack of access to decision makers and split incentives continue to be among the most significant barriers to energy efficiency in the commercial office building and retail market segments. The MAP Program is designed to address these barriers by partnering with the decision makers at property management companies. The Program seeks to secure preferred access to the decision makers of the property management company clients: the property owners and their individual property or building managers.

Through relationships with the property managers, the Program seeks to influence these decision makers and convince them to work with the Program to identify and implement energy efficiency opportunities. The MAP Program is designed to increase the installation of proven but emerging energy efficiency technologies in commercial office buildings. The Program will focus primarily on commercial office building, retail department stores and other business buildings that range in sizes from 20,000 to over one million square feet that are managed by participating property management companies (e.g., Trammell Crow Company, Cushman & Wakefield CB Richard Ellis, Jones, Land, LaSalle). In addition, the Program will work with other organizations such as the League of California Cities to provide limited assistance and Program services to cities with specific needs for the program offerings.

The Program has five key design features:

Gaining access to key decision makers

Marketing underutilized and new but proven technologies

Offering incentives

Division of marketing and installation activities between EIG and Intergy

Single source, streamlined customer service

The Energy Innovation Group, LLC (EIG) is implementing the Program. EIG will work in partnership with Edison Account Representatives to identify potential participants. EIG plans to do this by:

Providing access to commercial office building managers. Commercial office building managers have traditionally been hard to reach. MAP seeks access to these key decision makers and the opportunity to explain the benefits and costs of energy efficiency technologies. The Program implementer, EIG, is using its own business connections and those of Edison account managers to forge these relationships. EIG seeks to develop relationships with account managers at commercial office building management companies such as Trammell Crow Company, Cushman and Wakefield, CB Richard Ellis, Jones, Lang, and LaSalle.

Focusing on proven but underutilized energy efficiency technologies. Because these technologies have been underutilized, there is the opportunity for significant energy and peak demand savings. The MAP program offers five technologies for installation: lighting power regulator, HVAC Cycle Manager, CO Sensing System, CO2 Sensing system for DCV, and Turbocor Oil-Free Compressor.

Offering generous incentives. Because MAP technologies are not only expensive but also relatively new, EIG believes an incentive is necessary to encourage participation. The Program offers a rebate of $0.16 per kWh saved.

Contracting with Intergy to manage the engineering and installation aspects of the Program. EIG has expertise in the marketing of energy efficiency technologies and will handle this aspect of the MAP Program. Intergy has expertise in engineering and installation of energy efficiency technologies and will handle these aspects of the Program. In so doing, EIG seeks to draw upon the strengths of both companies and work in concert to provide the best possible implementation of the Program.

Offering customers a single source, streamlined experience. MAP customers will deal only with EIG, which will coordinate the entire experience from initial contact and project development to installation, financing, and the processing of the rebate.

Market Assumptions

The MAP Program makes several key assumptions about the market for energy efficiency technologies in commercial office buildings.

Lack of strong access to decision makers and split incentives continues to be among the most significant barriers to energy efficiency in the commercial office building and retail market segments. There is a large but untapped potential for energy and demand savings. Partnering with the decision-making level of property management companies will secure preferred access to their clients. The Program will capitalize on the unique relationships and influence of Management Companies to effectively harness the energy efficiency

potential of hundreds of millions square feet of commercial office, industrial, and retail space under management.[16]

Building managers are largely unaware of the Program's technologies. With high costs of heating, cooling, and lighting, building managers are interested in reducing energy costs but do not always know about the latest energy saving technologies. [17]

Building managers will respond to opportunities for energy savings if they can be reached. In general, building managers are interested in reducing energy costs but are often uninformed about opportunities for savings. One of the challenges is the lack of clear communication between the stakeholders. Mismatched language prevents even the most compelling projects from getting the attention they deserve. If managers are informed about opportunities, they will take action.[18]

Building managers will not participate unless incentives are offered. The Program implementer believes incentives are necessary because the Program technologies are expensive and relatively new.[19]

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Management Affiliates Partnership Program. The purpose of the process evaluation is to document the Program design and its development, including any differences between the proposed Program design and the Program as implemented.

Process Evaluation Methodology

The methodology utilized in this process evaluation included a review of documents, interviews with participants and nonparticipants, development of a logic models and a process flow chart, and identifying researchable issues and indicators of success.

The process evaluation focused on key market actors and their experience with the Program. The main topics addressed were the Program design, market assumptions, market barriers, Program implementation and delivery, the participation decision, and participant satisfaction. Cadmus (as Quantec, LLC) conducted personal or telephone interviews with the Edison Program manager, the Program implementer (Energy Innovation Group, Inc.), and the Program's installation subcontractor (Intergy)[20]. Cadmus also interviewed eleven participants, two partial participants (dropouts), and three nonparticipating building managers.

[16] EIG, Technical Proposal/Cost Proposal, Stage 2, MAP Energy, Summary of Offering. Pp 1, 3. October 2005.

[17] Ibid. Page 2.

[18] Ibid. Page 3.

[19] Ibid. Page 7.

[20] It should be noted that CADMUS is conducting the impact evaluation for this program under contract to the CPUC.

We first interviewed the Edison Program manager, Program implementer, and the installation subcontractor to improve our understanding of the Program and to identify key questions and issues to raise with participants and nonparticipants. We interviewed an Edison account representative to understand better the role of representatives in promoting the Program and establishing relationships between EIG and Edison customers. We then contacted Program participants, nonparticipants, and partial participants.

The Edison Program Manager interview discussed the overarching goals of IDEEA/InDEE program, changes to the Program, including incentive structure and marketing strategies, customer response, and possible improvements for the Program.

Program implementer interviews with EIG and Intergy focused on marketing strategy, implementation, incentive structure, customer response and potential improvements. We also discussed the Program changes and experience offering the Program through building management. We also updated the logic model and the process flow diagrams.

EIG provided lists of participating and nonparticipating buildings and the names and phone numbers of their managers. We asked respondents about their awareness and satisfaction with installed technologies and the Program, their participation decision making process, current market conditions, business practices and likelihood of participating in the future, and market barriers. Interview questions assessed free ridership and spillover.

Cadmus developed an interview guide or survey for each group. Interview guides and surveys are included in Appendix A.

Interview Sample Development and Disposition

Cadmus staff conducted interviews between January and May 2008, using interview guides developed for each type of Program actor. Before interviewing participants, interviewers confirmed that the respondent was involved in the decision to participate in the Program and/or were directly involved and knowledgeable about the Program.

For our analysis, we used detailed information about participants, partial participants, and nonparticipants obtained from the Program implementer. EIG tracked the building manager's name and contact information, the building address, building and measure type, project status, gross and net kWh and kW savings, incentive paid, and climate zone. EIG did not track nonparticipants (contacted but declined to participate) as closely as participants and there is much less detailed information about them.

Table 18 shows the goals for the targeted number of interviews and the number of interviews actually completed by each type of actor. Our goal was 19 interviews, including interviews with 10 Program participants and four nonparticipants; one nonparticipant managed two building projects.

Table 18. Targeted and Completed Interviews

Actor	Goal	Achieved
Edison Program Manager	1	1
Edison Account Representative	1	1
Program Implementer	1	1
Program installation subcontractor	1	1
Program participants	10	11
Program nonparticipants	5	2 nonparticipants 2 partial participants
Total	19	19

In this process evaluation, a Program ***participant*** is defined as the manager of a building in which a technology was installed and who received an incentive payment. A ***partial participant*** is one who agreed to participate but subsequently dropped out of the Program before the technologies were installed. A Program ***nonparticipant*** is defined as a building manager who was contacted by the Program but declined to participate.

At the time of this evaluation, a large number of building managers contacted by EIG were prospective participants who had not yet made a decision to participate, or who were in the pre-installation stage of the Program. We chose not to interview these individuals and instead focused on participants who had completed the Program.

Table 19 shows the status of the projects in the MAP database through February 2008. There were 92 projects between October 2006 and March 2008. Six buildings refused to participate in the Program. An additional ten dropped out at various stages. Most of them left the Program after Edison reduced the incentive amount. Through February 2008, 17 projects were in the pre-commitment stage, which corresponds to the completion of the preliminary feasibility review, audit, and economic analysis. Eight projects committed to installations. Fifty-one projects completed measure installations and received incentive payments.

Table 19. Program Participation and Attrition through February 2008

Participation Attrition	Number of Projects
Projects in database	92
Refused to participate	7
Dropped out at various stages	10
Pre-committed	17
Committed	8
Installation complete and incentive paid	51

Source: EIG customer and nonparticipant lists.

Table 20 shows the number of buildings and managers included in the database. Together, participants and partial participants included 43 managers with 86 building projects. Nonparticipants included 6 managers with 6 projects.

Table 20. Building Level Projects and Managers

	Contacted	Participants			Partial Participants	Non-participants	Total
		Pre-Commitment	Committed	Complete			
Buildings (Projects)	92	17	8	51	10	6	92
Building Managers	n/a	n/a	6	29	8	6	49

Source: EIG tracking system, Feb. 2008.

As Table 21 shows, we attempted to contact managers associated with 30 different buildings. Some were managers of more than one building on our list. We were successful in interviewing 11 mangers responsible for 14 buildings.

Table 21. Building Project Survey Sample Disposition

	Participant Buildings Incentive Paid		Nonparticipant Buildings		Partial Participant Buildings	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Projects in data base	51	100%	6	100%	10	100%
Completed surveys	14	27%	3	42%	2	20%
Incompletes	0	0%	0	0%	1	10%
Refusals	0	0%	1	29%	2	20%
Not available; no answer; busy; answering machine	16	33%	2	29%	4	40%
Did not attempt to reach	21	40%	0	0%	1	10%

We attempted to interview all six of the managers on our list of nonparticipants. We succeeded in interviewing three of six managers. We also attempted to reach seven of the eight managers on our list of partial participants and succeeded in reaching two managers, who represented three potential projects.

The final numbers of projects represented by participants interviewed is shown in Table 22. Overall, interviews represented 24% of building projects, including nearly half the Turbocor compressor installations, and 20% of both lighting power regulator and CO sensor installations.

Table 22. Projects Represented in Survey Sample

Technology	All Program participants	Incentives paid	Interviewed by Cadmus	Percent of all projects represented in interviews
	Projects Represented			
Turbocor Oil Free Compressor	17	14	8	47%
HVAC Cycle Manager	32	20	5	16%
Lighting Power Regulator	15	8	3	20%
CO Sensor for Garage Exhaust Fans	10	8	2	20%
CO2 Demand Ventilation Control System	1	1	0	0%
Daylight Harvester	1	0	0	0%
Total	76	51	18	24%

Source: EIG Project Database, as of February 26, 2008. Total 76 includes 17 pre-committed, 8 committed, 51 paid participants.

Process Evaluation Results

Program Theory

The Program theory supports the Program and informs Program development and implementation. A successful Program creates change, and the Program theory explains what is supposed to happen and how it is supposed to happen, as follows.

> If MAP partners with the decision-making level of property management companies, they will secure preferred access to the management company's clients, and provide financial and technical analyses for emerging energy efficiency technologies. Building managers will understand the energy benefits and savings potential available, take advantage of incentives and install measures. The Program will achieve energy and demand savings, and increase market acceptance and market penetration of the selected emerging technologies.

Logic Model

The Program logic model shown in Figure 4 highlights the key features of the Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The inputs for the Program are funding and other support from Edison, and the expertise of the Program implementer and subcontractors.

The elements of the logic model are:

Activities that the Program undertakes. The primary activities of the Program include Program design, marketing materials development, and outreach to building management companies

Outputs produced by Program activities. Outputs include marketing the Program, identifying and recruiting building management companies, identifying savings opportunities in commercial office buildings, selecting buildings for installations, and providing building level data to implementers.

Outcomes that result**:**

In the **short term**, outcomes include auditing of facilities for energy efficiency opportunities, a proposal detailing specifications and costs, developing energy savings strategies and selecting measures, and customer agreements.

Intermediate outcomes include installing the emerging technologies, energy and demand savings, and quality control site inspections by the vendor and Edison. Additional intermediate outcomes include increased awareness by facilities and building management companies.

The **long term** outcomes include reductions in market barriers, utility knowledge and experience in marketing this type of Program, property managers' awareness of other utility programs. The Program's external effects include other economic and environmental benefits, which could potentially include lower generation costs, greater system reliability, reductions in pollution, and improvements in human health. An important long term goal of the Program is to create awareness of energy consumption and costs and opportunities for energy savings through the installation of efficiency technologies. EIG's goal is to develop long term relationships with Program participants that lead to installations of additional technologies.

Figure 4 (on the following page) illustrates the linkages among the elements in the logic model and presents a list of progress indicators which can be used to evaluate the elements and their linkages.

Figure 4. MAP Logic Model

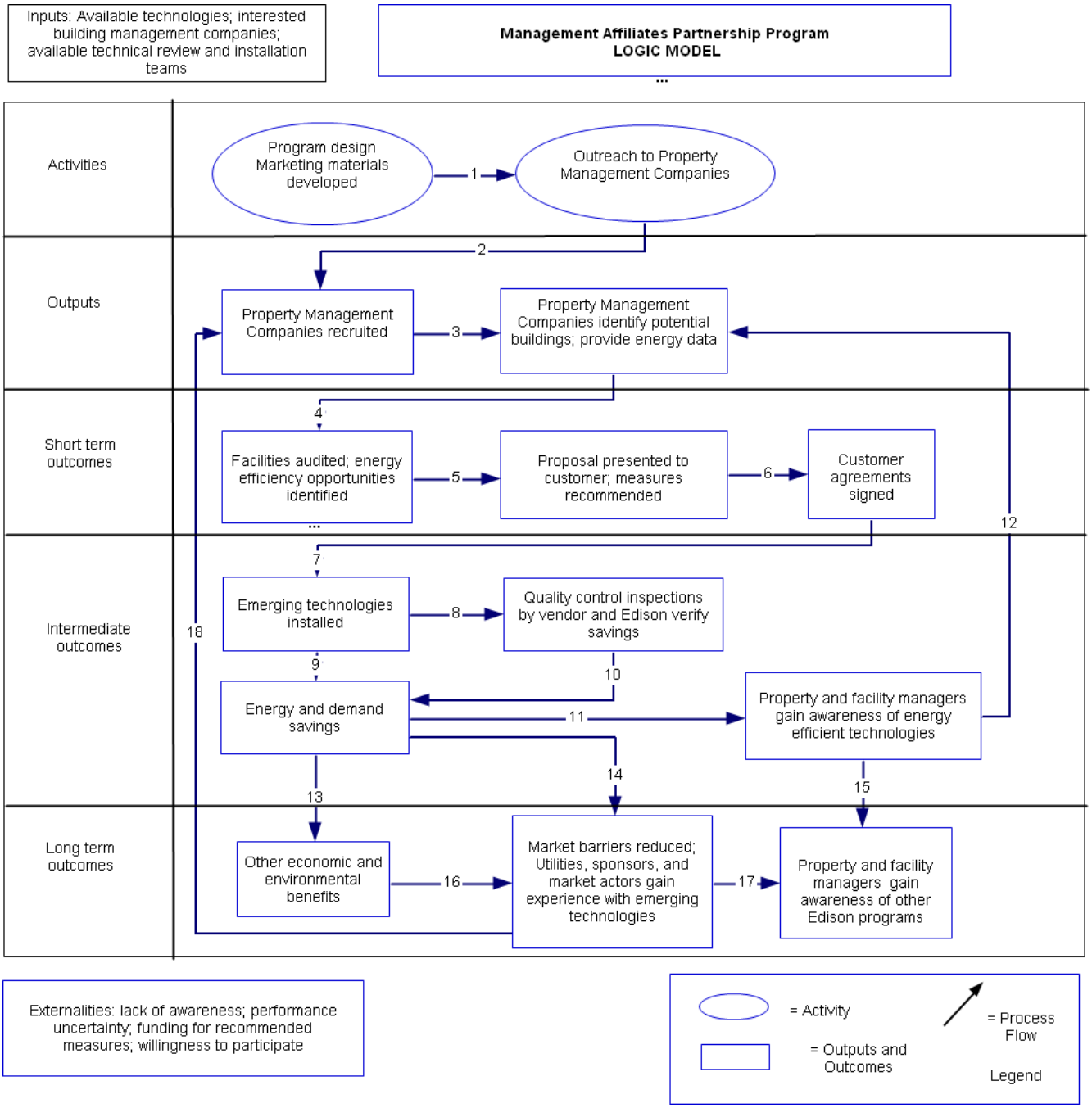


Table 23. Management Affiliates Partnership Program Logic Model Links: Researchable Issues and Indicators

Link	Working Hypotheses	Indicators
1	Preparing marketing materials will ensure that property management companies are aware of the benefits of the program and encourage participation.	Content of materials appropriate to property managers. Marketing meetings scheduled with property management companies
2	Outreach to property management companies.	Number of property management companies receiving marketing presentations
3	Property management companies identified and recruited when they are aware of the program and its associated benefits. .	Number of property management companies recruited. Content of marketing materials and presentations.
4	Educated Property Management Companies will select potential buildings for measure installation, provide energy and related building level data.	Number of buildings identified by management companies, information provided.
5	Selected buildings audited and energy efficiency opportunities identified increases Property Managers' knowledge of potential savings.	Number of audits performed; potential energy Efficiency measures identified. Staff increases knowledge of energy efficiency.
6	Proposals presented to Property Managers increases knowledge of potential savings.	Number of presentations. Staff increases knowledge of energy efficiency.
7	Customer commitments signed.	Number of commitments to participate.
8	Emerging technologies installed.	Number of technologies installed.
9	Energy and demand savings.	Energy and demand savings.
10	Quality control inspections by vendor and Edison assure correct installation.	Number and outcome of measure installation inspections assure correct installation and energy savings.
11	Property and facilities managers gain awareness of energy efficiency technologies and their energy and demand savings potential.	Knowledge of energy efficient technology.
12	Property and facilities managers identify additional buildings; gaining awareness of the technology's potential, reducing performance uncertainty.	Number of additional buildings identified. Continued relationship between Edison, Program implementers, and Property Management Companies.
13	Other economic and environmental benefits.	Economic and environmental benefits. Reduced energy use; reduced emissions.
14 / 16	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment. Additional emerging technologies identified.	First cost; performance uncertainty; knowledge and awareness. Key program players apply knowledge of the market; program strategies evolve to address remaining market barriers. Number of additional technologies identified and added to Program offerings.
15 / 17	Property and facilities managers gain awareness of other Edison Programs	Knowledge of other Edison Programs.
18	Reduced market barriers and increased experience with Program leads to additional outreach and recruiting of Property Management Companies. As demand increases, more companies participate.	Increasing number of Property Management Companies participate.

Process Flow

As distinct from the Logic Model, the Program process flow describes the specific work flow and steps in the operation of the Program. The process flow diagram in Figure 5 shows how MAP is administered and implemented. EIG identifies buildings for Program participation in the Edison service area. Older and larger properties that have not adopted energy efficiency strategies offer significant opportunity for energy savings and are targeted by MAP.

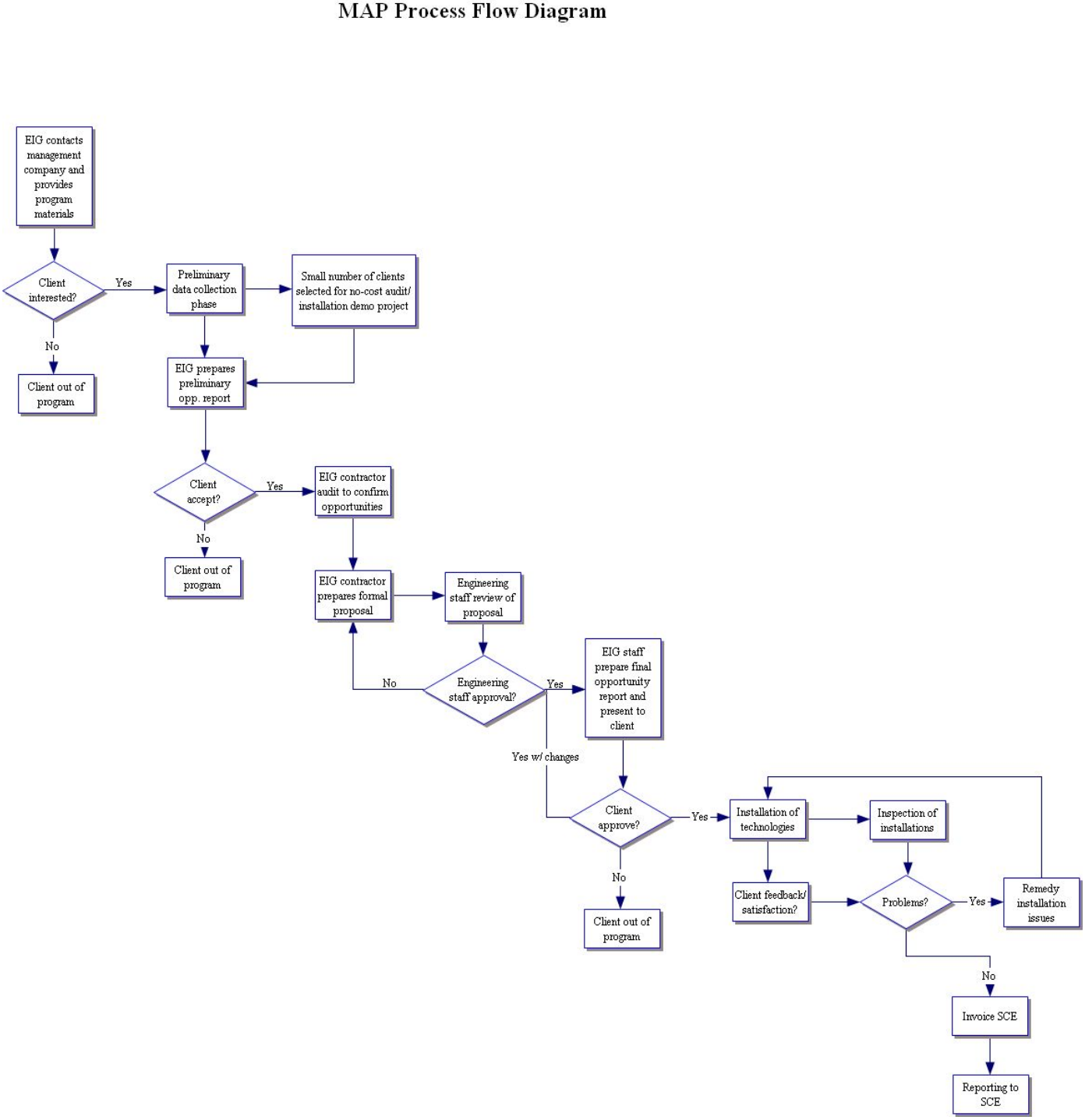
EIG contacts the property management companies to gauge potential interest and to conduct a preliminary eligibility screening for the Program. EIG usually speaks with the property manager and the chief engineer about potential applications of the MAP technologies. EIG also asks the property manager and engineer to complete a Technology Opportunity Identifier questionnaire, which asks for information about building equipment, operating data, energy costs, and square footage.

EIG uses this information to complete a preliminary feasibility review, audit, and economic analysis. The resulting information is summarized in a report and presented to the customer. The report provides information about potential opportunities for energy savings.

If the customer is interested in moving forward with the project, a full-scale audit and pre-installation inspection is conducted. EIG has contracted with Intergy to perform the audit and pre-installation inspections as well as all other engineering tasks. The results of the audit and installation are analyzed and form the basis for recommendations about installations of energy efficiency technologies. The recommendations are based on technical and economic criteria. An opportunity report containing specifications and pricing is prepared and presented to the customer.

If the customer accepts the opportunity report and signs a contract, EIG moves forward with the installation. EIG orders the equipment, schedules the installation, and tracks the project materials. Intergy then completes the installation, including a post-installation inspection and performance check. Lastly, the customer receives an incentive payment.

Figure 5. MAP Process Flow Diagram



Evaluability Assessment

Cadmus conducted an Evaluability Assessment for Edison in the first half of 2007, during early Program development, and listed potential issues that could affect Program evaluability.[21] These issues were initially explored through interviews with Program Managers and Implementers. Significant issues identified during the Evaluability Assessment were primarily baseline or monitoring issues, and were typical of new program database tracking issues.

We revisited the identified issues for this process evaluation. Edison is in contact with implementers regarding the enrollment pace and measure installation. Edison is also following up with implementers regarding documentation of the measure locations and M&V. Implementers addressed one of the two primary issues identified in the Evaluability Assessment

Issue 1: Implementers should track the location of measures, number installed and baseline conditions. Baseline and M&V monitoring was suggested. Pre-installation conditions should be fully documented. Baseline and post-installation monitoring should be conducted on a sample of installations to verify savings and the method used to compute savings per measure.

> ***Resolution 1:*** EIG documented all site locations with contact information. The contact point person provided actual location within each facility during the on-site visit. In some cases, though not all, diagrams with measures locations were provided. In most cases, basic baseline information was provided. EIG confirmed which data points were collected, however during the data extraction for the impact evaluation, not all sites had extensive baseline data. Additional baseline information might be available. EIG Metered a CMU (HVAC cycle management system) at one site over a three week period, and conducted spot metering on lighting power regulators during the commissioning process; all data was recorded.

Issue 2: The monthly report indicates that every contact proceeds with participation. Implementers should track all nonparticipants, that is, businesses and management companies contacted who did not proceed to participate.

> ***Resolution 2:*** The implementer did not track nonparticipants systematically. When the evaluator asked the implementer for a list of nonparticipants, the implementer assembled a list, but it appears implementers did not methodically record nonparticipant contact data. In the future, all firms contacted but not interested in participation should be entered in a database.

Program Modifications

The Program experienced three major changes since it was initiated. (1) Increased funding; (2) Reduced incentives; (3) New technologies.

[21] Quantec, LLC. Early Assessment of 2006-2008 InDEE/IDEEA Programs, Nov. 2007.

Increased Program Funding

MAP was originally funded through the end of June 2007. Since the Program was very popular and fully subscribed, Edison provided additional funding ($829,080) in September 2007. The Program received an additional $2,000,000 in May 2008. The latest increase in funding was accompanied by two major changes to the Program. First, Edison cut the incentive per kWh about in half. Second, four technologies were added to MAP's menu.

Reduced Incentives

Edison reduced incentives for measures installed with the second Change Order. Originally, incentives were $0.1542 per gross kWh. Beginning in May 2008, the new incentive levels became:

Lighting - $0.05/kWh

Controls and Motors - $0.08/kWh

HVAC - $0.14/kWh

Because the Program enrolled quickly and was fully subscribed, a number of projects were put on hold, pending additional Program funding. EIG stated that projects dropped out because of reduced incentives, including a Globalight (lighting power regulator) project.

Added Technologies

Daylight Harvesting / Dimmable Ballast

Hotel Keycard Energy Control System

Fan Wall

Delta Pressure Independent Water Flow Control Valves

Edison approved four technologies. As of September 2008, two of these technologies (Hotel Keycards and Daylight Harvesting) are being deployed and two are waiting final regulatory approval.

Implementers recommended additional technologies early in the Program based on interest from participants. EIG also put projects on hold pending Edison's approval of the additional technologies. However, they were frustrated by the length of time it took to receive approval for the new technologies.

Marketing and Participation Decisions

Awareness

One market assumption expressed by implementers was that while most building managers are very conscious about energy consumption and efficiency, they lack knowledge about energy saving technologies. We included questions about product awareness in the participant and nonparticipant surveys. Surveys with participants, nonparticipants, and partial participants confirmed the implementers' assumptions.

As Table 24 shows, ten of eleven participating building managers and four of five nonparticipating building managers rated their company's awareness of energy efficiency as very high.

Table 24. Awareness of Energy Efficiency

How would you rate your company's awareness and understanding of energy efficiency?	Participants (n=11)		Nonparticipants and partial participants (n=5)		Total	
	Frequency	Percent of Respon-dents	Frequency	Percent of Respon-dents	Total	Percent of all Respon-dents
Very aware	10	91%	4	80%	14	88%
Aware	1	9%	1	20%	2	12%
Somewhat aware	0	0%	0	0%	0	0%
Not aware	0	0%	0	0%	0	0%

Source: Surveys of participants, nonparticipants, and partial participants.

As Table 25 indicates, only seven participating building managers and one nonparticipating or partial participating building manager had heard of the specific Program technologies. Most managers admitted they were not knowledgeable about them, and most relied on the advice of their engineering staff when making installation decisions.

All 11 participants interviewed stated that they heard about the Program before they started thinking about installing the energy efficiency measures.

Table 25. Knowledge of MAP Energy Efficiency Technologies

Had you heard about the featured technologies before the Program?	Participants (n=11)		Nonparticipants and partial participants (n=5)		Total	
	Frequency	Percent of Respondents	Frequency	Percent of Respondents	Total	Percent of all Respondents
Yes	7	64%	1	20%	8	50%
No	4	36%	4	90%	8	50%

Source: Surveys of participants, nonparticipants, and partial participants. Featured technologies were listed separately in the survey question.

Marketing

Marketing was the responsibility of EIG, and the marketing strategy focused on forging personal relationships with commercial office building managers. Both the Program implementer and an Edison Account Representative we interviewed stressed the importance of building personal

relationships in this market. In addition, the Edison Program manager believed this strategy was highly effective.

EIG's marketing strategy had three elements.

1. EIG marketed the Program aggressively to Edison Account Representatives who could provide access to commercial office building managers.

From the beginning, EIG sought to get Edison Account Representatives excited about the Program. This investment paid off, as Edison contacts opened doors that have traditionally been closed to EIG and other sellers of energy efficiency technologies. As of the end of April 2008, MAP had worked with 22 Account Representatives in the development of energy projects.[22] The original Program plan called for coordinating all MAP activities with the Edison Account Representatives.[23] This partnering has been a key to the success of the Program.

Our interviews with participants confirmed the importance of the Edison Account Representatives and the implementers in the Program marketing. Table 26 shows how key decision makers first heard about the Program.

Table 26. Initial Program Contact

Initial Contact	Participants (n=11)		Nonparticipants and partial participants (n=5)		Total	
	Frequency	Percent of Respondents	Frequency	Percent of Respondents	Total	Percent of all Respondents
Implementer	4	36%	4	80%	8	50%
Edison	5	46%	0	0%	5	32%
Equipment manufacturer	1	9%	0	0%	1	6%
Contractor	1	9%	0	0%	1	6%
Don't recall	0	0%	1	20%	1	6%

Source: Surveys of participants, nonparticipants, and partial participants.

Among the participants we interviewed, almost half (46%) had heard about the Program through their Edison Account Representative. Another 36 percent first learned about the Program through the Implementer. The remaining participants heard about the Program through contractors or equipment manufacturers. Four of five nonparticipants or partial participants heard about the Program through the Program Implementer but none heard about it from the Account Representative.

[22] 2006-2008 Energy Efficiency Portfolio, Monthly Report Narrative, April 2008.

[23] [23] EIG, Technical Proposal/Cost Proposal, Stage 2, MAP Energy, Summary of Offering. Pp 1, 3. October 2005.

The Program Implementer reported being very pleased by *"the enthusiasm of the Edison reps."* The Edison Account Representative we interviewed observed that selective marketing of the Program was the most effective strategy. One stated he *"targets customers for which the technologies are good fits."* The representative *"looks to see if customers have the superstructure to support the technologies"* and *"does not target customers requiring huge capital outlays for installation."*

2. EIG leveraged its existing contacts in the commercial office building sector to sell the Program.

In addition to Edison Account Representative contacts, EIG used its own customer list, referrals from Program participants, and referrals from contractors and manufacturers to generate potential leads. Initially, EIG anticipated relying on these sources for customer leads but discovered that a large part of the market would go untapped without the help of the Edison Account Representative**s**.

3. EIG designated four of its first installations as demonstration sites.

As an inducement to participation, EIG agreed to cover 80 percent of the installation costs for building projects that agreed to serve as demonstration sites. The demonstration sites were intended to give potential customers an opportunity to observe the technologies in use. The demonstration projects had mixed success, however. For instance, the HVAC Cycle Manager demonstration project was not very successful because prospective customers had to climb rooftops to observe it. In contrast, the Turbocor and Global Light demonstration projects had more success. According to EIG, they sparked significant interest in the technologies.

Decision Making

Cadmus asked a series of questions to better understand the customers' participation decision making process. First, we asked participants, nonparticipants, and partial participants, who made the decision to participate. Answers to this question can help determine whether EIG's marketing is reaching the right audience.

Table 27. Responsibility for Participation Decision

Participation Decision	Participants (n=11)		Nonparticipants and partial participants (n=5)		Total	
	Frequency	Percent of Respondents	Frequency	Percent of Respondents	Total	Percent of all Respondents
Building manager	8	72%	3	60%	11	69%
Building manager in consultation with property owners	3	28%	0	0%	3	19%
Building owner	0	0%	1	20%	1	6%
Company energy manager	0	0%	1	20%	1	6%

Source: Surveys of participants, nonparticipants, and partial participants.

In most instances, building managers made the decision to participate in the Program. Eleven of 16 building managers we interviewed (69 percent of the total) indicated they or another building manager made the participation decision. Twenty percent of building managers made the decision in consultation with the property owners. Only in one case did the property owner make the participation decision on his or her own. Thus, MAP's marketing strategy of targeting building managers appears to be sound.

In addition, we asked about the factors affecting the decision to participate in the MAP Program. Table 28 shows these responses. Most respondents indicated that economic factors were very important in their decisions. Seventy-two percent of participants and 60 percent of non-participants indicated that incentives and participation costs strongly influenced their decisions. Significant numbers of respondents also cited energy bill savings (50%) or return on investment (38%) as factors.

Table 28. Factors Affecting the Participation Decision

Factors affecting decision making	Participants (n=11)		Nonparticipants and partial participants (n=5)		Total	
	Frequency	Percent of Respondents	Frequency	Percent of Respondents	Total	Percent of all Respondents
Participation costs/incentives	8	72%	3	60%	11	69%
Energy bill savings	5	45%	3	30%	8	50%
Return on investment	3	27%	3	30%	6	38%
Technical considerations/barriers	2	18%	2	20%	4	25%
Concern for environment	1	9%	1	10%	2	13%
Interest in energy efficiency technologies	1	9%	0	0%	1	6%

Source: Surveys of participants, nonparticipants, and partial participants. Multiple factors allowed.

To understand further factors that might lead to participation, we also asked participants to name important program features that might lead to increased participation. Over half of participants (54%) cited the incentive and energy savings as major benefits of participating in the Program. . A large fraction (36%) cited the additional energy savings opportunities identified by the implementer beyond the Program measures themselves. A smaller but still significant percentage (27%) cited the streamlined enrollment process and Program implementation. Participants appreciated dealing with one contractor during the whole process.

Table 29. Benefits of Participation

	Participants (n=11)	Percent
Economic benefits (energy savings, incentives, etc.)	6	54%
Technical expertise of implementer	4	36%
Streamlined enrollment process	3	27%
Information about energy efficiency technologies	1	9%

Multiple responses allowed.

Two nonparticipants or partial participants (40%) indicated that technical considerations or barriers were important in their decisions. In one case, it turned out that the daylight harvesting technology was not well suited for the building, and the installation was not feasible. In the other instance, the building manager believed he did not have the technical knowledge and sought the advice of an outside technical expert who advised against participating. The other nonparticipants stated that they did not have enough time to research the technology, and, that the savings from the recommended technology were not significant enough.

All nonparticipants and partial participants stated they were likely to participate in a program like MAP in the future. Respondents stated that to reconsider participation, they needed:

More education about the technologies (three responses)

Greater market penetration and acceptance of the technologies (two responses)

To get management approval for the energy efficiency investments (two responses)

To overcome technical barriers (one response)

To address uncertainty about the performance or lack of trust in performance claims (one response)

Incentives

Originally, the Program offered incentives at $0.1542 per gross kWh. Beginning in May 2008, the new incentive levels became:

Lighting - $0.05/kWh

Controls and Motors - $0.08/kWh

HVAC - $0.14/kWh

Edison reduced the incentives when they added funding. The Program implementer believed strongly that cost was a significant barrier to measure installation and the incentive was vital. The implementer was disappointed to learn that the incentive was reduced with the Program's funding renewal. In contrast, the Program installation subcontractor seemed less sure that the purchase and installation costs were barriers. Similarly, the Edison Program Manager and Account Representative were skeptical that the smaller incentive would have a large and

negative impact on participation. They believed the slowing economy would be a major drag on capital expenditures and responsible for any slowdown in installations.[24]

Our interviews with participants, nonparticipants, and partial participants suggest that costs are a barrier and the incentive was important. As Table 28 shows, 69 percent all building managers interviewed indicated that participation costs and incentives were important factors in the participation decision.

We interviewed a building manager responsible for two projects that enrolled before reduction of the incentive but dropped out after the incentive reduction. The manager was also responsible for buildings that continued with measure installation. He considered installing lighting power regulators but the energy savings and return on investment were not sufficient to justify installing them at the particular locations that dropped out.[25]

Program Delivery and Implementation

Program delivery involves general administration, marketing, and direct implementation of the Program. Responsibility for these duties was divided between EIG and Intergy. EIG is primarily responsible for the administration and marketing of the Program. EIG was successfully reaching out to company management to explain the benefit of energy efficiency. EIG was able to reach company management by drawing on its customer list as well as the contacts of SCE Account Representatives. The access to company management provided by SCE Account Representatives was instrumental to the success of the Program. The next step in the implementation of the Program was for EIG to explain the benefits of the program to company management. If company management were interested, EIG would then obtain operating and energy data from property managers, and identify general opportunities for energy and demand savings. EIG would then present these opportunities to company management for consideration.

Intergy was responsible for most of the direct measure implementation of the Program, which involves conducting energy analyses, installations of the technologies, and post-installation verification. Both the implementer and the Program contractor credit the clear division of responsibilities for the success of the Program.

Program participants appreciated that the enrollment process was straightforward and did not take a lot of time. All stated it was straightforward and only one thought it took a lot of time. (Table 30)

[24] At the same time, rising fuel prices will drive the prices of electricity and gas upwards and create stronger incentives for building managers to adopt energy efficiency measures.

[25] Incentives dropped at the end of the process evaluation. Additional dropouts could not be reached for interview to determine if the incentive reduction was the “deal breaker.”

Table 30. Enrollment Process Perceptions

	Yes	No	Didn't do the paperwork
Was the enrollment process straightforward?	8	0	3
Did it take a lot of time?	1	7	3

Participants made a number of comments about the enrollment process when they described the benefits of participating and in their closing comments.

EIG group made it easy; good rebate.

Time savings-little paperwork involved; incentives-a short payback period.

MAP is real streamlined; incentives. Big thing is the streamlining of paperwork.

EIG had a great team in place; relied on their expertise. EIG stayed in touch throughout the process. The presentation that EIG did to the Cushman and Wakefield managers was very helpful.

Enrollment process was very easy in comparison to other SCE programs; one of the best benefits.

