PROCESS EVALUATION OF 2006-2008 IDEEA & INDEE PROGRAMS

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FINAL REPORT

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E.1 SCE 2535 – 80 Plus Program

The 80 Plus program is implemented by Ecos Consulting. The SCE 80 Plus program is part of an international program that promotes the development and implementation of efficient power supplies for computers that meet the 80 Plus standards. These standards have recently been incorporated into the Energy Star standard for computer systems and servers.

Southern California Edison provides rebates to manufacturers and system integrators for systems and servers that incorporates the 80 Plus power supply sold in SCE service territory. They provide $5 for each desktop with the 80 Plus power supply, $8 for each desktop that meets the Energy Star 4.0 Standard, and $10 for each desktop derived server. Manufacturers and system integrators must provide end use customer zip code information to receive the rebate. End use customers do not enroll in the program, nor do they receive rebates, but they can specify 80 Plus in their purchase of desktop computers and desktop-derived servers to acquire the benefits of the 80 Plus power supplies.

Ecos runs the 80 Plus program as an international program and cannot track just SCE's portion of the 80 Plus units. Ecos says it was able to provide zip code information to SCE from one of the manufacturers, but the other OEM had data migration issues and could not provide the data. Manufacturers typically do not provide that kind of data, many do not even capture that data and they have confidentiality breach concerns. This issue may affect the kWh impact estimate, but based on these surveys, it is unknown if that impact would increase or decrease the kWh impact of this program.

The SCE Program Manager however, felt that the program needs to be redesigned. It has been running for three years with incentives far lower than the incremental cost of the power supply. Only two OEMs have signed up for the program and there is minimal program awareness on the part of customers and end users. Neither of the OEMs has a significant presence for 80 Plus power supplies on their website and neither will provide end use customer data for tracking purposes. The primary goals of the program were to procure energy and demand savings, and the program did not measurably achieve those goals, however Ecos staff feels that manufacturers and system integrators are shipping more systems with 80 Plus Power supplies, but are not submitting invoices to the program because it is not worth the hassle for a low volume. The program did get the 80 Plus specification incorporated into the Energy Star standards, industry players got involved and multiple power supply manufacturers began producing power supplies that met the 80 Plus standard, and computer manufacturers joined the program.

- **Recommendation:** Increase the incentive to better address the incremental cost issue.
- **Recommendation:** Work with purchasing agents also they understand what an 80 plus power supply does and why they would want it.
- **Recommendation:** Decrease requirements involving tracking customers. The manufacturers either do not want to or cannot (due to technical and confidentiality difficulties) release that information.
- **Recommendation:** Ensure the program website is viewable across all standard web browsers.
- **Recommendation:** The program marketing approach to system integrators and manufacturers should be further tailored promote specific decision making factors important to each participant category.

E.2 SCE 2550 – Variable Speed Pool Pump Program

The Pool Pump Program is implemented by Pentair and promotes the implementation of variable speed pool pumps in residential pools. This program provides a $250 rebate to the pool owner and a $250 rebate to the pool pump installer for installing a variable speed pool pump in a residential pool in SCE service territory.

The program targets pool builders and pool maintenance people who install pool pumps. Initially, high end pool builders were invited to a training session where the benefits and installation of the Intelliflo variable speed programmable pool pump were explained. Later pool service personnel were also invited to these training sessions held by Pentair. Once trained, pool professionals educated pool owners on the program and the benefits of the variable speed pool pump over a single speed pump.

This program started late (June rather than January) and as a result required an additional six months to meet its goals. Had the program started earlier so that installers were trained to coincide with pool use season they would likely have attained the goal within one year.

The program had a goal to install 775 variable speed pool pumps in SCE service territory and has exceeded that goal, installing over 800 pool pumps.