Process was much more streamlined than regular SCE programs.

Straightforward, forms easy to fill out- not a lot of paperwork.

Program Update

The MAP Program exceeded initial energy savings goals of 7,195,704 kWh and exhausted its initial funding. Funding for the Program was renewed twice, and the savings goals increased accordingly. In September 2007, Edison increased the Program budget by $800,000 and increased the savings goal to 10,795,704. In May 2008, Edison increased the budget by an additional $2,000,000 and more than doubled the Program savings goal to 22,240,939 kWh. The Program is on schedule to meet its revised savings goals.

The keys to the successful implementation of the Program have been:

Access to commercial building managers. EIG successfully leveraged Edison and EIG business links to reach commercial building managers.

Division of marketing and engineering responsibilities between EIG and Intergy. EIG and Intergy focused on their strengths and MAP customers experienced high quality services throughout the Program.

Emphasis on cultivating direct and personal contact with building managers. EIG developed personal and lasting relationships with building managers. EIG explained the Program technologies and benefits of participation to building managers in person.

Effective education about the MAP program technologies and benefits of participation. EIG explains the uses of the MAP technologies and the benefits of Program participation in language building managers can understand.

Our interviews with participants support these findings. As described more fully below, customers indicated high levels of satisfaction with the services MAP provided and the installed technologies. Many respondents remarked on the knowledge and professionalism of the implementer and subcontractor staff and the streamlined enrollment and installation process.

One other aspect of the Program involved the CPUC impact evaluation. The implementers and their subcontractors were required to provide project level data and coordinate with building managers so that evaluators could conduct on-site visits and metering. Without a facility manager, Intergy, or an installing contractor present, it would have been difficult to gain access to most measure locations. During all M&V site visits, a guide escorted evaluators to the correct location. EIG's and subcontractor Intergy's cooperation providing all project data was initially helpful and useful. Data were provided for completed projects. Overall, EIG was very responsive; however, it appeared that EIG was not prepared for the M&V workload. As the Program progressed, it proved harder for evaluators to receive data and coordinate site visits. Implementers were reluctant to spend the amount of time needed to provide assistance to evaluators and requested additional financial resources for Intergy's time. Edison stated that some of the $2,000,000 awarded with the second Change Order was for subcontractor's assistance with evaluation.

It is easier for evaluators to get project level data after the measure installation is complete, when data are centralized. Before installation is complete, implementers and subcontractors have different pieces of the project's data.

Evaluators found that some customers were not aware of the third party M&V requirement. This can be a problem. While participants agree to provide data by signing the agreement to participate, it is not discussed in detail. One customer declined to take part in M&V evaluation.

Market Barriers

Market barriers defined in the 1996 market transformation scoping study by Eto et al[26] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[27]

Edison's portfolio of IDEEA and InDEE programs focus on overcoming market barriers in new market segments. Market barriers are structural, perceptual or economic impediments to the adoption of energy efficiency equipment in commercial office buildings. EIG specifically noted several market barriers in their proposal discussions.

[26] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996.

[27] Ibid. Page 12.

We asked interview respondents if they knew of barriers to the adoption of energy efficiency technologies in commercial buildings. Respondents cited two main barriers: a lack of awareness and the cost of energy efficiency technologies. Implementers stated split incentives and lack of access to decision makers who needed information were the two primary barriers.

As explicitly and inexplicitly stated in Program documents, by Program management and participants, MAP was designed to address several major barriers.

1. Information or search costs
2. Hassle or transaction costs
3. Performance uncertainty
4. Misplaced or split incentives
5. Asymmetric information and opportunism
6. Bounded rationality
7. Organization practices or custom

EIG designed the strategies to affect lasting change in the marketplace and not just the marketability of the various technologies installed through this Program. The Program focused on increasing product availability, and educating market actors to increase demand for emerging technologies offered through the Program.

Approaches to overcoming the market barriers included: (1) financial incentives to retailers; (2) information and education provided to building property management companies.

Several assumptions illustrate the market barriers this Program addressed:

Traditionally, key decision makers in the commercial office building sector have been hard to reach. According to the Program proposal:

"Mismatched language prevents even the most compelling projects from getting the attention they deserve … Unknown or misunderstood goals can also stand in the way of financially attractive improvements to income properties."[28]

This assumption involves several market barriers, including information and search cost, misplaced or split incentives, asymmetric information, and, product or service unavailability.

MAP's approach to overcome these barriers is through partnering with the decision-making level of property management companies to secure preferred access to their clients. Implementers count on these personal relationships with managers to provide the management and owners with detailed and comprehensible financial and technical analysis.

Building managers are interested in energy efficiency but unfamiliar with energy efficiency technologies.

[28] EIG, Technical Proposal/Cost Proposal, Stage 2, MAP Energy, Summary of Offering. Page 2. October 2005.

The market barriers underlying this assumption include asymmetric information, information or search costs, hassle or transaction costs, performance uncertainty, organization practices, and bounded rationality.

One participant stated that the main benefit of the Program was *"raising awareness of the existence of technologies"* and that *"energy efficiency is always on the minds of building managers but they need some prodding."*

The Program implementer, subcontractor, and Edison Account Representative agreed that many building managers are interested in energy efficiency but unfamiliar with energy efficiency technologies. According to the subcontractor Intergy, *"Property managers are energy savvy when they have the right information."* Too often, property managers are *"unaware of opportunities for energy savings."* Similarly, an Edison Account Representative observed, *"These are newer technologies that commercial office building managers are not that familiar with and that require more focused and direct marketing before managers will adopt them."*

Managers' and implementers' were more knowledgeable about technologies and energy savings, and provided information and incentives to address these barriers, including the hassle and transaction costs, and lack of knowledge. The participants and nonparticipant statements support this assumption. All reported they were either aware (12%) or very aware (88%) of energy efficiency technologies. Half reported they were aware of the technologies available through this Program. For example, one participant stated he knew lighting power regulators existed but did not know anything about them. Another stated he had heard of systems to control HVAC but did not know anything about them.

Building managers will not participate unless incentives are offered.

The market barriers underlying this assumption again include asymmetric information, information or search costs, hassle or transaction costs, and performance uncertainty.

Implementers addressed these barriers by providing information to managers, including discussions of technologies appropriate to their building, and calculating potential energy savings. For the first round of participants, incentives were offered at 15 cents/gross kWh saved.

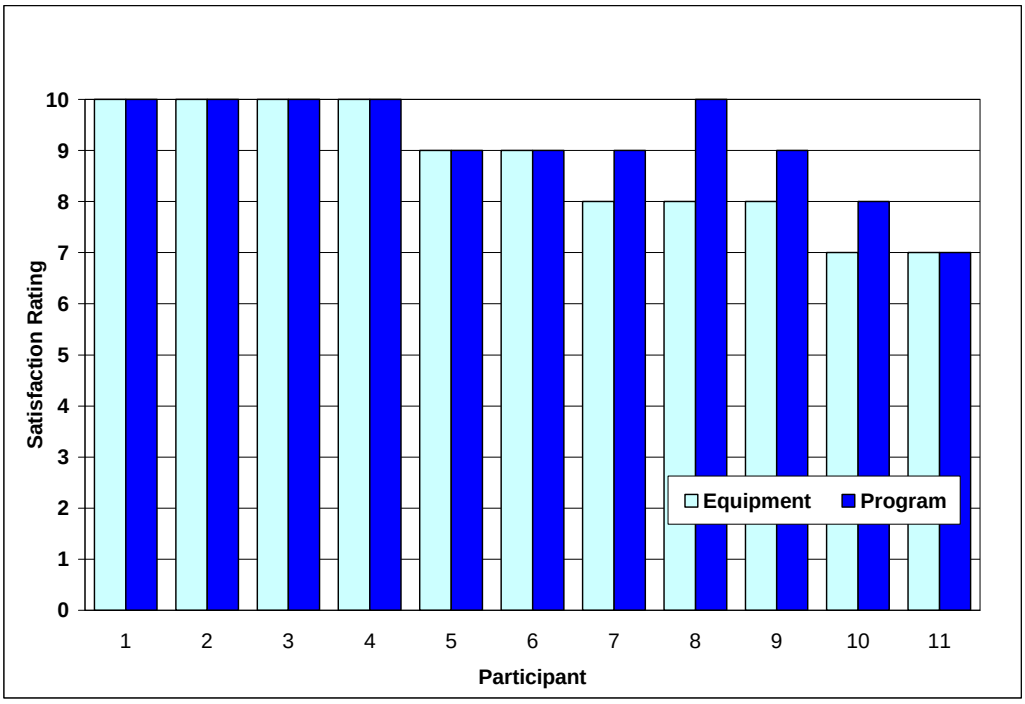
The majority of participants stated that incentives and energy bill savings were factors that influenced their participation decisions. Table 28 shows that incentives influenced decision making for 77% of participants, and energy bill savings for 45%. Of the eleven managers interviewed, one installed measures because equipment failed, five managers installed equipment as new installations and five retired equipment early. In the absence of the incentives, four of the five with new installations would have "done nothing." New installations include, for example, HVAC cycle managers and CO sensors installed where none existed before. Four of the five retiring equipment early would have considered some other alternative in the absence of incentives.

Participant Experience with the Program and the Technology

Satisfaction

Program participants expressed satisfaction with the Program itself and the installed technologies. (Figure 6) All participants expressed high satisfaction with the installed technologies, though some are reserving final judgment until they know more about the level of energy savings. On a scale from 0 to 10, with 0 being least satisfied and 10 being most satisfied, the average level of satisfaction with the installed equipment was 8.7. Six of the eleven respondents gave the equipment a rating of 9 or 10.

Figure 6. Satisfaction with Installed Equipment and Program Overall



Participants also expressed satisfaction with the Program overall. On the same 0 to 10 scale, the average level of satisfaction with the Program equaled 9.2. Figure 6 shows that only two respondents gave the Program a score below 9. Participants cited the ease of enrolling and participating in the Program; the incentives; and expertise of subcontractor as the best aspects of the Program. Many respondents remarked on the professionalism of the implementer and subcontractor staff and the streamlined enrollment and installation process. One customer remarked *"EIG was helpful in getting information about energy savings" and "EIG had a great team in place."* The customer went on to say that he *"relied on their expertise. EIG stayed in touch throughout the process."* Another customer said the technical expertise of Intergy was a valuable benefit of the Program.

One customer questioned the kWh saving estimates and did not think it would be possible to achieve. This customer was curious about how the savings were determined and felt they did not get a clear answer from implementers.

The Program Manager, implementer, subcontractor, and the Edison Account Representative all indicated that they would like to see funding for the Program renewed after 2008 and the Program become a regular Edison Program offering, implemented in other utility service territories. They believed MAP's success will continue in the future and could be replicated elsewhere.

Free Riders

Free riders are Program participants who would have installed the measures in absence of the Program, and participate in order to earn the incentive. As Table 31 shows, there appear to be few free riders. We asked participants several questions to determine whether they were free riders. To be counted as a free rider or partial free rider, the participant must: (1) have already ordered or installed the technology; (2) be highly likely to install exactly the same piece of equipment in absence of the Program; (3) have participated because of the incentive; (4) installed an alternative in the absence of the Program.

None of the participants had ordered or already installed the equipment. Four of the participants ranked the likelihood of installing the technology without the Program as a 10, on a scale of 0 to 10 with 10 being "extremely likely." Of these four, three knew about the technology when they heard about the Program. The incentive was instrumental to the decision making for each of these three, and, each would have installed an alternative in the absence of the incentive. Two of these three retired equipment early, and one had funding in their five year capital budget. These three are considered 50% free riders because they had not ordered or installed the equipment but they were extremely likely to install the same equipment in the absence of the Program.

Two other participants are partial free riders. These two had heard of the technology, ranked likelihood of installing the equipment as a 6 and 5, the incentive was instrumental, and they would have installed an alternative in the absence of the Program. These are 25% free riders, adjusted for their likelihood of installing the equipment in the Program's absence.[29]

[29] 25%*.6=15%; 25%*.5=12.5% free rider.

Table 31. Free Ridership

Free-Ridership Score	Already ordered or installed	Heard of technology before Program	Would have installed w/o Program (likelihood rating)	Incentive instrumental to decision to participate	Install an alternative in the absence of the Program	Early replacement or new application
50%	No	Yes	likelihood = 10	Yes	Installed alternative	Early replacement
50%	No	Yes	likelihood = 10	Yes	Installed alternative	New application
50%	No	Yes	likelihood = 10	Yes	Installed alternative	Early replacement
0%	No	No	likelihood = 10	No	Installed alternative	Early replacement
15%	No	Yes	likelihood = 6	Yes	Installed alternative	Early replacement
12.5%	No	Yes	likelihood = 5	Yes	Installed alternative	Replaced on burnout
0%	No	Yes	likelihood = 5	No	Done nothing	New application
0%	No	No	likelihood = 5	Yes	Done nothing	Early replacement
0%	No	Yes	likelihood = 3	Yes	Done nothing	New application
0%	No	No	likelihood = 2	Yes	Done nothing	New application
0%	No	No	likelihood = 0	No	Done nothing	New application

Source: Surveys of participants, nonparticipants, and partial participants.

Overall, free ridership appears to be low for the MAP, as might be expected from an IDEEA-type Program. There were less than two free riders of the 11 interviewed, or 16 percent. We estimated the NTG ratio adjusted for free riders is .84.

Spillover

The MAP Program has several potential spillover effects. These include

- Installation of additional technologies in buildings participating in the Program;
- Installation of technologies in other buildings of companies participating in the Program; and
- Installation of technologies in buildings of companies not participating in the Program.

To gauge the potential for spillover, we asked the MAP participants, nonparticipants, and partial participants if they had installed any other energy efficiency technologies since they participated in or were contacted about the Program. If they answered affirmatively, we then asked, *"How influential was the MAP Program in your decision to install these technologies?"*

As Table 32 shows, seven of the 11 participants interviewed replied affirmatively to the first question. Most of the installations were lighting power regulators. All seven respondents who installed additional measures said participation in MAP influenced their decisions, with scores ranging from 2 to 10. The average level of influence of the MAP Program was 6.1. Additional measures included daylight harvesting (a MAP lighting measure), lighting controls, lighting management system, and pump stations.

Three of four partial participants also installed additional measures; however, only one of four managers said MAP influenced her decision. Additional measures installed were lighting power regulators, motion and light sensors.

Table 32. Program Spillover

Questions	Participants (n=11)
Installed additional measures since installation completed or was contacted about Program	7 of 11, or 63%
Where measures were installed, did MAP influence decision to install additional measures?	7 of the 7, or 100%
Where measures were installed, how influential was MAP in the decision to install measures? (0-10 point scale)	Average score:6 n=7

The results suggest that MAP is having spillover effects among Program participants. Over half of participants installed additional measures, and all indicated that MAP influenced their decisions. One installed additional measures under MAP.

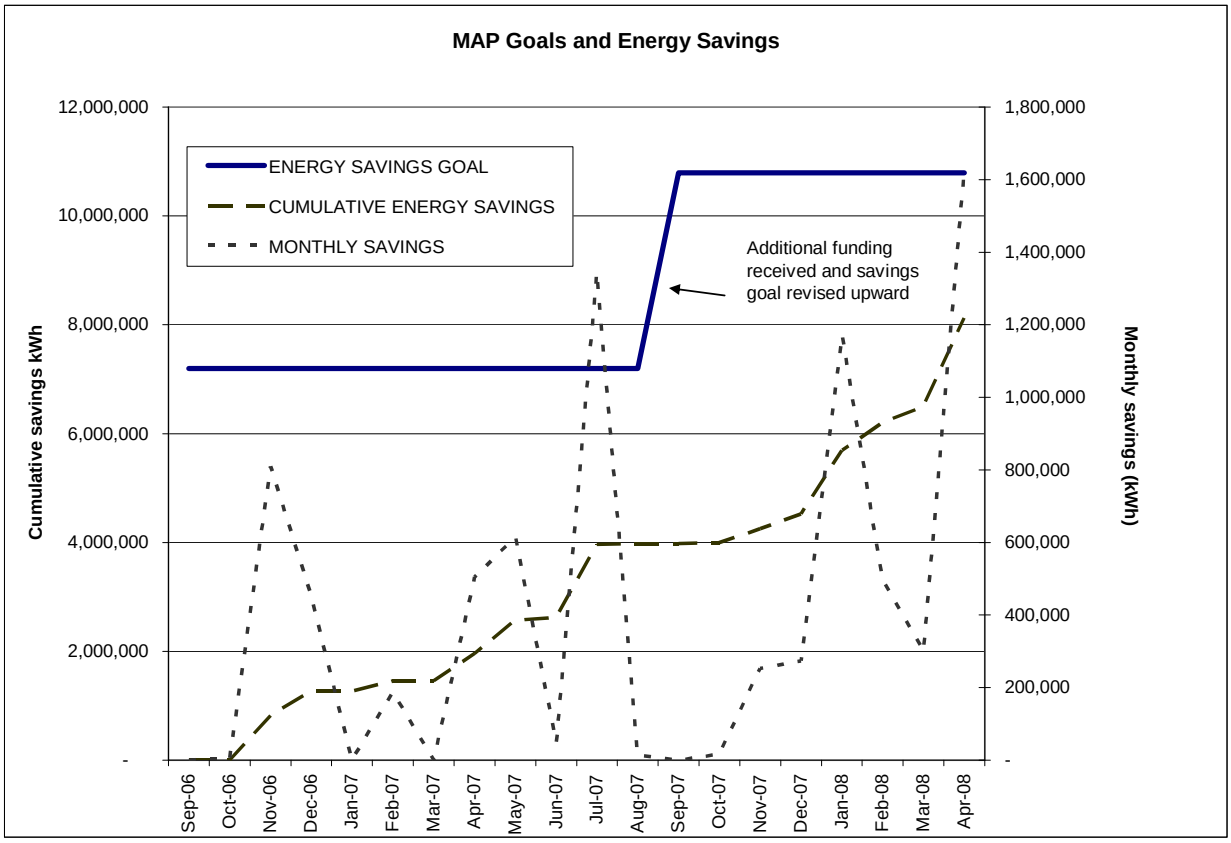
Analysis of Market Assumptions

The MAP Program makes four key assumptions about the market for energy efficiency technologies in commercial office buildings:

1. **Lack of strong access to decision makers and split incentives continues to be among the most significant barriers to energy efficiency in the commercial office building and retail market segments.**

   This assumption is supported by the tremendous response that the Program received. In the first phase, the Program was oversubscribed and exceeded its energy and demand savings goals. Figure 7 shows the Program goal for energy savings and monthly progress towards the goal. MAP completed its first installation and generated its first energy savings in October 2006. Since then, there has been significant month-to-month variation in installations, but MAP made steady progress toward achieving its initial ex ante goal of 7,195,704 kWh of energy savings and exceeded it. Anticipating the Program would meet its initial goal, Edison increased the Program budget by $800,000 and increased the savings goal to 10,795,704 in September 2007. In May 2008, Edison increased the budget by an additional $2,000,000 and more than doubled the Program ex ante savings goal to 22,240,939 kWh.

Figure 7. MAP Goals and Energy Savings



Source: MAP monthly reports.

2. Building managers are largely unaware of the Program's technologies. With high costs of heating, cooling, and lighting properties, building managers are interested in reducing energy costs but do not always know about the latest energy saving technologies.

Our interviews with participating, nonparticipating, and partial participating building managers validates this assumption. Twelve of 16 building managers reported that their companies were very aware of energy efficiency issues. However, only seven of 11 Program participants or 64 percent had heard of the specific technologies before hearing about the Program. In addition, most managers said that while they had heard of the technologies, they did not know much about them.

3. Building managers will respond to opportunities for energy savings if they can be reached. In general, building managers are interested in reducing energy costs but are often uninformed about opportunities for savings. If managers are informed about opportunities, they will take action.

This assumption is supported by Figure 7, which shows the Program exceeded its initial energy savings goals in March 2008.

4. Building managers will not participate unless incentives are offered.

This assumption is largely supported. As discussed elsewhere, the interviews with building managers indicated that incentives were a primary factor in the decision to participate.

Conclusions and Recommendations

Conclusion 1

The Program's premise and basic operations are sound. The Program was largely implemented as planned. The one unexpected development was that the Program implementer relied on the Edison Account Representatives more than planned, but this development was very positive in the end. The Program exceeded its original enrollment and energy savings goals. Edison increased funding and savings goals twice in the 2006-2008 program cycle.

Recommendation 1

The market chain and structure is ready for these technologies. Edison should consider making MAP a regular Program offering and perhaps advocate for the adoption of this Program on a statewide basis. The enthusiasm of participants suggests the existence of a large untapped market for energy efficiency technologies in commercial office buildings**.** As new energy efficiency technologies are introduced and approved, there will be additional opportunities for energy savings in commercial office buildings.

Conclusion 2

A lesson pertinent to utility resource acquisition Programs is the benefit of an efficient division of labor. In the MAP Program, EIG assumed responsibility for marketing and handed the engineering and installation responsibilities to subcontractor Intergy. This allowed EIG and Intergy to focus on what they do best in order to provide superior customer service. The Program probably would have been less successful if one company had attempted to perform both the marketing and installation work.

Recommendation 2

The Program should continue using this delivery method. The successful model where different companies provide marketing and installation may be a good structure for other programs. Complex programs in particular could benefit from this approach.

Conclusion 3

Doing business face-to-face is of great value in the commercial office building market. The Program implementer and the Edison Account Representative stressed this point repeatedly in interviews and made development of personal relationships a priority in their work. These relationships can have a high upfront cost but pay dividends in the form of additional energy savings for years to come. The comments of participants about the quality of service and professionalism of MAP staff also suggest the value of these relationships.

Recommendation 3

The Program should continue this approach utilizing direct marketing to both building management companies and building managers. Given the influence of building engineers, the Program implementer should consider increasing its outreach to building engineers.

Conclusion 4

Customers are interested in installing energy efficiency technologies that are not on the MAP menu, and EIG would like to offer those installations. The Program implementer proposed adding technologies to the Program menu but was frustrated by the length of time it took to receive approval from Edison. The process for establishing savings calculation methodologies and granting approval for new Program technologies is too slow. The technologies ultimately received approval, but the implementer believes opportunities for savings were lost because of the slow pace.

Recommendation 4

Edison should speed up the process for establishing savings calculation methodologies and granting approval for new MAP technologies.

Conclusion 5

Incentives make energy efficiency technologies affordable to companies that would otherwise be reluctant or unwilling to install them. Incentives also make participation in the Program attractive to companies that would install energy efficiency technologies in absence of the incentive. However, it appears free ridership is slightly less than the default .80 NTG listed in the E3 calculators. The Program implementer and the Edison account representative would like to see the original incentive level restored. Both are concerned that participation will drop off significantly. The Edison account representative said the slowing economy made restoring the incentive imperative.

Recommendation 5

Edison should assess whether the new incentive level is optimal or adversely affects participation. Interviews should be conducted with participants who were wait-listed but dropped out when funding was added but incentives reduced, and with those wait-listed who did not drop out. Edison may want to increase the incentive if participation declines significantly, or participants dropped out because incentives were reduced.

Conclusion 6

Overall, EIG was very responsive to process and impact evaluators. However, it appeared that EIG was not prepared for M&V workload required to assist with the impact evaluation. As the Program progressed, it proved harder for evaluators to receive data and coordinate site visits. In addition, participants did not know that they were required to provide access for on-site measurement and verification. Impact evaluators also found it easier to obtain project level data after the measure installation is complete, when data are centralized.

Recommendation 6

Edison should clearly explain the evaluation expectations to the implementers. Implementers should make it clear to participants that they may be required to provide site access for third party measurement and evaluation.

Conclusion 7

The Evaluability Assessment recommended implementers systematically collect and retain nonparticipant contact data needed for evaluation. However, implementers did not methodically retain these data and could not easily access these data when needed by evaluators.

Recommendation 7

Conduct Evaluability Assessments early and follow up to assure recommendations are implemented. In the future, implementers should maintain a complete database of nonparticipants to facilitate evaluation of the Program.

SCE 2557: Transforming the Market for ENERGY STAR® Manufactured Homes

Program Overview

Transforming the Market for New Energy Star® Manufactured Homes Program (the "Program") offers upstream incentives for manufacture and sale of Energy Star® manufactured homes Southern California Edison's service territory. Strategic upstream incentives are designed to move the market from basic energy construction under the HUD standards to high performance Energy Star® standards.

The Manufactured Housing Research Alliance (MHRA) developed and implemented the Program. MHRA designed the Program to:[30]

- Improve the energy efficiency of new manufactured homes placed in Edison's service territory through improved envelope efficiency (thermal and air tightness);
- Reduce the cooling load by right sizing equipment capacity: This will, on average, eliminate between 0.5 and one (1) ton of installed capacity (1.76 and 3.52 kW) per home;
- Change electric heating equipment from electric resistance furnaces to more efficient heat pumps; and
- Educate the key members in the industry, particularly the retail community about the benefits of Energy Star® Manufactured Homes and energy efficient construction.

The Program budget was $884,929, with 68% budgeted for upstream incentives. MHRA planned to incent manufacturers $400 for each Energy Star® manufactured. HVAC contractors

MHRA's goal was to sell 1,250 Energy Star® certified homes, with projected gross energy savings of 1,442,114 kWh (Table 33) and net energy savings of 1,153,691 kWh.

Table 33. Energy Savings[31]

Installation Goals	Period 1	Period 2	Period 3	Period 4	Total
Number of Installations	15	375	450	410	1,250
Gross Peak Demand Savings (kW)	28.5	711.5	853.5	777.5	2,371
Gross Energy Savings (kWh)	15,451	432,079	521,826	472,758	1,442,114
Net Peak Demand Savings (kW)	23	569	683	622	1,897
Net Energy Savings (kWh)	12,361	345,663	417,461	378,206	1,153,691

Period 1: From Notice to Proceed (NTP) through 06/30/07, **Period 2:** From 7/1/07 through 12/31/07, **Period 3:** From 1/1/08 through 06/30/08, **Period 4:** From 7/1/08 through 12/31/08

[30] MHRA, Statement of Work, 06-10008 MHRA SOW V 2.1.doc, page 1, 12/11/06.

[31] Ibid

Program Design

Transforming the Market for New Energy Star® Manufactured Homes Program is designed to increase the market share of manufactured Energy Star® homes. The Manufactured Housing Research Alliance implements the Program and markets upstream, targeting manufacturers and retailers to influence homebuyers' purchase decisions.

MHRA is based in New York, and is the manufactured home industry's research and development arm. The over 500 MHRA members include home manufacturers, retailers and community owners, suppliers, consumers, associations, financial institutions, insurance companies, power suppliers and other research organizations involved in the factory built housing industry. This puts MHRA in a unique position to develop and promote new technologies and manufacturing methods within the factory built housing industry. MHRA has been working with EPA to develop factory-based Energy Star® quality control procedures that require oversight by third-party certifiers operating under the auspices of MHRA.[32] [33]

MHRA reported that in 2005, Edison connected service to about 4,000 manufactured homes, with Energy Star® homes making up less than 1% of connections. The majority of manufactured homes are built to HUD Manufactured Housing Standards, with energy requirements less stringent than the California Energy Code and well below Energy Star® levels. Energy Star® homes offer a 30% efficiency increase over HUD homes. MHRA proposed that the Program's efforts over the two-year period of 2007 through 2008 could capture a 15% market share for new Energy Star® manufactured homes.[34]

In 2005, Congress included a $1,000 tax credit expressly for manufacturers of HUD-code homes to upgrade to Energy Star® homes in the national Energy Bill. Recognizing Energy Star® homes are more costly to build than HUD homes, and the Federal tax credit does not fully cover incremental cost, MHRA proposed manufacturers participating in this Program receive $400 incentives to help to partially offset the increased cost of building homes with improved envelope efficiency (thermal and air tightness).

While the manufacturer installs the Energy Star® features included within the building shell, they do not install mechanical equipment outside the home, including the air conditioning equipment. The retailer sells air conditioners and heat pumps and an HVAC contractor specifies and installs the equipment. Equipment is frequently oversized and few manufactured homes in CA offer high efficiency heat pump air conditioning systems. MHRA notes that the retailer and HVAC installer are pivotal players in decisions that influence overall energy use and demand.

[32] MHRA, Technical Proposal, Nov. 2006. Phone discussion with Emanuel Levy, Executive Director, MHRA.

[33] The Manufactured Housing Construction and Safety Standards (MHCSS) regulate the manufactured housing industry. MHRA notes the MHCSS is nationally pre-emptive and state and local building and energy codes have no bearing on the construction of manufactured homes. California Code of Regulations, Title 24, does not apply to manufactured housing. For these reasons, manufacturers can build a home in Arizona and ship it to California.

[34] MHRA, Technical Proposal, Nov. 2006.

One Program goal is to accrue energy savings from proper sizing (typically downsizing) the cooling equipment.[35] MHRA estimated savings based on replacing oversized air conditioners with right-sized heat pumps. Therefore, participant homes must include properly sized heat pump air conditioning equipment. Therefore, the MHRA proposed to pay distributors a $350 incentive for Energy Star® homes with a properly sized electric heat pump connected to Edison service. MHRA developed manufactured home Cooling Equipment Sizing Guidelines with look-up procedure to assist equipment specifiers. Energy Star® homes installed without any air conditioning did not qualify for the rebate since MHRA estimated savings based on the incremental energy efficiency of the heat pump.

In summary, MHRA designed the Program to target upstream market actors to increase placement of Energy Star® manufactured homes in Edison's service territory by:

- **Targeting Energy Star® qualified manufacturing plants, developing procedures to help them support Program goals.** MHRA works with the plant to assist them to produce Energy Star® homes on a large scale. The Program offered $400 incentives to help reduce the incremental cost of manufacturing the Energy Star® home.
- **Working with retailers and HVAC distributors to right-size cooling equipment.** MHRA educates retailers and HVAC distributors about heat pumps and sizing requirements for HVAC units. MHRA provides a tool kit to correctly size the heat pump. MHRA relies on retailers to sell homebuyers an energy efficient heat pump to meet air conditioning needs. Distributors were offered a $350 incentive for electrically heated homes sold with a heat pump.
- **Assisting retailers in their efforts to market Energy Star® homes.** MHRA provides educational workshops informing retailers about the benefits of Energy Star®, and provides marketing materials to facilitate their sales efforts. Marketing materials targeting homebuyers are provided to retailers, including banners, DVDs, brochures, posters, and window decals.
- **Conducting final placement inspections to verify correct siting, installation, and heat pump installation.** Third-party inspectors complete post occupancy inspections and an Energy Star Site Installation Checklist prior to rebate approval and processing.

Market Assumptions

A number of key assumptions underlie the Energy Star® Manufactured Homes Program.

- **Marketing that targets key stakeholder groups will convert them into Energy Star advocates.** Rapid Program growth will occur when everyone involved in the Energy Star home delivery process recognizes the benefits from their own perspective.

[35] MHRA, Statement of Work, Dec. 2006.

The $400 manufacturer's incentive, together with the $1000 Federal tax credit, will cover most of the incremental manufacturing cost. This will tip manufacturers to build Energy Star homes and participate in the Program.

Shifting the $400 incentives from manufacturers to retailers will encourage them to sell Energy Star® homes. The $350 HVAC contractor's incentive will lower the cost of properly sized efficient equipment.

Installing heat pump cooling equipment is the main financial stumbling block to converting HUD-code homes to Energy Star homes with electric heat. Heat pumps are a costly increase over industry standard practice. Incentives will address this barrier.

Homeowners choose and purchase their cooling equipment from the retailer when they order their manufactured home. The rebate is contingent on the homeowner purchasing properly sized cooling equipment. MHRA assumes that retailers can influence this decision.

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Energy Star® Manufactured Homes Program. The purpose of the process evaluation is to document the Program design and its development, including any differences between the proposed Program design and the Program as implemented.

Process Evaluation Methodology

The methodology utilized in this process evaluation included a review of documents, interviews with participants and nonparticipant, developing logic models and a process flow chart, and identifying researchable issues and indicators of success.

The process evaluation focused on key market actors and their experiences with the Program. Cadmus[36] interviewed three program managers and implementers, a representative from the California Manufactured Housing Institute (CMHI), five participant manufacturers, and four nonparticipant manufacturers. Cadmus interviewed twelve participant and five nonparticipant retailers.

The Edison Program Manager interview discussed the overarching goals of IDEEA/InDEE program, changes to the Program, including incentive structure and marketing strategies, customer response, and possible improvements for the Program.

Program implementers interviewed included two MHRA staff. One MHRA implementer was responsible for the Program's design and development, and worked closely with the manufacturers. The second MHRA staff interviewed was responsible for day-to-day operations. The Implementer interview focused on marketing strategy, implementation, incentive structure,

[36] Formerly Quantec. LLC

customer response and potential improvements. Program changes and experience within the manufactured housing industry were discussed.

CMHI, identified as a market actor, is a member organization serving the California manufactured housing industry. The CMHI representative interviewed was actively involved with marketing the program in California. The interview discussed CMHI's role in the marketing process and their relationship with MHRA.

MHRA and Edison identified participant manufacturers whose plant was Energy Star® certified and they offered Energy Star® manufactured housing to retailers and distributors placing homes in Edison's territory. We asked respondents about their decision to participate, current standards and market conditions, business practices, free ridership and spillover.

MHRA and Edison identified participant retailers who marketed the Energy Star® manufactured homes and received the Program incentive. We asked respondents about their decision to participate, market conditions, and their experience with the Program.

MHRA identified nonparticipant manufacturers and retailers. We asked respondents about their awareness of Energy Star® homes and the Program, their decision not to participate, current market conditions, business practices and likelihood of participating in the future, and market barriers.

Surveys with participating homebuyers were part of the original evaluation plan. However, the homebuyer contact database was not available and customer participation and satisfaction surveys could not implemented.

The Edison Program Manager and third-party Implementer interviews included discussions about issues raised during an earlier Program evaluability assessment. In addition, interviews included two key questions. First: was the program implemented as designed, according to the original proposal and scope of work, and as reflected in the logic model and process flow diagram? Second: what are the lasting effects of the Program?

The main goals of interviewing the participant manufacturers were to determine how the market actors experienced the Program, and, to update the logic model and the process flow diagram to reflect the Program as implemented. Other topics included marketing and market barriers, the lasting effects of the Program, the state of the housing market, and the demand for Energy Star® homes.

Participant retailer interviews assessed their program experience and satisfaction, updated the logic model and the process flow diagram, and assessed free ridership and spillover. We asked retailers about home sales in Edison's service area, if the incentive influenced their decision to participate, and marketing and market barriers.

Nonparticipant manufacturer and retailer surveys assessed reasons for not participating and potential future participation. We asked about the relationship between the retailer and the manufacturer and demand for Energy Star® homes to assess potential market barriers.

Cadmus developed an interview guide or survey for each group. Interview guides and surveys are included in Appendix A.

Interview Sample Development and Disposition

Cadmus conducted interviews with the Program Managers and Implementers, participants, nonparticipants and market actors. We based survey sample sizes on information from Edison and MHRA about the total population of each respondent group.

Cadmus staff conducted interviews between January and May 2008. Before interviewing participants, interviewers confirmed that the respondent was involved in the decision to participate in the Program and/or were directly involved and knowledgeable about the Program. Table 34 shows the sample frame and completed calls.

Table 34. Targeted and Completed Interviews

Task	Goal	Achieved
Implementer Interviews	1	1
Program Manager Interviews	1	1
Market Actor Interviews (CHMI)	1	1
Participant Manufacturer Interviews	4	5
Nonparticipant Manufacturer Interviews	4	4
Participant Retailer Interviews	15	12
Nonparticipant Retailer Interviews	15	5
Participant Home Buyer Interviews	30	0
Nonparticipant Home Buyer Interviews	30	0
Total Interviews	101	29

MHRA reported that nineteen (19) of the twenty manufactured home facilities shipping homes to Edison's service territory are Energy Star® -qualified home manufacturing plants. Of the 19 facilities, 11 participated in the Program. Six (6) companies control these 19: Fleetwood Enterprises, Champion Enterprises, Clayton Homes, Skyline Corporation, Palm Harbor Homes and CAVCO Industries. Cadmus interviewed four of the six parent companies.

We developed the retailer call list from two sources. Early in the evaluation, December 2007, Edison provided a list from MHRA of 46 retailer companies with homes in process, i.e., homes "in the pipeline" who had received at least one marketing contact. The list provided company names but no retailer contact names or phone numbers. We researched phone numbers and called the retailers to determine whether they were participants or nonparticipants, and conducted the appropriate survey. From this original list we identified 17 participants, 7 nonparticipants, 4 with disconnected phones, and 17 could not be reached.

MHRA later provided a list of participant and nonparticipant retailer company and manufacture contacts. The early and the later lists were not fully comparable. Two respondents interviewed as nonparticipants were later shown as participants on the MHRA lists. One of the late lists included 24 participating retailers. A second list provided by MHRA listed 56 nonparticipant and 39 participant retailers.

The homebuyer sample was not called; none were identified. Some retailers stated they did keep track of buyers; however, it was confidential information and could not be shared. Between 100 and 200 homebuyers were reported to have purchased qualifying homes, but the manufacturer's

plant was not certified. Edison requested that we not call these buyers while they and MHRA were working to certify the plant. This issue was not resolved, nor buyer lists released during the evaluation period. We also called several building departments to determine whether we could identify newly placed manufactured homes. None of the departments recorded manufactured home placements.

Table 35. Survey Call Disposition

Disposition	Participant Manufacturing Plants	Nonparticipant Manufacturing Plants	Participant Retailers	Nonparticipant Retailers
Total Population	11	8	39	56
Refused to respond; referred caller to parent company	1	0	1	
No Answer/left message/call back	4	3	5	46
Not a retailer or manufacturer			2	1
Disconnected/wrong number			1	4
Not Called	1	1	18	
Complete	5	4	12	5

Process Evaluation Results

Program Theory

The program theory for the Energy Star® Manufactured Homes Program can be summarized as follows:

> By introducing manufacturers to the Program, and offering incentives to reduce the incremental cost of manufacturing homes above HUD standards to meet Energy Star® specifications, then manufacturers will build Energy Star® manufactured homes. Retailers and HVAC distributors educated about energy efficient heat pumps and offered Program incentives will specify and install heat pump cooling systems. When the Program educates key members of the manufactured housing industry about the benefits of the Energy Star® manufactured homes, they will educate homebuyers about the benefits of energy efficient construction, increasing awareness and demand for the product, transforming the marketplace for new Energy Star® manufactured homes. Program-qualified homes located in Edison's territory will achieve energy and demand savings.

Logic Model

The Program logic model shown in Figure 8 highlights the key features of the Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The elements of the logic model are:

Activities that the program undertakes. The primary activities involved MHRA marketing and outreach activities to prepare marketing materials and recruit manufacturers and retailers.

Outputs produced by program activities. The marketing and outreach activities result in outputs including production of marketing materials and outreach to all audiences, including the manufacturer, retailer, and HVAC distributor.

Outcomes that result**:**

In the **short term**, outcomes include participation agreements from manufacturers, modification of facilities and manufacturing processes to comply with Energy Star® and Program guidelines. Retailers will be educated about Energy Star® manufactured homes and Program requirements. Short-term outcomes included retailers and other key players increasing their knowledge and awareness of Energy Star® homes, and marketing these homes to buyers.

Intermediate outcomes include increases in homebuyer awareness and demand for Energy Star® homes, and sales of Program qualified homes. Energy Star® Intermediate outcomes include site inspections and certifications for newly purchased homes, and kW and kWh savings. In addition, Edison, implementers and market actors, gain Program experience. These outcomes reduce market barriers and increase product availability.

The **long term** outcomes include fundamental changes in the manufactured home industry will result in market transformation from HUD to Energy Star® standards.

Table 36 (on page 78) describes the linkages among the elements in the logic model and presents a list of progress indicators which can be used to evaluate the elements and their linkages.

Figure 8. Logic Model

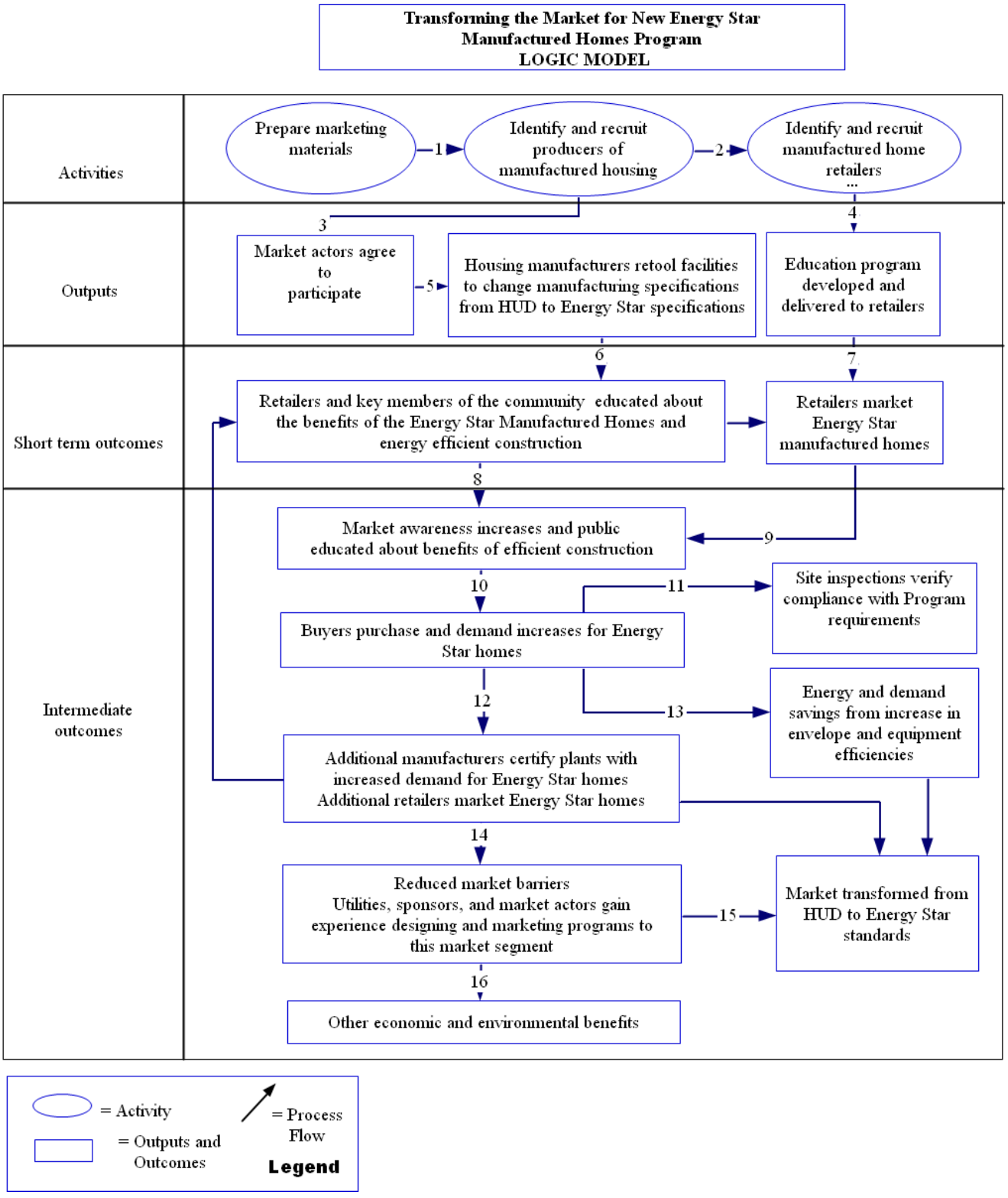


Table 36. Energy Star Manufactured Homes Logic Model Links: Researchable Issues and Indicators

Link	Researchable Issues	Indicators
1	Preparing marketing materials will ensure that manufacturers are aware of the benefits of the program and encourage participation.	Marketing meetings scheduled; manufacturers recruited. Materials delivered.
2	Recruiting retailers ensures that homebuyers will be exposed to the program and increases the availability of marketing channels.	Retailer participating in Program.
3	Manufacturers will participate when they are aware of the program and its associated benefits.	Content of materials appropriate to manufacturer. Manufacturers aware of program benefits and participate; number of participants.
4	Educating retailers about Energy Star homes and marketing strategies ensure the marketing message is consistent across retailers. Education addresses information barrier and raises awareness.	Retailer trainings scheduled; attendance levels; retailer marketing packets delivered, materials read.
5	Manufacturers retooling their plants to meet Energy Star requirements ensure Energy Star qualified homes will be available to homebuyers.	Increasing number of Energy Star certified plants.
6	Certifying manufacturers will increase industry knowledge about Energy Star homes to key industry members.	Plant personnel and staff increase knowledge of Energy Star and its benefits.
7	Educating retailers and providing them with marketing tools will assist them to market Energy Star homes to their customers.	Retailers' knowledge of Energy Star and its benefits, increasing number of customers who hear about Energy Star from their retailers.
8	Educating key industry members will increase customer awareness of Energy Star and its benefits	Increasing levels of inquiries about Energy Star homes from customers; customer general knowledge of Energy Star benefits.
9	Retailers marketing Energy Star homes will increase customer awareness of Energy Star and its benefits.	Increasing levels of inquiries about Energy Star homes from customers; customer knowledge of Energy Star benefits
10	Buyer market barriers are decreased with knowledge and awareness among retailers and buyers. Increased public awareness will lead to more demand for Energy Star homes.	Number of Energy Star homes purchased and certified.
11	Sales require site inspections to verify properly installed homes and qualifying heat pump.	Number of homes verified and qualified as Energy Star homes eligible for Program rebate.
12	As demand increases more manufacturers will pursue the Energy Star certification.	Increasing number of certified plants.
13	Sales of Energy Star homes with right-sized heat pumps will result in energy and demand savings.	Decreasing energy consumption; decreasing peak load, decreasing homeowner utility bills.
14	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment.	First cost; performance uncertainty; knowledge and awareness. Key program players apply knowledge of the market; program strategies evolve to address remaining market barriers.
15	Replacing HUD standards with Energy Star standards and higher efficiency HVAC transforms the market	Increasing numbers of Energy Star homes manufactured and sold. Manufacturers phase out HUD homes.
16	Market adoption leads to long-term energy and environmental impacts.	Reduced energy use; reduced emissions.

Process Flow

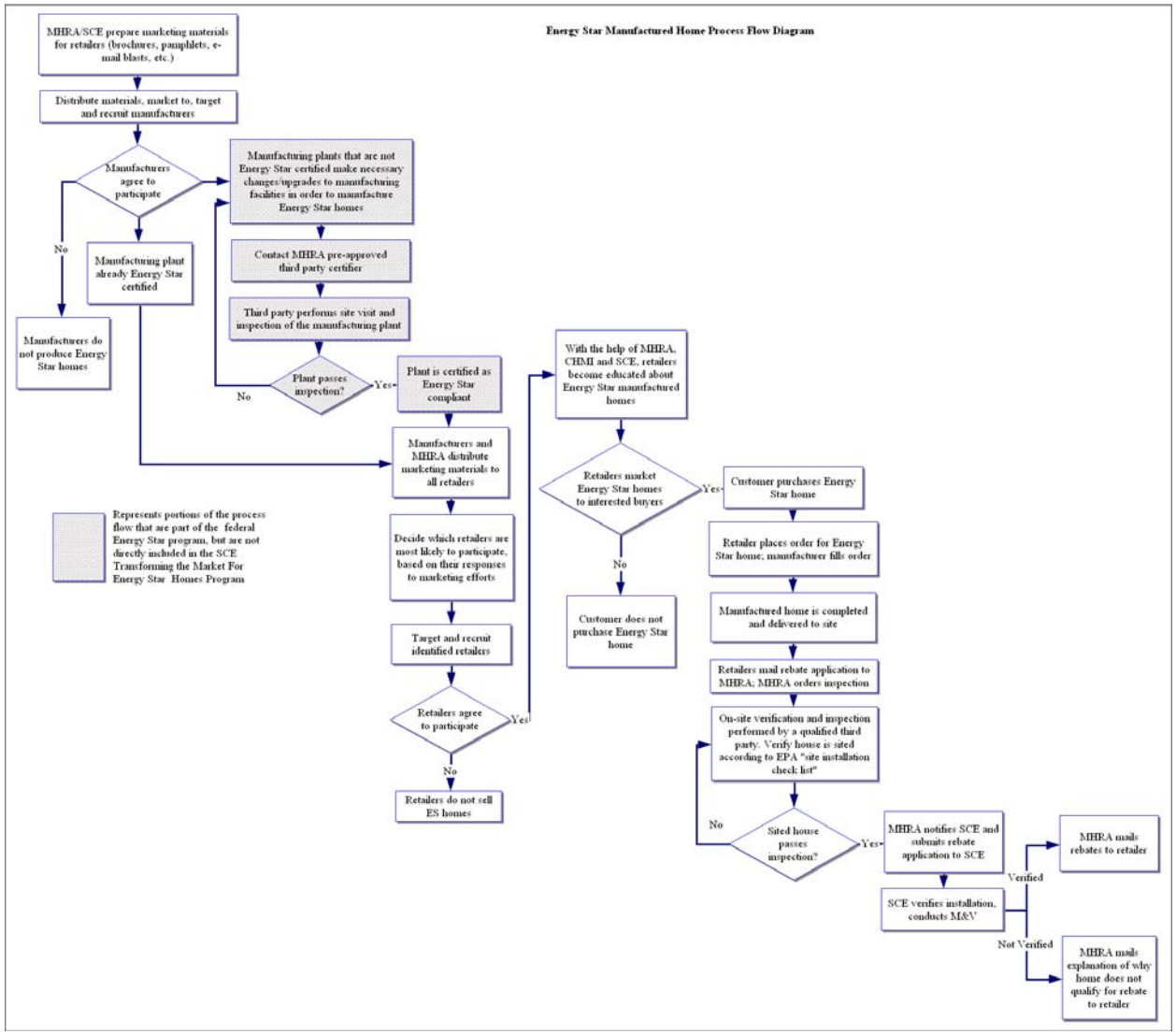
As distinct from the Logic Model, the Program process flow describes the specific work flow and steps in the operation of the Program. The process flow diagram in Figure 9 shows that the Program begins with MHRA and Edison preparing marketing materials for retailers and homebuyers. MHRA works with manufacturers whose plants are not Energy Star certified as well as those that are. Manufacturers whose plants are not Energy Star certified must decide to upgrade their plant to meet Energy Star® requirements, including inspection and plant certification.

MHRA recruits manufacturers with certified plants into the Program, providing marketing materials and, if interested, manufacturers chose to participate. MHRA and the manufacturer contact retailers and distribute Program marketing materials, recruiting retailers into the Program. MHRA, CMHI and Edison provide educational materials, workshops about Energy Star® manufactured homes, and marketing tools.

Retailers place individual home orders with the manufacturer, and work with the HVAC distributor to specify heating and cooling equipment. The completed home is delivered and placed according to EPA regulations and building codes of the local jurisdiction. After third-party inspections verify proper installation of the home and verify the installation of specified cooling equipment, retailers mail rebate applications. Edison verifies the home is connected to their service and completes M & V inspections to verify the home has appropriately sized cooling equipment. Edison then rebates MHRA, and MHRA forwards appropriate incentives. If the home is located outside Edison's territory or does not have appropriately sized cooling equipment, Edison notifies MHRA, and MHRA notifies the retailer that the home does not qualify for the Program incentive.

After the home is located on site, third-party inspectors must certify the home qualifies. The third-party inspector is retained by the plant, and is typically a HERS rater. The inspector verifies that homeowners purchased and installed a correctly sized heat pump and the home meets requirements included in the Site Inspection Check List. Edison also has the opportunity to conduct an on-site inspection after the home is installed.

Figure 9. Energy Star® Manufactured Home Process Flow



Evaluability Assessment

An evaluability assessment conducted for Edison in the first half of 2007, during early Program efforts, listed four potential issues that could affect Program evaluability. These issues were explored through interviews with program managers, implementers, and participating manufacturers and retailers.

MHRA did not provide specific indicators of program success in the proposal and scope of work. However, the desired long term outcome is a substantial increase in non-subsidized Energy Star® manufactured homes in the market. The number of paid incentives provides the measure of this indicator's success.

Early document review noted there are several participants, and evaluators could not identify the potential population of all participants and nonparticipants. Major participants are manufacturers, distributors and retailers. MHRA noted they reached agreements with manufacturers representing 90% of the market, although could not provide a list until late in the evaluation period. The industry is evolving so that retailers are now more like car dealerships that manufacturers own. MHRA did not provide a discreet list of participant and nonparticipant retailers. Lists are easily outdated as retailers join the program; some listed as nonparticipants stated they were participants when phoned for surveys. Evaluators asked MHRA to track or identify nonparticipating retailers and manufacturers. It appears MHRA can provide this information; timeliness in delivery remains an issue.

Purchasers of energy efficient homes are the hardest to identify. Building departments telephoned stated they do not track manufactured home placements, let alone whether they are Energy Star® or HUD manufactured homes. During the Evaluability study, we informed MHRA that they or retailers would need to track the buyers for later contact. Some retailers kept track of purchasers but would not share proprietary data. Building contact lists remains an issue, particularly nonparticipant buyers. Participants can be contracted through incentive requests.

Estimating savings from Energy Star® Manufactured Homes requires knowledge of the baseline. Using DOE-2 based software, MHRA estimated savings using a HUD manufacturing specifications baseline, specifying characteristics of an Energy Star package with a 20 year measure life. However, the number of Energy Star® manufactured homes connecting to Edison's service prior to the Program must be estimated. Measuring change in the number of connections requires additional data from manufacturers and retailers.

MHRA and Edison should track changes in manufacturing practices for non-Energy Star homes which can have a definite program impact. Changes in HUD standards that increase energy efficiency requirements should be documented since they will change the baseline from which energy savings are calculated.

Market pull is the effect that homebuyers have on the behavior of product suppliers, in this case, manufacturers and retailers. For example, homebuyers may demand more energy efficient homes from retailers, resulting in retailers providing more Energy Star homes. Market pull should be documented through nonparticipant and participant surveys, recording the reasons for purchasing energy efficient homes.

Incorrect or sloppy installation can led to degradation of measures, especially in the ducting/plenum. The evaluability assessment recommended an independent party should complete installation quality checks. MHRA reports each home is inspected and the home must pass the Site Inspection Checklist before the home is eligible for the incentive.

Program Modifications

There have been major design changes since the inception of the Program. First, the incentive structure changed. Second, Edison revised the Program goals downward. Third, Edison is considering another program change to relax heat pump sizing requirements where the equipment is not available.

Incentive Changes

Early Program documents and discussions with implementers indicate that the proposed incentive structure might be difficult to implement. The difficulty related to dual goals of the program—thermal efficiency and equipment efficiency. Different entities were responsible for each component. Manufacturers controlled the thermal efficiency of the building shell by meeting Energy Star requirements of their certified plant. Retailers sell the cooling equipment to buyers at the time of purchase and work with HVAC contractors to specify and size equipment. In addition, retailers may be structured and operate differently, with varying ability to accept incentives.

The original incentive structure provided the manufacturer with $400 per home placed in Edison's service territory and $350 to the HVAC distributor for installing properly sized heat pump cooling equipment. However, manufacturers indicated that the incentives were not critical to their participation. Retailers appeared to be the Program bottleneck and MHRA changed the incentive structure to refocus on retailers. As of June 2007, retailers receive $400 for gas or oil heated homes with a properly sized HVAC units and $750 for homes heated with electricity and equipped with a properly sized heat pump. The shift required MHRA to alter their marketing materials and according to Edison's Program Manager, they had to restart the process to approve marketing materials. This change delayed the Program's market presence, but seemed to place the incentive in the appropriate market sector.

Goals Revision

The second design change occurred in the third quarter 2007 when it became clear that the overall housing market had slowed significantly. One key indicator cited by MHRA was that there were 300 retailers in Edison's area in 2006, but by the end of 2007 there were about 215 retailers. Edison and MHRA revised the Program goals from 1,250 installed homes to 750 to reflect the slowing market. This revised Program goals are proportional to original goals, but based on lower total sales. Table 37 shows the revised Program goals and associated ex ante energy savings.

Table 37. Revised Program Goals

	Original Savings Estimates			Revised Savings Estimates		
	Gas	Electric	Total	Gas	Electric	Total
Installed measures:	972 homes	278 homes	**1,250 homes**	585 homes	165 homes	**750 homes**
Net kW reduction:	1,475 kW	422 kW	**1,897 kW**	888 kW	250 kW	**1,138 kW**
Net kWh savings:	657,072 kWh	496,619 kWh	**1,153,691 kWh**	395,460 kWh	294,756 kWh	**690,216 kWh**

By the first quarter 2008, MHRA and Edison had approved incentives for only one manufactured home. MHRA and Edison discovered that many customers did not have access to properly sized cooling equipment. In order to increase participation and prevent the exclusion of homes that built and placed according to Energy Star® requirements, Edison is considering relaxing HVAC sizing requirements where the correctly sized HVAC equipment is not readily available.[37] If this change is approved it will increase the number of incentives, and claimed savings, while reducing per home savings.

As of June 2008, the Program had 11 participating manufacturers and 38 participating retailers. Edison had paid eight rebates and 36 were scheduled to be paid within the next month.

Marketing and Participation Decisions

Manufacturers and Retailers

Awareness

We included questions about product awareness in the participant and nonparticipant surveys of manufacturers and retailers.[38] All nonparticipant manufacturers and retailers were aware of Energy Star® homes prior to contact. Four of five nonparticipating retailers stated there is consumer demand for the product, and three of five stated their manufacturers offered them. Eight of twelve participating retailers were selling Energy Star® homes prior to participation. Two of five participating manufacturers had certified Energy Star® plants prior to participation, and others were aware of Energy Star® homes. Product awareness does not seem to be an issue in this industry.

Both participant and nonparticipant manufacturers understand that the HUD standards are less strict in terms of energy efficiency than Energy Star® standards. Retailers interviewed do not all

[37] Edison Quarter 1, 2008 program report. As of June 2008, Edison had not approved the change.

[38] For clarity, note that Energy Star® homes and Program-qualified homes are not exactly the same. Program-qualified homes are Energy Star® homes with the addition of a right-sized electric heat pump installed in electrically cooled homes. Surveys asked about awareness of Energy Star® homes.

understand that the HUD standards are less strict than Energy Star® standards. Half the retailers interviewed did not know which was stricter. One quarter f the participant retailers interviewed also stated that HUD standards were stricter.

In all other questions about the benefits of Energy Star® homes, only two participant retailers did not list energy efficiency as an attribute of Energy Star® homes. While some retailers may not know the relative energy efficiency of HUD and Energy Star® standards, all but two understand that Energy Star® homes are energy efficient.

We can conclude that education and outreach to retailers are not working as well as it could. In particular, the participant retailer should be aware that the Energy Star® homes are more energy efficient than other homes on their lots.

Table 38. Relative Strictness of HUD and Energy Star® Standards

	Participant Manufacturer N=5	Nonparticipant Manufacturer N=4	Participant Retailer N=12	Nonparticipant Retailer N=5
	Frequency	Frequency	Frequency	Frequency
HUD standards are more strict than Energy Star			3	
Energy Star standards are more strict than HUD	5	4	3	3
Don't know			6	2

Marketing

MHRA conferred with the six manufacturing parent companies, meeting one-on-one with senior leadership at each manufacturing plant. During these meetings, MHRA explained the Program, the Energy Star® certification process, the manufacturers' role in marketing to retailers and encouraged participation. MHRA also provided manufacturers with marketing materials that manufacturers could provide to their retailers to encourage retailers to participate.

MHRA chose to concentrate marketing efforts on the top 60 retailers, who closed more than 75% of the manufactured home sales in Edison's service area. MHRA marketed the Program to retailers in a variety of ways. MHRA worked with the California Manufactured Housing Institute (CHMI). CHMI offered six educational workshops during the Program's duration, to explain the benefits of Energy Star® homes and the Program, and provide marketing materials and strategies for selling Energy Star® homes. CHMI and MHRA also saturated the market with information by writing articles in several industry magazines and appearing at trade shows. Manufacturers and MHRA contacted retailers via e-mail, telephone and mail.

We asked the participants where they heard about the Program (Table 39). MHRA informed all the nonparticipant manufacturers and two of five participant manufacturers. Energy Star representatives informed two other participants. Only one respondent heard about the Program from an Edison representative (Table 39).

Manufacturers informed half the participant retailers about the Program but none of the nonparticipant retailers interviewed. The Program relies on manufacturers to promote the Program to retailers. MHRA contacted nearly 75 percent of market actors at some point in time

(Table 40), including 100 percent of manufacturers and 59 percent of retailers contacted. Retailers could potentially benefit from additional exposure to the Program through contact by MHRA and/or Edison.

Table 39. Participants' Source of Program Information

	Participant Manufacturer N=5	Nonparticipant Manufacturer N=4	Participant Retailer N=12	Nonparticipant Retailer N=5
Source of Information	Frequency	Frequency	Frequency	Frequency
MHRA	2	4	2	2
Edison	0	0	1	0
Energy Star®	2	0	1	0
Corporate Headquarters/Internally	1	0	1	0
Manufacturer	n/a	n/a	6	0
Trade Show	0	0	1	0
Aware of Energy Star® homes but not aware of the Program	0	0	0	3

Table 40. Contact with MHRA

	Participant Manufacturer N=5	Nonparticipant Manufacturer N=4	Participant Retailer N=12	Nonparticipant Retailer N=5
	Frequency	Frequency	Frequency	Frequency
MHRA	5 (100%)	4 (100%)	8 (67%)	2 (40%)

Decision Making

We asked the participating manufacturers and retailers why they chose to participate and what they thought were the Program benefits. Retailers chose to participate largely because of the incentive (66 percent) and potential increase in sales (33 percent). The benefits most often recognized by retailers were promoting energy efficiency (58 percent), promoting sustainability (42%), and increased customer satisfaction (42 percent).

The majority of manufacturers (80 percent) perceived increased customer satisfaction was a benefit. Table 41 summarizes the results, and multiple answers were allowed.

Table 41. Perceived Value and Decision Making

	Participant Manufacturer (N=5)		Participant Retailer (N=12)		
	Decision Making	Perceived Benefits	Decision Making	Perceived Benefits	Total
	Frequency	Frequency	Frequency	Frequency	Frequency
Participation Costs/Incentives	1	1	9	4	15
Customer Demand/Customer Satisfaction	1	4	2	5	12
Promote Energy Efficiency		2		7	9
Increased Home Value/Marketing Tool	1	1	4		6
Promote Sustainability		1		5	6
Concern for Environment	1		3		4
Energy Bill Savings	1		2		3
Familiarity with ENERGY STAR/Already Certified	2				2

Nonparticipating manufacturers and retailers were asked their reasons for not participating in the Program. The majority of the retailers that chose not to participate did so because they needed more information about the Program and their manufacturers either did not participate or were not certified. Two manufacturers stated they did not sell enough homes in Edison's service territory. Two manufacturers did not think there was enough demand for Energy Star® homes to participate. One manufacturer stated they were participating and dropped out because third-party certification issues delayed rebates, and there were *"thousands of dollars floating around out there that no one has because of the certification issues."*

Overall, nonparticipants require additional information about the program and coordination between retailers and manufacturers. Manufacturers perceived there was not enough consumer demand, but retailers did not mention lack of consumer demand. Incentives were an issue with one manufacturer who dropped out, and nonparticipants stated incentives would make a difference in their decision to participate.

We asked respondents to use a scale of 0 to 10 to indicate the likelihood they would participate in a future Program of this type. None responded with scores lower than five. The respondent scoring five said they need a *"higher incentive"* before they would participate. Others stated their manufacturer needs to participate; the incremental cost for appliances needs to be reduced; and they needed more information about the Program.

Table 42. Reasons for Nonparticipation*

	Nonparticipant Manufacturers N=4	Nonparticipant Retailers N=5
	Frequency	Frequency
Not contacted by MHRA or don't remember contact		3
Manufacturer needs to participate; manufacturer is not certified		3
An incentive to retailers or consumers would make a difference		3
More training about Energy Star and the Program is needed	2	1
Not enough consumer demand	2	
Don't ship very many homes to Edison territory	2	
Price of Energy Star homes and/or appliances is too high		2
Problem with third-party certification and incentives	1	
Retailers need to be on board	1	

*Multiple responses allowed.

Table 43. Likelihood of Participating in Future Programs

Likelihood Score	Nonparticipant Manufacturers N=4	Nonparticipant Retailers N=5
Scale of 0 to 10, with 10 the highest likelihood score	Frequency	Frequency
10	2	2
9	1	
8	1	
7		1
6		
5		1

Incentives

Of the twelve participating retailers interviewed, eight said the incentive influenced their participation decision (Table 44). However, eleven of the twelve stated they "would still market" the home even if the incentive had not been offered. The twelfth respondent stated that he did not know about the incentive. While participants said the incentive was influential, their answers indicated it was not essential.

Survey responses revealed widespread confusion about how the rebate payment process worked. Five participating retailers did not know if they received a rebate or not, and six did not know if the customer received a rebate. Only two of the five nonparticipating retailers thought a rebate was associated with the Program, while two said if a rebate was available they would likely participate (Table 44). This confusion clearly shows a disconnect between the information MHRA is providing retailers and the retailers' understanding of the Program.

Table 44. Retailers and Incentives

	Participant Retailers (N=12)	Nonparticipant Retailers (N=5)
	Frequency	Frequency
Availability of incentive contributed to participation decision, or would have contributed	8	2
Retailers receive rebate	6	2 offered incentives
Retailers don't receive rebate	1	
Don't know if retailers receive rebate	5	
Customers receive rebate	4	
Customers don't receive rebate	2	
Don't know if customers receive rebate	6	

Homebuyers

Retailers marketed to homebuyers using MHRA's marketing materials. These materials included posters, brochures, decals and sales videos to explain the benefits of Energy Star® homes to buyers. Retailers also received a toolkit that explained how to properly size cooling equipment. Participant retailers stated they emphasized the benefits reported in Table 41 to prospective home buyers. Six of the twelve respondents (50 percent) stated that between 90 percent and 100 percent of homes they sold were Energy Star. As noted earlier, we were unable to conduct participant and nonparticipant surveys.

Program Delivery and Implementation

The Program uptake occurred more slowly than anticipated, and various issues were discussed during interviews and surveys. MHRA noted that the Program was slow to see results because of the time it took for the industry to gear up for Energy Star® production, MHRA also noted that there was a considerable time lag between home purchase and ordering it from the manufacturer, and locating the home on-site, along with Program verification and certification on-site.

MHRA commented that retailers, who focused on selling current non-Energy Star® inventory before selling new Energy Star® homes, may have compounded the slow uptake. While MHRA cannot reduce the time between sale and the home's placement, an increase in the rebate amount could incent retailers to sell Energy Star® while they sell existing inventory.

The Program experienced coordination problems between MHRA and one manufacturer. During the first quarter 2008 Edison discovered that the manufacturer was producing Energy Star® qualified homes, but the manufacturing plant was not officially Energy Star® certified. The manufacturers is now certified, but between 100 and 200 homes were sold prior to certification. Because the homes were lacking certification, homeowners may not know they have an Energy

Star® home. Edison and MHRA planned to retroactively inform the homeowner of the Energy Star® label, verify the home met Program requirements, and provide the retailer with the rebate. One participating retailer referenced this problem, stating the certification process was happening from the bottom up, starting with the homeowner and then moving to the manufacturer.[39]

CMHI noted that certifying manufacturing plants and producing Energy Star® qualified homes was simple. However, certifying that sited homes were Program-qualified was very difficult. A third-party inspection must be completed after the home is located on site, and all requirements on a Site Installation Checklist, including standards and specifications for cooling equipment, ducts and insulation, must be met. One manufacturer interviewed as a nonparticipant noted he dropped out of the Program because of third-party certification problems.

The Program needs to establish a systematic and scheduled site inspection process. MHRA must communicate the process more clearly to retailers, manufacturers and home buyers so they are fully aware of this process and educated about their role.

Edison's Program Manager had two concerns with the Program's implementation and delivery process. The first concerned their impression that retailers were not properly trained to sell Energy Star® homes. The second concern was that MHRA was located in New York and did not have a local presence. Cadmus designed survey questions to inform these concerns.

To address the training issue, we asked participant retailers to describe the key selling points they use to market the homes. Eleven of twelve respondents gave a variety of answers that covered increased efficiency and quality, better resale value, insulation, windows and warranty and global sustainability issues (Table 41). Their answers show retailers are informed about the benefits associated with Energy Star® homes and are relaying that information to their customers. However, as shown earlier in Table 38, retailers may not fully understand the relative differences in energy efficiency between the HUD manufactured homes and Energy Star® homes, and additional education and outreach could benefit retailers.

None of the retailers interviewed stated Program requirements included cooling equipment standards, and in other responses stated they did not know when or if the customer installed an air conditioner. The training appears to fall short in areas regarding specifics that qualify a home for this Program's rebate. Increasing education and training on the rebate and verification process, and, forging a more direct connection between the retailer and the customer's air conditioning purchase should increase the number of rebate payments and claimable energy savings.

Regarding MHRA's base of operations in New York, we asked both participating manufacturers and retailers if that affected their ability participate and to market Energy Star® homes in

[39] For process evaluation surveys with Program homebuyers, Cadmus requested contact information, which at the time included only this list of home purchasers. To keep potential confusion to a minimum, Edison withheld the list and requested that we not survey any homeowners.

California. All five of the participating manufacturers said it had no effect. Of the eight retailers we interviewed who had contact with the MHRA, all said their New York home had no effect on their ability to market homes in California.

As of June 2008, MHRA had received 98 rebate applications, of which, 44 were scheduled for payment indicating fewer than 50% are qualifying for the rebate. This appears to be occurring for several reasons including: (1) homes located outside of Edison's territory, (2) absent or improper program-qualified cooling equipment, (3) missing paperwork such as the Site Installation Checklist.

Market Barriers

Market barriers defined in the 1996 market transformation scoping study by Eto et al[40] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[41]

Edison's portfolio of IDEEA and InDEE programs focus on overcoming market barriers in new market segments. The Energy Star® Manufactured Home Program is like a new construction program where energy efficiency of buildings is improved at the design and construction phase. The manufactured housing industry offers a strategic target because these homes fall outside the California Energy Codes, the building life cycle is long, and utilities usually do not target these homes for retrofit programs. The Energy Star® Manufactured Home Program offers incentives to the manufacturer and retailer (akin to a builder for site-built homes) and not the buyer. In this sense, the manufacturer and retailers are intermediaries, a role often played by trade allies in programs where rebates go to dealers (such as appliance rebate programs where appliance manufacturers receive the rebate).

Although not explicitly stated in Program documents or by Program management, the Program appears to have been designed to address seven major barriers, including:

1. Information or search costs
2. Misplaced or split incentives
3. Product or service unavailability
4. Asymmetric information and opportunism
5. Bounded rationality
6. Organization practices or custom
7. Inseparability of product features

[40] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996.

[41] Ibid. Page 12.

Taken together, MHRA designed the strategies to affect lasting change in the marketplace and not just the marketability of the product. The Program focused on increasing product availability, changing standard practice, and educating market actors to increase demand for the Energy Star manufactured home. Approaches to overcoming the market barriers included: (1) financial incentives to retailers; (2) training and education for manufacturers and retailers; (3) company sponsored information including brochures, banners, and DVDs that include logos, with materials distributed to prospective customers, in model homes, and in purchased homes; and (4) company-sponsored trade advertising.

Several assumptions illustrate the market barriers this Program addressed:

The low level of Energy Star® certified manufacturers in the market limits the availability of Energy Star® manufactured homes.

This assumption involves several market barriers, including information and search cost, misplaced or split incentives, and, product or service unavailability.

In the manufactured home industry, manufacturers may lack information on availability of energy efficiency manufacturing techniques used to manufacture Energy Star® homes, and the requirements to certify their plant as Energy Star® qualified. In new construction, builders may minimize first cost by not installing energy efficiency measures because they do not benefit from these measures, that is, they don't pay the energy bill. Manufacturers may not believe it will be profitable to increase the cost of homes (by building Energy Star® homes) because they do not think purchasers will pay for energy efficiency. In this case, manufacturers find it difficult to predict market demand for the Energy Star® homes and are reluctant to invest the amount of time and money needed to certify their manufacturing plant.

MHRA approached these barriers by consulting and working with the six parent corporations associated with the 19 manufacturing plants serving Edison's territory. Their support facilitated the Energy Star® certification process where the plant was not already certified. Currently 17 of the 19 plants are Energy Star® certified. MHRA worked diligently to overcome this market barrier and were successful in their efforts.

The lack of information about Energy Star® and its benefits ultimately results in low consumer demand for Energy Star® homes.

The underlying barrier in this assumption relates to information or search costs. Both retailers and consumers may lack information about the energy efficient manufactured homes. Even where customers are aware of the Energy Star home, they may face high search costs to locate a manufacturer and retailer. MHRA attempted to overcome this barrier by educating and certifying almost 100% of manufacturers serving Edison's territory. CMHI held workshops for retailers and saturated the market with information. According to CMHI they presented information at trade shows, sent out e-mail blasts and wrote articles in newsletters and magazines. They also made several mailings to manufacturers, retailers and customers with their largest mailing 5,200 pieces.

The low numbers of rebate payments indicate consumer demand may be lacking. There may be a breakdown between the upstream market actors (manufacturers and retailers) and the consumer.

Homebuyers had the least contact with Program marketing materials. MHRA noted that the typical manufactured homebuyer is less apt to know about energy efficiency, Energy Star® and sustainability. In order to increase homebuyers' awareness and demand to overcome lack of information, the Program needs to target marketing toward homebuyers. This is a multi-step process: since homebuyers are mainly influenced by retailers, retailers must educate the buyers.

The incremental cost of an Energy Star® home is prohibitive to the homebuyer and suppresses market adoption rates.

High first costs are typical for energy efficiency products and services. Reducing high first cost is used as a strategy to increase market adoption rates, but the first cost is not a market barrier. In this case, high first cost results from market and demand uncertainty and poor economies of scale for this low-volume product. Incremental costs are incurred from manufacturing homes to meet high performance Energy Star standards (30% above IECC) and installing heat pumps rather than industry standard electric resistance heating.

Edison and MHRA estimate the incremental cost to manufacture an Energy Star® home is about $2000. MHRA initially planned to address the incremental cost and increase market adoption by providing a rebate to manufacturers which supplemented the $1000 Federal tax credit. The theory was that a modest incentive directed at manufacturers would have a multiplier effect, reducing wholesale price. This would enable retailers to purchase Energy Star® and standard manufactured homes at the same price and offer them to customers for the same price. During the Program, however, MHRA redirected the incentive to retailers and HVAC distributors without increasing the wholesale price. The $750 rebate ($400 retailer rebate and $350 distributor) offered some reduction in incremental cost to the retailer, but it was not able to place Energy Star® homes and standard manufactured homes on a completely even playing field in terms of price. Four of the twelve retailers interviewed pass some of the incentive on to homebuyers. Homebuyers were not interviewed for this evaluation; their opinions regarding incremental cost are not available.

HVAC contractors regularly oversize cooling units installed in manufactured homes, resulting in inefficient energy use.

This statement illustrates market barriers inhibiting installation of right sized cooling equipment with two components: bounded rationality, and, organizational practices or customs. HUD manufactured home building standards are less restrictive than California Energy Codes and standards do not require right-sized cooling equipment. MHRA reports that electric resistance heating is the industry standard practice, and on average, installers oversize cooling equipment .5 to 1.5 tons larger than required by Manual J.[42] Contractors may rely on standard practice or rules of thumb to make equipment sizing decisions. Properly sized cooling equipment will result in both energy savings and reductions in peak demand.

[42] MHRA, Proposal Abstract_RFI. Page 5. June 2006.

MHRA planned to overcome this practice of over sizing equipment by requiring properly sized cooling equipment in Program homes, and providing incentives to HVAC contractors. MHRA provided sizing toolkits to retailers. This strategy to increase the viability of energy efficiency investments was not effective. More than 50% of the rebate applications did not qualify, partially because the cooling equipment was not properly sized. Edison also reported that the properly sized cooling equipment is not available in some areas. This barrier is still needs addressing.

HVAC units are sold separately from the Energy Star® homes and retailers lose the opportunity to influence installation of energy efficient equipment.

This statement characterizes the misplaced or split incentives market barrier. In the manufactured housing industry, it is often standard practice for the retailer to sell the home without selling HVAC equipment. The HVAC contractor works with the purchaser through another venue. In these cases, it is impossible for the retailer to ensure that the homeowner will purchase the appropriate cooling equipment required by the Program.

MHRA planned to overcome this barrier that obstructed energy efficient HVAC equipment by tying the rebate to right sizing equipment. MHRA offered an incentive to HVAC contractors for properly sized heat pumps. In addition, the retailer's rebate was tied to the same requirement to install properly sized equipment. Few manufactured homes were certified. As noted above, contractors did not properly size cooling equipment and retailers did not understand the rebate process that tied the incentive to the requirements.

Other Obstacles

Other factors affected Program participation, including:

Housing Downturn

Manufacturer – Retailer Contractual Relationship

The housing downturn is the biggest obstacle to Program participation. The building industry is normally cyclic, and manufactured housing starts are tied to the economy along with the construction industry. According to the LA Times housing prices in Southern California dropped 27% from May 2007-May 2008.[43] Foreclosures have increased in California as in other areas of the United States. MHRA and Edison recognized the downturn in the market and revised Program goals downward.