- **Recommendation:** Develop training for installers. Training on the energy efficiency aspects and payback of variable speed pumps could help installers support of the program. Additionally, develop training on programming. Programming VFD controllers is involved and new installers mentioned difficulties with programming.
- **Recommendation:** Market the program to pool owners as well as installers.
- **Recommendation:** Marketing campaigns should focus on the rebate, utility bill savings, and energy efficiency, because these elements resonate with the installers. SCE should also provide more information on the savings that could be attributed to the variable speed pumps.
- **Recommendation:** A separate pool pump program was running while Pentair ran their program. This caused confusion amongst participants. If these programs remain separate, there is a need to improve Edison's call center staff training on the Variable Speed Pool Pump Program and to create a way for participants to transition between programs.
- **Recommendation:** Expand the qualifying equipment list to allow new technologies hat meet the intent of the program.
- **Recommendation:** For this and other seasonal programs, ensure the program can start on time to coincide with the appropriate season.
- **Recommendation:** Improve the rebate redemption process. Multiple participants complained about the length of time required to receive a rebate. Limit the amount of information installers are required to provide; they found the amount of information they were required to provide to be onerous.
- **Recommendation:** Bring distributors into the program. Many installers depend on their distributors for information.

E.3 SCE 2552 – NightBreeze Program

The NightBreeze (NB) program promotes the installation of a newly patented residential space conditioning technology, NightBreeze. The NightBreeze system is an automated ventilation component, analogous to a commercial cooling system's economizer that is integrated with the home's heating and air conditioning system. It senses indoor and outdoor air temperatures and, based on the temperature difference, controls air intake damper in conjunction with the furnace fan (for forced air systems; hydronic systems utilize an add-on air handling unit) to bring in fresh outdoor air instead of using the air conditioner, thereby reduce air conditioning energy usage.

The program delivers information and incentives to participating builders and HVAC contractors to support their installing NB units in new homes and retrofit/replacement applications. The primary objective of the program is to prove the technology's viability and reliability in the residential new-home and retrofit market. The long-term objective is to gain a foothold in the residential housing market for future expansion of NB production, which would help achieve economies of manufacturing scale. The target market initially was new single-family homes being built by production builders. Recently, the target market scope has been expanded to include appropriate retrofits to existing single-family homes within the SCE service area.

The program is technologically viable, but too costly for the current housing market. SCE has decided to discontinue the program and the evidence gathered in this evaluation to some extent supports that decision. However, given the potential of the NB technology to reduce air conditioning loads, and the likely continuing upward direction in energy prices, a way should be sought to continue support to DEG and Intergy to further develop the technology. The focus should be on ways to reduce the first cost of the NB unit itself, as well as ancillary costs. DEG's efforts to design a retrofit configuration and also a variation of the system that works in more humid climates also should be supported in some way, given the very large potential market for such variants on the technology. Recommendations to support NightBreeze technology are:

- **Recommendation:** Consider incorporating the NB technology as part of the new-home program menu of energy efficiency measures – including making it eligible as a Title 24 measure – in order to take advantage of program scale economies and cross-marketing opportunities.
- **Recommendation:** Consider restructuring the program budget of analogous future INDEE programs to provide contingent marketing funds, so that if unexpected factors beyond the program's control cause a loss of participants, additional marketing can be undertaken to regain momentum and recruit additional participants.
- **Recommendation:** SCE should work to be more flexible with the program timeline for programs having unique market circumstances that result in product installation timeframes that do not match typical calendar-year program timeframes.

E.4 SCE 2563 – Plugging the Consumer Electronics Gap Program

The program promotes the sale of ultra-high efficiency liquid crystal display (LCD) computer monitors that are at least 25% more efficient than the current Energy Star™ qualifying level for LCD monitors. The sales channel used is large electronics retailers, who are recruited by the program to act as marketing agents for the program, to display, advertise and otherwise promote eligible computer monitors they sell. The primary marketing channel objective for the program, therefore, is to influence electronics retailers'

decisions on the type of monitors to promote, and increase the shelf space available for eligible monitors. The program provides a $5 incentive per eligible monitor sold. The incentive is paid to the retailer.