Participating manufacturers and retailers expressed concern about the housing market. When asked if they thought the housing market would have an effect of the market of Energy Star® manufactured homes the majority of manufacturers and retailers thought it would. One manufacturer thought the downturn in the housing market would increase Energy Star® manufactured home sales. Three participating manufacturers and eleven retailers felt the downturn in the housing market has also affected the manufactured housing market. Eight of the

[43] <http://www.latimes.com/business/la-fi-homes17-2008jun17,0,2766175.story>

twelve retailers interviewed felt the downturn would affect the Energy Star® manufactured housing market in particular.

The manufacturer – retailer contractual relationship is a factor affecting retailer participation. Manufacturers and retailers reported they are contractually bound to work with one another. This can create a problem if one party wants to participate in the Program and the other does not. We asked the manufacturers and nonparticipant retailers if they were contractually bound to work with specific businesses. All four nonparticipant manufacturers interviewed stated they were contractually bound to work with specific retailers and this influenced their decisions. Three of the four stated their retailers were not marketing Energy Star homes. Three nonparticipating retailers stated they would have participated if their manufacturers participated.

Participant Experience with the Program and the Technology

Satisfaction

Overall, the participant retailers and manufacturers interviewed were pleased with the Program. Participant retailers were asked about homebuyers' response to the Energy Star® homes. Eight of the 12 retailers' stated homebuyer response was good, fantastic, or customers were very happy. These retailers rated their customers' satisfaction with Energy Star® homes between 7 and 10, on a satisfaction scale from 0 to 10, where 10 is the highest rating.

The most common complaints from retailers centered on the incentives. Retailers were unable to receive the rebate unless a properly sized HVAC unit was installed. The standard practice in this industry did not lend itself to retailer involvement in the HVAC purchase decisions. The retailers also reported a long wait between marketing and sale, and, the home's final location on the property. Once the home is located, on-site verification documents correct siting and installation of right-sized heat pumps. Only then is a home qualified for rebate, the paperwork submitted to Edison, and Edison commences its tasks to verify and process the rebate.

The five participating manufacturers stated the Program had not transformed the market, and offered suggestions. One manufacturer stated increased education would transform the market. One manufacturer said Energy Star® standards need to be mandated. Four of the five manufacturers stated the Program should offer additional rebates. Two manufacturers thought retailers should receive more incentives. One also thought appliance rebates should be added to the Program. Two manufacturers thought customers should receive rebates. One manufacturer recommended their company offer a uniform rebate on regional basis.

Free Riders

Free ridership could not be estimated because access to end-use purchasers was not made available to the evaluation team.

We asked retailers if they were selling Energy Star® manufactured homes before they participated in the Program and if they would have sold them without the availability of the incentive. Perhaps it is not appropriate to consider retailers as free riders at this point in the market development. However, our interviews indicate that the marketing of Energy Star® manufactured homes would occur even in the absence of the program. Eight of twelve

participating retailers were selling Energy Star® homes before the Program. All but one of the retailers - who did not know about the incentive - said they would have sold the Energy Star® homes without the incentive.

Analysis of Market Assumptions

This section discusses original market assumptions presented earlier, and the assessment of their salience given what was found in the process evaluation.

1. **Marketing that targets key stakeholder groups will convert them into Energy Star advocates.** Rapid Program growth will occur when everyone involved in the Energy Star home delivery process recognizes the benefits from their own perspective.

   MHRA proposed marketing strategies for four audiences: manufacturers, retailers, HVAC specifiers, and homebuyers. It may be true that over time targeted marketing will move the market. However, during the evaluation period, the Program did not experience the expected growth.

2. **The $400 manufacturer's incentive, together with the $1000 Federal tax credit, will cover most of the incremental manufacturing cost.** This will tip manufacturers to build Energy Star homes and participate in the Program.

   Manufacturers receive a $1000 Federal tax credit for each Energy Star manufactured home, and stated they did not require the additional $400. In practice, two of the five stated they were not offered any incentive to participate.

   The cost to convert and certify the plants as Energy Star facilities is quite high. Two of five respondents were already certified prior to participation. The program incentive itself was not enough to trigger the decision to certify the plant. Three of the five participating manufacturers stated they received the $1000 Federal tax credit for manufacturing Energy Star homes, and that the credit covered all or nearly all the incremental cost.

   One other manufacturer stated the corporate office received the tax credit and they did not make enough money for the tax break to make a difference. None of the manufacturers thought an additional incentive was necessary to participate in the Program. Two manufacturers thought rebates should go to homeowners and two thought rebates should go to retailers. These results clearly support MHRA's choice to change the incentive structure, moving it from the manufacturer to retailer.

3. **Shifting the $400 incentives from manufacturers to retailers will encourage them to sell Energy Star® homes.** The $350 HVAC contractor's incentive will lower the cost of properly sized efficient equipment. Installing heat pump cooling equipment is the main financial stumbling block to converting HUD-code homes to Energy Star homes with electric heat. Heat pumps are a costly increase over industry standard practice. Incentives will address this barrier.

   It does not appear that $400 incentive was the tipping point leading retailers to market Energy Star® homes. Eight of twelve respondents stated the rebate contributed to their decision to participate. Eight of twelve respondents also stated they were selling

Energy Star® homes before participating in the program, including who did not claim the rebate influenced their decision to participate. Eleven of twelve respondents also stated they would sell the homes without the incentive and the twelfth respondent didn't know about the incentive.

Energy Star® homes qualify for rebates once the installation is verified on site. Retailers stated they did not receive the rebate, didn't know who received them, or they sometimes passed the rebate on to buyers. In practice, retailers don't know if they will receive a rebate until after the home is sited, passes the installation verification checklist and inspectors verify the heat pump has been installed.

While MHRA and Edison moved incentives from manufacturers to retailers, they may still be misplaced. Edison's Program Manager proposed that the Program incent the buyer. Retailers have not been successful selling Energy Star® homes that meet Program requirements, including right-sized heat pumps. HVAC contractors often sell cooling equipment sometime later than the purchase.

Retailers also stated that they may not fill out rebate forms and may in fact be unable to complete paperwork. Retailers must fill out the Site Checklist and confirm the cooling equipment installation prior to submitting rebate paperwork. This may take a long time from home sale to verification, and retailers may not be in contact with buyers. MHRA proposes future Programs use a single rebate of $500 to reduce necessary paperwork.

4. **Installing heat pump cooling equipment is the main financial stumbling block to converting HUD-code homes to Energy Star homes with electric heat.** Heat pumps are a costly increase over industry standard practice. Incentives will address this barrier.

   MHRA's strategy to change standard practice involved encouraging retailers to sell Energy Star homes, while working with HVAC installers to properly size cooling equipment. Equipment dealers were offered a $350 incentive to install right-sized heat pumps. However, retailers may not be working with HVAC installers. Only two of 12 interviewed stated they mention increased energy efficiency of heating and cooling equipment as key marketing points. None referenced working with HVAC contractors to right-size heat pumps. In some areas, heat pumps were not available. This Program facet needs additional attention.

5. **Homeowners choose and purchase their cooling equipment from the retailer when they order their manufactured home.** The rebate is contingent on the homeowner purchasing properly sized cooling equipment. MHRA assumes that retailers can influence this decision.

   This assumption was a major weakness of the Program. Homebuyers often purchase cooling equipment separately, either working through the retailer or on their own. Retailers reported that buyers can purchase equipment later or do not purchase cooling equipment at all. It is very difficult for retailers to find out what cooling equipment was purchased after the home is sold and sited. Retailers may not understand that their incentive also depends on selling right-sized heat pumps. Two retailers specifically stated they don't know what cooling equipment gets installed.

Conclusions and Recommendations

Conclusion 1

The market structure is in place to introduce Energy Star® manufactured homes to the manufactured home industry and increase sales of Energy Star® homes. According to MHRA, nineteen (19) of the twenty manufactured home facilities shipping homes to Edison's service territory are Energy Star® qualified home manufacturing plants. Of the 19 facilities, 11 participated in the Program. Six (6) companies control the 19 manufacturing plants and MHRA has worked with all six. MHRA concentrated marketing efforts on the top 60 retailers, who closed more than 75% of the manufactured home sales in Edison's service area. The CHMI was actively involved in marketing and outreach to the California manufactured home industry. Nonparticipant retailers did not participate because their one manufacturer did not participate; the Program can recruit additional manufacturing facilities and retailers.

Recommendation 1

The market chain and structure for manufactured homes is ready for participation in a new construction program. Edison should continue to work within this structure to recruit both manufacturers and retailers.

Conclusion 2

Other market assumptions underlying the Program appear to be mistaken. Appropriate market research for the program was not undertaken.

One assumption was that manufacturers needed an incremental $400 incentive above the $1000 tax credit to tip them to certify their plant to produce Energy Star® homes. Since the incremental cost of producing an Energy Star home was around $2000, $1400 would be 'close enough' to convince them to participate. In practice, the $1000 Federal tax credit was enough incentive to retool their plants. Manufacturers recommended incentives go to retailers or consumers.

The Program required right-sized heat pumps and implementers assumed retailers sold HVAC equipment with the home purchase and could verify installation. MHRA provided retailers with materials to assist them to size cooling equipment correctly. MHRA also provided an equipment incentive. However, retailers reported they don't always know what equipment was installed, and some homes did not have heat pumps installed. It appears implementers did not fully research the means by which HVAC equipment is marketed, sold, and installed in new manufactured housing in California.

Recommendation 2

Even with a Program proposed by an industry group, they must meet the same requirements to fully research the market as other third-party proposers. As the program moves forward, additional market research should be conducted to understand the HVAC purchase points and decision making to provide the information to revise, as needed, the incentive process for right-

sized heat pump installation. Additional market research should also inform implementers about which market actors are the most appropriate recipients of rebates.

Conclusion 3

The rebate structure and payment process is not working properly. The incentive structure may still be inappropriate. Early in the Program implementers learned the manufacturers did not need the incremental Program incentive to encourage them to certify their plant. The $400 incentive was shifted to retailers. Seven of 12 retailers interviewed stated the rebate influenced their decision to participate. Even though eight of twelve retailers (67%) stated they were selling Energy Star® before the Program and eleven of twelve retailers would sell them without incentives, retailers are key players and homes are not sold without them. Most retailers had not received a rebate, even though some said they passed it on to customers. Others stated the customer receives the rebate. Five of the twelve respondents stated they did not know if the retailer should receive a rebate. Retailers are confused about the rebate process.

HVAC contractors are pivotal players in heat pump installation. However, the process by which the HVAC equipment is purchased and installed is not clear, and the proper recipient of the rebate is not clear. It appears some retailers are unable to perform or unaware of their role in explaining the cooling equipment requirements to the customer. This resulted in sales of Energy Star® homes which did not qualify for the Program rebate. Lastly, retailers cannot apply for rebates until the home is sited, installation verified with a Site Installation Checklist and heat pump installation verified.

Recommendation 3

The process by which HVAC equipment is marketed, purchased, and installed must be fully researched and understood to ensure right-sized heat pumps are installed. Additional interviews with purchasers, retailers, and HVAC contractors should be conducted to better inform Edison and implementers about this process, and to identify any changes to the HVAC rebate process.

MHRA and Edison should revisit the incentive structure, and re-examine the $350 HVAC incentive. This incentive should be directed to the HVAC contractor if the cooling equipment is purchased with the home. The incentive should be directed to the homebuyer if they purchase the appropriate cooling equipment at a later date.

MHRA should revisit marketing materials for clarity regarding Program and rebate requirements. They should conduct a reminder or re-education campaign for participating retailers to explain the rebate process. This re-education should include discussions about rebate amounts, who the rebate recipients are, cooling equipment requirements, paperwork requirements and expected waiting period before the payment is processed.

Conclusion 4

The availability of right-sized heat pumps for air conditioning may also be an issue to successfully meet program success.

Recommendation 4

Edison and implementers should encourage distributors to provide right-sized heat pumps that meet program requirements. HVAC contractors should be active market actors in this program.

Conclusion 5

From 100 to 200 homes were sold as Program-qualified Energy Star® homes, but the plant was not Energy Star® certified. There appears to be a breakdown in communications, requirements, and procedures.

Recommendation 5

Edison and implementers should review the process and determine where the breakdown occurred. Edison should consider retroactively qualifying the homes if the plant is certified and the homes meet all other requirements. Going forward, Edison should verify that participating manufacturing plants have the Energy Star® certification in place.

Conclusion 6

Three-quarters of participating retailers did not know the difference between HUD standards and Energy Star® standards, and some thought HUD standards were more energy efficient. Marketing and outreach needs to be improved so that all retailers understand the Program details.

Recommendation 6

MHRA should revisit marketing materials for clarity and perhaps include additional material or discussions regarding benefits of Energy Star® homes and how they differ from traditional homes built to HUD standards.

Conclusion 7

This evaluation effort could not be completed because purchaser data was not made available. Final estimates of free ridership, NTG, and normal awareness associated with evaluation cannot be completed without these data.

Recommendation 7

Edison should conduct surveys with participant homebuyers to discuss their awareness of energy-efficient housing in general, Energy Star® homes in particular, purchase decisions, incremental cost, and their HVAC purchase decisions. Similar surveys should also be conducted with nonparticipant homebuyers; participant retailers should make contact information available.

SCE 2558: Automatic Energy Review for Schools

Program Overview

The Automatic Energy Review for Schools (AERS) Program seeks to increase the energy efficiency of school building projects that only meet or marginally exceed state Title 24 building standards. It takes advantage of a narrow window of opportunity during review by the Division of the State Architect's (DSA). The AERS Program is implemented by the Benningfield Group – a third party implementer - and has four key elements:

- **AERS targets school building projects after they have been submitted to DSA for review but before DSA's approval.** All projects in the DSA pipeline are reviewed for their eligibility. According to the proposal, this is a period when design teams and schools can make changes in building design.
- **AERS identifies candidate building projects by mining the DSA database.** The DSA database contains information from the EnergyPro file submitted with the project to document compliance with the 2005 Building Energy Efficiency Standards. Benningfield Group uses this information to identify candidate projects for the Program.
- **AERS focuses on low-impact changes to building plans that provide maximum efficiency savings.** The AERS Program intervenes at a late stage in the design process when many building architects and engineers are reluctant to make significant changes to building designs. The AERS Program focuses on technologies with small impacts on design, such as variable frequency drives, lighting, and controls. Building plans can be modified to include these measures at a modest cost.
- **AERS provides incentives to help defray the costs of design changes.** The Program provides incentives to partially offset the costs of redesign and to cover the cost of the review fee DSA charges. AERS offers a stipend of $2,000 to cover the redesign costs and pays 100 percent of the DSA review fee up to $2,250.

Table 45 shows the approved Program budget. The Program's total budget is $825,264. Seventy percent of the budget is for the direct costs of implementing the Program.

Table 45. Program Budget*

Item	Budget Amount ($)	Percent of Total (%)
Administrative Costs	$179,120	22%
Marketing/Outreach Costs	$75,032	9%
Direct Implementation Costs	$571,112	69%
Total	$825,264	100%

*Source: Statement of Work, Approved 12/11/06.

Table 46 shows estimates of energy and peak demand savings from the Program. Edison does not claim energy savings until the projects are completed and the building is connected to electric service, which could be two to four years in the future. In the 2006-2008 IDEEA program cycle, AERS has a goal for committed projects of 24 to 27 schools. The net energy and peak demand savings goals for the Program are 1,167,466 kWh and 242 kW, respectively.

Table 46. Ex Ante Energy Savings*

Installation Goals	Period 1	Period 2	Period 3	Period 4	Total
Number of Commitments	4	8	8	7	27
Gross Peak Demand Savings (kW)	45.375	90.75	90.75	75.625	302.5
Gross Energy Savings (kWh)	218,900	437,800	437800	364833	1,459,333
Net Peak Demand Savings (kW)	36.3	72.6	72.6	60.5	242
Net Energy Savings (kWh)	175,120	350,240	350,240	291,867	1,167,466

*Source: Statement of Work, Approved 12/11/06. Period 1: From Notice to Proceed (NTP) through 06/31/07; Period 2: From 7/1/07 through 12/31/07; Period 3: From 1/1/08 through 06/31/08; Period 4: From 7/1/08 through 12/31/08

Program Design

The AERS Program targets a market segment where energy efficiency ". . . saturation is relatively low and the potential remains relatively large…."[44] The Program targets new construction, including alterations to school buildings that involve adding or modifying conditioned space. The Program serves all of Edison's service territory. The Program does not use funding from Savings by Design, Express Efficiency, or CHPS.

Most new design and retrofit Programs, such as Savings by Design, target early intervention, during the Programming and design development phases, to accomplish the greatest energy cost savings. As an alternative, the AERS Program utilizes the final design and review process to identify potential energy-saving design modifications during the last window of opportunity where changes to building project drawings can occur. The Program offers plan review technical assistance to review the project and provide suggestions for cost-effective improvements to the building design team.

The Technical Proposal states that "school designers are accustomed to entertaining the idea of low-impact design changes at this point in the process due to comments and requests from DSA engineers that dictate changes in order to secure project approvals."[45] DSA records show projects submitted for review that marginally exceed Title 24, which are not requesting supplemental funding for measures exceeding Title 24. These projects represent lost opportunities the Program intends to recapture.

Technologies considered in the design review include high efficiency packaged HVAC units utilizing VFD technology to reduce fan energy, lighting, and day lighting controls, including

[44] Benningfield Group, Stage 2 Request for Proposals, Modernization and New Construction Efficiency Enhancement Programs for Schools, 2006. Page 9.

[45] Ibid. Page 3.

occupancy sensors. Other measures will be considered on a case-by-case basis, including exterior lighting, pool equipment, and other components that do not affect conditioned space.

Implementation activities involve the Division of the State Architect's offices where intake architects screen out projects already applying for additional energy efficiency funding to eliminate double dipping and projects with a low return on investment. DSA requests a copy of the EnergyPro file submitted with the documents. Benningfield's technical review team reviews the candidate buildings and proposes changes. It was assumed that measure installation could be verified through DSA's monitoring of the final approved plans, change orders and building inspections.

The Program also proposed to design and implement a hand-held computer system to assist DSA inspectors to monitor acceptance tests and document measure installation. This hand held is a prototype utilizing file exchange with EnergyPro software.

Market Assumptions

A number of key assumptions underlie the AERS Program.

- **There are additional opportunities for energy savings in school building projects.**[46] Despite growing awareness of energy efficiency and availability of design assistance through Edison's Savings by Design Program, many schools do not take advantage of cost-effective opportunities for energy savings.

- **Architects and design teams are open to making changes in building designs at a late stage in the design process.**[47] The Program seeks changes in building design after the school district has submitted its plans for DSA review but before the agency approves the plans. A premise of the Program is that builders and designers are willing to incorporate changes into their building plans at this late stage. According to the proposal, the DSA review stage is a time when "changes to building project drawings normally occurs.

- **A large incentive is not necessary to encourage participation in the Program.** The plan review conducted under the Program utilizes DSA's review and approval process to identify potential energy-saving design modification opportunities, during a time in the process where changes to building project drawings normally occur.[48] Therefore, incentives are provided to the design team to offset their time to make the necessary plan changes and to the school district for participating in the program. AERS offers a stipend of $2,000 to cover the redesign costs and pays 100 percent of the DSA review fee up to $2,250.

[46] Benningfield Group. Stage 2 Request for Proposals. Page 4.

[47] Benningfield Group. Abstract in Response to SCE/IDEEA. Page 2. Stage 2 Request for Proposals. Page 3.

[48] Benningfield Group. Stage 2 Request for Proposals. Pages 2,

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Automatic Energy Review for Schools Program. The purpose of the process evaluation is to document the Program design and its development, examine barriers and opportunities and to make recommendations for program improvement. The evaluation involved document review, the development of a program logic model, researchable issues and indicators, a process flow, and discussions with program managers and implementers, key market actors, participants and nonparticipants.

Process Evaluation Methodology

We evaluated the AERS Program using the results of interviews and review of key Program documents provided by Edison. We studied the AERS Program proposal, the statement of work, and monthly and quarterly reports to better understand the Program goals, implementation, and progress towards meeting the goals.

We spoke with a number of individuals and organizations involved with the Program. We conducted personal or telephone interviews with the Edison Program manager, the Program implementer, a DSA representative, participating and nonparticipating school districts, and design teams working for participating and nonparticipating school districts. Care was taken not to interfere with ongoing activities between the implementer, design and engineering teams, and Program participants. The interviews results were entered into a spreadsheet, tabulated, then analyzed. The small sample sizes prevent us from performing formal statistical tests on the researchable issues identified. . Nonetheless, the data convey useful information about participant and nonparticipant motivations.

The Edison Program Manager interview discussed the overarching goals of IDEEA/InDEE Program, changes to the Program, including incentive structure and marketing strategies, customer response, and possible improvements for the Program. The questions for the Edison Program Manager and the third-party Program Implementer focused on the objectives and implementation of the Program and opportunities for improving the Program.

Program implementers interviewed included staff of the Benningfield Group. This Implementer was responsible for the Program's design and development, and worked closely with DSA and the design and review teams. The Implementer interview focused on marketing strategy, implementation, incentive structure, customer response and potential improvements. Program changes and experience within the manufactured housing industry were discussed.

The Edison Program Manager and third party Implementer interviews included discussions about issues raised during an earlier Program evaluability assessment. In addition, interviews included two key questions. First, was the Program implemented as designed, according to the original proposal and scope of work, and as reflected in the logic model and process flow diagram? Second, what are the lasting effects of the Program?

The questions for the DSA representative focused on the data referral process. Questions for these actors aimed to improve our understanding of the Program and to identify key questions and issues to discuss with participants, nonparticipants, and design firms.

We used Benningfield's Program tracking reports to identify both participating and nonparticipating schools and design teams. We asked respondents about their decision to participate, market barriers, business practices, free ridership and spillover. The main goals of interviewing the participant schools were to determine how the market actors experienced the Program, and, to update the logic model and the process flow diagram to reflect the Program as implemented. Surveys assessed their Program experience and satisfaction. Nonparticipant schools assessed reasons for not participating and potential future participation.

Cadmus (formerly Quantec, LLC) developed an interview guide or survey for each group. Interview guides are included in Appendix A.

Interview Sample Development and Disposition

Cadmus conducted interviews with the Program Managers and Implementers, participants, nonparticipants, and market actors. We based survey sample sizes on information from Edison and Benningfield Group about the total population of each respondent group.

We developed interview guides with different questions for each type of Program actor. The interviews took place between January and June 2008.

Table 47 shows our goals for the targeted number of interviews and the number of interviews actually completed by each type of actor. Our goal was 21 interviews, which included interviews with the census of participants, five interviews with nonparticipants, and five interviews with partial participants.

Table 47. Targeted and Completed Interviews

Actor	Goal	Achieved
Program implementer	1	1
Edison Program manager	1	1
DSA representative	1	1
Program participants*	6	5
Program nonparticipants	5	1
Program partial participants	5	6
Participating design team	1	2
Nonparticipating design team	1	1
Total	21	18

Three customer types were identified for this evaluation. A ***participating*** school district is defined as one that incorporated at least some of the recommendations of the Program implementer into its building plans and received an incentive payment or is enrolled in the Pre-Program Agreement or Program Agreement stages of the Program. A ***nonparticipating*** school district is one that decided not to participate after contact from Benningfield. A ***partial***

participant is one that enrolled in the Program but dropped out before completion. These would include, for example, all those who dropped out of the Program sometime during discussions (e.g., at the Pre-Program Level 1 Report or Program Agreement stages).[49]

Table 48 shows the status of the projects in the AERS tracking database as of April 8, 2008. Since the beginning of the Program in 2007, Benningfield Group identified 282 projects in the DSA database that were potentially eligible for the Program. Upon further review, 73 of these projects proved ineligible for the Program. Disqualifications included, for example, estimated savings that were too low, no HVAC or lighting in the projects, the customer participated in Savings by Design or other Edison program, the project involved a portable classroom, or the customer was outside of Edison's service territory.

One-hundred thirty-eight projects were prospective, that is, eligible but not contacted by the implementer yet. In April 2008, 12 projects were in the pre-Program stage undergoing a preliminary energy analysis of their building plans in preparation to present a Level 1 Report. Another six projects had Program Agreements signed. Six projects had made commitments to install AERS energy efficiency technologies and received incentive payments.

Table 48. Program Participation and Attrition through April 8, 2008

Participation Attrition	Number of Projects
Projects referred from DSA	282
Not qualified	73
Refused to participate	36
Dropped out at various stages	13
Prospective - eligible but not yet contacted	138
Pre-Program Agreement (Level 1 Report)	12
Program Agreement Signed (Level 2 Report)	4
Commitment Agreement Approved	6

Source: AERS tracking system, April 2008.

As shown in Table 48 and Table 49, a total of 49 building projects refused to participate (n=36) or dropped out of the Program (n=13). These projects were in 29 different school districts.

Table 50 shows stages at which nonparticipants and partial participants dropped out of the Program. Almost three-quarters of potential participants refused to participate when first contacted by the implementer. This contact sought permission to talk with the designers to conduct a preliminary analysis and the Level 1 Report. Six percent (three projects) dropped out when they reviewed the Level 1 report. Of the remaining projects, 10 (which is 20 percent) dropped out of the Program after signing a Program Agreement.

[49] The process flow discussion and chart in Figure 10 show the stages at which Program reports are prepared. The Level 1 Report is the technical team's review report presented to the customer. The Program Agreement is signed after the Level 1 Report is accepted. The Level 2 Report is a savings potential report, generated after the Program Agreement.

Table 49. Attrition Analysis of Nonparticipating and Partial-Participating Schools

Last stage completed (n=49)	Number	Percent
Nonparticipant: Did not complete any stage: refused participation when contacted	36	73.5%
Partial participant: Preliminary analysis - Level 1 Report	3	6.1%
Partial participant: Program Agreement	10	20.4%
Total	49	100%

Source: AERS tracking system, April 2008.

We obtained contact information for participants and nonparticipants from the AERS database.[50] Before interviewing, we confirmed respondents were familiar with the Program and the key decision makers. Each entry in the Implementer's tracking database represented a building-level project. That is, each building is considered a project. School districts could have more than one project, and could, therefore, be included in the database more than once.

Table 50 shows the number of projects and school districts included in the database. Both participants (with plans approved and incentives paid) and partial participants had one district with two building projects. Nonparticipants included 10 districts with multiple projects. One district involved 12 building projects.

Table 50. Projects and School Districts

	Pre-Program Agreement	Program Agreement	Plans Approved	Nonparticipants	Partial Participants	Total
Projects	12	4	7	36	13	72
School Districts	5	3	6	15	11	40

Source: AERS tracking system, April 2008.

As Table 51 (on the following page) shows, we contacted all Program participant school districts with plans approved and incentives paid (n=6) and succeeded in interviewing five. The facilities manager of the school district that we did not interview was seriously ill and unable to speak with us; no one else at the school district could be identified who was familiar with the Program. Each participant interviewed worked with a different design and architectural firm.

[50] Implementers provided access to their tracking database for purposes of evaluation.

Table 51. School District Survey Sample Disposition

	Participant Districts		Nonparticipant Districts		Partial Participant Districts	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Contact list from Benningfield Group database	6	100%	15	100%	11	100%
Eligible sample of projects	6	100%	15	100%	11	100%
Completed surveys	5	83%	1	7%	6	55%
Refusals	0	0%	0	0%	2	18%
Not available/no answer/busy/answering machine	1	17%	4	26%	2	18%
Did not attempt to reach	0	0%	10	67%	1	9%

Reaching partial participants and nonparticipants was more difficult. We contacted 11 school districts that dropped out of the Program and completed interviews with six districts. The six districts were affiliated with seven building projects (Table 50). Of these six partial participants interviewed, one dropped out of the Program after reviewing the Level 1 Report, and five dropped out after signing a Program Agreement.

For the nonparticipants, we attempted to reach eight school districts. We succeeded in reaching and interviewing one district.[51] The implementer's tracking database records reasons for refusal, so some data was already available to assess refusal reasons. Therefore, we concentrated survey efforts on contacting partial participants to learn more about why they dropped out of the Program. Table 56 summarizes the refusal reasons.

For the remainder of this report, we combine nonparticipants (one respondent) and partial participants (six respondents) into a single category and analyze their experiences together. In our sample of partial participants and nonparticipants, each employed different architects.

We analyzed the list of nonparticipant and partial participant building projects and found a large number of nonparticipating projects employed the same architectural firm. Seventeen of the 49 nonparticipating and partial participant building projects shown in Table 49 employed the same architectural firm. In addition, this firm was the architect for the nonparticipating district with 12 projects. To understand this firm's reasons for not participating and impressions of the Program, we spoke with an architect employed there.

We also interviewed architects working on two participating building projects. The design teams have significant influence with school districts and, thus, their perspectives on the market for energy-efficiency technologies are important.

[51] Many district representatives were not available when we called, and although we left detailed messages, they rarely returned our initial or follow up calls.

Process Evaluation Results

Program Theory

The Program theory supports the Program and informs Program development and implementation. A successful Program creates change, and the Program theory explains what is supposed to happen and how it is supposed to happen.

The Program theory for the AERS Program is straightforward and can be described as follows:

> By systematically identifying all projects in the existing DSA approval pipeline when the design team is open to making changes and recommending enhancements to improve energy efficiency, the Program expects to change initial designs of projects awaiting approval, and these design changes will lead to increased energy and demand savings for the specific project. This Program is then expected to influence the design of all subsequent projects produced from that district and design team, achieving additional energy and demand savings.

Logic Model

The Program logic model shown in Figure 10 highlights the key features of the Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The inputs for the Program are funding and other support from Edison, and the expertise of the Program implementer.

The elements of the logic model are:

- Activities that the Program undertakes. The primary activities of the Program are to identify building projects that marginally exceed Title 24 building standards from the DSA database, propose changes to the building designs to increase energy efficiency, and work with school districts and design teams to incorporate the changes into building plans.
- Outputs produced by Program activities. The activities result in enhanced design options and energy savings analyses, the presentation of the design options and potential savings to the school district, and DSA's acceptance of any changes to building designs.
- Outcomes that result:
  - In the **short term**, outcomes are commitments to install energy efficiency measures from school districts. The Program has a goal of between 24 and 27 building projects.
  - **Intermediate** outcomes include utility knowledge and experience in marketing this type of Program, and school district and design team awareness of energy efficiency. The Program theory posits ongoing effects in the form of energy efficiency enhancements to future building projects. The Program could also serve as a model for similar Programs targeting other public building projects.
  - The **long term** outcomes are the construction or modernization of energy efficient schools and annual net energy and peak demand savings of 1,167,466 kWh and 242 kW, respectively. The Program's external effects are related to energy and peak

demand savings and possibly include lower generation costs, greater system reliability, reductions in pollution, and improvements in human health.

Figure 10 (on the following page) illustrates the linkages among the elements in the logic model and presents a list of progress indicators which can be used to evaluate the elements and their linkages.

Figure 10 Automatic Energy Review for Schools (AERS) Logic Model

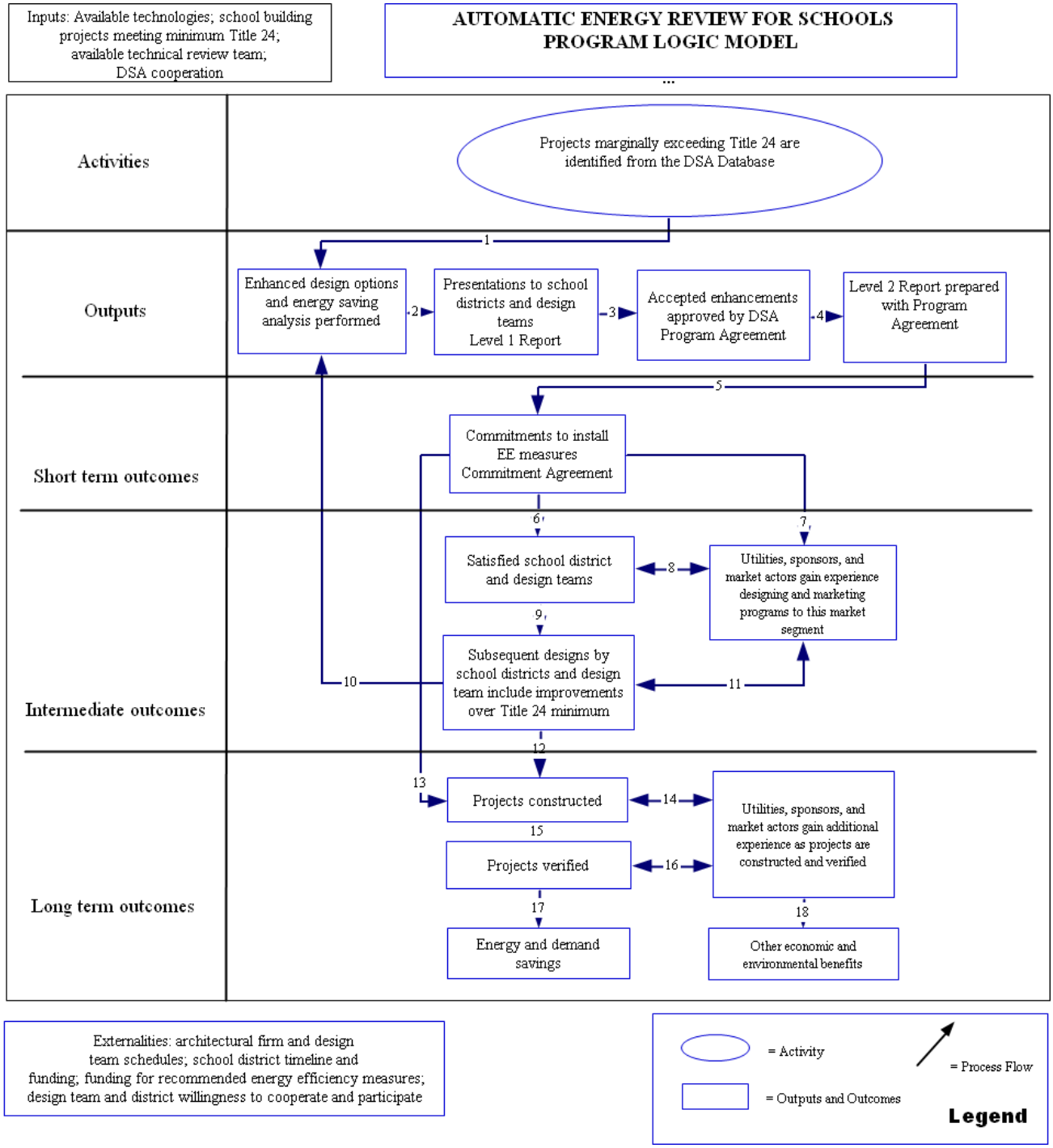


Table 52. Automatic Energy Review for Schools Logic Model Links: Researchable Issues and Indicators

Link	Researchable Issues	Indicators
1	Identifying projects marginally exceeding Title 24 standards provide the opportunity for enhanced design options and energy saving analysis.	Potential projects identified.
2	Presentations to school districts and design teams (Level 1 Report) based on the enhanced design options and energy saving analyses provide information and an invitation to participate.	Presentations made to school districts and design teams, Level 1 Reports produced.
3	Potential participants aware of Program and benefits; Level 1 Report presentations address information barrier; potential participants provided opportunity to approve proposed enhancements.	Accepted enhancements approved by participant and DSA.
4	Level 2 Reports with Program Agreement, approved and accepted enhancements provides additional Program information, promotes awareness of energy efficiency technologies.	Number of Level 2 Reports prepared.
5	Providing analysis and reports will educate potential participants , resulting in Commitment Agreements	Number of signed Commitment Agreements.
6	Committed project will be implemented. School districts and design teams are educated about energy savings, reducing information barriers.	Market actors increase knowledge of energy efficiency technologies. Satisfaction levels.
7	Educating key utilities, sponsors, and mark actors gain experience designing and marketing Programs to this market segment.	Key Program players apply knowledge of the market; Program strategies evolve to address market barriers.
8	Educated school districts and design teams communicate with utilities, sponsors, and market actors, increasing knowledge in this market segment.	Communication between actors; knowledge of market segment. Increasing number of school districts and design teams hear about the Program.
9	Subsequent designs by school districts and design team include improvements over Title 24.	Decreasing energy consumption; decreasing peak load, decreasing homeowner utility bills..
10	Subsequent designs include energy efficiency analyses.	Additional projects and potential energy savings identified.
11/14	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment.	Performance uncertainty; knowledge and awareness. Key Program players apply knowledge of the market; Program strategies evolve to address remaining market barriers.
12/13	Projects constructed with above-code technologies.	Number of constructed projects; number of above-code technologies installed.
15	Constructed projects with verified energy savings replace code with above-code technology reduces performance uncertainty, knowledge and awareness.	Number of completed projects, number of measures installed correctly.
16	Utilities, sponsors, and market actors gain additional experience as projects are verified.	Knowledge gained through the verification of projects and incorporation of above-code technologies.
17	Energy and demand savings.	Decreasing energy consumption; decreasing peak load, decreasing homeowner utility bills.
18	Market adoption leads to long-term energy and environmental impacts.	Reduced energy use; reduced emissions.

Process Flow

As distinct from the Logic Model, the Program process flow describes the specific work flow and steps in the operation of the Program. The process flow diagram, Figure 11 (on page 114), shows that the Program begins when the Benningfield Group identifies candidate building projects for AERS by searching the DSA database. The database contains building projects submitted for review but not yet approved by DSA. Benningfield Group applies several criteria to determine eligibility for the Program. These criteria include:

- **Location:** The school must be located in the Edison service territory.
- **Active Review:** DSA must be actively reviewing the project.
- **Costs:** The building costs must be at least $300,000.
- **Project Types:** All new and modernized buildings are eligible, except relocatable building projects, those enrolled in Savings by Design, or those applying for other energy efficiency funding.

After identifying an eligible building project, Benningfield Group contacts the school district, introduces the Program, and asks for permission to speak with the architectural and engineering teams. The design team provides information to Benningfield Group about building specifications needed to complete a preliminary energy analysis. The preliminary analysis generated with EnergyPro and eQuest software yields a list of feasible efficiency measure upgrades, estimates of energy savings, a budget, and a project schedule. Benningfield Group presents the results of its assessment to the client in a Pre-Program Level 1 Report.

The school district reviews the Level 1 Report and can move forward with some or all of the recommendations. If the school district goes forward, Benningfield Group draws up a Program Agreement incorporating recommendations from the preliminary assessment. Once the district signs the Program Agreement, the energy savings, costs, and budget estimates found in the Level 1 Report are refined as needed, product literature is distributed, and a savings potential report is generated, known as a Level 2 Report.

The next step is to revise and resubmit the drawings to DSA for approval and to reach a Commitment Agreement between Benningfield Group and the school district. The Commitment Agreement reflects any changes to the recommendations, energy savings, cost, and budget estimates reflected in the Program Agreement.

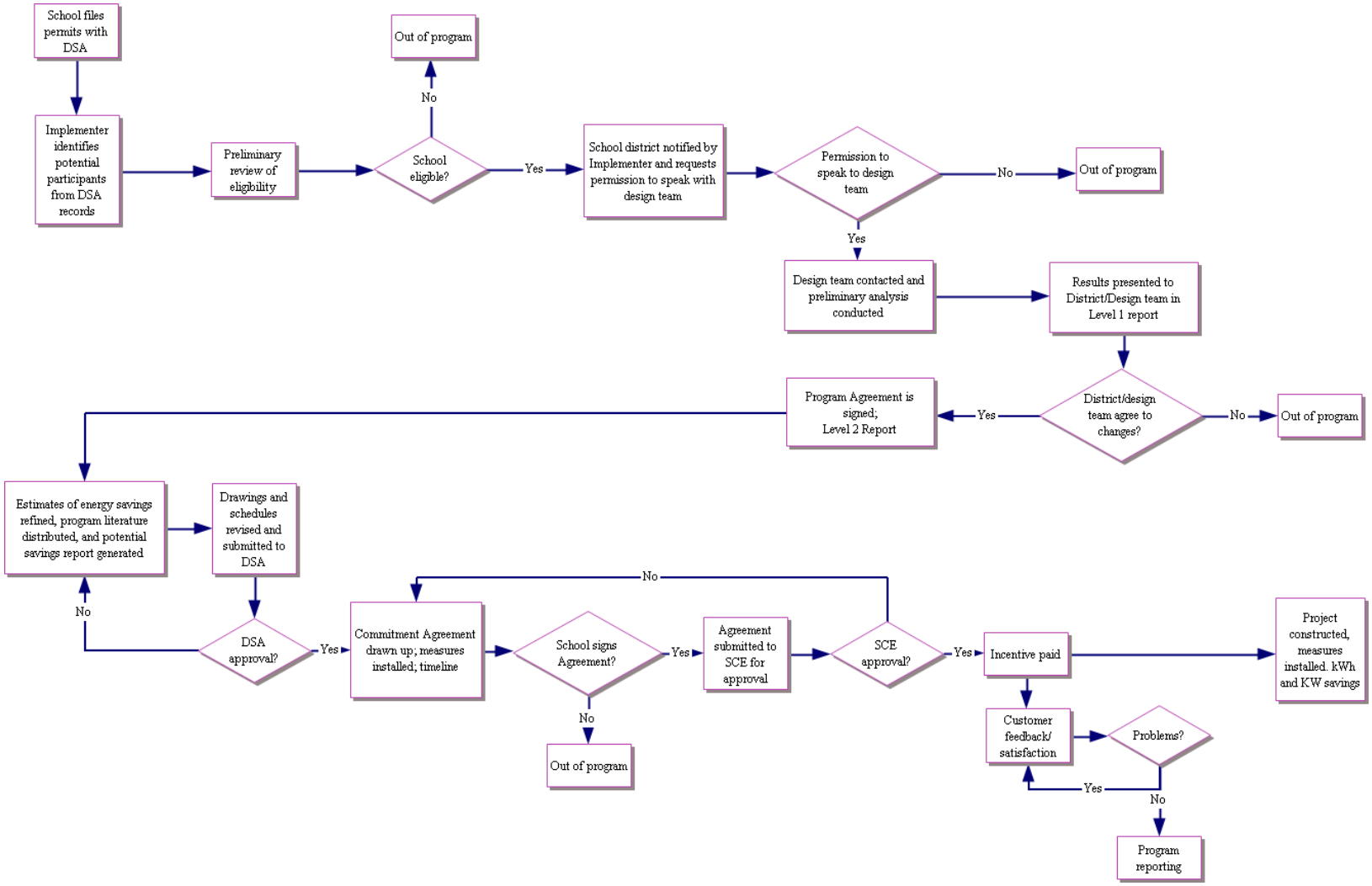
After the Commitment Agreement is signed, the final step is submission of the Commitment Agreement to Southern California Edison (Edison) for approval. After Edison approves the agreement, the school district receives the incentive payment. AERS offers a stipend of $2,000 to cover the redesign costs and pays 100 percent of the DSA review fee up to $2,250.

School districts can drop out of the Program at any point before signing the Commitment Agreement. In addition, there are a number of safeguards in place to minimize the likelihood schools receiving incentive payments renege on their commitments. For instance, DSA will

notify Benningfield Group of change order requests on its projects and have the opportunity to intervene.

Benningfield Group tracks the progress of school districts through the Program using its Web-based AERS tracking software. The tracking Web site includes project data, measure data, contact information, documents, and a correspondence log.

Figure 11. Automatic Energy Review for Schools (AERS) Process Flow



Evaluability Assessment

An evaluability assessment conducted for Edison in the first half of 2007, during early Program efforts, listed four potential issues that could affect Program evaluability.[52] Issues related to the measures proposed, and measure simulation data, issues affecting energy savings and the impact evaluation. None of these issues identified were deemed to be critical to the program's success, but were rather typical of new program database tracking issues. Ultimately, however, the Program will be judged by energy saving through measures actually installed. To this end, special care should be taken that the data tracking include measures recommended, measures installed, and measures originally proposed, etc, in sufficient detail so best practices in follow-up process evaluation and impact evaluation can be followed.

Issue 1: The Program is a new construction design review; therefore, the assessment recommended a careful review of the proposed measures to ensure that mandatory measures required by Title 24 are not encouraged.

> ***Resolution 1.*** A review of the Implementer's database shows 16 projects were not qualified because above-code savings were too low. It appears that the Program is encouraging above-code measures.

Issue 2: The evaluability assessment found the Program proposed to refer participants to other Edison programs. Although double-dipping is discouraged, this program and the referred program must record the referral and the source of lead, respectively, so that only one program claims savings.

> ***Resolution 2.*** Double-dipping is not a problem. Participants cannot participate in both Savings by Design and AERS.

Issue 3: The Program relies on one technology, installation of VSDs on distribution boxes, for nearly 80 percent of the proposed savings. Edison should closely review the code requirement and the baseline usage and savings on an ongoing basis. Measures such as the installation occupancy sensors, VSDs, and occupancy sensors in PTAC equipment might not operate coincident with Edison's peak summer period. Edison was made aware of minimal demand savings potential of VSDs and occupancy based PTAC sensor controls.

> ***Resolution 3.*** These issues cannot be addressed until buildings are completed and the post-installation M&V and impact evaluation are conducted. Projects should be reviewed to ensure that an appropriate demand diversity factor is used, and post-installation measurement is carried out to establish coincident demand savings.

Issue 4: The Evaluability assessment recommended that the implementation contractor maintain a DSA-referral database and invitation and attendance records at workshops.

[52] Quantec, LLC. Early Assessment of 2006-2008 InDEE/IDEEA Programs, Nov. 2007.

Resolution 4. The data tracking database is extensive. Program status is tracked, and notes are kept that describe why participants drop out and why others refuse to participate. Participation in workshops is not.

Program Modifications

In general, Benningfield Group implemented the Program as designed, and no significant modifications were undertaken. However, the implementation plan indicated Benningfield Group would set up an automatic referral system in which DSA would screen out projects ineligible for AERS. Instead of using an automatic referral process, the Program implementer identified potential projects by mining the DSA data manually. Identifying eligible projects in this way was resource intensive, and an automated process is still a desirable addition.

Marketing and Participation Decisions

Awareness

A potential barrier to technology adoption in any Program is awareness of the benefits of energy efficiency technologies. In this Program, however, awareness does not appear to be a barrier. Most school districts are very energy conscious. Four of five participating schools we interviewed indicated they were aware or very aware of energy efficiency. Six of seven nonparticipating or partial participants reported the same. The population AERS target is, therefore, very aware of energy efficiency, and should be receptive to opportunities for energy savings.

Marketing

Benningfield Group screens the DSA database to identify potential projects for the Program, then phones the school district to introduce the Program and to ask for permission to speak with design team.

Once Benningfield Group contacts the districts, they must persuade key decision makers of the Program benefits. These decision makers may include the school district facility manager, the superintendent, the school board, the district financial administrator, and the design and engineering teams. Much of the Program marketing occurs through the production and distribution of the Phase 1 Report, which describes opportunities for energy savings. Benningfield Group also keeps in close contact with key decision makers through email. The Correspondence Log in the AERS tracking system documents communication between the implementer and prospective customers.

Interviews confirmed the Program was marketed through direct phone contact. Table 53 shows how key decision makers first heard about the Program. Almost half of participants and nonparticipants recalled direct contact by the Program implementer. Twenty-five percent remembered hearing about the Program from Edison and another 25 percent from their design team. Benningfield Group has pursued indirect marketing strategies as well. For instance, the implementer has attended school conferences to promote the Program. However, none of the respondents stated they heard about the Program via school conferences.

Table 53. Initial Program Contact

	Participants (n=5)		Nonparticipants and partial participants (n=7)		Total (n=12)	
	Frequency	Percent of Respondents	Frequency	Percent of Respondents	Total	Percent of Respondents
Phone call from implementer	1	20%	4	58%	5	42%
Design team	2	40%	1	14%	3	25%
Utility	2	40%	1	14%	3	25%
Other	0	0%	1	14%	1	8%

Source: Surveys of participants , nonparticipants, and partial participants.

Decision Making

District facilities managers or directors of maintenance, sometimes in consultation with the Board of Trustees or superintendent, usually make the decision to participate in the Program. Table 54 shows who made the participation decision.

In the majority of cases for both participants and nonparticipants, the district building manager was responsible for the participation decision. Building managers made the participation decision for 80 percent of participants and 58 percent of nonparticipants.

Table 54. Responsibility for Participation Decision

	Participants (n=5)		Nonparticipants and partial participants (n=7)	
	Frequency	Percent	Frequency	Percent
District building manager alone	4	80%	4	58%
District building manager in consultation with superintendent	0	0%	1	14%
Financial administrator	0	0%	1	14%
Director of maintenance	1	20%	0	0%
Energy manager	0	0%	1	14%
Consulted with design team*	2	40%	4	58%

*Not an independent group; those consulting with a design team are included in the categories above.

Although school district managers were responsible for the participation decisions, they often consulted with their architectural and engineering teams. The opinions of architects and engineers carried substantial weight because of their technical expertise. Two of five participants said they relied on the advice of their design teams before making a decision. Four of seven nonparticipants did the same. Not surprisingly, participants generally received positive recommendations from their design firms, while nonparticipants generally received negative recommendations.

We surveyed schools about factors affecting their participation decisions. As Table 55 (on the following page) shows, participants indicated the most important factors were Program participation costs and incentives (3 respondents, 60 percent), energy bill savings (2, 40 percent), concern for the environment (1, 20 percent), and interest in energy efficiency (1, 20 percent). For partial participants and nonparticipants, the most important factors were participation costs and

incentives (3, 43 percent), energy bill savings (2, 29 percent), return on investment (2, 29 percent), technical considerations and barriers (2, 29 percent).

Table 55. Reasons for Participating or Not Participating

	Participants (n=5)		Nonparticipants and partial participants (n=7)	
Reason	Frequency	Percentage	Frequency	Percentage
Participation costs/incentives	3	60%	3	43%
Energy bill savings	2	40%	2	29%
Return on investment	0	0%	2	29%
Concern for environment	1	20%	0	0%
Interest in energy efficiency technologies	1	20%	0	0%
Technical considerations/barriers	1	20%	2	29%
Other	1	20%	2	29%

Source: Surveys of participants (n=5) and nonparticipants and partial participants (n=7), multiple responses allowed.

Financial considerations were paramount for participants, partial participants, and nonparticipants. Every respondent indicated at least one of costs, savings on energy bills, or return of investment affected their decision. The importance of financial factors suggests additional financial incentives might increase participation in the future.

We asked participants what the primary benefits of the Program were. Participants reported a principal benefit was the outside review of their building plans by an energy efficiency expert. Three respondents also said a main benefit was saving energy. One district reported it liked being on the cutting edge of energy efficiency.

We analyzed information in the AERS tracking database to understand why school districts refused to participate in the Program. When school districts refused to participate, the Program implementer made short notes about their decisions in the project list and correspondence log.

Table 56. Reported Reasons for Refusal

Last stage completed (n=36)	Number	Percent of schools with reasons indicated
No funding	1	4%
Over budget	1	4%
Uncooperative architect	9	35%
Uncooperative district	11	42%
Uncooperative district and architect	4	15%
No comments in tracking data base	10	-
Total	36	100%

Source: AERS tracking system, April 2008.

Table 56 shows that in 92 percent of cases, the architect, school district, or both were uncooperative. An architect or school district could be uncooperative for several reasons, and the

correspondence log provides more detailed information about the concerns of architects and schools. The remaining 8 percent of refusals were due to a lack of funding or budget constraints.

The following representative comments from architects were recorded in the correspondence log. The comments about not participating are revealing and suggest many architects are skeptical of the AERS Program and utility energy-efficiency programs in general. (Identifying references were removed.)

> *"…[the] architect will not participate in anything that is not mandatory. He spoke to district and got their OK to opt out."*

> *"I called the architect's office… He wanted to know what benefit there was for the designer to participate in this Program."*

> *"the architect is 'not interested in working with Edison projects, ...hasn't panned out in the past....savings not worth it.....too much hassle...reimbursements to design team never enough to cover designers costs'."*

The following comments were made by school district representatives as recorded in the AERS Correspondence Log.

> *"[The district representative] repeated his desire to opt out. Does not see any benefit from the Program, 'all our systems...are efficient to today's standards.'"*

> *"Spoke with district rep and he said they are already working with an energy company on this project and is not interested in this review. Has worked with Edison in the past and not interested in this Program."*

> *"They have decided to opt out. Hired own consultant for Title 24."*

In addition, many of the partial and nonparticipants stated that they were already including energy efficiency measures in their design plans, or that the measures recommended were not cost-effective ant the payback period was too long.

Program Delivery and Implementation

Program delivery involves general administration, marketing, and direct implementation of the Program. Much of Program administration involves communication with Edison and Program reporting. (For example, the Program implementer and Edison have communicated repeatedly about how to avoid overlap with the Savings by Design Program.)

Benningfield Group's first task was plan review, identifying prospective participants. Implementers disqualified 62 projects. The most common reasons included:

- Savings too low (16 projects)
- No HVAC or lighting (11 projects)

Participated in Savings by Design or other Edison program (9 projects)

Portable (relocateable) classrooms (8 projects)

Outside Edison's service territory (6 projects)

Project on hold (4 projects)

Once qualified, marketing activities involved communication with districts and design teams. These efforts are continuing, and the implementer continues to upgrade and improve the Website and tracking database. The internal AERS tracking database is easy to navigate and provides very detailed information about the projects. It is an excellent resource for tracking participation and evaluating the Program. No participants volunteered comments about the client-facing website.

Benningfield's Program implementation involves searching the DSA project database, producing and distributing preliminary savings reports, Program Agreements, and Commitment Agreements. At the end of the first quarter of 2008, the Program implementer had 12 projects in Pre-Program Agreement phase (Level 1 Report), six Program Agreements, and six projects with Commitment Agreements approved.[53]

The 2008 First Quarter Report Narrative provided by the implementer indicated the Program is on target to meet its participation goals and the savings anticipated from the participants' completed buildings incorporating the recommended measures. The Program has commitments for 62 percent of its kWh and 42 percent of kW savings goals. However, the Program is well behind its goal of obtaining Commitment Agreements for 24 to 27 projects. In addition, keep in mind energy and peak demand savings are based on commitments to install measures, and that Edison will not be able to claim credit for the energy savings until the construction is complete and measures are installed. Building construction can take two to four years. Edison does not expect to claim savings for the participants committed during the 2006-2008 Program cycle until the 2009-2011 Program cycle.

Implementers reported four primary reasons that the Program was falling short of enrollment and savings expectations.

- **It has been difficult to obtain information needed for the energy analyses.** The architects and engineers have this information, but the Program implementer must obtain district approval before speaking with them. Benningfield Group has learned the mechanical engineer is usually the best source of this information. The need to contact the district and the architect before speaking with the mechanical engineer has added another step to, and slowed down the process of producing the Level 1 Report.

- **School districts are bureaucratic and slow to make decisions about changes in building plans.** Often the building or facilities manager must obtain the approval of the

[53] Since the beginning of the first quarter 2008, one more Commitment Agreement was signed and approved, bringing the total to seven.

superintendent or school board before a Program Agreement can be signed or a design change can be approved. Benningfield Group indicated this has been a problem with the Los Angeles Unified School district, the largest in the state. Benningfield Group has had difficulty reaching the right decision makers in this district.

- **Projects are schedule driven, and the priorities of the designers may not include energy efficiency.** Benningfield Group sometimes loses projects because architects maintain rigid work schedules. Many architects fear falling behind schedule if they participate, and are unwilling to fall behind schedule to improve the energy efficiency of their buildings.

- **Key decision makers in school districts are absent during the summer, making it difficult to move forward with recommended changes.** Benningfield Group believes this problem is inevitable but can be managed by timing contacts with school districts appropriately.

Our interviews with designers confirmed many of the Program implementers' perceptions about low participation rates.

First, we found many building managers must get the approval of the superintendent or the school board before making changes to building plans. This bureaucratic process raises the costs and time required before participation, and it may make facilities managers reluctant to participate in the Program. There are limits to what the implementer can do to overcome bureaucratic process in school districts, but additional outreach to superintendents and principals may help move the process forward.

Second, we found school building projects are schedule driven, and energy efficiency must compete with other priorities for architects' attention. For instance, one architect noted that he *"already [has] to deal with a maze of regulations and requirements from the California Department of Education, the Office of School Construction, local governments, and so on… and [he does] not need more hassles."* Most architects are reluctant to make changes to building designs that risk setting the project behind schedule.

Some architects and architectural firms simply refuse to recommend participation in AERS and other Edison Programs regardless of the benefits. The reasons for their refusals are numerous and include skepticism about energy savings, the burden of paperwork, and misunderstanding Program goals.

The AERS tracking database shows one architecture firm in particular was associated with a large number of nonparticipating projects. This firm has a harmful effect on Program participation. We spoke with one architect at the firm. He was very negative about the Program and complained the incentives for participation were insufficient, the paperwork was onerous, and the large number of Edison Programs generally confused him. While he did not want to speak for others, he believed these sentiments were widely shared at his firm.

We also spoke with the implementer about this firm. The Program implementer said the firm was responsible for three or four large and growing districts in southern California. In conversations with architects at the firm, the implementer had the impression the firm had negative experiences

with other Edison programs and did not want to be troubled again. She believed the source of their negative impressions was excessive paperwork.

Market Barriers

Market barriers defined in the 1996 market transformation scoping study by Eto et al.[54] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[55]

Edison's portfolio of IDEEA and InDEE Programs focus on overcoming market barriers in new market segments through the use of new marketing or delivery methods or the introduction of new technologies. New construction for schools involves several parties in a complex development process. It includes the school district and its decision makers and financial team, the design-architect team, the engineering team, and builders. The AERS Program touches each of these market actors.

Benningfield Group states that the Program pulls the market toward utilization of market-ready energy efficiency measures, providing education and technical support to inform decision making of each of the market actors: designers, engineers, and building owners. They also state that the primary market barrier to energy efficiency is its competition with other factors including regulatory constraints imposed by the Department of Education and Division of State Architecture.[56] Therefore, the incentive offered partially offsets minor redesign costs.

Both explicitly and implicitly stated in Program documents, the Program appears to address six major barriers, including:

1. Information or search costs
2. Hassle or transaction costs
3. Bounded rationality
4. Organization practices or custom
5. Access to financing
6. Inseparability of product features

Benningfield Group designed their strategies to affect lasting change in the marketplace by providing education and technical assistance rather than by locating incentive money. The

[54] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs, July 1996.

[55] Ibid. Page 12.

[56] Benningfield Group, Technical Proposal, Stage 2 Request for Proposals, Modernization and New Construction Efficiency Enhancement Program for Schools, 2006. Pages 6-8.

Program focused on changing standard practice, and educating market actors to increase demand for above-code energy efficiency technologies. Approaches to overcoming the market barriers included: (1) free plan review, energy analyses, and recommendations to upgrade technologies, (2) financial incentives to designers to offset costs associated with redesign and DSA review.

Two major assumptions illustrate the market barriers this Program addressed.

- **Designers often fail to consider energy efficiency enhancements late in the design process, when other design changes are occurring.** This assumption involves several market barriers including information or search costs, bounded rationality, organization practices, and inseparability of product features.

The AERS Program helps school districts to overcome these barriers. First, it alerts school districts and their design teams to the opportunity for energy savings at a late stage in the design process. By contacting the school districts directly and informing them of their eligibility for the Program, AERS raises awareness about energy efficiency and offers opportunities for energy savings they would not otherwise have. AERS takes on the burden of reviewing plans for appropriate above-code technologies, conducting the energy analyses, and providing that information to the school districts and design teams. This relieves the design team of research costs.

The Program intervenes to educate and influence designers and engineering firms specializing in schools, with the longer term goal of interesting these firms in considering market ready efficiency technologies in other projects. The Program assumes the incentive fee offered to offset the redesign fee, would encourage school districts to participate in this Program, and consider energy efficiency upgrades identified late in the design process. Removal of these barriers could create opportunities for substantial energy savings.

In practice, the firms working with schools appear to be aware of energy efficiency technologies, and suggested they recommend cost-effective equipment, complying with Title 24 requirements.

- **There are long lags between the original design of a school and construction.** This means the newest energy efficiency technologies are not installed in newly constructed and modernized buildings.

  This assumption again involves several market barriers including information or search costs, bounded rationality, organization practices, access to financing, and inseparability of product features.

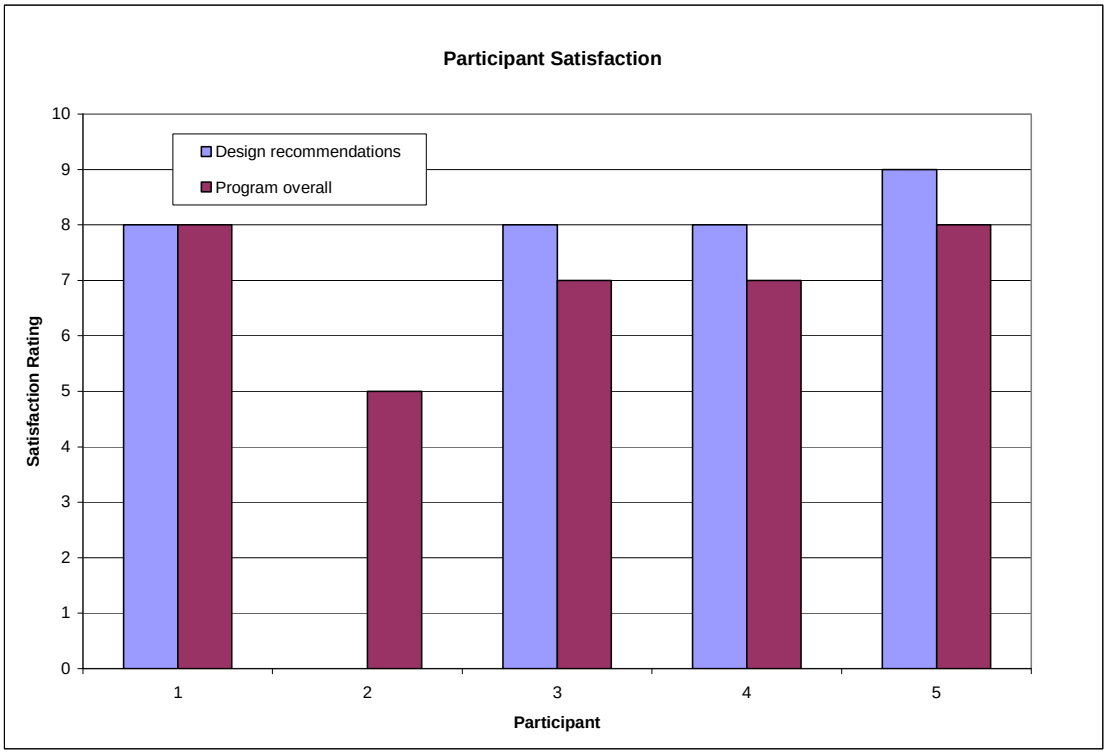
  Again, the AERS technical team undertakes the efforts to review plans and research options, overcoming the information and search cost barriers, as well as hassle costs related to researching market ready efficiency technologies. By intervening at a late stage in the design process, the AERS Program creates opportunities for schools to incorporate the most up-to-date and efficient measures into their building plans. This strategy addresses bounded rationality and organizational practices where the latest market-ready technologies typically not researched and added late in the design and permitting process.

Participant Experience with the Program and the Technology

Satisfaction

Most participants expressed high satisfaction with the implementer's recommendations and the Program, as shown in Figure 12 (on the following page). On a scale from 0 to 10, with 0 indicating "not at all satisfied" and 10 "highly satisfied," the average satisfaction level with the recommendations was 8.25. The overall satisfaction with the Program was slightly lower but still high. The average was 7, the maximum 8, and the minimum 5. None of the building projects is complete, so respondents were unable to report on their satisfaction with the recommended technologies.

Figure 12. Participant Satisfaction



Participants offered advice to improve the Program.

- Two participants said the incentives should be higher. For example, one participant could not understand why the incentive did not vary with the size of the building project. Both wanted additional incentives to defray the costs of purchasing high-efficiency equipment.
- Other participants expressed a wish for intervention at an earlier stage in the design process to identify a larger number of energy savings opportunities.

Nonparticipants' and partial participants' opinions about the Program were less uniformly positive. We interviewed four school districts that opted out of the Program after signing the Program Agreement; so two-thirds of our partial participants were very familiar with the

Program. Two of the partial participants that reached the Program Agreement stage reported dissatisfaction with the implementers' recommendations. One complained:

> *"There weren't any benefits of participating. The recommendations were highly impractical. The major savings were in variable speed fans, but these fans were not cost-effective. Edison did not get their money's worth out of this review."*

Other partial participants expressed dissatisfaction about the Programs' timing. Their design teams recommended against participation because of the costs of changing plans at the late stage.

Nonparticipants and partial participants made two suggestions for improving the Program:

The incentive should be higher and offset some of the costs of purchasing more expensive energy efficient equipment. According to one partial participant, "The bottom line for the district is dollars."

Assistance should be available to schools earlier in the design process. Five of the seven partial participants indicated AERS intervened too late to make the recommended design changes.

Table 57 summarizes the recommendations for improvement offered by participants, nonparticipant, and partial participants.

Table 57. Market Actor Recommendations for Improvement

Recommendations	Participants (n=5)	Nonparticipants and partial participants (n=7)
Provide assistance earlier in the process; better timing needed	2	5
Provide incentives for capital purchase		2
Increase incentive for design review	2	3
Recommend cost-effective measures		2
Improve knowledge of reviewers and information provided; Program did not raise awareness of energy efficiency		2

Source: Surveys of participants (n=5) and nonparticipants and partial participants (n=7), multiple responses allowed.

Free Riders

Free riders are individuals or organizations that install measures through utility incentive Programs but would have installed the measures in the Programs' absence. Utility Programs that attract many free riders generate little energy savings. The definition of free ridership in AERS is a little different because measures are not actually installed through the Program. Free riders would be school districts that enroll in AERS to obtain the incentives, but that would redesign their building plans after submitting them to DSA in absence of the Program.

It is highly unlikely any participants were free riders. First, the incentives are for redesign of building plans and not the purchase of energy efficiency equipment, meaning the direct financial benefit of participating is small. Second, a school would not submit its building plans to DSA unless it was looking for final approval. According to architects with whom we spoke, it would be more cost-effective to incorporate energy efficiency measures into building plans early in the

design process than to wait until the plans have been submitted to DSA, even with the incentive. Hence, schools eligible for the AERS Program probably never intended to install additional measures, thus cannot be considered free riders.

To gauge the potential for free ridership, we asked participants: "If the AERS Program had not been available, what is the likelihood that you would have known about and considered the same equipment in your future building designs, using a likelihood scale from 0 to 10, where 0 is 'Not at all likely' and 10 is 'Extremely likely'?" Surprisingly, most participants indicated the probability of installation was greater than 50 percent, even though they had submitted plans without the measures to DSA. The average response was 6.6, and two respondents reported scores of eight and 10. Rather than indicating free ridership, these responses probably indicate school districts are aware of energy efficiency.

Spillover

Cadmus identified two spillover effects of the AERS Program in the market for energy efficiency technologies in schools. These are indicated as long-term outcomes in the logic model.

- **Architects can learn about new technologies and incorporate them into their current and future building designs.** As the implementers noted, through architects, the Program has an opportunity to influence standard practice in the market.

There is some evidence the Program is having such an effect. One architect we interviewed indicated participation in AERS helped to push energy efficiency to the "forefront of his mind." The architect said he now includes more energy efficiency measures in building plans because of his participation in the Program. For the Program to have large spillover effects of this kind, however, it will have to enroll more building projects and work with a larger number of architects.

- **School districts learn about new technologies and incorporate them into future building plans**.

School districts said their experience with the Program influenced subsequent building projects. We asked participants, nonparticipants, and partial participants that installed energy efficiency equipment after the AERS participation decision was made whether the Program influenced their decisions. Their responses are summarized in 0. Of the three participants that installed additional equipment or plan to install additional equipment, two said that the AERS Program had a significant effect, and one said the Program had no effect. On a scale from 0 to 10, with 0 being not influential at all in their decision, and 10 being very influential, the participants gave the Program scores of 0, 5, and 7. The average score was 4, again suggesting the AERS Program is having a wider effect on energy efficiency in schools. Even one nonparticipant observed the Program had a significant effect on the district's thinking: "Every time we get involved in these things it makes you think about doing more."

Table 58. Program Spillover

Questions	Participants who installed post participation (n=5)	Nonparticipants and partial participants (n=7)
Installed additional measures since contacted about Program?	3 of 5, or 60%	5 of 7, or 71%
Where measures were installed, did AERS influence decision to install additional measures?	2 of the 3, or 66%	1 of 5, or 20%
Where measures were installed, how influential was AERS? (0-10 point scale)	Average score: 4 n=3	Average score: 5 n=5

Source: Surveys of participants (n=5) and nonparticipants and partial participants (n=7).

Analysis of Market Assumptions

This section discusses original market assumptions presented earlier, and the assessment of their salience given what was found in the process evaluation.

There are opportunities for energy savings in school building projects. Despite growing awareness of energy efficiency and availability of design assistance through Edison's Savings by Design Program, many schools do not take advantage of cost-effective opportunities for energy savings.

This assumption is well supported. According to DSA, many school building projects barely exceed Title 24 requirements and do not request supplemental funding. In addition, for the proposal, the implementer examined a sample of school building projects under review at the DSA's Los Angeles and San Diego offices. The Program implementer found a significant number of schools could not claim eligibility for other energy efficiency funding, thus would be eligible for the AERS Program.

Architects and design teams are open to making changes in building designs at a late stage in the design process. The Program seeks changes in building design after the school district has submitted its plans for DSA review but before the agency approves the plans. A premise of the Program is that builders and designers are willing to incorporate changes into their building plans at this late stage. According to the technical proposal, the DSA review stage is a time when "changes to building project drawings normally occurs."

This is a controversial assumption. The Program implementer estimated 50 percent of districts have design teams open to making such changes. The implementer noted *"The receptiveness of schools to changes depends strongly on the architect. Some design teams are open to making changes while others are not."* Also, according to the implementer, **"***Access to the mechanical engineer is key because the engineer understands these technologies and the benefits and costs."*

Based on the interviews, it is clear the Implementer's original assumption was wrong, and after experience in the field, the assessment that 50 percent might be receptive may be closer to correct. Many school districts refuse to participate in the Program because they or their design teams are unwilling to make changes late in the design process. Five of seven nonparticipants indicated a preference for intervention at an earlier stage. One nonparticipant noted, *"If we had been alerted to the opportunity for savings earlier on, the changes could have been incorporated*

into plans at lower costs." Two of five participants also expressed a desire for earlier intervention.

Architects expressed similar sentiments. Design projects are schedule-driven and many architects appear unwilling to risk delays to make their building more energy efficient. We spoke to an architect working on a nonparticipating project who said he was most interested in getting the project completed on time according to the district's specifications and was reluctant to risk delays.

Despite misgivings about last-minute changes, the extra work to incorporate energy efficiency enhancements appears to be modest. Two participating architects said the changes recommended by Benningfield Group required only a few hours of additional work and were not expensive. One architect indicated it took his engineering team 6 to 8 hours of work at $100 per hour to make the changes. In the future, the implementer should better communicate the ease of making such changes. This might have a positive effect on participation. Interestingly, the participating architects did not bill their clients for any extra work and absorbed the costs of the changes.

- **A large incentive is not necessary to encourage participation in the Program.** The plan review conducted under the Program utilizes DSA's review and approval process to identify potential energy-saving design modification opportunities, during a time in the process where changes to building project drawings normally occur.[57] Therefore, incentives are provided to the design team to offset their time to make the necessary plan changes and to the school district for participating in the program. AERS offers a stipend of $2,000 to cover the redesign costs and pays 100 percent of the DSA review fee up to $2,250.

This assumption may be a significant weakness of the Program. The stipend and coverage of the DSA fee help offset the redesign costs, but schools still face significant costs from the purchase of more expensive energy efficiency equipment. The Program relies on expectations of a positive and significant return on investment to create incentives for Program participation. If the return on investment is small or negative, these expectations will not be met. In fact, six of seven nonparticipants stated that, had they installed the recommended measures, the energy savings would not cover the cost to redesign, purchase and install the efficiency measures. Four of the five participant respondents stated that the energy savings would cover these costs.

As noted elsewhere, respondents stated the incentive for redesign is low. As the Edison Program manager noted, additional financial incentives—perhaps, in the form of on-bill financing—would remove a significant barrier to participation.

[57] Benningfield Group. Stage 2 Request for Proposals. Pages 2,

Conclusions and Recommendations

Conclusion 1

Although the program design appears sound, the Program is behind schedule in achieving its goals. Although the Program is on track to meet its kWh and KW savings goals, at the end of the first quarter of 2008, it had commitments from only six schools to install energy efficiency measures. If the Program is going to have a wider impact on the marketplace, it will have to enroll more schools. Additionally, six of the seven nonparticipant school districts, and one of five participant districts stated the intervention occurred too late in the process.

Recommendation 1

The Program needs better marketing, primarily educating the market actors about the benefits of participation.

Conclusion 2

Some market assumptions underlying the Program appear to be mistaken. The Implementers assumed that school districts and their architects, design firms and engineers would willingly make changes to their plans at the final review, after filing with DSA. Our research shows that questions remain about the viability of the Program design. The Program's customers are school districts, which are bureaucratic and have limited budgets. Although they are not the final decision makers, designers have tremendous influence with school districts. Architects and designers resist changes at late stages in the design process.

The Program offered incentives to partially offset the cost of redesign and DSA review fees, assuming large incentives were not needed. No rebates or other financial incentives were offered to install the recommended measures. Respondents stated that incentives were an issue, energy savings would not recoup costs, and they were already meeting or exceeding Title 24 requirements.

Some participants (see p. 26, above) expressed a wish for intervention at an earlier stage in the design process to identify a larger number of energy savings opportunities. This may mean that the other programs targeted at the early stages of the design process either still have not reached their intended audience, or need to be reinvigorated.

Recommendation 2

More systematic market research may have identified these barriers. Going forward, additional market research should be conducted to better determine the means to assist projects late in design and permitting phases, and better inform the target market about existing programs that target the early design stages.

Conclusion 3

The Program did not effectively overcome critical market barriers including information research and hassle costs, or move designers and builders beyond their standard practice.

- Some nonparticipants and designers expressed confusion about the Program's purpose and how it differs from other Edison Programs, such as Savings by Design.
- Architects and design teams play a significant role in participation decisions, and some felt the implementer's review team did not offer cost-effective recommendations.
- Design and build projects are heavily schedule driven and potential participant are reluctant to join because they do not want to be delayed.
- Our research indicates that many architects have poor opinions of utility incentive Programs.

Recommendation 3

The Program implementer and Edison should better communicate the objectives, eligibility, and benefits of the AERS Program. Designers may be more willing to consider last minute changes if they better understand the benefits of participation and the time commitment other participants experienced.

AERS can mitigate the negative impact of projects' schedule-driven nature by explaining the amount of time needed to make changes and the Program's benefits to designers. It may also be helpful for implementers to refer potential participants to prior participants to discuss the project and the amount of time it took to participate. This may alleviate the fear that schedules will be set behind.

Benningfield Group plans to enhance the AERS Website to facilitate interactive marketing to design teams. We support this activity; designers could see the recommended design changes and their impacts on energy savings and building costs online. Enhancing the Website would improve communication between the implementer and the designer, and perhaps reduce participation costs.

Conclusion 4

In specialized areas of Program implementation, one or two important market actors can significantly impact Program implementation. In this Program, one uncooperative architectural firm represented a large number of projects and was responsible for a majority of refusals.

Recommendation 4

Going forward, it would be worthwhile for Edison and the Program implementer to reach out to this and other uncooperative firms. The implementer should attempt to set up face-to-face meetings or conference calls with the uncooperative architects and their clients to explain the Program benefits. Altering the perceptions of uncooperative firms could have a large and positive impact on Program participation and future energy savings in this specialized market.

Conclusion 5

The Program incentives are intended to reduce the costs of modifying building plans, but design teams have weak incentives to recommend participation because they often bear additional costs of redesign. No incentives are offered for the purchase and installation of energy efficiency equipment. Participation would increase if the Program offered additional financial incentives.

Recommendation 5

Incentives for project redesign should be revisited and tiered incentives based on project size explored. The Program implementer and Edison should consider offering additional financial incentives, possibly in the form of on-bill financing for recommended and installed measures.

Conclusion 6

The Program planned to automate the selection of potential participants by working with the DSA. In practice, the implementation review team manually reviewed and selected the plans, which was a time consuming process. Should the Program continue or expand, implementers need to find a better means to automate the selection and review process.

Recommendation 6

The Program implementer should cultivate a relationship with the DSA and explore other means to improve the efficiency with which the DSA database is mined.

SCE 2559: Lighting Energy-Efficiency Par 38/30

Program Overview

The Lighting Energy Efficiency PAR 38/30 CFL (LEEP 38/30 CFL) Program offers retail, commercial, hospitality and governmental facilities in Southern California Edison's service territory the opportunity to replace halogen PAR lamps with PAR CFL lamps. Aluminum PAR 38 Compact Fluorescent Lights (CFLs) (23 watts) replace Halogen PAR 38 lights (90 watts); and Westinghouse Aluminum PAR 30 CFLs (15 watts) replace Halogen PAR 30 lights (65 watts).[58]

EnergySolve Demand Response, LLC developed and implemented the Program to:

- Introduce a new technology to the retail sector that uses these types of lamps for downlighting and display lighting.
- Demonstrate that the aluminum PAR lamps provide the same amount and quality of light as halogen PAR lamps while providing energy and maintenance savings.

The Program has a total budget of $4,810,455 and the goal of installing 200,000 aluminum PAR (Parabolic Aluminized Reflector) CFL lamps. The Program's projected gross energy and demand savings are 43,680,000 kWh and 11,700 kW. The projected net energy and demand savings are 35,607,000 kWh. and 9,712 kW.