The program's goal is to have 30,000 eligible monitors sold by November, 2008, out of an estimated market of 700-800,000 monitors in SCE's territory. The program has not yet met the volume goal of 30,000 rebated monitors. This is largely due to the narrow product offering and geographic focus. However, the program has had some success. It played a role in getting Circuit City, a major monitor retailer, to roughly double their stocking of ultra-efficient monitors in 2007. Key among the program's difficulties has been that retailers are reticent to participate because the program's incentive is too small to overcome the real and perceived costs of accommodating the niche aspects of advertising and tracking eligible monitor sales for just one product type, computer monitors, in one geographic area (SCE's service area, particularly as the adjacent PG&E service area has a similar program having critically differing incentive design; further, the LADWP service area is not part of the program, exacerbating the geographic problem).

The program appears to have lost traction with its constituent partners. This is largely due to the development of a broader consumer electronics program that resulted in PCEG support to partners being discontinued to avoid confusion with the new program. Rather than recommending an effort to revitalize the program in its current form and, especially, product and geographic scope, the following actions are recommended:

- **Recommendation:** Coordinate with other utilities to develop a nationally based electronics efficiency program that has Energy Star™ as its basis and that provides incentives to go beyond Energy Star's baseline efficiency level (possibly to establish a *platinum* brand). In particular, organizations such as the Consortium for Energy Efficiency (CEE) provide a venue through which utilities can cooperate and coordinate development and operation of a national program.
- **Recommendation:** Broaden the product scope to include other computer components and, perhaps, electronics products generally.
- **Recommendation:** Budget sufficient resources to undertake both corporate-level and in-store marketing and other support for the program on a continuing basis until such time as evaluation efforts find the program has transformed the market or has reached diminishing returns in program impacts. In particular, in-store advertising and sales training, such as has been done for laundry efficiency programs, is critical to build and maintain program momentum "on the ground."
- **Recommendation:** To the extent possible, utilize the Energy Star sales tracking process developed for other types of equipment as a common reporting base that also has achieved credibility with manufacturers and distributors, in order to enable reasonably accurate tracking and impact evaluation.

E.5 SCE 2564 – Grocery Area Energy Network Program

The Grocery Area Energy Network (GAEN) program delivers energy efficient lighting and humidity controls to stand alone freezers in grocery stores. These controls were provided to grocery stores at no cost. The humidity sensor controls reduce the cooling load and account for about 60% of the energy savings of the unit; and the lighting retrofit accounts for the other 40% of the energy savings. The two most important GAEN program objectives are to achieve energy savings and to introduce the technology into the market. The target market is small, medium, and large grocery stores with stand alone

refrigeration coolers within the SCE service area. Shelf Control developed the technology for the program and is the third-party firm awarded the contract for implementing the GAEN program.

Shelf Control experienced some problems in the program's design and operation. The central issue appears to be that the GAEN technology was not ready to be implemented in the market place. The controller and lighting unit had not yet been certified by Underwriters Laboratory, which delayed program delivery for some time. Additionally, the marketing plan could not be implemented as designed and SCE account executives were called upon to market the program to larger grocery stores with larger numbers of compatible refrigerated units. Some modifications were made in the field to the system design during installation. In addition, some customers reported problems with their internal electrical system during the installation of the units. Shelf Control responded quickly to resolve these issues.

One of the major policy changes developed by SCE because of the GAEN program was to develop an incubator program to help companies develop and market brand new technologies. While the GAEN Program was originally designed for products that were offered to a new market and for new technologies, SCE learned that many programs involving emerging technologies need more technical and marketing support and more development time than the IDEEA/INDEE program offered. One of the main requirements of the IDEEA/INDEE program is that the proposals for new technology are offered as turn-key programs. In this case, there was an emerging technology marketed by a startup company with manufacturing located in China. SCE extended the implementation deadline and used this experience to develop an incubator program that would help nurture new ideas.