Table 59. Total Budget[59]

Item	Budget Amount ($)	Percent of Total (%)
Administrative Cost	$200,000	4.158%
Marketing/Outreach Costs	$600,000	12.472%
Direct Implementation Costs	$4,010,445	83.370%
Total	$4,810,445	100%

[58] The Program initiated with Westinghouse lamps. Edison approved GE lamps in late June 2008, at the close of this evaluation. Therefore, no information about the GE lamp was available for this report.

[59] EnergySolve Demand Response LLC, Statement of Work, 06-10019 LEEP 38-30 CFLV 3.1 (Legal Approved).doc, page 10.

Table 60. Ex-Ante Energy Savings & Installation Schedule[60]

Installation Goals	Period 1	Period 2	Period 3	Period 4	Total
Number of lamps installed	50,000	50,000	50,000	50,000	200,000
Gross Peak Demand Savings (kW)	2,925	2,925	2,925	2,925	11,700
Gross Energy Savings (kWh)	10,920,000	10,920,000	10,920,000	10,920,000	43,680,000
Net Peak Demand Savings (kW)	2,428	2,428	2,428	2,428	9,712
Net Energy Savings (kWh)	8,901,750	8,901,750	8,901,750	8,901,750	35,607,000

Period 1: From Notice to Proceed (NTP) through 06/30/07, Period 2: From 7/1/07 through 12/31/07, Period 3: From 1/1/08 through 06/30/08, Period 4: From 7/1/08 through 12/31/08

Program Design

The Lighting Energy Efficiency PAR 38/30 Program was designed by EnergySolve Demand Response, LLC for the Innovative Design for Energy Efficiency Activities Program (IDEEA). IDEEA programs target new markets and employ new marketing methods or new technologies with the goal of transforming the market.

The LEEP 38/30 CFL Program was designed to introduce a new lighting technology, the Westinghouse aluminum PAR CFL, to the retail market. EnergySolve offered customers financing for the cost of the bulbs and required customers to purchase a Service Agreement. Under this agreement EnergySolve provided maintenance and relamping for six years in order to ensure persistence of the savings for at least that period of time.[61]

The Program's goal was to demonstrate to customers that aluminum PAR CFLs can provide significant savings in utility and maintenance costs while providing lighting quality superior to halogen PAR lamps. The retail sector was selected initially as the target market because they frequently use PAR lighting for downlighting and display lighting. Lighting facilitates sales and is critical for the proper display of merchandise, however, the retail market sector has been hesitant to adopt new lighting technologies.

PAR 30 and 38 refer to the size and shape of a bulb, and while there are many manufacturers, the Westinghouse aluminum PAR CFL is an improved technology, proprietary to Westinghouse, and has not been widely marketed. The Westinghouse bulbs are not sold in stores and therefore have very little market penetration and will be new to the majority of customers. The Westinghouse aluminum PAR CFL design is superior to other PAR CFLs because of its quality and strength of light. They provide better lighting quality than the halogen PAR lamps commonly used in the retail market sector. In addition, aluminum PAR CFLs are more energy efficient, run cooler, and have a life which is 3 to 4 times greater than halogen PAR lamps.[62] Replacing PAR halogen

[60] Ibid, page 1.

[61] EnergySolve Demand Response, LLC Lighting Energy Efficiency: PAR 30/30 CFL (LEEP 38/30 CFL) Stage II Response Proposal Requisition No. V305601, Technical Proposal V.2, page 2. August 2006.

[62] [62] Ibid. page 5.

lamps with aluminum PAR CFLs is projected to provide energy efficiency savings of greater than 70% and maintenance savings of 300% to 400%.[63]

The Program was originally marketed to members of RETEX, a not-for-profit, member-controlled retail buying cooperative. RETEX also provides a full menu of marketing, financial and energy management services to its members.[64] Implementers originally planned to market the lamps through RETEX. The aluminum PAR CFLs are only available through Westinghouse, RETEX and EnergySolve.

The Program targets large national retail chains as well as standalone retail facilities and single facilities within shopping centers or shopping malls. It has also been made available to other market sectors directly connected to Edison Account Representatives promoting the Program.

EnergySolve designed the Program to target the retail market sector and convince customers of the benefits of using the new Westinghouse aluminum PAR CFL bulbs versus halogen PAR lamps by:

- **Offering the new lamps to customers at low cost**. Customers can either install the lamps themselves or contract with EnergySolve, who will conduct the installation for a fee of $3 per lamp. Customers must sign an agreement to leave the lamps in place for six years, the normal life of these lamps. This allows the Program to demonstrate the long-term savings provided by these bulbs.

- **Marketing to retail, hospitality, commercial, nonprofit and government buildings.** EnergySolve and Edison Account Representatives are responsible for marketing to customers via e-mail, telephone and face to face meetings. The retail sector was chosen because of the high use of PAR lamps in displays and showrooms. Hospitality, churches, commercial, nonprofit and governmental buildings are also targeted. Edison Account Representatives included these additional market sectors because they felt these markets would be receptive to and could benefit from the new lighting technology.

Market Assumptions

A number of key market assumptions underlie the LEEP 38/30 CFL Program.[65]

- **Educating retail customers about the superior quality of light produced by the Westinghouse aluminum PAR CFLs will overcome their resistance to adopt a new lighting technology.** Because lighting has such a critical effect on product sales for this

[63]Ibid, page 2.

[64] EnergySolve Demand Response, LLC (EnergySolve), an energy service company based in Somerset, NJ, is the exclusive energy management service provider for RETEX.

[65] EnergySolve Demand Response, LLC, Lighting Energy Efficiency: PAR 30/30 CFL (LEEP38/30 CFL) Abstract Proposal Requisition No. V305601, pp. 2-3.

market sector, customers must be assured of the quality of the light produced. Demonstrating to customers that the quality of light provided by Westinghouse aluminum PAR CFLs is superior to that provided by halogen PAR lamps currently in use will remove the primary barrier to adoption of this lighting technology for this very cautious market sector.

- **Retail customers will understand and be motivated by the savings and maintenance benefits to retire their halogen PAR lamps and replace them with Westinghouse aluminum PAR CFLs.** The Program's success depends on customers' desire to save energy and their comprehension that consumption savings over the long-term will more than cover the initial short-term capital costs of relamping.

- **Providing the new technology at low or no initial cost is the best way to quickly introduce this new technology and transform the market**. Because the Westinghouse aluminum PAR CFL is a new technology and only available through Westinghouse, providing the bulbs for free is the best way to introduce this product into the market, quickly generate interest in the bulbs, and demonstrate its superior lighting characteristics and savings potential.

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Lighting Energy Efficiency PAR 38/30 Program. The purpose of the process evaluation is to document the Program's design and development, including any differences between the proposed Program design and the Program that was implemented, specifically, to determine if activities, outputs, and desired outcomes depicted in the Program's logic model and process flow diagram were achieved.

Process Evaluation Methodology

The methodology used in this process evaluation included a review of documents, interviews with participants and nonparticipants, developing logic models and a process flow chart, and identifying researchable issues and indicators of success.

The process evaluation focused on key market actors and their experiences with the Program. Cadmus[66] interviewed the Program Managers from both Edison and the Implementer EnergySolve, a representative from Westinghouse, two Edison Account Representatives, five participant retailers and five nonparticipant retailers.

In-depth interviews were conducted with the Program Managers from the implementer, EnergySolve, and from Edison. The EnergySolve Program Manager interview focused on

[66] Formerly Quantec, LLC

Program goals, marketing strategy, implementation, technological considerations, customer response and potential improvements. The Edison Program Manager interview discussed the overarching goals of the IDEEA/InDEE Program, customer response, changes to the Program - including cost structure, marketing strategies, technological considerations - and possible improvements to the Program.

The primary goal of both of the Program Manager interviews was to answer two key questions:

1. Was the Program implemented according to the design reflected in the logic model and process flow diagram?

2. What are the lasting effects of the Program?

Cadmus also conducted interviews with market actors. Three market actors were identified: Westinghouse - the manufacturer of the aluminum PAR CFLs; RETEX - a buying consortium providing technology-based goods and services to its members; and, the Edison Account Representatives.

The interview with the representative from Westinghouse addressed the accuracy of the logic model and process flow with questions regarding distribution and marketing. We asked questions about market barriers and customers' understanding of the energy-related benefits of the lamps to determine the lasting effects of the Program. Additional questions were asked about the specifics of the aluminum PAR CFL technology and customer awareness of the bulb.

EnergySolve planned to use RETEX as a marketing arm and direct most of its marketing efforts toward RETEX's members. A survey was designed to determine the marketing process flow as experienced by RETEX.

Cadmus created an interview guide for the Edison Account Representatives to determine their role in marketing the Program and customer response to the Program. We asked additional questions about their key accounts, opinions on market barriers, and the lasting effects of the Program.

The main goals when interviewing participants were to discuss Program implementation as experienced by the end user, update the logic model and the process flow diagram, and assess free ridership and spillover. In addition, Cadmus asked questions about the participants' decision making process, a comparison between halogen PAR lamps and aluminum PAR CFLs, their satisfaction with the Program, the influence of the free bulbs on their participation, and the likelihood of future energy efficient installations.

We also surveyed nonparticipants to gather information about the implementation process, focusing mostly on marketing and market barriers. We asked nonparticipants about their decision making processes, current lighting choices, awareness of energy-efficient lighting and likely future behavior.

Interview Sample Development and Disposition

Cadmus conducted interviews with the Program Managers from Edison and the Program Implementer, participants, nonparticipants, and market actors. Cadmus staff conducted the interviews between January and July 2008.

For this evaluation, a ***participating*** retail store is one which installed the PAR CFL lamps. Participant surveys focused on decision making and experience with the Program.

Nonparticipants are defined as those who were contacted about the Program and chose not to participate. Nonparticipating retailers were surveyed to gather information about the implementation process, marketing, and market barriers.

Table 61 shows the overall sampling goals and surveys completed. We developed an interview guide or survey for each group, available in Appendix A.

Table 61. Survey Sample Goals and Achievements

Actor	Goal	Achieved
Implementer Interview	1	1
Program Manager Interview	1	1
Market Actors (RETEX, Westinghouse, and Edison Account Representatives)	4	3
Participant Interviews	5	5
Nonparticipant Interviews	5	5
Total Interviews	14	13

Three market actors were identified and three interviews were completed, including one representative from Westinghouse and two Edison Account representatives. EnergySolve stated that RETEX's involvement was minimal and did not provide contact information; no survey of RETEX was conducted.[67]

Before interviewing participants, interviewers confirmed that the respondent was involved in the decision to participate in the Program and/or were directly involved and knowledgeable about the Program. Table 62 and Table 63 show the sample frame and completed calls for the Program participant and nonparticipant surveys.

[67] Six months into the Program, EnergySolve took on the Program marketing directly, and RETEX was removed from the Program process. See page 16 for a more detailed discussion.

Table 62. Participant Survey Call Disposition

Disposition	Number
Total participating retailers	585
EnergySolve provided participant contact information	9
Ineligible	1
No answer	2
Refused	1
Complete	5

One participant was deemed ineligible because she had ordered the lamps, but had not installed them and did not want to be surveyed until installation was complete. Three nonparticipants were deemed ineligible for different reasons. One decision maker was no longer employed at that place of business and no one else there was aware of the Program. One nonparticipant respondent wanted to participate in the Program, and a third respondent was unsure if they had participated or not.

Table 63. Nonparticipant Survey Call Disposition

Disposition	Number
Total number of nonparticipants	87
EnergySolve provided contact information for nonparticipants	32
Ineligible	3
No answer	20
Refused	4
Complete	5

EnergySolve did not maintain a systematic tracking database for nonparticipants. For this evaluation, they did research nonparticipants through their email correspondence and provided as much information as available for nonparticipants. Of the 87 identified, 32 had contact information.

One nonparticipant respondent who is tallied as “refused” in Table 63 explained briefly that he installed the lamps, hated them and subsequently removed the bulbs and disposed of them. We asked EnergySolve about this specific case and they explained that the customer tried a sample in his warehouse. After deciding he did not like them, he chose not to participate in the Program. EnergySolve added that the most common reasons customers do not like the bulbs is their color or that they need to “warm up” before full lighting levels are achieved.

It is important to note that EnergySolve was reluctant to release participant contact information. This resulted in incomplete information about the total numbers of participants and nonparticipants leading to the underestimation of sample size goals.

Process Evaluation Results

Program Theory

The Program theory supports the Program, and informs Program development and implementation. A successful program creates change, demonstrated through the program theory. The program theory for the LEEP 38/30 PAR CFL Program can be summarized as follows:

> By introducing new PAR lighting technology, the program intends to increase market acceptance and market penetration of this technology. Commercial businesses will learn of the energy benefits and savings will be achieved through bulb installation. The increased market penetration will further increase sales and mainstream the technology, achieving additional energy savings.

Logic Model

The Program logic model shown in Figure 13 highlights the key features of the current Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The Program was implemented according to the final logic model reflecting the Program after the design changes were made (discussed under Program Modifications, below).

The elements of the logic model are:

Activities that the program undertakes. The primary activities involved EnergySolve's marketing and outreach activities to prepare marketing materials, distribute them to Edison Account Representatives, and recruit retail customers.

Outputs produced by program activities. The marketing and outreach activities result in outputs including the production of marketing materials and outreach to all audiences, including the Edison Account Representatives and the retail customers, as well as interested customers following up with Edison Account Representatives or EnergySolve.

Outcomes that result:

In the **short term**, outcomes include increased knowledge and awareness in the retail market sector of the benefits and savings available from this new lighting technology, the aluminum PAR CFLs. Short-term outcomes include retailers and shopping mall owners retiring their less efficient halogen PAR lamps and installing more efficient, longer lasting Westinghouse aluminum PAR CFLs.

Intermediate outcomes include increased awareness, acceptance and demand for Westinghouse 38 and 30 PAR CFLs in the retail market sector, increased installations of the CFLs, and kWh and kW savings. In addition, Edison, implementers and market actors gain Program experience. These outcomes reduce market barriers and increase product availability.

The **long-term** outcomes include transformation of the market for PAR lighting from halogen lamps to aluminum CFLs.

Figure 13. Lighting Energy Efficiency PAR 38/30 CFL Logic Model

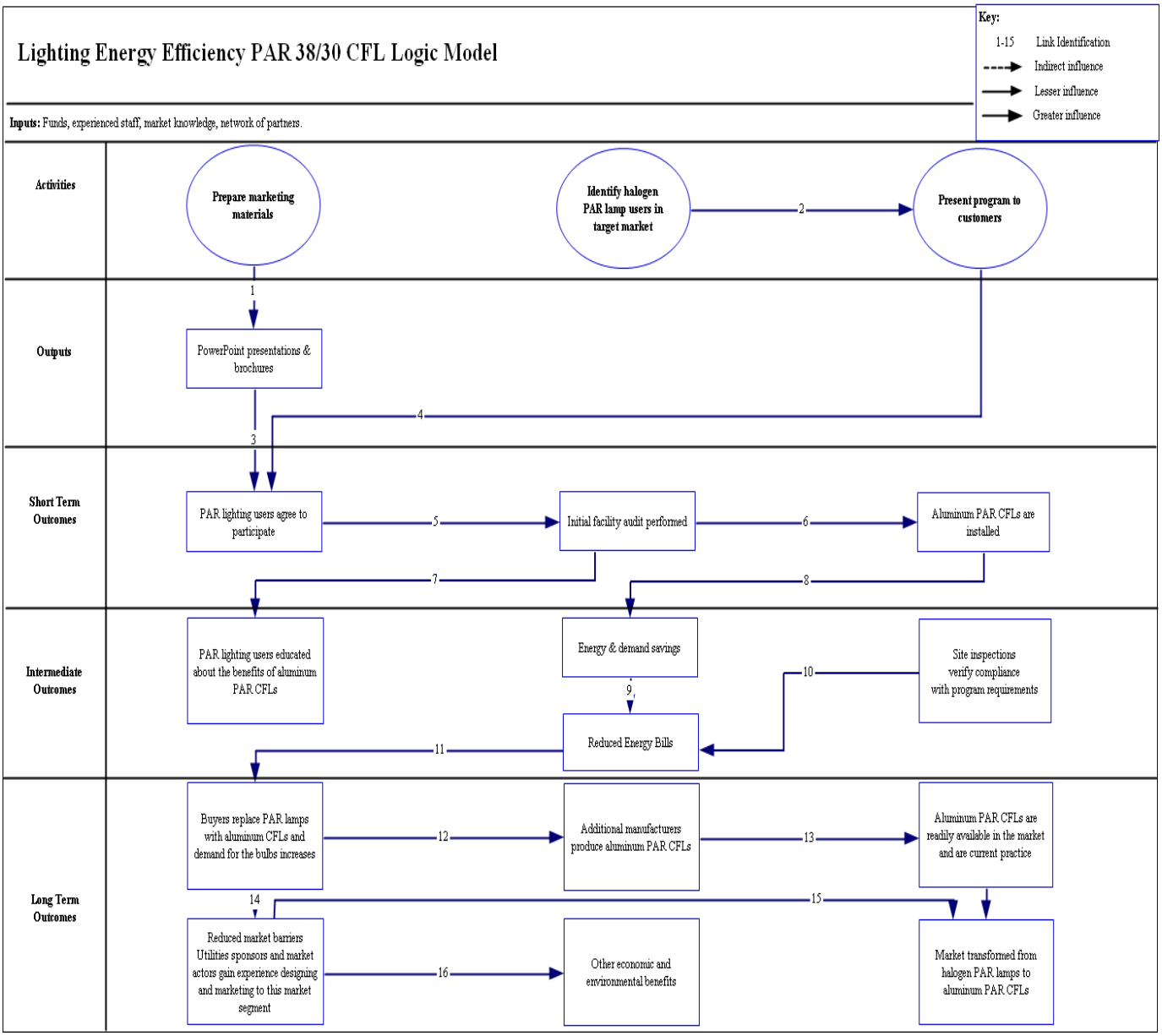


Table 64. LEEP 38/30 PAR CFL Logic Model Links: Researchable Issues and Indicators

Links	Researchable Issues	Indicators
1	Preparing marketing materials will ensure that customers and Account Representatives are aware of the benefits of the Program and encourage participation	Marketing meetings scheduled, materials prepared
2	Identifying customers in the target market will allow marketing to an optimal group.	Target market specified, Account Representatives identify potential participants from their customer base
3	Customers will participate when they are aware of the Program and its associated benefits	Content of materials appropriate to the customer. Customers aware of Program benefits and participate; number of bulbs replaced.
4	Outreach to prospective customers from an EnergySolve representative or an Edison Account Representative encourages product marketing and addresses the information barrier raises customer awareness of the Program and its associated benefits	Customer meetings scheduled; customer satisfaction with Program introduction, products and promotional materials, increasing customer satisfaction
5	Facility audits determine final eligibility and estimate customers savings	Increased participant knowledge and awareness through facility audit and savings projections; number of participants (bulbs ordered)
6	Customer market barriers decrease as free bulbs are installed	Number of bulbs ordered and installed; first cost; performance uncertainty; knowledge and awareness
7	Customer market barriers decreased; educating customers about benefits of aluminum PAR CFLs enables them to make informed choices	First cost; performance uncertainty; knowledge and awareness
8	Energy and demand savings	Reduced energy use; reduced peak demand
9	Customers see reduction in energy bill	Lower energy bills; increased customer satisfaction
10	Returning to inspect installations ensures that the bulbs are installed as invoiced, and have been installed correctly	Reduced energy use; reduced peak demand; customer satisfaction
11	Satisfied participants market the Program by word of mouth	Demand for bulbs increases
12	As demand increases, more manufacturers produce aluminum PAR CFL bulbs	Increased availability of bulbs and choices for customers; competition pushes price per bulb down
13	Increased availability of product coupled with knowledge of customers ensures that aluminum PAR CFLs become current practice	Increased number of bulbs purchased
14	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment	First cost; performance uncertainty; knowledge and awareness. Key Program players apply knowledge of the market; Program strategies evolve to address remaining market barriers.
15	Market transformation occurs	Phase out of halogen PAR lamps
16	Market adoption leads to long-term energy and environmental impacts	Reduced energy use; reduced emissions

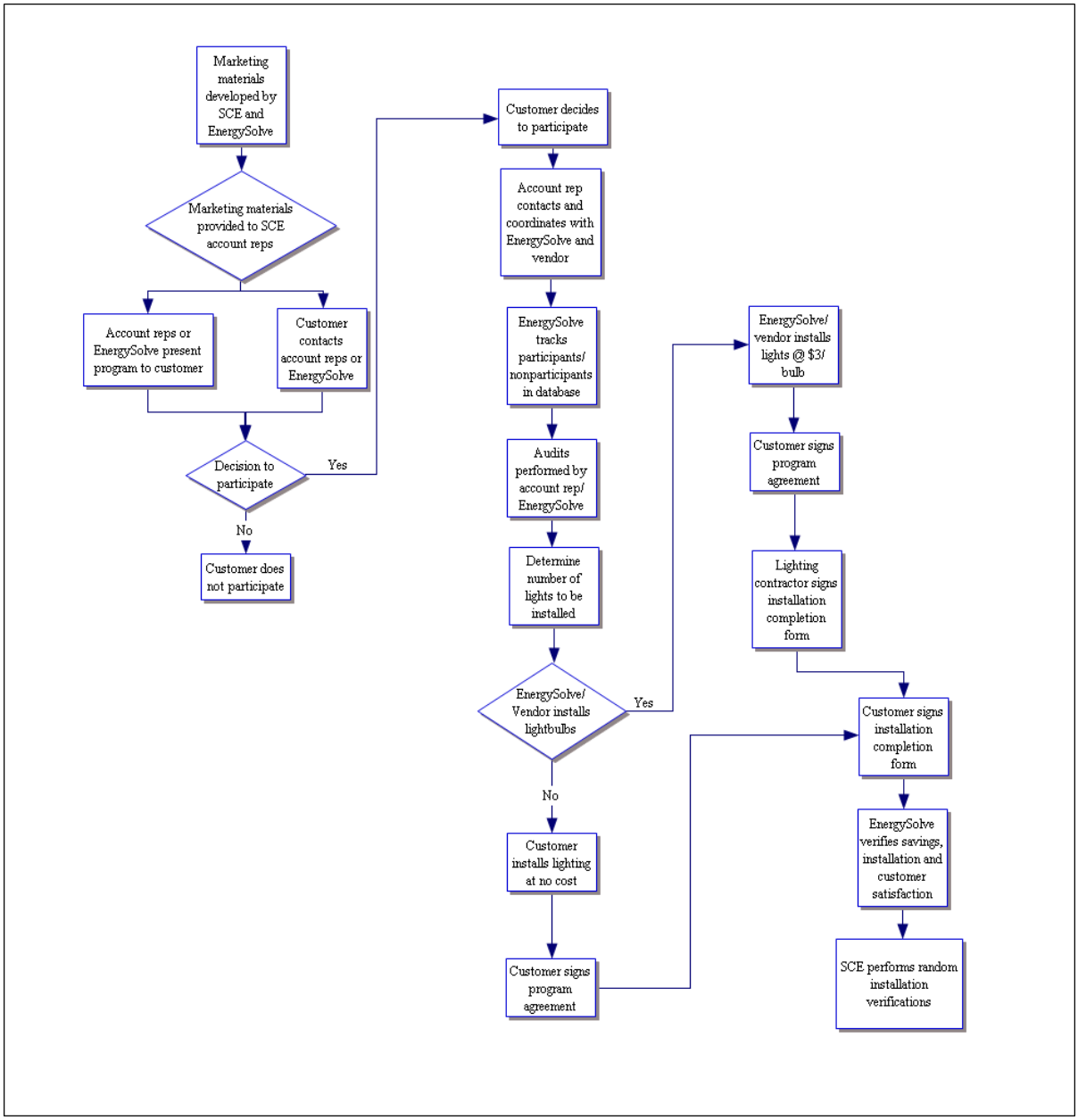
Process Flow

As distinct from the Logic Model, the Program process flow describes the specific work flow and steps in the operation of the Program. The process flow diagram in Figure 14 shows that the Program begins with Edison and EnergySolve preparing marketing materials for retail customers. EnergySolve marketing materials include brochures, PowerPoint presentations, and sample products. Marketing strategies include direct phone contact, in person meetings and working with Edison Account Representatives.

Once the customer decides to participate, the Account Representative will work with EnergySolve to determine whether EnergySolve or the Edison Account Representative will perform the initial facility audit. EnergySolve or the Account Representative provides a detailed energy audit, including a complete lamp count, installation costs and projected energy savings. During this time they will also recommend other areas where energy savings could be realized and point the customer to applicable Edison programs.

The lamps, which are free to the participants, can be installed by the customers on their own, or EnergySolve will provide installation services at $3 per bulb. In both cases, customers sign a Program agreement stating that they will keep the bulbs installed for their full lifespan of six years. EnergySolve will verify energy savings and customer satisfaction and inspect all facilities. Edison will verify installations of the PAR CFL lamps for a random sample of facilities.

Figure 14. LEEP 38/30 PAR CFL Process Flow



Evaluability Assessment

An Evaluability Assessment conducted for Edison in the first half of 2007, during early Program efforts, listed potential issues that could affect Program evaluability.[68] These issues were initially explored through interviews with Program Managers and Implementers. Significant issues identified during the Evaluability Assessment were primarily baseline or monitoring issues, and were typical of new program database tracking issues.

EnergySolve provided sample databases to the process evaluation team during the Evaluability Assessment, but not later. EnergySolve stated that they did retain databases with information from the purchase orders, including baseline data on existing equipment. They stated that they also listed each retail RETEX member with their contact dates and response.

Issue 1: The location of installed lamps was not recorded in the sample database.

> ***Resolution 1:*** The Implementer felt there would be no problem locating actual lamp installations within a building.

Issue 2: The database sample recorded the same number of operating hours for all participants. As part of the Evaluability Assessment, Implementers were asked to document the hours of operation by facility and location within a building if they differed from the whole facility. There are two main variables in determining savings for this Program: delta watts and hours of operation. The implementer should make these variables location specific, not building specific. For display lighting retrofits, hours of operation for the particular location should be used, not hours of operation for the facility (unless, of course they are the same).

> ***Resolution 2:*** Implementers did not provide a sample database to determine whether this issue was resolved. This issue will be addressed by the impact evaluation.

Issue 3: Implementers were asked to record a sample of the baseline (pre-installation) lamp wattage. A sample of actual wattage of replaced bulbs should be recorded. It may be analogous to normal CFL programs, where the replaced bulb is not the assumed baseline.

> ***Resolution 3:*** Implementers did not provide a sample database to determine whether this issue was resolved. This issue will be addressed by the impact evaluation.

Issue 4: The Program proposes to refer Customers to other Edison programs. The Evaluability Assessment suggested the referrals be documented for future follow-up.

> ***Resolution 4:*** Implementers did not provide a copy of their customer contact database; collection of referral data could not be confirmed.

[68] Quantec, LLC. Early Assessment of 2006-2008 InDEE/IDEEA Programs, Nov. 2007.

Issue 5: The lighting measure savings are dependent on the assumed on-to-one replacement, as proposed. Verification should confirm replacements were one-to-one.

> ***Resolution 5:*** Implementers did not provide a sample database to determine whether this issue was resolved. This issue will be addressed by the impact evaluation.

Issue 6: Implementers will need to request that RETEX provide lists of participants and nonparticipants with contact information.

> ***Resolution 6:*** Implementers decided not to use RETEX as their marketing arm early in the Program. Collecting contact information fell to the Implementers who stated they did retain this information. Limited contact information was provided to evaluators for the process evaluation.

Issue 7: Since this is a new technology, post-installation monitoring is recommended (runtime data logging for three weeks). The Evaluability Assessment suggested an M&V plan for this program.

> ***Resolution 7:*** Implementers did not plan to install light loggers or monitor lighting.

It is not clear whether the prior Cadmus Evaluability Assessment recommendations were integrated into the Program planning and implementation. Implementers noted that baseline data were collected as well as participant and nonparticipant contact data. Complete databases were not shared with evaluators.

Program Modifications

Since the inception of the Program in December 2006, the Program design has changed several times. The first change removed the capital cost of the bulbs for the customers, and with it, the original funding mechanism that included a six-year service contract. Other changes involved a different approach to marketing the Program, and expanded the target market for the Program.

Financing and Incentives

Through their contract with EnergySolve, Edison pays a $15 buy down per lamp to EnergySolve to cover the cost of labor and equipment. According to EnergySolve, they originally sold the bulbs to participants, which typically retail for about $25 per bulb for the PAR 38 lamps and $22 per bulb for the PAR 30 lamps, for the discounted price of $10-$12 per bulb. To sell the bulbs for this price, EnergySolve originally offered customers financing with no up-front cost and a usage fee via a six year Service Agreement. The Agreement also provided maintenance and relamping.[69] The price of this contract varied by customer and the Implementers guaranteed that the energy savings would cover the cost of this contract.

[69] EnergySolve Demand Response, LLC Lighting Energy Efficiency: PAR 30/30 CFL (LEEP 38/30 CFL) Stage II Response Proposal Requisition No. V305601, Technical Proposal V.2, page 2. August 2006.

A major change to the Program involved the cost of the lamps to the customer. Because (1) Program marketing experienced a slow start; (2) a less expensive, albeit inferior quality, PAR CFL was introduced to the market by a Westinghouse competitor; and (3) other Programs were discovered running concurrently with the LEEP 38/30 CFL Program that provided PAR CFLs at low or no cost, EnergySolve proposed changing the Program to offer the lamps at zero cost to the customer. Edison approved the decision to offer the bulbs for free during the third quarter of 2007, although it changed the cost structure of the Program. In essence, offering the bulb for free reduced EnergySolve's profit per bulb.

The new Program design proved to be effective; the number of lamps installed increased from 3,744 at the end of the third quarter 2007 to 20,180 at the end of the fourth quarter of 2007. Nevertheless, this only represents 20% of the original 100,000 installation goal.

The new cost structure prompted changes to other aspects of the Program. Originally, there was no installation charge because customers were paying for the lamps as well as installation and maintenance in the six year service contract. With the Program change offering the lamps for free, EnergySolve set their installation fee at $2 a lamp and then increased it to $3 a lamp. According to EnergySolve, 99% of customers install the lamps themselves. This Program change was finalized by the third quarter of 2007.

Marketing Approach

Another significant change to the Program design involved the marketing strategy. Initially EnergySolve planned to use RETEX, a member-based buying consortium, as the main marketing arm of the Program. EnergySolve planned to use RETEX's member list as a pool of potential participants and use RETEX's name recognition to help increase Program success. First, it took about two to three months for Edison to approve marketing materials that RETEX needed for marketing. Second, about six months into the Program, EnergySolve discovered that RETEX did not have as much influence in the market as originally envisioned. Implementers reported that many members were unaware of what RETEX was, or that they even had a membership. EnergySolve was also concerned that the addition of a third party name to the Program would be confusing to some customers and adversely affect participation. By the beginning of the fourth quarter of 2007, the Implementer began marketing directly to the customers and enlisted Edison Account Representatives to aid in the process.[70] EnergySolve found it easier to market the Program this way. In addition, they noted that as distributors of the PAR CFL, customers could order lamps directly from them.

Expanding the Target Market

In addition to changing the marketing strategy, the target market was also changed. To increase participation, EnergySolve expanded their marketing from the original target market – the retail

[70] EnergySolve did not provide contact information for the RETEX contacts, and we were unable to interview anyone for the process evaluation.

sector - to include local governments, hotels, churches and other commercial properties. The involvement of Edison Account Representatives made this possible through their contacts in these specific market sectors.

After customer requests, EnergySolve and the Edison Account Representatives worked to include a new GE PAR CFL in the Program. Edison approved the GE lamp and the Program offered it to customers June 30, 2008, providing added PAR options. Implementers also partnered with additional sales agents, and refocused on markets showing the greatest success, i.e., hospitality, furniture retail, and general retail.[71]

Overall, the modifications to the Program design promoted Program participation, as evidenced by the dramatic increase in lamps ordered or installed between the third quarter 2007, when most of the major changes took place, and the fourth quarter 2007. By removing the cost to the customer and expanding the target market, the Program was able to dramatically increase participation, resulting in a lamp installation rate that was approximately five times higher after the change in Program design. The downside associated with all of the Program modifications was that it took a substantial period of time for the Program design to be finalized and to get on track.

Marketing and Participation Decisions

Marketing

The PAR CFL lamp initially offered through this Program is proprietary to Westinghouse, and this Program offered a unique distribution channel, as the lamps were not sold through retailers. The bulb differs from other PAR lamps because it has an aluminum deflector, driving heat away from the ballast. It has 95% lumen maintenance, uses 75% less energy, and lasts four times longer than the halogen it typically replaces. These features are highlighted in marketing the bulb.

EnergySolve marketed to retailers and other market sectors through telecommunications, brochures and meetings. EnergySolve made site visits to potential customers where PowerPoint presentations and lighting demonstrations further conveyed the message of the Program. EnergySolve also noted that lighting maintenance contractors were important trade allies, as they hold contracts to purchase and maintain their customers' lighting needs.

In June 2007, after discovering that RETEX was not an effective marketing arm, EnergySolve used "e-mail blasts" to alert Edison Account Representatives about the Program. Marketing materials were adapted for the Account Representatives and the target market was expanded to include hotels, nonprofit, commercial and government buildings. One Account Representative interviewed managed about 30 key commercial accounts and the second managed national chain accounts and churches. The Account Representatives email their customers or visit in person,

[71] EnergySolve, SCE2559 Second Quarter 2008 Report. Since the GE lamp was approved at the close of this evaluation, the Program had no experience marketing the lamp, and no information was available for this report.

conducting visual inspections to determine the applicability of the bulb. The color of the lamp, the aesthetics, and its application are critical. The Representatives work closely with their customers, estimating savings and helping them to fill out forms.

By the first quarter 2008, EnergySolve estimated the hotel and hospitality industry made up about 35% of participants, and government about 2%. Both Representatives noted that their customers did not have discretionary funds, it was a tight market, and the free bulbs and energy savings were convincing.

Once on track, the marketing strategy proved to be effective. Sales in the fourth quarter of 2007 alone were four times greater than all sales through the third quarter of 2007.

Decision Making

Participants were asked how they heard about the Program. Three of the five participating businesses interviewed cited Edison as their source of information for the Program. One respondent heard about the Program from a Westinghouse Representative while the other could not remember their source of information.

Participants were asked their reasons for participating in the Program and gave multiple answers, which are provided in Table 65. Four were interested in the potential for financial savings with two adding that the potential for energy savings was appealing. Two participants liked the lights and two wanted the free bulbs.

Table 65. Reasons for Participation

Attribute	Participants (N=5)	
	Reasons for Participation	Perceived Benefits
	Frequency	Frequency
Free Bulbs	2	
Energy Savings	2	5
Financial Savings	4	2
Like Lights	2	
Promoting Energy Efficiency		2
Last Longer	1	1
Better Lighting		2

Multiple responses allowed.

Participants were also asked what they considered to be the benefits of participating in the Program. These responses are also presented in Table 65. All respondents cited energy savings as one of the benefits of the Program while none mentioned the free bulbs. This allays the Edison Program Manager's concern that participants were not aware of any benefits besides the free bulbs. The free bulbs may have initially made relamping a more attractive option and drawn some customers into the Program but did not overshadow the other benefits provided by the Program.

All five nonparticipants stated they knew about energy efficient lighting before being contacted about the Program. Two of five nonparticipants knew about Westinghouse PAR CFL in particular, one mentioned Energy Star, and one said they knew about CFLs.

Nonparticipants were asked about their reasons for not participating in the Program (Table 66). Two respondents stated timing was the issue, one was already installing energy efficient lighting on their own, and one was in the process of renegotiating his lease. Other respondents stated they weren't sure if the lighting would work; another said they already had the PAR CFL in place but they just didn't have the Edison sticker on them. One respondent was unaware of the technology and did not feel he had enough information, while the other felt overwhelmed by all the information she received and thought the savings would not cover the cost and the inconvenience.

Table 66. Reasons for Not Participating

	Nonparticipants (N=5)
Reason	Frequency
Timing	2
Installing lighting on their own already	1
PAR CFL already installed	1
Satisfied with current lighting	1
Unaware of technology	1
Unsure of technology	1
Costs outweighed savings	1
Renegotiating lease	1

Multiple responses allowed.

Nonparticipants were also asked if they remembered any benefits of the Program when it was marketed to them. Two of the five remembered the lights were energy efficient and free. One refused to answer and the other two respondents did not remember how the Program was marketed.

When asked if anything would have convinced them to participate, one stated timing, another said they needed more information, one wanted lighting at a different location. The last person stated that they were overwhelmed with information, the application was too long, and there was *"too much administration time for so few benefits."*

Overall, Program marketing was effective once EnergySolve began working in concert with the Edison Account Representatives to market the Program directly to the customers. Participants joined the Program to reduce their energy use as well as for the resulting financial savings. Neither benefit was overshadowed by the offer of the free bulbs. Furthermore, the nonparticipants were more concerned with levels of information rather than the cost of the bulbs or the amount of savings.

Program Delivery and Implementation

The Program was implemented according to the final logic model and the process flow. None of the five participants interviewed cited problems associated with delivery and implementation.

Four of the five interviewed participants said they were already considering installing energy efficient lighting before they heard about the Program. However, all of the participants installed the Westinghouse bulbs ahead of regularly scheduled maintenance and were not just replacing burned out bulbs with free ones.

One participant mentioned that she is interested in increasing energy efficiency for the store's HVAC system and computers. According to the Program design, EnergySolve should have provided the customer with suggestions for other methods to increase energy efficiency as well as referrals to other Edison programs. In this case, EnergySolve may have not made recommendations because of the nature of the technology, lack of relevant Edison programs or because the customer did not express the desire for recommendations during the site visit.

The Edison Program Manager identified several problems associated with delivery and implementation. Some customers were receiving incorrect bulbs from the vendors, which can confuse customers, eliminate the potential energy savings and be costly to the vendors. Errors appeared to be related to ordering the wrong size bulb. EnergySolve and the vendors resolved this shipping problem and the problem of customers receiving the wrong bulbs is no longer occurring. A participant was also concerned that her installations were not verified by Edison. EnergySolve noted that Edison is currently conducting verification inspections on a random selection of sites; however, the Edison Program Manager suggested that Edison should increase their verification inspections to 100 percent of installations.

The Edison Program Manager also cited concern that customers were overestimating their need and ordering too many bulbs because they were free. However, EnergySolve reported that there are no problems with overestimation. Now that EnergySolve or Edison Account Representatives do the majority of counts themselves, there is much less opportunity for overestimation or stockpiling. EnergySolve did mention that there have been problems with customers ordering the wrong size bulb, but those problems are easily fixed.

In some cases, customers were installing the Westinghouse PAR CFLs in dimmable ballasts, despite the information specifying they are not appropriate for dimming. The bulb is not designed to be dimmable and installing it in these fixtures can eliminate energy savings or render the bulbs unusable. This problem can be remedied through the marketing materials and the pre-installation audit. The audit should identify which fixtures are appropriate for PAR CFLs and confirm the number to order. Once installed, Edison and EnergySolve verification inspections should confirm the appropriate installation of the bulbs.

It is important to note that none of the five participating survey respondents chose to have EnergySolve install the PAR CFL lamps. If EnergySolve performed the installations, the delivery and implementation problems identified by the Program Manger could have occurred.

Finally, in a few cases, the lamps were damaged in shipping. The lamps are delicate and any crack results in them being unusable. An Edison Account Representative and EnergySolve noted this problem, but stated it has happened on a very rare basis. The Account Representative noted that as of 2008, shipping replacements to customers has been a much quicker process than it was in 2007.

Market Barriers

Market barriers defined in the 1996 market transformation scoping study by Eto et al[72] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[73]

Edison's portfolio of IDEEA and InDEE programs focus on overcoming market barriers in new market segments. Although not explicitly stated in Program documents or by Program management, the Program appears to have been designed to address 3 major barriers, including:

1. Information or search costs
2. Performance uncertainties
3. Product or service unavailability

Taken together, EnergySolve designed the strategies to affect lasting change in the marketplace and not just the marketability of the product. The Program focused on educating customers, changing standard practice, and educating market actors to increase demand for the Westinghouse aluminum PAR CFLs. Approaches to overcoming the market barriers included: (1) development of marketing materials distributed to potential participants; (2) marketing materials and education for the Edison Account Representatives; (3) site-specific audits to demonstrate the energy saving potential of the lamps; (4) introduction of a new superior technology at no cost to the customer.

Three assumptions illustrate the market barriers this Program addressed:

- **Educating retail customers about the superior quality of light produced by the Westinghouse aluminum PAR CFLs will overcome their resistance to adopt a new lighting technology.**

The underlying barrier in this assumption relates to performance uncertainties, and information or search costs.

Because the aluminum PAR CFL is a new technology, retailers cannot compare the performance of the new lamps against the lamps they normally use. EnergySolve tried to overcome these barriers with the marketing materials developed for customers and by educating the Edison Account Representatives.

[72] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996.

[73] Ibid. Page 12.

The Edison Account Representatives reported that their non-retail customers were concerned with a different aspect of lighting quality than their retail customers. For non-retail customers, such as nonprofit organizations, or churches, the brightness of the light was most important to them. Customers who placed the lamps in warehouses liked the lack of glare. For retail customers, the color of the light produced was critical. One Account Representative reported that retail customers would send a sample lamp to their visual arts department to see how the merchandise would look under the aluminum PAR CFLs before they would move forward with lamp installations. If they were satisfied with the color of the light and its quality, they would move forward with the Program; otherwise, they would either pass on the Program or approve installation of the bulbs for nondisplay applications such as hallways or warehouses.

- **Retail customers will understand and be motivated by the savings and maintenance benefits to retire their halogen PAR lamps and replace them with Westinghouse aluminum PAR CFLs.**

The underlying barrier in this assumption relates to performance uncertainties.

Because the lamps are a new technology, customers have no prior information about the energy and financial savings potential of the lamps. EnergySolve educated the Edison Account Representatives, who then relayed the information to their customers. The on-site audits performed by the Account Representatives were very effective in selling customers on the savings benefits they would experience if they installed the Westinghouse aluminum PAR CFLs.

- **Providing the new technology at low or no initial cost is the best way to introduce this new technology and transform the market**.

High first costs are typical for energy efficiency products and services. Reducing high first cost is used as a strategy to increase market adoption rates, but the first cost is not a market barrier. In this case, high first cost results from market and demand uncertainty and from the purchase volume necessary to completely relamp a facility. The real barrier addressed in this assumption is the current lack of availability of the product.

The Westinghouse aluminum PAR CFLs are not available to buy off-the-shelf; they are currently only available through EnergySolve. Because the intent of the Program was to transform the market for PAR lamps by introducing this superior quality, high efficiency technology to a change-resistant market sector, providing the lamps to the customers free of charge was an effective way to ensure that a large number of lamps would be installed in a short period of time and would serve to demonstrate the value of the lamps to customers. One Edison Account Representative reported that customers certainly liked that the lamps were free, but the energy savings and lighting quality were even more attractive to them, especially in this tight economy. Another Account Representative reported that they knew their customers would implement these lamps on their own now that they are aware of the bulbs.

Participant Experience with the Program and the Technology

Satisfaction

Overall, the surveyed participants rated the Program and the Westinghouse bulbs highly. When participants were asked to rate their satisfaction with the PAR CFLs on a scale of 0 to 10 with 0 being *"not at all satisfied*" and 10 being *"very satisfied"* three responded "10." One respondent had not installed all the bulbs at the time of the survey and was unable to respond. (Table 67)

Table 67. Customer Satisfaction with PAR CFLs

	Participants N=5
Rating	Frequency
10	3
8	1
No Response	1

Table 68 summarizes responses concerning bulb quality. Two of the participants were having problems with their old bulbs, including overheating, short life span, and high energy consumption. Both noted that these problems were resolved with the Westinghouse PAR CFL. Three respondents said they saw a noticeable increase in lighting quality once the new PAR CFLs were installed. One respondent saw a decrease in his electric bill and two respondents were confident they would see reductions in their bills.

Table 68. Quality of Original Bulbs

	Participants N=5
Concerns with old bulbs	Frequency
Short Life Span	1
Overheating	1
High Energy Consumption	1
Improvements over old bulbs	
Lighting Quality	3
Electric Bill Savings	1

With the exception of the one participant who exited the Program, satisfaction with the Program in general was overwhelmingly positive. All of the five participating interviewees gave the Program a rating of 10 ("*very satisfied*").

Suggestions to improve the Program were limited. Participants suggested that Edison and the implementers increase marketing and education about the Program so that other businesses can participate. One nonparticipant wanted clearer and more condensed information, while the another participant was interested in more detailed information.

Free Riders

Westinghouse PAR CFLs bulbs were only available through Westinghouse. The likelihood of the respondents installing the Westinghouse PAR CFLs in the absence of the Program was fairly

minimal, with two of the five respondents saying is was highly unlikely and one saying it was not at all likely. However, one replied that it was extremely likely he would have installed the Westinghouse PAR CFLs. Because the lamps weren't available in stores at that time, in practice it is unlikely the customer would have installed the lamps. If the customers were really determined, they could have found Westinghouse's website, read about the bulbs and purchased them directly from Westinghouse.

There are no free riders in the Program since the bulbs were not available outside of the Program. This finding is typical for new technologies. Future offerings where the lamps are available through internet outlets and other retailers could have free riders, especially when marketing and product availability become widespread.

Spillover

One of the lasting effects of the Program is spillover. Spillover is defined as energy savings occurring as a result of the Program, but not through the Program. Participants could install the bulbs in other locations without incentives, or, they could install additional energy efficiency measures as a result of participating in the Program. One participating respondent characterized his store as part of a larger chain and noted they were in the process of installing Westinghouse bulbs in all their stores. Another respondent who said their store had multiple locations is very likely to install the bulbs at other locations. In order to increase this type of spillover, EnergySolve needs to continue to market to large chains as well as inform customers about how to order more Westinghouse PAR CFLs, which are not sold in stores.

When EnergySolve conducted pre-installation site visits to determine the number of bulbs needed at each location they suggested other areas where the facilities could improve their energy efficiency. None of the participants have installed other energy efficiency measures.

Participants were asked if they were likely to continue to install the Westinghouse PAR CFLs after the six year service agreement ended. All five said they were very likely to continue using the CFLs. This indicates that behavior may have changed and that energy savings could continue after the Program has ended.

All five participating respondents said they would recommend the Program to others, including two who are actively promoting it to business associates and other acquaintances. Word of mouth and customer testimonials was one of EnergySolve's marketing strategies.

One retailer, who did not participate because of uncertainties surrounding his lease, said they are installing the Westinghouse PAR CFLs within the next six months because of their awareness of the Program. This interview was conducted in late May and the customer may be able to participate in the Program before the recruitment cutoff on October 31, 2008. This respondent also noted that they will also be installing the bulbs across their entire chain of stores. This type of spillover can be maintained if EnergySolve continues to aggressively market the Program and ensure that all facilities contacted know how to purchase the Westinghouse bulbs.

Two participants had been involved in prior Edison programs. One stated he had participated in many programs during the past twenty years, and the second had been involved in two, but could not recall their names. Since both respondents have been involved in more than one program

prior to the LEEP 38/30 Program they will most likely continue to participate in future Edison programs. Two nonparticipants had been involved in previous Edison programs, one had already installed energy efficient lighting and the other planned to install lighting in the next two years.

Analysis of Market Assumptions

This section discusses the original market assumption presented earlier, and the assessment of their salience, given what was found in the process evaluation.

1. Educating retail customers about the superior quality of light produced by the Westinghouse aluminum PAR CFLs will overcome their resistance to adopt a new lighting technology.

Both Account Representatives noted this as a problem when trying to encourage participation from retailers. One Account Representative explained that in many cases the art department will not like the way the light makes clothes or other products look and will choose not to use the bulb. However, she stated that for nonretail customers it is clearly a "no brainer." The other Account Representative noted that it will be hard transform the market in the retail sector until the technology is better. According to him, the PAR CFL does not have the same "pop" as the traditional halogen and therefore retailers are reluctant to use it on showroom floors. He has been able to convince many of these retailers to use the bulb in nondisplay settings, such as hallways and conference rooms.

It will be impossible to overcome this market barrier until the technology is better. However there are ways that EnergySolve can still make the Program successful despite this problem. Currently EnergySolve estimates the hotel/hospitality industry makes up 35percent of their customer base, government makes up 2 percent and the rest is commercial or retail. If they continue to push the Program to nonretail customers they will increase the market share of the PAR CFL and help to transform the market in sectors where aesthetics are not the top priority.

2. Retail customers will understand and be motivated by the savings and maintenance benefits to retire their halogen PAR lamps and replace them with Westinghouse aluminum PAR CFLs.

The Program's success depends on customers' desire to save energy and their comprehension that consumption savings over the long-term will more than cover the initial short-term capital costs of relamping.

3. Providing the new technology at low or no initial cost is the best way to quickly introduce this new technology and transform the market.

The Westinghouse aluminum PAR CFL is new to the market and is not sold in stores, therefore product awareness and market penetration are very low. EnergySolve addressed the lack of awareness of this product by creating a comprehensive marketing strategy including brochures, PowerPoint presentations and lighting demonstrations. Based on survey results, the marketing materials proved to be effective in conveying the benefits of the Westinghouse bulbs, and based on the increase in orders, the free bulbs are effective in getting participants on board. While EnergySolve has achieved great success in the number of installations during the last 7 or 8

months, it not yet reached its installation goals, and has only begun to achieve market transformation.

Conclusions and Recommendations

Conclusion 1

The original Program design assumed that RETEX, the retail buying cooperative with 2,800 members, would provide a ready-made marketing arm for the Program. The Program was adversely affected because the assumption that RETEX had a solid member base, actively receiving RETEX's services, was not correct. EnergySolve assumed they would be able to reach a large pool of potential customers and easily convince them to participate on the strength of RETEX's reputation and name recognition. This was not the case. This assumption and lack of research slowed the Program during the time it took for Implementers to realize that their confidence in the influence RETEX had on its members was misplaced. EnergySolve changed marketing approaches and was able to regain momentum.

Recommendation 1

Implementers should conduct thorough market research, including all potential Program partners. Multiple, complementary marketing approaches run concurrently can help avoid the problems that developed when EnergySolve depended on one marketing channel. When strategies run concurrently, marketers can quickly shift to another strategy if one is found ineffective.

Conclusion 2

The initial Program design required customers to pay part of the cost per bulb because the $15-per-bulb incentive Edison paid to EnergySolve did not completely cover the costs of the lamps plus installation. After the Program was in the field, it was discovered that there were competing Programs offering similar bulbs for no cost or low cost. This required a mid-cycle change to the incentive structure of the Program.

Recommendation 2

More market research should be done to make sure the Program is not undercut by competition from other utility or industry programs. Even though the quality of the Westinghouse bulbs offered by the LEEP 38/30 PAR CFL Program was superior to the competing bulbs, it was hard for the Program to compete when other bulbs were offered to the customers for free, especially during a slower economy.

Conclusion 3

The original target market for this Program was narrowly focused on the retail market sector, a sector known to be reluctant to adopt new lighting technologies due to the sensitivity of their business to lighting quality. The marketing strategy was to demonstrate to retailers that the

aluminum PAR CFLs produced lighting of superior quality to that produced by the halogen PAR lamps currently used by the retailers, and that the lighting, particularly the color of the lighting, would not adversely affect the appearance of their merchandise, and therefore, their sales.

After the Program expanded the target market to include other market sectors that use PAR lamps, Program participation increased substantially. In addition, interviews with participants and Account Representatives revealed that other market segments were also interested in the quality of the light produced by the aluminum PAR CFLs; although it was a different characteristic of the lighting quality in which they were interested. The additional market sectors targeted expressed enthusiasm for the brightness of the light produced and the lack of glare.

Recommendation 3

The target market for the Program should be thoroughly researched and care taken not to focus the pool of potential participants and the influential trade allies too narrowly. All aspects of the product should be considered so that the bulbs can marketed to the widest possible market, with marketing materials tailored to the particular concerns of each sector.

Conclusion 4

Nonparticipants interviewed revealed a lack of knowledge about the Program and the lighting. One respondent found the materials overwhelming; another felt the materials did not provide enough information.

Recommendation 4

Edison and EnergySolve should revisit the marketing materials for clarity.

Conclusion 5

Edison Account Representatives were very successful in helping to identify potential participants and marketing the Program to them. Some participants are part of retail chains; having a system for customers to record positive feedback about the lighting and the Program could be instrumental in marketing the Program to businesses.

Recommendation 5

Edison should create a web-based application for customers to conveniently voice their satisfaction (or complaints) about the Program. This would allow Account Representatives current feedback on participant satisfaction with the Program and allow them to both quickly address problems as well as use testimonials of satisfaction to help them market the Program to other customers who would benefit from the Program.

Conclusion 6

In order to evaluate the Program, Cadmus needed the contact information for all Program participants and nonparticipants; consequently, the Evaluability Assessment included four

questions to check whether or not EnergySolve's tracking database collected this information. While conducting the process evaluation, EnergySolve was reluctant to release the contact information. This resulted in incomplete information about the total numbers of participants and nonparticipants which led to underestimation of sample sizes. We made several requests for the tracking database, but only received contact information for a few participants at a time. EnergySolve insisted on checking with participants before we contacted them. EnergySolve also did not systematically track nonparticipants and therefore only a few contacts with complete information were supplied.

Recommendation 6

All parties participating in the Program administration and evaluation need to understand the purpose and value of program evaluations, whether process or impact, and the importance of cooperation and the timely and complete exchange of information.

Conclusion 7

Concerns were cited with customers ordering the wrong bulbs, or installing the bulbs incorrectly, e.g., installing them in dimmable ballasts, which renders them useless. Misordering typically involved the wrong size bulb.

Recommendation 7

Edison and EnergySolve should consider changing to a direct install approach. If the Edison Account Representative or EnergySolve representative conducting the initial facility audit ordered the equipment for the customer, and installed it, problems with misordering or faulty installation would not occur.

Conclusion 8

It is not clear whether the prior Cadmus Evaluability Assessment recommendations were integrated into the Program planning and implementation. Implementers noted that baseline data were collected as well as participant and nonparticipant contact data. Complete databases were not shared with evaluators.

Recommendation 8

Evaluability Assessment should be integrated into program design. Future program offerings should reinforce the need to track participant and nonparticipant contact information which will be needed for both process and impact evaluations. Collecting baseline data, e.g., existing lighting configuration and location, is important to the impact evaluation in order to verify savings.

SCE 2561: Energy-Efficiency Program for Entertainment Centers

Program Overview

The Energy Efficiency Program for Entertainment Centers (the Program) is a retrofit Program offering demand controlled ventilation (DCV) and coil cleaning services to commercial movie theater complexes at a discounted price. It is a joint utility Program sponsored by Southern California Edison (Edison), the lead utility, and Southern California Gas (SCG), the lag utility. Matrix Energy Services (Matrix) is the Program's implementer and is responsible for all marketing, installations and inspections.

The Entertainment Center Program has two key elements.

- The Program targets existing multiplex movie theaters that do not use DCV technology, which is now required under 2005 Title 24.
- The Program offers the technology at very little cost to participants.

The Program targeted this hard-to-reach and underserved market, making it an ideal fit for the IDEAA portfolio, especially since movie theaters have highly variable occupancy during peak hours. The retrofit market for DCV was a new niche for this technology.

The Program has a budget of $769,596. Once SCG joined, the budget was raised to $864,396 (Table 69) with the goal of installing 632 DCV units. Expected gross energy savings are 2,806,080 kWh (Table 70) and net energy savings are 2,244,864 kWh (Table 70, on the following page).

The Program was fielded in January 2007 and is slated to end December 2008.

Table 69. Program Budget

Item	Budget Amount ($)	percent of Total (percent)
Administrative Costs	$149,200	19.4%
Marketing/Outreach Costs	$57,600	7.5 %
Direct Implementation Costs	$562,796	73.1 %
Original Budgets	$769,596	100 %
Revised Budget with SCG	$864,396	

Source: Statement of Work, Energy Efficiency Program for Entertainment Centers, page 10. Revised 12/17/07. Change Order 001, page 11.

Table 70. Ex Ante Energy Savings

Installation Goals	Period 1	Period 2	Period 3	Period 4	Total
Number of Installations	133	183	228	88	632
Gross Peak Demand Savings (kW)	491.4	676.1	842.4	325.1	2,335
Gross Energy Savings (kWh)	590,520	812,520	1,012,320	390,720	2,806,080
Net Peak Demand Savings (kW)	393.1	540.9	673.9	260.1	1,868
Net Energy Savings (kWh)	472,416	650,016	809,856	312,576	2,244,864

Source: Statement of Work, Energy Efficiency Program for Entertainment Centers, page 10. Revised 12/17/07. Period 1: Notice to Proceed to 6/30/07; Period 2: 7/1/07 to 12/31/07; Period 3: 1/1/08 to 6/30/08; Period 4: 7/1/08 to 12/31/08.

Program Design

Demand based ventilation controls are required per the 2005 Title 24 in new construction with single-zone HVAC system that has an occupant density of 25 people/1,000 sq ft or higher. Matrix proposed the Energy Efficiency Program for Entertainment Centers for Edison's Innovative Design for Energy Efficiency Activities Program (IDEEA). Through this buy-down Program, Matrix offers the opportunity to install demand-based ventilation controllers on single cooling units in retrofit situations. It also provides for coil cleaning for units in which DCV is installed.

The IDEEA Programs target new markets, and employ new marketing methods or new technologies. According to Edison's Program Manager, the Energy Efficiency for Entertainment Centers Program fit the IDEEA portfolio because it filled the new niche of DCV in older theaters which regularly experience variable occupancy patterns.

Traditionally, entertainment centers are not the subject of energy efficiency Programs; however, movie theaters are prime candidates for energy and peak demand savings. The entertainment center market includes megaplexes and large chains. These types of theaters have multiple screening rooms, each with individual packaged cooling units, providing numerous installations per single Program Agreement, making them an attractive candidate for an energy efficiency Program. Furthermore, megaplexes and large chains will most likely have locations outside of Edison and SCG territories, increasing potential for spillover.

Entertainment centers are a prime market for the DCV technology because of their building design, heating and cooling needs, and occupancy patterns. As required by code, cooling and heating loads inside a movie theater are designed to satisfy the ventilation needs in a space at full occupant capacity. Lighting in screening rooms is on for only a brief period in between shows, and screening rooms are well-insulated to minimize noise transmission from inside and outside the theater; therefore, any heat gain inside a screening room is provided by two primary heat sources: theater occupants, and fresh, outside air pumped in to meet building code regulations for ventilation during the summer.

During sparsely attended early shows on hot weekday afternoons, the few people in attendance contribute very little heat gain to the room. However, the ventilation systems are typically set to provide fresh air at one of two levels: either a high minimum level (typically 50 to 60 percent outside air) or at full capacity, flooding the cooling unit with hot afternoon air, which then needs

to be cooled. Theatres often cool and ventilate unoccupied screening rooms because it is simpler to opt for a regular cooling schedule for the entire season than to change the cooling settings on a daily basis. During the summer, this excess ventilation occurs when the weather is hot and the demand for electricity is at its peak.

In order to decrease this demand on the system, the Program offers demand-based ventilation controls installed on a customer's existing HVAC or heat pump units. The DCV controls provide variable economizer (ventilation) operation based on space temperature and CO2 sensor data that represent actual occupancy.

Participation criteria include:

- The Program was initially open to existing entertainment centers located in Edison and SCG territory and climate zones 6-10 and 13-16. By early 2008, the Program expanded to include all climate zones in Edison service territory.
- The Program targets retrofit opportunities only; the measure is now required for new buildings that fall under Title 24 requirements.
- Theaters must have at least one packaged HVAC unit with functioning economizer.
- HVAC units with damaged economizers can be repaired prior to participation.

The cost to the customer is $150 per unit, which is greatly reduced from the actual cost of approximately $1,000 per unit. The Program also offers a cleaning service for the condenser and evaporator coils of each unit. The Program marketing materials include three key benefits: energy savings; AC system efficiency improvement; and, improved comfort and air quality.

The Joint Utility Process

Shortly after Matrix negotiated their original contract with Edison, and before they fielded the Program, Matrix and Edison entered into negotiations with Southern California Gas to implement the Program as a joint utility Program. Matrix sought SCG's co-sponsorship because the retrofit offered gas savings as well as electric savings and SCG could co-fund, reducing the customer co-payment. The decision to structure the Program as a joint utility Program was internal, and was not the result of customer demand.

The effort to structure the joint administrative process took many months, and all the while, fielding the Program was on hold. Some of the effort to structure this as a joint program involved: negotiations with both utility legal departments; decisions regarding disclosure statements; how each utility would claim energy savings attributable to the Program; reporting mechanisms between utilities; development of marketing materials, and, the criteria for participation. With the joint program, theaters initially needed to have both electric service with Edison and gas service with SCG. However, in practice the utilities found that theaters that were good gas candidates were not good electric candidates, and vice versa. In the end, the utilities did not restrict participants to dual fuel customers so that both goals could be met.

Matrix's third quarter 2007 report notes that Edison issued a Change Order authorizing a jointly administered Program with SCG. The fourth quarter 2007 report states that SCG agreed to co-

fund the Program. SCG pays $150 of the $300 initially allocated as a customer co-payment. SCG will claim the gas savings associated with the Program.

Administratively, Edison is the lead utility and Matrix works with Edison. Matrix reports their activities and Program results to Edison, and invoices Edison for $1,368 per completed retrofit. After paying Matrix, Edison invoices SCG, the lag utility, for their portion of the Program buy-down. Of the $1,368 buy-down, Edison provides $1,068 and SCG provides $300 for each HVAC unit retrofitted. For each electric heat pump retrofitted, Matrix forgoes the $150 buy-down typically provided by SCG since there are no associated gas savings.

Market Assumptions

A number of key assumptions underlie the Energy Efficiency for Entertainment Centers Program.

- **Theater complexes offer large potential for DCV retrofit.**[74] Most movie theaters are multiplexes, with many screening rooms in a single building. Package HVAC units serve individual screening rooms and DCV retrofits are possible. Many complexes are franchises with multiple sites. Cinemas associated with major chains and independent theaters offer opportunity for energy efficiency improvements.
- **Contact information for the theater decision-maker is readily available.**[75] Matrix proposed that they identify major theater chains operating in Edison's service territories using published commercial directories and websites.
- **Large chains will provide the majority of DCV installations.**[76] Implementers noted in their proposal that franchises are usually open to participating in energy efficiency projects requiring little time or cost commitment. Matrix anticipated recruiting the major theater chains, and allocating some slots for independently operated theaters.
- **A two-pronged collaborative marketing effort will reach both larger and small theater complexes**.[77] Matrix markets to larger theater chains with assistance from Edison Account Representatives. Matrix independently markets the Program to smaller theaters.

[74] ADM Associates, Stage 2 Technical Proposal, Energy Efficiency Program for Entertainment Centers, pages 3, 28. Revised Oct. 2006.

[75] Ibid. Page 3.

[76] Ibid. Page 8.

[77] Ibid. Pages 8-9.

Process Evaluation Methodology and Sample Design

This section describes the process evaluation conducted to assess the Energy Efficiency Program for Entertainment Centers. The purpose of the process evaluation is to document the Program's design and development, including any differences between the proposed Program design and the implemented Program.

Process Evaluation Methodology

The methodology utilized in this process evaluation included a review of documents, interviews with participants and nonparticipant, developing logic models and a process flow chart, and identifying researchable issues and indicators of success.

The process evaluation focused on key market actors and their experience with the Program. The evaluation team conducted in-depth interviews with two Program Managers, including the Implementer from Matrix and Edison's Program Manager. Cadmus (as Quantec, LLC) interviewed two Edison Account Representatives marketing the Program. Cadmus also conducted surveys with four participating theaters and two nonparticipating theaters.

The Edison Program Manager interview discussed the overarching goals of IDEEA/InDEE program, changes to the Program, including incentive structure and marketing strategies, customer response, changes to the Program, including the joint utility agreement, improvements to the Program, and its future. We also interviewed the Edison Program Manager to answer two key questions. First, was the Program implemented as designed, according to the original proposal and scope of work, and as reflected in the initial logic model and process flow diagram? Second, what are the lasting effects of the Program? The Program Manager also identified key issues for discussion with the implementer, participants and nonparticipants.

The implementer interview focused on overarching Program goals, marketing strategy, implementation, the joint utility process, customer response, long-term Program effects, and potential Program improvements.

Matrix identified three Edison Account Representatives involved with Program marketing. Efforts were made to reach all three Account Representatives actively working with this Program and two were interviewed. The main goals of the Edison Account Representative's survey were to discuss their involvement in the Program and relationship with Matrix, determine if the Program was implemented as designed, and to discuss marketing strategies. Account Representatives were asked about the lasting effects of the Program on the market.

The surveys with decision makers from participating entertainment centers covered their awareness and understanding of energy efficiency, decision-making process, enrollment process, satisfaction, and free ridership and market effects.

Cadmus developed an interview guide or survey for each group. Interview guides and surveys are included in Appendix A.

Interview Sample Development and Disposition

Cadmus conducted interviews with the Program Managers and Implementers, participants, nonparticipants and market actors. We based survey sample sizes on information from Edison and Matrix about the total population of each respondent group. The interviews took place between January and May 2008. Before interviewing participants, interviewers confirmed that the respondent was involved in the decision to participate in the Program and/or were directly involved and knowledgeable about the Program.

For this evaluation, a ***participating*** theater is one that signed an agreement and installed the DCV. The main goals of interviewing the participating entertainment center representatives were to assess their experience with the Program, satisfaction, free ridership and spillover. Questions were asked about the enrollment process, influence of the incentive on participation and the likelihood of future energy efficient installations.

Nonparticipants are defined as those who were contacted about the Program and chose not to participate. Nonparticipating entertainment centers were targeted for surveys to gather information about the implementation process, focusing mostly on knowledge of the Program, marketing, and market barriers.

We classified entertainment centers as ***uncommitted*** when Matrix had contacted the theater but the decision makers had not yet finalized their participation decision. Matrix was actively marketing and recruiting them at the time of this evaluation and asked us not to contact the potential participants. Since theater decision makers are hard to reach and their decision-making process can be lengthy, we did not contact uncommitted entertainment centers. Table 71 shows the Program participation and attrition. Edison identified 78 theaters in their service territory and Matrix mailed marketing materials to 62 potential participant theaters. Of the 78 theaters Edison identified, 20 had complete contact information that enabled Matrix to contact a decision-maker by phone. Others listed, for example, the phone number for the movie show times. Matrix contacted 20 theaters, including 10 that remain uncommitted. Two had DCV installed and are ineligible. Eight theaters are participating.

Table 71. Program Participation and Attrition

	Number of potential participants
Edison identified population of potential participants	78
Matrix telephoned or emailed those with complete contact information for the decision-makers	20
Entertainment center participation decision pending	10
Ineligible: DCV already installed	2
Entertainment centers with signed Program Agreements	8

We based survey sample sizes on Program target goals and information from Edison and Matrix about the total market population. Matrix provided a list of participating, nonparticipating and uncommitted entertainment centers.

Table 72 shows the evaluation team's survey and interview goals and the number of interviews actually completed by each Program group.

Table 72. Targeted and Completed Interviews

Interview Group	Goal	Achieved
implementer Interviews	1	1
Program Manager Interviews	2	2
Market Actor Interviews (Edison account representatives)	2	2
Participant Interviews (theater contacts)	8*	4
Nonparticipant Interviews (theater contacts)	10	2
Total	22	9

*Eight entertainment centers signed agreements and seven were qualified to participate.

Table 73 shows the participant survey call disposition. Of the eight entertainment centers signing Program Agreements, one was ineligible because the HVAC condition did not allow DCV installation. The remaining seven entertainment centers installed DCV technology in the majority of their screening rooms, totaling 81 installations. We attempted contact with all participants and completed surveys with four, accounting for 64 DCV installations. After multiple attempts, we did not reach three participants, representing 17 DCV installations.

Table 73. Program Participant Survey Disposition

Disposition	Number	Percent
Eligible sample - Entertainment centers with signed Program Agreements	8	
Ineligible -	1	13%
No answer/unable to reach	3	38%
Completed surveys	4	50%

Cadmus interviewed two nonparticipants and found they had already installed DCV units before the Program began; the theaters were less than one year old and DCV was installed under Title 24 requirements.

At the time of the process evaluation, there were 10 uncommitted potential participants that implementers were actively recruiting. Implementers requested that we not contact uncommitted theaters for the process evaluation and discuss the Program with them, since it was difficult to reach them in the first place, and could also be confusing with multiple callers.

Process Evaluation Results

Program Theory

The program theory for the Energy Efficiency for Entertainment Centers Program can be summarized as follows:

> By educating entertainment center owners and managers about the benefits of demand based ventilation control systems, they will install this energy efficiency technology, and increase market acceptance and market penetration. The Program will increase energy savings by providing condenser and evaporator coil cleaning service to the units modified along with the demand based control systems. By educating theater service contractors about optimizing maintenance for energy efficiency, savings will persist through continued performance maintenance. Installation of the controllers and other services will reduce peak summer cooling energy usage and winter heating energy usage.

Logic Model

The Program logic model shown in Figure 15 highlights the key features of the Program as understood by the evaluation team, indicating the logical linkages between activities, outputs, and outcomes. The elements of the logic model are:

Activities that the program undertakes. The primary activities involved identifying the potential participants, coordinating recruitment efforts between Matrix and the utilities, preparing marketing materials and presenting them to potential participants.

Outputs produced by program activities. The marketing and outreach activities result in outputs including production of marketing materials and outreach to all audiences, customer agreements, equipment inspection and assessment, and installation of DCV and coil cleaning.

Outcomes that result**:**

In the **short term**, outcomes include participation agreements, and, monitoring a sample of the new installations and verifying kW and kWh savings.

Intermediate outcomes include increases in awareness and demand for the technology, experience gained by the implementers, installers and Edison in new market approaches resulting in future Programs. These outcomes reduce market barriers and increase product availability.

The **long term** outcomes include changes in the entertainment industry, installing DCV in retrofit applications.

Figure 15. Energy Efficiency for Entertainment Centers Logic Model

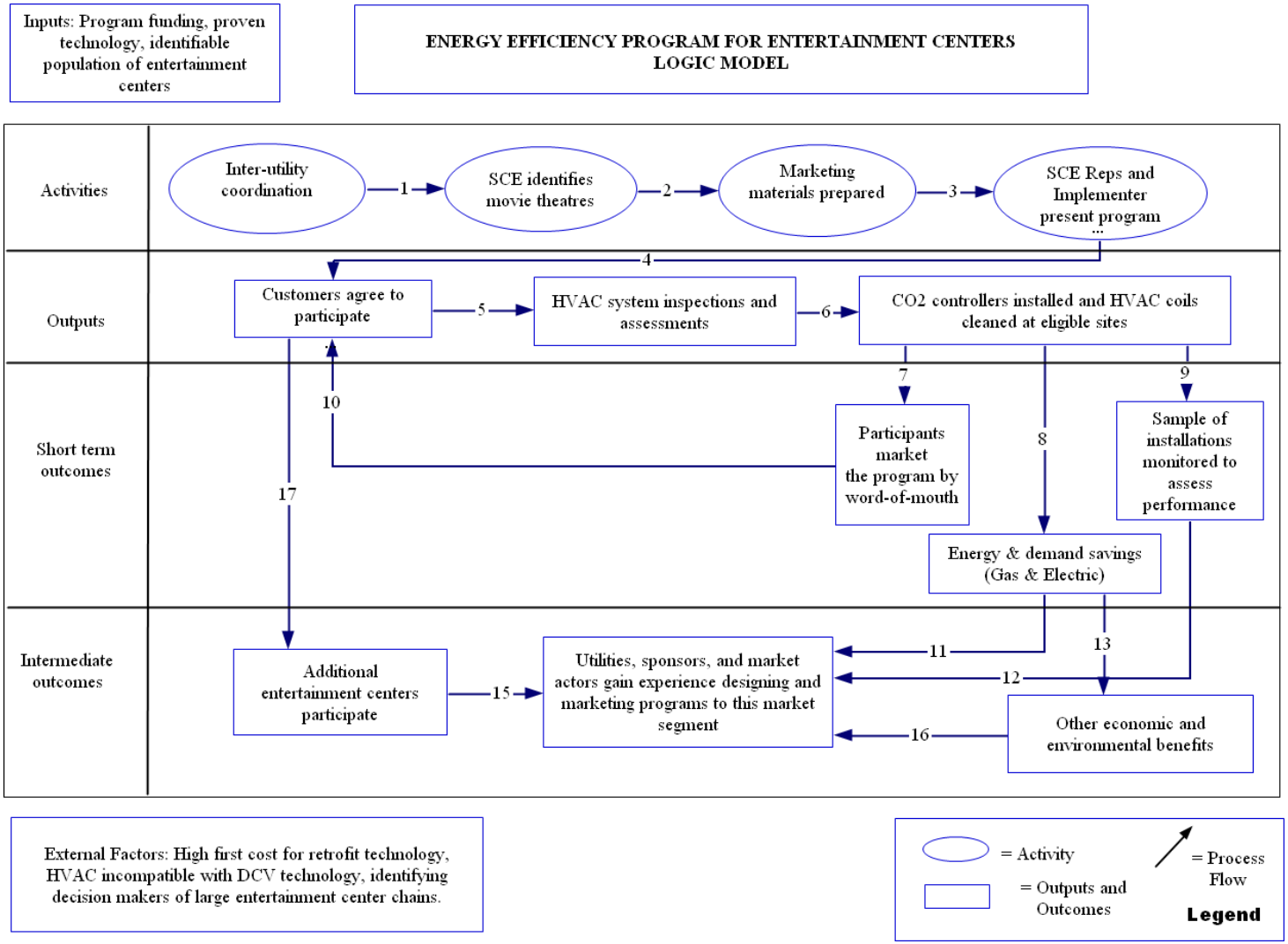


Table 74 describes the linkages among the elements in the logic model and presents a list of progress indicators which can be used to evaluate the elements and their linkages.

Table 74. Energy Efficiency Program for Entertainment Centers Logic Model Links: Researchable Issues and Indicators

Link	Researchable Issues	Indicators
	Inter-utility coordination ensures that the program is a consistent, regional-wide activity and that utility efforts are coordinated	Meetings scheduled; work papers; agreements; program changes
1	The initial identification of participants allows marketing to an optimal group within the target market.	Movie theaters identified as potential participants.
2	The development of marketing materials in a standardized way will lead to consistent marketing messages	Lack of confusion among implementer, Account Representatives, and customers on marketing messages.
3	Outreach to prospective participant movie theaters encourages product marketing and addresses information barrier and raises awareness	Satisfaction with the program introduction, the products, and the promotional materials; number of presentation events
4	Increased knowledge and awareness leads to participation and increased demand for services	Increasing customer satisfaction, increased knowledge and program services
5	Inspections and assessments determine final eligibility and estimate system efficiency of participant HVAC systems	Increased participant knowledge and awareness through HVAC inspection and assessment; number of eligible participants
6	Customer market barriers decreased with CO2 controls installed and HVAC coils cleaned	Number of CO2 controls installed and HVAC coils cleaned. First cost; performance uncertainty; knowledge and awareness
7	Customer market barriers decreased; participants market through referrals	First cost; performance uncertainty; knowledge and awareness
8	Energy and demand savings (both gas and electric)	Reduced energy use; reduced peak demand
9	Increased knowledge through site performance monitoring and assessment of the installed measures	Reduced uncertainty about performance
10 / 17	Additional customers participate after referral from participants	Knowledge and awareness; new customers agree to participate in the program
11 / 12 15 / 16	Market barriers decreased for customers and market actors. Utilities, sponsors and market actors gain experience in this market segment.	First cost; performance uncertainty; knowledge and awareness. Key program players apply knowledge of the market; program strategies evolve to address remaining market barriers.
13	Market adoption leads to long-term energy and environmental impacts.	Reduced energy use; reduced emissions.

Process Flow

As distinct from the Logic Model, the Program process flow describes the specific work flow and steps in the operation of the Program. The process flow diagram in Figure 16 shows that Edison identified candidate entertainment centers from their customer information system and provided candidates to Matrix for follow-up.

Matrix identifies potential participants from a list of theaters provided by Edison. Matrix prepares marketing materials and contacts entertainment centers in a variety of ways, including

e-mail, phone calls, direct mailing and in-person meetings. Edison Account Representatives introduce the larger theater chains to the Program, while Matrix markets directly to smaller entertainment centers.

If the entertainment center is interested in participating, Matrix assesses the current HVAC system to determine if the entertainment center has the appropriate equipment and can benefit from DCV.