- **Recommendation:** The program should be redesigned to include a customer investment to gain knowledge on the price sensitivity of the grocery store market.
- **Recommendation:** Assuming that a customer investment would be required in the future, market to larger stores or chain store organizations that will generally have more investment dollars available and may apply a 2-3 year payback criteria to an investment like the GAEN technology. Small to medium grocery stores, may find it difficult to justify an investment in this technology.
- **Recommendation:** Conduct an impact study of energy savings from GAEN technology.
- **Recommendation:** Explore the possibility of partnering with refrigeration sales companies to market this technology with replacement refrigerator units.
- **Recommendation:** Require all new electro-technologies to be approved by the Underwriters Laboratory before considering adding to the program.
- **Recommendation:** For the Incubator Program, SCE may want to look at a multi-year funding cycle as new technologies are unstable, require design changes and often have production issues creating a slow start.
- **Recommendation:** Perform more testing on the technology for INDEE programs before consider adding to the program.

E.6 SCE 2565 - Escalator PowerGenius™ Program

The Escalator PowerGenius™ Program aims to install controls on escalators located in a department stores, malls, office buildings and amusement parks. Escalators are designed for a maximum load but operate for many hours of the day under no or reduced load conditions. The PowerGenius™ technology reduces the voltage delivered to escalators with no load. Under the program, the controller was provided at no cost but the customer was responsible for the cost of installing the controller.

Escalator service companies played a central role in the delivery and potential success of this program but not the role originally planned by Matrix ESI, the third-party firm awarded the contract for implementing the Escalator PowerGenius™ Program. The original program was designed around the assumption that the escalator service companies would market the escalator controls to their current customers. Escalator service technicians were unfamiliar with the technology, disinclined to take on the marketing role and were not enthused about the additional work load. Not all technicians were equally skilled and some companies did not have any technicians with the appropriate skills. Some escalator service companies took advantage of their pivotal role to block the program or to charge unjustified installation fees. The program gained traction when Matrix developed a relationship with one of the service companies, negotiated reduced installation fees and trained their technicians.

The Escalator PowerGenius™ Program goal was to install 240 escalator controls. However, records indicate 100 controllers were installed in 13 sites. Of these participants, three customers indicated they had removed the controllers or were not able to participate in the program. A revised estimate based on current information is 76 controllers were installed in 10 sites.

It is unclear whether the Escalator PowerGenius™ Program contributed to the core IDEEA objectives as the ability of the controller to deliver measureable energy savings to customers has been called into question. Matrix ESI attempted to meter the sites to verify electric savings, but critics claim the savings cannot be detected by the average utility billing meter.

The evaluation's recommendations are:

- **Recommendation:** This application and similar applications of control technology are not appropriate for energy efficiency programs until a definitive study confirms or denies the claimed savings estimates.
- **Recommendation:** Develop a verification process. In the state of California, any person entering the 'pit' area must be a licensed technician. Neither the third-party implementer nor SCE could access the pit to verify the controller was properly installed.
- **Recommendation:** Obtain cooperation of the participating escalator service companies. The implementer should develop a partnering relationship with one or more escalator service companies that include training in installation, maintenance and marketing of the control technology.
- **Recommendation:** SCE should take a closer look at the marketing plan and the assumptions behind the marketing plan recommended by the implementer. Either SCE or the implementer must take responsibility for marketing the program and the technology rather than assume installers will provide marketing.

1 OVERVIEW

Southern California Edison (SCE) implemented a bidding process and awarded multiple contracts to firms to implement programs under the 2004-2005 Innovative Design for Energy Efficiency Activities (IDEEA) Program and the Innovative Design for Energy Efficiency (INDEE) Program. The IDEEA and INDEE Programs solicit competitive bids for innovative energy efficiency program proposals across all market sectors and customer segments, focusing on unique and newer energy efficiency technologies or very distinctive approaches for capturing cost-effective energy efficiency to create a future for the next generation of energy efficiency programs. The intent of the programs is to identify, fund, and test the submitted ideas to determine whether they have potential to fill gaps in SCE's Energy Efficiency portfolio. Of the 26 initiatives implemented through the IDEEA Program in 2007, SCE commissioned process evaluations of all the programs. Summit Blue Consulting conducted the process evaluations on the following six programs:

- 80 Plus,
- Variable Speed Pool Pumps,
- Night Breeze,
- Plugging the Consumer Power Gap,
- Grocery Area Energy Network, and
- Escalator Power Genius.

The process evaluations, which assess the implementer's delivery of the program and identify participation barriers and possible solutions, were completed using an interview and phone survey approach. This evaluation also included a review of the program logic model and provided program modification suggestions. The approach used in the process evaluation of each of the programs included the following six tasks.

1. Reviewed "Early M&E Review Final Report" by Quantec for the program including a review of the existing logic models included in the Quantec report.
2. Reviewed the results from the program's 2004-2005 IDEEA process and impact evaluations.
3. Developed interview guides for the program.
4. Conducted interviews and surveys for the program.
5. Revised the existing logic model for the program.
6. Prepared process evaluation findings and recommendations for the program.

This remainder of this report presents the results of the six program process evaluations.

2 80 PLUS PROGRAM

2.1 80 Plus Program Description

The program description provides a brief overview of the 80 Plus program. It includes a description of the firm implementing the program, the design of the program they implement, and a description of the technology implemented through the program.

2.1.1 Implementation Firm

The 80 Plus program is marketed and implemented by Ecos Consulting of Portland Oregon. The firm has five staff members who implement this program as a part of an international program. Ecos coordinates communication with the 80 Plus sponsors, facilitates promotional activities such as tradeshow demonstrations, processes the rebates offered through the program, provides a mechanism to certify the efficiency of power supplies through EPRI, and engages a variety of market actors to transform the market for 80 Plus power supplies through incremental change. The Ecos strategy is to bring large computer manufacturers on board with the expectation that smaller companies will follow.

2.1.2 Program Design

The 80 Plus program is an upstream buy-down program whose goal is to transformed the market for desktop computers and low end server power supplies by providing rebates for each 80 Plus power supply delivered to the market. The program model includes utilities, power supply manufacturers, computer manufacturers, and computer system integrators to encourage the adoption of more efficient personal computer and server power supplies. This program is designed to overcome the first price barrier while educating consumers about the benefits of efficient power supplies. By overcoming the first price barrier, this program helps generate and maintain market demand for efficient power supplies.

Target Market

The program has multiple targets. The primary targets are the original equipment manufacturers (OEM) who manufacture computer systems and severs (like Dell, Apple, and HP), system integrators who do not manufacture the parts, but who assemble systems and servers (like Acer), and power supply manufacturers. The implementation firm, Ecos Consulting, worked with power supply manufacturers to provide 80 Plus rated power supplies. They also worked to bring OEMs and system integrators into the program to sell systems with 80 Plus power supplies. Other 80 Plus targets include utilities, the EPA, and end users, although these are indirect targets. Rebates, provided by utilities, are offered to OEMs and System Integrators. The EPA included the 80 Plus power supply standard in their Energy Star specification and end users receive more efficient systems because they have 80 Plus power supplies in them.

Marketing Strategy

The marketing strategy is a multi pronged approach that includes print materials, web based materials, a dedicated website for the 80 Plus program, mini-tradeshows, and direct one-on-one meetings with potential end users and sponsors. There is limited end user education in this program.

Implementation Method

The 80 Plus program offers manufacturers and system integrators a $5 buy down per 80 Plus desktop $8 per ENERGY STAR 4.0 desktop and $10 per desktop derived server for each qualifying power supply sold in SCE Service territory. In return, the manufacturers and system integrators must prove shipment by providing information that includes end customer zip codes. End use customers do not enroll in the program, nor do they receive rebates, but they can specify 80 PLUS in their purchase of desktop computers and desktop-derived servers to acquire the benefits of the 80 PLUS power supplies. Ecos works with SCE customer Account Executives to market the program to the IT managers at SCE's large corporate and institutional accounts.[1]

Implementer Program Goals

Ecos has goals of 100,000 units per year, which translates to 5-6 million kWh per year. It is currently not meeting its target; however, many important elements have been put into place which will enable meeting the goal in the future. In the beginning, the program had few qualified power supplies. Ecos developed the testing protocol and brought EPRI on board to test the power supplies. Now multiple system integrators say they buy their chassis with an 80 Plus power supply already incorporated.