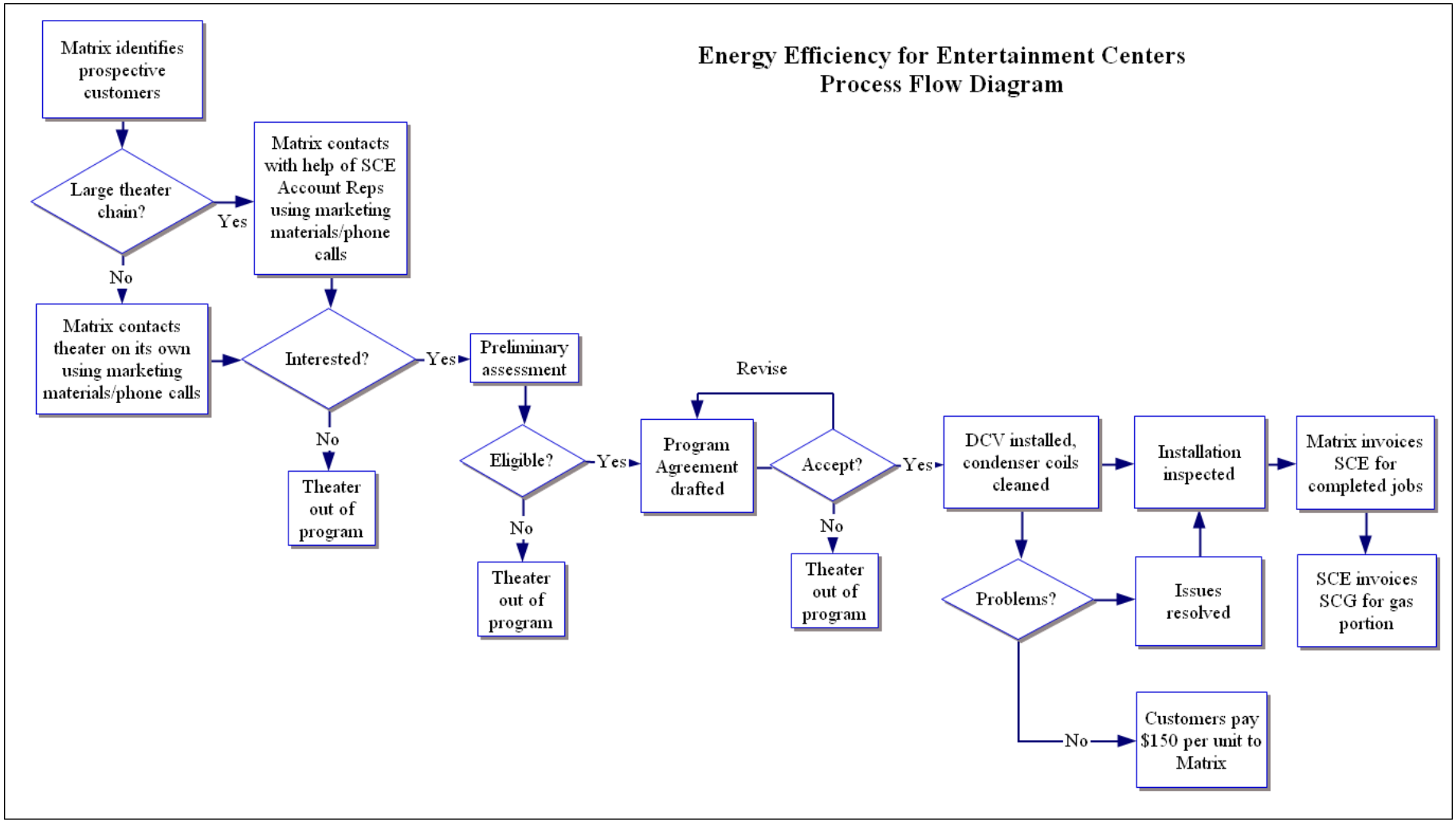
Implementer executes a Program Agreement, including costs and the installation plan, with the participant. Once an entertainment center has signed the agreement, Matrix will install the DCV equipment and perform the other complementary services that include cleaning the condenser and the evaporator coils. Customers pay a $150 co-pay, per cooling unit retrofitted, directly to Matrix.

After installations are complete, Matrix is responsible for inspecting 100 percent of the retrofitted HVA C units to test the functionality of the installed control system. Ten percent of the retrofitted units will be selected for monitoring for a minimum of three weeks pre-retrofit and three weeks post-retrofit. The monitoring will be capable of determining the minimum CO2 level, economizer damper command or position, compressor and fan operation, furnace firing rate (natural gas consumption), return air temperature, supply air temperature, mixed air temperature, and outdoor air temperature.

Matrix must respond to any complaints directly by telephone within 24 hours. Matrix must resolve any complaints within five days; if they do not, they must provide a detailed report of the complaint to Edison so that Edison can handle the complaint.

Overall, this process has been working as designed, albeit slowly. The initial bottleneck was the coordination between the IOUs, including legal agreements and marketing reviews. The bottleneck was also in identifying the appropriate contact person at the theaters, and then actually being able to contact them. Marketing methods included direct mail, phone calls, and in-person meetings. In this industry, direct contact between implementers and decision-makers is needed to sell the Program. The decision-making process engaged by the theater’s decision-makers can also be a lengthy process.

Figure 16. Entertainment Center Process Flow Diagram



Evaluability Assessment

An Evaluability Assessment conducted for Edison in the first half of 2007, during early Program efforts, listed potential issues that could affect Program evaluability.[78] These issues were initially explored through interviews with Program Managers and Implementers. Significant issues identified during the Evaluability Assessment were primarily baseline or monitoring issues, and were typical of new program database tracking issues.

We revisited the identified issues for this process evaluation. The implementer provided copies of the data collection and inspection instruments. Matrix had addressed the issues identified in the earlier Evaluability Assessment. The Evaluability Assessment for this project revealed thorough and comprehensive proposed baseline, early M&V and tracking database activity in support of program evaluation.

Issue 1: The implementation contractor plans to conduct 100 percent inspections and monitor performance of ten percent of installations where CO2 controls are installed. Details of monitoring plan have not been developed yet but it will include recording damper position over a few weeks period. More information on the pre- and post-installation measurement method should be requested. Estimated savings will require an adjustment for outdoor temperature.

> ***Resolution 1:*** More detail on the monitoring plan and data collection fields were provided by Matrix. Outdoor temperature was included in the fields to be measured and recorded.

Issue 2: Matrix' proposed baseline data were reviewed and additional pre-installation parameters were communicated to Edison's Program Manager. The program data collection forms have not been finalized at the time the Evaluability Assessment was conducted. The energy audit/assessment should record the identifying and nameplate information for the analyzed units and address comments already made by us and the Edison Program Manager.

> ***Resolution 2:*** Final Program data collection forms provided by Matrix include spaces to record the manufacturer, model and serial number of the treated units.

Issue 3: The implementation contractor has proposed measurement of pre- and post-installation data over one week which is inadequate because the occupancy profile of movie theaters varies during the week and weekend, and is seasonal. A more elaborate baseline data development is recommended, especially considering that average energy savings per installation (4,400 kWh) are too low for the billing analysis to differentiate from noise.

> ***Resolution 3:*** The Change Order dated August 16, 2007 states that monitoring will be *"for a minimum of three weeks for pre- and three weeks for post-retrofit."*

[78] Quantec, LLC. Early Assessment of 2006-2008 InDEE/IDEEA Programs, Nov. 2007.

Issue 4: The protocols and savings basis for the clean coils measure were not provided with the proposal, nor were they available as of July 2007. These protocols should be consistent with the CPACS program. Ex-ante savings assumptions should be documented for both measures. The baseline data for the clean coils measure should be collected similar to the CPACS program.

> ***Resolution 4:*** Protocol and savings basis for the clean coils have been developed and were provided for the impact evaluation.

Issue 5: The program ex-ante savings are 3.69 KW peak demand savings per installation. It is not clear from which measure these savings will be realized. The CO2 sensor based control of economizers is unlikely to save demand and energy during the peak period.

> ***Resolution 5:*** Demand savings will be addressed in the impact evaluation.

Issue 6: Early M&V was recommended to Edison's Program Manager.

> ***Resolution 6:*** Conversations with implementation contractor indicated monitoring would be installed on the first available units retrofitted so that the implementer could use the savings data as a marketing tool to recruit other participants. Edison is also prepared to conduct random site verifications (no monitoring) at 20-30% of the units installed.

Issue 7: Mailing list and contact information for nonparticipants should be retained.

> ***Resolution 7:*** Contact information was provided in the implementation contractor's tracking database.

Program Modifications

The Program design evolved since the Program was first proposed and Edison held the kick-off meeting in January 2007. There were three primary changes.

- **The Program became a joint utility offering**. SCG joined the Program as the lag utility. This occurred before implementers fielded the Program. The agreement took 9 - 10 months to complete and delayed Program roll-out to customers.
- **Edison added four climate zones and heat pumps to the Program.** Matrix began shifting focus away from recruiting participants in coastal zone 6, which would provide mostly gas savings and recruited more heavily in climate zones 8, 9, and 10, which provide greater peak electric savings. During the first quarter of 2008, because of the late start and low Program participation, Edison and Matrix expanded the Program to include Edison and SCG customers in climate zones 13, 14, 15, and 16. It also expanded to include retrofitting heat pumps.
- **Marketing efforts expanded**. Expansion included reference to peers participating in the Program, and marketing "door-to-door" on-foot.

Joint Utility Offering

The Program became a joint utility offering when SCG joined the Program as the lag utility. The original customer co-pay prior to the joint effort was $300. Matrix believed that a $300 co-pay would result in substantially fewer participants, and it would have been detrimental to the Program's success.

Matrix sought SCG's co-sponsorship since proposing the Program to Edison because the technology retrofit offered gas savings as well as electric savings. With SCG co-funding, Matrix proposed to fully fund the retrofit so that there would be no cost to the customer. By removing the cost to the customer, Matrix hoped to encourage Program participation, especially in large theater chains. Negotiations with SCG stretched into the second quarter of 2007, and SCG agreed to co-fund the Program, but not at the level desired by Matrix. Although SCG's contribution to the buy-down did not remove the participant cost altogether, it reduced it from a co-pay of $300 per retrofitted HVAC unit to $150 per unit. The legal documents needed for co-sponsorship, including a contract amendment, were signed third quarter of 2007. Matrix was able to field the Program in late October 2007, nine or ten months later than the original startup date proposed for February 2007.

Program Managers reported a number of items took time to negotiate, including: joint marketing materials, including logo placement, trademarks, disclosure statements, language, etc.; division of savings between utilities; issues of customer confidentiality; Quality Assurance procedures; and the agreement between legal departments. While both utilities used a common interface, they had different "back offices" when it came to SMART data entry and reporting; both utilities made changes to databases.

Despite the late start and low participation rates resulting from the length of time it took to finalize the joint utility agreement, Edison's Program Manager and the implementer thought that the joint utility process was a good coordinating effort and beneficial to the Program in the long run. Edison's Program Manager cited the importance of coordinating efforts and added that SCG was able to cover some of the administrative costs.

The Program Manager specifically mentioned gaining experience in the initiation, negotiation and the legal process associated with the agreement. SCG's Program Manager thought that in the future Program Managers should be more involved in the development of the contract so they can identify and remedy potential problems proactively. Further, the Program Manager also mentioned that staff changeover led to issues with continuity and information transfer, and suggested Program Managers should be kept on for the duration of the Program. This would avoid confusion and problems when programs are handed down from one person to the next, and knowledge and insight are lost.

The Program Implementer noted that the joint utility process initially had a negative effect on the Program. Once the joint agreement was in place however, the joint utility approach no longer had a negative effect. In fact, the Implementer stated the joint utility process had a large impact on participation by lowering the customer's participation cost. Matrix also noted that both

utilities had been very flexible about approving projects, even if the project resulted in significantly more gas or electric savings.

Climate Zones and Heat Pumps

Edison added four climate zones and heat pumps to the Program. Because the Program was slow to start and slow to enroll, Matrix sought to increase participation by marketing to additional climate zones. During the first quarter of 2008, a second change in the design of the Program occurred. To increase the pool of potential participants, Matrix proposed marketing to two additional inland climate zones where savings would be significant, climate zones 15 and 16. Edison responded by proposing that in addition to customers in climate zones 15 and 16, Matrix also market to customers in climate zones 13 and 14, effectively including all of Edison's service territory. Besides the addition of four new climate zones, heat pumps were added as potential retrofit targets. Because heat pumps provide no gas savings, Matrix will forgo any contribution to the buy-down provided by SCG.

Expanded Marketing

Expanded efforts included naming other participants in marketing materials. Implementers referenced this approach as using "peer pressure." Case studies documenting participants' energy savings should become part of the marketing approach. All potential participants should receive case studies and referrals to contact other participants. In addition, marketers

Marketing and Participation Decisions

Awareness

The two nonparticipant entertainment centers interviewed already had the DCV technology in place. They both explained that their theaters were built within the past year and the DCV technology was installed to meet Title 24 requirements.

When asked how they would rate their awareness and understanding of energy efficiency, three of four respondent participants stated they were "very aware," and one stated they were "aware." Two of the four participants interviewed were aware of the DCV prior to hearing about the Program. One participant considered installing the technology prior to the Program, but had no immediate plans to install DCV.

Edison Account Representatives stated theater managers are interested in energy efficiency but they are not aware of technologies appropriate to their business and don't have time to think about it. One also stated some theater EMS systems are not compatible with the DCV technology. The Implementer stated awareness and cost impede adoption of the technology.

Marketing

Marketing is a collaborative effort between Edison and Matrix, with the bulk of the work performed by Matrix. Utility Program Managers sent "e-mail blasts" and brochures to their key

Account Representatives, requesting their help to target larger chains. The Edison Account Representatives were instrumental in opening channels of communication between Matrix and the larger theater customers. Matrix contacted the smaller theaters without the assistance of Account Representatives.

Marketing included three primary elements: (1) phone calls to theater reps. and managers; (2) mailing of brochures describing the program; (3) face-to-face meetings with executives and managers of large theater chains. Matrix noted that while it is time consuming to market the Program by phone, this was an invaluable approach to marketing.

Edison originally identified approximately 78 entertainment centers, with a total of 185 site locations in the service area, and supplied Matrix with their contact information. In some cases contact information included theater personnel names, phone numbers and addresses. In other cases only partial information was available and Matrix used resources such as the internet to supplement it. The entertainment centers varied in size from independent, single location theaters to large chains.

As shown in Table 71, Matrix mailed marketing materials to all 78 entertainment centers. Matrix targeted marketing to 20 entertainment centers with both a phone number and an address. Marketing strategies included phone calls, e-mails, and face-to-face meetings. Three Edison Account Representatives worked with key accounts within this pool of 20 theater complexes. Edison Account Representatives put the entertainment center owner in contact with Matrix. Matrix explained the Program and provided savings projections based on DCV product specification sheets. Larger chains benefited from on-site visits and personalized cost projections while smaller theaters received savings estimates based on theater size and number of HVAC units. Matrix provided these estimates before the final Program Agreement was signed.

Of the 20 entertainment centers that received targeted marketing, 12 did not sign Program Agreements. Two entertainment centers were recently constructed and installed the DCV technology in compliance with Title 24 standards. The remaining ten entertainment centers are currently uncommitted. Matrix and Edison are currently working with these centers.

The Program successfully recruited eight entertainment centers since fielding the Program in the fourth quarter 2007. One of the eight entertainment centers that signed the Program agreement was found ineligible based on the condition of the HVAC units. The remaining seven entertainment centers installed DCV technology in the majority of their screening rooms, totaling 81 installations.

Overall however, the Program experienced slow uptake. Marketing efforts evolved from those originally proposed. By the fourth quarter of 2007, Matrix employed a new strategy, using “peer pressure” to encourage participation. By mentioning the participant’s names to nonparticipants, Matrix hoped to sway the skeptical. Matrix noted that this tactic was effective, especially with small, single location entertainment centers, citing several requests for reports of the names of participants and their energy savings. This marketing method is akin to offering case studies, sharing real examples of participants and their realized energy savings.

The four participating entertainment centers interviewed were smaller chains, with easily accessible managers or owners, and did not warrant the services of an Edison Account Representative. In keeping with the marketing approach for smaller chains, none of the four respondents had heard of the Program from an Edison Account Representative. Three of four respondents heard about the Program from implementers, and one heard about if from a colleague (another employee).

The small chains did not experience the same marketing issues experienced with large chains, that is, decision makers were easier to reach and the decision making process did not take as long. The decision maker at these firms was the theater manager for three participants and the regional manager at the fourth.

All four participants interviewed stated that the marketing materials were easy to understand and the implementers clearly explained the benefits of the Program. They also stated enrollment was straight forward, but one stated it took a long time to coordinate with installers.

Decision Making

Among the four participants interviewed, reasons for participation varied. Overall, the majority of entertainment centers interviewed needed financial motivation to install the measures.

Saving money on their energy bill; quickness of installation; and timing of the Program (2 respondents)

An interest in energy efficient technology from previous involvement in several Edison Programs. (1 respondent)

Inexpensive cost of participation (1 respondent).

Incentives

The cost of purchasing and installing DCV is likely to be about $1,000. Matrix proposed to subsidize the cost through buy-down from Edison incentives and promote the unit to customers for $300 each. After introductory conversations with a few large chains, Matrix thought this price might still be too high. With SCG's co-funding, through the joint utility agreement, the participant cost was lowered to $150 per unit. Although Matrix was hoping for a zero co-payment, they viewed this cost as low enough to entice customers.

One Edison Account Representative interviewed agreed that the $150 co-payment was at an appropriate level, but thought that full subsidization would have been ideal. The second Account Representative interviewed stressed that the key to the co-payment level is a payback period of one year or less. All of the participants that were interviewed were optimistic that the savings would cover their co-payment.

All four respondents stated they felt that energy savings would cover the purchase, installation and service costs of the DCV *"eventually"* and, *"if it does what it is supposed to do."*

Program Delivery and Implementation

Program delivery involves general administration, marketing, and direct implementation. Matrix both marketed and implemented the Program. This is in contrast to another Edison program installing the same technology, where implementers contracted out marketing and implementation to different firms, so they could focus on their specialty.[79]

Implementers stated that weekly meetings with the Edison Program Manager and monthly reporting worked well, and that Edison's reporting database structure (SMART) was not particularly difficult for Matrix. Matrix also reported that the Program was technically difficult to implement because each HVAC unit is different and presents its own challenge. However, they have a good understanding of the different system types.

The Program Implementer relied on discussions with theaters' service contractors to determine whether or not units at a particular theater complex were eligible for installation of Program measures. Matrix personnel do not perform visual inspection until they were ready to install the DCV equipment. At a few theaters, Matrix arrived to install the DCV and found some existing equipment ineligible.

Implementers noted that most existing HVAC units are eligible for the Program. The savings depend on the size of the units but Matrix agreed to service all HVAC units regardless of size. Matrix does not service HVAC units connected to projector rooms since projector equipment is expensive and fragile and has special ventilation needs. One recommendation offered by Matrix was that future similar programs should invest money upfront in securing equipment needed for installations. Matrix spent time locating parts to fit HVAC units. Matrix also suggested that Edison's HVAC program include DCV.

The Program was falling short of enrollment and savings expectations. Cadmus identified several implementation issues that resulted in a large number of uncommitted entertainment centers (ten in June 2008). The issues were:

The slow Program start-up;

Hard-to-reach decision makers;

The extended nature of the marketing and business decisions making process;

Consolidation of the entertainment center market segment;

Technological issues;

Qualifying units; and,

[79] Management Affiliates Partnership Program (MAP), implemented by Energy Innovation Group.

Communication.

1. Slow Program Start-Up

The slow Program start up resulted from the lengthy process associated with the joint utility agreements. According to Edison's Program Manager, there were a number of reasons why the joint utility process took several months. First, there were administrative issues to address, such as bringing SCG into the Program proposal and retroactively changing the Purchase Order. Second, the negotiation and legal process was time consuming. Edison and SCG had to address customer confidentiality, determine how to share the energy savings, and draft a trademark and logo disclosure statements for the marketing collateral. The joint utility process significantly slowed finalization of the participant co-payment amount and prohibited Matrix from full Program startup until the last quarter of 2007. Both Edison's Program Manager and the implementer agree that this change to the Program design proved to be a major obstacle to the Program's startup. Some of the low participation rate in 2007 can be attributed to the shortened amount of time Matrix was able to market the Program in the field.

2. Decision Makers Are Hard To Reach

Complete contact information is not always available from the Edison customer information system or Edison Account Representatives. In particular, the decision maker of large chains is difficult to locate. Account Representatives highlighted the difficulty contacting entertainment centers' decision makers.

3. Decision Making Can Be an Extended Process.

Once the correct decision maker is identified, the marketing and decision-making process can be long and involved. Busy managers may be involved with a number of theater complexes, in more than one state. Matrix is continuing their marketing efforts with the uncommitted theaters, including the "peer pressure" and case study approach and hopes to see results.

4. Consolidation Of The Entertainment Center Market Segment

The structure of the entertainment center market segment was a hindrance rather than advantageous. Matrix marketed this Program very aggressively to one large chain because they have a large number of theater complexes in Edison's service territory. Matrix focused their efforts less aggressively on independent, single location entertainment centers. Unfortunately, the large chain has yet to commit and combined, the eight participating entertainment centers have produced fewer installations than the single chain could have. This illustrates how one business' decision, if they are a large share of the market, can adversely affect the success of a Program. In the future, similar Programs should aggressively market to both large chains and smaller theaters from the onset.

5. Technological Constraints

Technological constraints proved to be problematic for some entertainment centers. One Account Representative and the implementer noted that in some theaters the DCV units were not always compatible with the Energy Management Systems. Compatibility can only be determined during the initial on-site visit and installation.

6. Qualifying Units

In certain cases, the Program Implementer qualified HVAC by relying on discussions with theaters' service contractors and did not perform a visual inspection of the units until they were ready to install the DCV equipment. At that point several theaters were found to be ineligible due to issues with existing equipment. This issue impacted coordination with the impact evaluation contractor who was unable to install monitoring equipment on four of twelve planned units because units available at two theater complexes turned out to be ineligible upon arrival and inspection.

7. Communication

Communication between Matrix, Edison Account Representatives and the theater contact is critical. Lack of communication between all parties significantly slowed the finalization of a Program Agreement with one large chain. The Edison Account Representative thought the chain's decision makers were waiting for Matrix to follow-up, while Matrix thought the entertainment center was working through their decision-making process. Matrix stated that it is their standard practice to follow up with decision makers once every week, keeping them informed about the Program and encouraging participation.

In this case, the real issue may be a lack of communication and information sharing between the Edison Account Representative and Matrix. Increasing communication between the utility and the implementer, establishing regular schedules to check in and update status, can remedy this issue.

Market Barriers

Edison's portfolio of IDEEA and InDEE Programs focus on overcoming market barriers in new market segments, or through using new marketing or delivery methods or through new technologies. Market barriers defined in the 1996 market transformation scoping study by Eto et al[80] include three recurring themes: information; risk; and, incentives. Eto lists information-related market barriers as a variety of issues associated with availability, cost, and trust-worthiness of information. Risk-related market barriers include issues assessing and managing risk. Incentive-related market barriers involve financial and nonfinancial rewards or penalties for

[80] Eto J., R. Prahl, J. Schlegel, A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs, July 1996.

pursuing energy efficiency opportunities appearing cost-effective as measured by standard economic means.[81]

Implementers focused on high first cost as the market barrier impeding DCV installation. Recruiting SCG was pursued to add funding to the Program and further reduce the customer co-pay. Implementers assumed that reducing the customer co-pay would increase participation. According to Eto,[82] high first cost and the need for additional up-front capital is often identified as the primary barrier, and incentives are expected to increase adoption of energy-efficiency products. However, high first costs result from underlying market barriers. In this case, the underlying barriers could include performance uncertainties, bounded rationality of manufacturers in the distribution chain, and high information and hassle costs.

Although not explicitly stated in Program documents or by Program management, the Program appears to have been designed to address several major barriers underlying high first costs, including:

1. Information or search costs
2. Performance uncertainty
3. Product or service unavailability
4. Asymmetric information and opportunism

Several assumptions illustrate the market barriers this Program addressed.

- **Entertainment center managers lack information and awareness of the DCV technology, resulting in low demand for energy efficiency technologies.**

This assumption relates to market barriers including information and search costs, performance uncertainty, and product availability.

Edison Account Representatives and the Implementer interviewed characterized the awareness of DCV technology among theater managers as low. In addition, Matrix noted that since this technology is fairly new for packaged units, HVAC contractors are not installing this technology as standard practice. *"Even if individual movie theaters would like to see this technology implemented, the cost and efforts involved in getting local contractors to do it may not be an attractive proposition."*[83]

Matrix addressed lack of awareness of the DCV technology through focusing specifically on that technology, and actively marketing directly to entertainment centers, providing explanatory materials about DCV and projected cost of installation. Matrix expected to *"push the cost down"* by focusing only on this technology.

[81] Ibid. Page 12.

[82] Ibid. Pages 28-29.

[83] ADM Associates, Stage 2 Technical Proposal, Energy Efficiency for Entertainment Centers, Page 8. October 2006.

However, the lack of contact information and slow startup to the Program severely restricted the number of entertainment centers Matrix was able to reach. This meant that although the marketing materials were effective they did not reach enough of an audience to fully enroll the Program or change the market on a whole.

Because two of the four participants interviewed knew about DCV before they had heard of the Program, lack of awareness may be less of a barrier than anticipated.

- **Franchises are usually very open to participating in energy efficiency projects that require little time or cost commitment on their part.**

This assumption relates to market barriers including information and search costs, performance uncertainty, and product availability, and asymmetric information and opportunism.

Matrix assumed that once information was provided, technology performance documented, and participation cost was low, entertainment centers would participate in the Program. Again, Matrix addressed this assumption by focusing on entertainment centers. Matrix made several assumptions about this market segment. First, Matrix assumes that few individuals are responsible for a large number of regional theaters, and marketing will be cost effective. Matrix preliminary market research showed 170 complexes housed 1,225 screens, and they could market to the regional management of these chains.

Again, the lack of contact information and slow startup to the Program severely restricted the number of entertainment center franchises Matrix was able to reach. The large franchises proved to be harder to reach than the smaller independent theaters. This assumption remained untested. There were ten uncommitted franchises at the time this process evaluation was conducted; we were not allowed to discuss decision making with these theater managers.

- **Since it is already a requirement for new movie theaters, Implementers were confident that movie theater operators would respond very positively to this Program.**

This assumption relates to asymmetric information, and information and search costs.

Implementers stated in their Technical Proposal that demand based ventilation is a very effective and but sharply underutilized technology that could reduce cooling and heating energy consumption.[84] They planned to market the technology by pointing out that it was a Title 24 requirement for new construction. As before, Matrix assumed that once information was provided and technology performance documented via its Title 24 requirement in new construction, entertainment centers would participate in the Program.

[84] Ibid. Pages 2-10.

Participant Experience with the Program and the Technology

Implementation Issues

Of the four participating entertainment centers interviewed, two noted problems associated with Program implementation. One respondent experienced unexpected costs after signing the Program Agreement because the implementer did not identify problems with the theater's HVAC units in the original cost projection. When the extra costs were revealed the installations were already in progress; the respondent stated that as a result, he felt trapped in his decision. He explained that if these extra costs were included in the projection he may not have participated in the Program. Since the entertainment center was a small chain, they did not receive an on-site assessment like the larger participants receive. A more thorough cost projection including initial inspections for small theaters, as conducted for larger theaters, would likely prevent this type of problem.

The second respondent reporting a problem thought that the installers had damaged the CO2 sensors during installation. He added that he was not certain this was the case, but had no reason to believe that anyone else had touched the HVAC equipment. This concerned him because installation errors could reduce energy savings and even increase costs.

According to Matrix and reflected in the process flow diagram, problems like this are addressed through the established inspection and compliance process. At the time we conducted the interview, the respondent had not yet contacted Matrix about the problem. If Matrix implements the Program according to design, once the entertainment center contacts Matrix, the DCV units will be repaired. Matrix does make an effort to ensure quality control by inspecting 100 percent of their installations to ensure functionality of the installed control system.

The other two respondents did not report any problems associated with Program delivery or implementation. Overall, the Program as implemented was problematic because of the marketing problems and problems associated with installation of DCV units.

Satisfaction

Three of the four respondents had recently completed DCV installations stated it was too soon to comment on their satisfaction with the measures. One respondent stated they were highly satisfied with the installation. Installations were too recent for the participants to see energy savings although all were very optimistic that energy savings would cover costs associated with the measures.

Participants were asked if they were satisfied with the Program overall. Three respondents stated they were very satisfied with the Program. One participant thought that is was too early in the process to comment.

Suggestions to improve the Program were limited. Two respondents had no suggestions, while the other two respondents' recommendations were linked to the problems discussed earlier. One suggested implementers provide more upfront cost information since they experienced unexpected costs. The second wanted the installers to be more careful and follow-up on all

installations. Excluding the two very specific complaints, the Program was received well by customers.

Matrix is required to monitor ten percent of installations. At the time of the evaluation, no data was available. When it is, the results can be reported as a case study, and included in marketing materials. More importantly, the monitoring results will be instructive regarding the performance of the system.

Free Riders

To assess free riders in the Program and determine the net to gross ratio (NTG), participants were asked if they were aware of the technology and if they had planned or considered installing the DCV measure before the Program. They were also asked whether they would have installed the DCV measures without the incentive and when they would have done so.

Of the four participants interviewed, two stated there were no CO2 sensors installed in their theaters before the Program and two were unaware of any currently that were installed. Therefore, the installations were new applications of the technology.

Table 75 is a free ridership matrix, showing the participants' answers to a series of questions. The answers are used to score free ridership for each participant. Two respondents had heard of DCV technology prior to the Program. One of these respondents considered purchasing DCV equipment prior to participating in the Program. This participant stated he would have installed the DCV without the Program, but "later." This participant can be classified as 50 percent free rider.

The likelihood of the other three respondents installing the DCV equipment in the absence of the Program was little to none. These three respondents are not free riders. Overall, we estimated the rate of free ridership in the Entertainment Center Program at 12.5 percent.[85]

Table 75. Entertainment Center Program Participating Theaters Free Ridership

Participant ID Number	Free ridership score	Heard of DCV prior to Program	Considered DCV before Program	Already installed	Would install without Program (likelihood scale of 0 to 10)	Planning to install soon
1	50 percent	Yes	Yes	No	Yes (likelihood = 10)	"Later"
2	0 percent	Yes	No	No	No (likelihood = 3)	no
3	0 percent	No	No	No	No (likelihood = 0)	no
4	0 percent	No	No	No	No (likelihood = 0)	no

[85] One of 4 would install without the Program (25%). That participant is 50% likely to install DCV without the Program. (25%*50%=12.5%)

In addition to customer interviews, the Program Manager at Matrix was asked to comment on the likelihood of customers installing DCV with CO2 sensors on their own, outside of the Program. He responded that the installation of the DCV and CO2 sensors was very complex and required engineering expertise. It was unlikely that any of the entertainment center facilities managers would have the engineering expertise. In addition, some entertainment complexes have software-based energy management systems (EMS). The heating and cooling systems are managed from a central location, most likely by someone who is less likely to possess the skills necessary to install and calibrate the DCV/CO2 sensor retrofits. Because of the highly specialized nature of the technology used in this Program, the likelihood of respondents installing the equipment in-house is remote. However, that does not preclude the entertainment centers hiring the installation of DCV controls.

Spillover

Spillover is defined as energy savings occurring as a result of the Program, but not through the Program. Cadmus identified two spillover effects of this Program. These are indicated as long-term outcomes in the logic model.

One of the lasting effects of the Program could be spillover occurring when theater complexes install DCV units in other theaters they own and in theaters outside Edison and SCG territory. The possibility of this occurring is very good. The two interviewed participants who also operate theaters outside Edison territory will both install DCV if the units prove to successfully reduce the participants' energy bills.

Spillover can also occur within the participant's building. During site visits, Matrix suggested other areas where the entertainment centers could improve energy efficiency. Two participating entertainment centers reported they are considering installing electricity saving light bulbs and LED exit lights, but have not yet made the change.

Three of the participants said they would recommend the Program to other entertainment centers. One noted that he was already actively promoting it. The fourth respondent could not respond because the DCV units had not been installed for very long. If participants promote the Program and the DCV technology by recommending it to other entertainment centers, it will increase awareness in the market and potentially increase energy savings.

Only one participant had participated in Edison programs in the past, and stated he had been participating in programs for the past ten years. This is the same participant who was classified as 50 percent free rider, but he did not know about this Program before being contacted.

Analysis of Market Assumptions

Key assumptions underlie the Energy Efficiency for Entertainment Centers Program.

1. **Theater complexes offer large potential for DCV retrofit.** Most movie theaters are multiplexes, with many screening rooms in a single building. Package HVAC units serve individual screening rooms and DCV retrofits are possible. Many complexes are

franchises with multiple sites. Cinemas associated with major chains and independent theaters offer opportunity for energy efficiency improvements.

This assumption is well supported. The Program target is 632 DCV installations. Edison identified 78 entertainment centers for potential participation, with multiple screening rooms where DCV could be installed. Within six months of fielding the Program, eight theater chains chose to participate, with 81 DCV installations. In the first quarter 2008 report to Edison and SCG, Matrix identified 16 potential theater centers with 129 site locations and 1,558 HVAC units that they could potentially retrofit with DCV technology.

Table 76. Potential Participants Identified Quarter 1, 2008

Site	Number of Sites	Potential HVAC units
Potential 1	1	12
Potential 2	1	12
Potential 3	14	168
Potential 4	1	12
Potential 5	13	156
Potential 6	7	89
Potential 7	1	12
Potential 8	6	103
Potential 9	6	72
Potential 10	11	51
Potential 11	3	59
Potential 12	10	120
Potential 13	1	14
Potential 14	50	622
Potential 15	1	12
Potential 16	3	44
Total	129	1558

Source: Matrix Quarter 1, 2008 report to SCG.

2. **Contact information for the theater decision-maker is readily available.** Matrix proposed that they identify major theater chains operating in Edison's service territories using published commercial directories and websites.

This assumption was not borne out in the implementation process. The marketing process is more complex than Matrix may have anticipated. Matrix's technical proposal states they will *"contact representatives of the major theater chains to conduct recruitment and present marketing materials that outline the benefits associated with this Program."*[86] In this Program, contacting the theater's decision-maker is not an easy task. The assumption that Edison could

[86] ADM Associates. Energy Efficiency Program for Entertainment Centers, Technical Proposal. October 2006.

provide complete contact information for all or at least a majority of entertainment centers caused the marketing to fall short of expectations.

Many entertainment centers either did not have a phone number or an address. For some theaters the only number listed was an automated show-time listing. Matrix was unable to contact approximately 75 percent of the potential pool and the participation rate suffered. Matrix is trying to remedy the problem by sending marketers out on foot. This may increase participation and help to reach currently unreachable entertainment centers, but will be a very time consuming process.

3. **Large chains will provide the majority of DCV installations.** Implementers noted in their proposal that franchises are usually open to participating in energy efficiency projects requiring little time or cost commitment. Matrix anticipated recruiting the major theater chains, and allocating some slots for independently operated theaters.

In practice, this assumption could not be supported. Both Matrix and Edison Account Representatives noted the difficulty in reaching managers or decision makers from large chains. In many cases one person was the decision maker for several theaters in several states rendering them exceptionally busy. The lack of direct contact with key decision makers from large chains significantly stunted Matrix's ability to sell the Program. This is illustrated by the fact that the current participants are all relatively small chains with the average number of DCV units per participant just over 11.

4. **A two-pronged collaborative marketing effort will reach both larger and small theater complexes**. Matrix markets to larger theater chains with assistance from Edison Account Representatives. Matrix independently markets the Program to smaller theaters.

Again, the lack of contact information for large theater complexes is an impediment to reaching this group. Account Representatives stated they market the Program to their key accounts, and refer them on the Matrix, and Matrix to the account, if interested. Neither stated they had difficulty reaching their account contacts. However, there were mutual complaints about follow-up.

Conclusions and Recommendations

Conclusion 1

The Evaluability Assessment for this project revealed a thorough and comprehensive proposed baseline, early M&V and tracking database activity in support of program evaluation. We note that the implementer is also an evaluation contractor, and has experience in conducting both process and impact evaluations.

Recommendation 1

The approved M&V plan should be used as an example of good evaluation planning for future IDEEA solicitations.

Conclusion 2

The joint utility Program was a learning process for both the implementer and the two utility Program Managers. Finalizing the joint utility agreement delayed marketing materials and efforts by about nine to ten months. The implementer was then challenged with accomplishing all of the program installation goals within one year (one cooling season). Matrix reached far fewer entertainment centers than anticipated.

Both the implementer and the Edison manager agreed the that finalization of the joint utility partnership was too slow and affected the Program's success rate, but thought in the long run a joint utility Program was the best choice. The joint utility administration enabled a reduction in the customer co-payment from $300 to $150. Matrix viewed this as key to participation.

Recommendation 2

Future joint utility programs should have all partners on board and all funding sources determined at the time of the kickoff meeting and initial fielding. Had this program been in the field during the 2007 cooling season with even a few sites, the implementer could have used these sites for marketing. Had they existed, earlier sites could have been monitored and results used as a monitoring a powerful marketing tool in anticipation of and during the 2008 cooling season.

Conclusion 3

Although the program design appears sound, the Program is behind schedule in achieving its goals. The Program's premise and basic operations are sound. Theatre complexes offer large opportunity to install the DCV in retrofit applications, comparable to new construction required by Title 24. The joint utility aspect and adding more climate zones to the Program expanded the potential participant base and appear to be good ideas. The primary obstacle to enrollment lies with identifying the appropriate decision maker at large chains. Matrix was unable to deliver materials to 75 percent of the market identified by Edison because contact information was insufficient. This lack of contact with of the total market was detrimental to Program goals.

Recommendation 3

The market chain and structure is ready for this technology. Edison and Southern California Gas should continue to work within this structure to recruit more theaters. The Program needs better marketing and outreach, primarily appropriate contact information and educating the market actors about the benefits of participation. Matrix should explore alternative methods to market and enroll the Program. This may include contracting with a separate firm specializing in

identifying potential participants and decision makers, contacting and marketing the Program. This will allow Matrix to focus on installations.

Conclusion 4

Communication between parties, Edison, Matrix and potential participants, could be improved. The decision-making process takes time and it is important to keep track of status and keep the process moving.

Recommendation 4

Matrix should communicate regularly with the Account Representatives and Program Managers and follow-up with projects in the pipeline.

Conclusion 5

Even with only a $150 per unit co-payment, the program implementer met with resistance from some theater district managers. The $1500 - $3000 potential out of pocket cost seemed to be a sufficient impediment to some theater company district managers so that they were willing to forgo installation of approximately $15,000-$30,000 worth of energy efficiency equipment, plus the energy savings.

Recommendation 5

More market research with theater company district managers during the proposal phase of the Program might have uncovered this and allowed the implementer to negotiate a funding strategy earlier on that would have eliminated all costs to the customer. Matrix should also develop case studies including the results from monitoring installations. Potential participants are interested in knowing how the units perform and the energy savings achieved.

Conclusion 6

This evaluation effort could not be completed because uncommitted theaters could not be contacted. Since the evaluation, these theaters will have either made participation decisions or remain uncommitted. Final estimates of free ridership, NTG, and normal awareness associated with evaluation cannot be completed without these additional data.

Recommendation 6

Edison should conduct surveys with uncommitted theaters, and those who participated and declined since June 2008. Surveys should discuss awareness of demand controlled ventilation in general, the Program in particular, and participation decisions. In particular, surveys should explore the influence of equipment purchase cost on participation decisions.