Factors Leading to Program Inception

This program is occurring at a time when energy efficiency is becoming more important and at a time when systems in common use have inefficiencies. Power supplies fit this criterion; there is an enormous opportunity for energy savings with power supplies, but it is an area where limited attention has been focused, especially not from the utility sector. The incremental cost of an efficient power supply is considerably higher than a standard efficiency power supply, therefore incentives provide a means to overcome the incremental cost barrier. Energy Star is revising its desktop computer specification and will include low end servers as well, so the time is ideal to affect those standards and have them include efficient power supplies. Intel has also been focusing on power supply efficiency and there are numerous utilities and market transformation organizations that are joining the program. [2]

2.1.3 Technology Description

This program promotes PC power supplies that meet the 80 Plus criterion. These power supplies are at least 80 percent efficient (which is more efficient than standard power supplies) at 20, 50 and 100 percent of rated load, and they have a power factor of 0.9 or greater at 100 percent load. The 80 Plus power supplies use the energy more effectively because they convert less energy to heat and transfer more of the electricity directly to the computer or server.

When compared to a typical power supply, an 80 Plus power supply consumes 61 kWh per year on average, as opposed to 149 kWh/yr for a standard power supply. Peak demand is also decreased by 16 watts per unit. The power supplies are certified by EPRI. Each power supply manufacturer wishing to certify a power supply as 80 Plus pays a $400 testing fee to EPRI which the 80 Plus program later refunds once the model has passed the certification. This certification process demonstrates that the technology does exist and can be achieved within a reasonable budget and technical parameters. It also levels the playing field among manufacturers.

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[1] SCE website http://www.sce.com/NR/rdonlyres/6661F371-2846-4A4E-A7C7-AA2CDD076D6D/0/SCE253580PLUS.pdf Page 5

[2] Ecos consulting, 80 Plus Proposal submitted to Edison. Oct. 2004

2.2 Process Evaluation Methodology and Sample Design

A variety of market actors were interviewed by telephone or in person during the evaluation of the 80 Plus Program. The sample design was developed specifically for this program. Both the evaluation methodology and the sample design are discussed in greater detail below.

2.2.1 Process Evaluation Methodology

For the 80 Plus Program, Summit Blue interviewed three program implementers or sponsors, two EPA Staff people, two participant manufacturers, two non-participant manufacturer, two participant system integrators, two non-participant system integrators, for a total of 12 interviews. These parties are defined as follows:

- Program implementer - Ecos Consulting
- Sponsor - SCE
- Participant manufacturers – Original equipment manufacturers who have signed contracts with Ecos consulting wherein they agree to sell systems with 80 Plus power supplies and in return will receive a rebate for each power supply delivered in SCE service territory
- Non participant manufacturer – Original equipment manufacturer who has not signed a contract with Ecos to participate
- Participant system integrators – A system integrator who have signed contracts with Ecos consulting wherein they agree to sell systems with 80 Plus power supplies and in return will receive a rebate for each power supply delivered in SCE service territory
- Non participant system integrators – A system integrator who has not signed a contract with Ecos to participate

The interview guides for each of these groups are attached in Appendix A. The implementer and sponsor interviews were about two hours each, the EPA interviews were about 45 minutes each, the participant and non participant interviews ranged from 15 minutes to one hour and 45 minutes. All interviews were conducted by senior members of the Summit Blue team. Study participants were asked to discuss program goals, program design and operations, program improvements, and program specific issues.

2.2.2 Sample Design

The evaluation of this program includes phone interviews from a variety of players in the program to represent views from multiple perspectives. The sample frame used for this evaluation is shown below in Table 2-1.

Table 2-1. Sample Design for the 80 Plus Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Implementer / Sponsor	3	3
EPA Staff	1	2
Manufacturer participant	2	2
Manufacturer non participant	2	2
System Integrator participant	2	2
System Integrator non participant	2	2
Total Respondents	**12**	**13**

2.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the program from a process perspective. It has been divided into the following sections: overview, program design, market conditions, marketing and outreach, implementation and operations, and other program dimensions.

2.3.1 Overview

The SCE program manager and Ecos Consulting staff were interviewed and asked to discuss the program. Their interview guides included a discussion of program goals, program design and operations, program marketing, program definitions, program evaluability, quality control, program improvement, barriers to participation, and lessons learned. The EPA staff responded to questions about their role in developing the specifications for the 80 Plus Power supplies, how the specification came to be, Ecos' role, market and market actors, the impact of the 80 Plus specification, and the non energy benefits of the 80 Plus power supply. These findings are discussed in the other program dimension section.

The Participant interview guides for the manufacturers and system integrators were similar, though tailored to the respondent type. These interview guides included a discussion of the respondent's background, their sales of systems with 80 Plus power supplies, their view of the marketing and outreach of the 80 Plus program toward them, their decision making process as they considered joining the program, Net to Gross issues, production issues, Energy Star, non-energy benefits, marketing and market actors, delivery and implementation, market customer response, and additional information. The non-participant interview guides were also similar for the manufacturers and system integrators. These guides included background information, participants' view of the marketing and outreach of the 80 Plus program towards them, their decision making process as they chose not to participate, delivery and implementation, and market response.

2.3.2 Detailed Results

The following section addresses topics discussed in the various evaluation interviews including program design, marketing, and operations.

2.3.2.1 Program Design

Implementation Firm

Ecos Consulting runs the 80 Plus program with five staff people. They are responsible for marketing the program, bringing on sponsors, developing the testing protocols for the 80 Plus power supplies, bringing in manufacturers and system integrators to participate in the program, and the day to day operations of the program.

Implemented as Designed

Both SCE and Ecos agree that this program was essentially implemented as designed. SCE felt that this program was closer to being implemented as designed than many programs are. It was designed to be an upstream program with manufacturers and system integrators pushing power supply manufacturers to produce 80 Plus power supplies. Additional pieces include outreach and downstream work. While there was some outreach, it was not as much as was planned. Originally, tradeshows, publicity in the computer press, and a tie into energy star was planned. SCE attempted some press releases, but internal issues prevented them from completing them. SCE tried to sell the power supplies using SCE reps. One element, that of certifying power supplies using EPRI, went as planned.

Unrealistic Program Design Assumptions

There were several design assumptions that proved to be unjustified. SCE felt that the participation projections were overly optimistic, they also found that the $5 incentive was not enough to move OEMs to manufacture more systems with 80 Plus power supplies. Ecos noted marketing assumptions that proved to be unfounded. They found that the logo would not be placed on the front of the system as expected. This eliminated a marketing channel that would have raised end user awareness of the program. Ecos thought they would be able to audit and verify installations, but found that the volume that system integrators yielded was too small to merit a visit. They also believed they would be able to make onsite plant visits, but were unable to do so. They believed that they would be given end use customer information, but this also proved untrue. The large manufacturers either could not or would not provide the information. In one case, there was a data migration issue and, in the other, the OEM had concerns about maintaining their competitive advantage and would not disclose the information.

Problems with Implementation

This program has a few problems with its design as implemented according to SCE. SCE staff felt that the incentive level was too low and believed this to be a fatal flaw in the program because the $5 incentive offered is much lower than the $45 - 80 incremental cost of the 80 Plus power supply. SCE was concerned about the verification process and the fact that incentives could not be tracked. Ecos was not able to provide SCE with the information necessary to verify the location or usage of a given power supply for which SCE had provided an incentive. SCE also noted a lack of customer outreach, they felt that the average customer does not know now more about the program now than they did three years ago.

Ecos runs the 80 Plus program as an international program and cannot track just SCE's portion of the 80 Plus units. Ecos says it was able to provide zip code information to SCE from one of the manufacturers, but the other OEM had data migration issues and could not provide the data. Manufacturers typically do not provide that kind of data, many do not even capture that data and they have confidentiality breach concerns. This issue may affect the kWh impact estimate, but based on these surveys, it is unknown if that impact would increase or decrease the kWh impact of this program.

Meeting Program Goals

The SCE program manager felt that the goals of the program were to procure energy and demand savings, and he felt that the program did not achieve those goals. However, there were three additional goals

which he felt that the program did achieve. The program did get the 80 Plus specification incorporated into the Energy Star standards, industry players got involved and multiple power supply manufacturers began producing power supplies that met the 80 Plus standard, and computer manufacturers joined the program.

Ecos Consulting felt that the program was a unique program that offered SCE a way to round out its portfolio. Two large manufacturers have signed on and other large system integrators have also joined the program. Ecos staff feels that manufacturers and system integrators are shipping systems with 80 Plus Power supplies, but are not submitting invoices to the program because it is not worth the hassle for a low volume.

The SCE Program Manager however, felt that the program needs to be redesigned. It has been running for three years with incentives far lower than the incremental cost of the power supply. Only two OEMs have signed up for the program and there is minimal program awareness on the part of customers and end users. Neither of the OEMs has a significant presence for 80 Plus power supplies on their website and neither will provide end use customer data for tracking purposes.

Evaluability

Both the SCE program manager and Ecos staff were asked to address the evaluability issues identified in an evaluability assessment conducted in 2007. This assessment identified six areas that needed to be addressed so that this program could better be evaluated in the future. Both SCE and Ecos agree that there is no market level analysis to identify participant and non participant end users. Ecos identified the top five to ten end users by sector, but did not contact end users with this program, which as noted earlier, was an element SCE was concerned about. They both agreed that there was a list of staff and contact information for this program. Ecos has information on how system integrators and OEMs are identified to develop a population sampling plan. SCE does not have that information, but knows that Ecos does. The same is true of tracking outreach efforts to non-participant OEMs and system integrators.

Ecos did not market to end users and therefore did not track them. Typically, an OEM does not provide documentation that the billed amount to the participant includes the incentive received by the manufacturer. Ecos claims that it is not required and that the rebate helps cover the cost premium of the 80 Plus power supply. They note that most manufacturers use the incentive to incent their sales reps or to discount the cost of a service contract, because a system with an 80 Plus power supply will require less maintenance due to the decreased heat output. SCE believes that, if the order were for 100 systems or more, the bill of lading for a system integrator would contain that information. Both agree that the system integrators do not provide documentation that the billed amount to the participant includes the incentive. Ecos says some manufacturers pass the cost savings on and that for others the rebate pays for the cost of educating customers about the program and about the benefits of 80 Plus power supplies.

Non-energy Benefits

When asked about non-energy benefits, participating manufactures felt that there were non-energy benefits, whereas participating system integrators saw only the energy efficiency and the dollar savings benefits. Participating manufacturers note that the non-energy benefits are very important. These benefits allow them to expand their marketplace and, when they offer high efficiency products, they can become a better competitor. The benefits are also part of the value proposition that the manufacturer can offer to the end use customer. The non-energy benefits also offer a marketing opportunity for the manufacturer, because the customers have a sense that they are doing their part for the environment and energy efficiency is very important for business customers.

EPA staff noted that efficient power supplies produce less heat, which increases the longevity of the systems. They also noted that a system with an efficient power supply is quieter, because fewer fans are

required when there is less heat output. Efficient power supplies also have a smaller footprint which can translate into smaller system size or increased functionality.

The take home message is that manufacturers and system integrators see things differently and, thus, would respond differently to different marketing messages from the program implementer. Manufacturers perceive multiple benefits and could thus be targeted on multiple levels of the program, whereas the system integrators either need to be educated about other non-energy benefits or the marketing towards them should focus on the energy efficiency aspects of the program.

2.3.2.2 Market Conditions

Awareness of Technology

Overall, program participants felt that end use customers are not aware of 80 Plus power supplies. This was also a concern for SCE and Ecos. One participant noted that they do not explicitly market 80 Plus power supplies and another felt that there is a need for more support. One participant used promotions and instant rebates to address the price differential. One manufacturer included the 80 Plus logo on collateral brochures and, as a company, is committing to energy efficiency in the hopes that that will further 80 Plus power supplies. A different manufacturer develops press releases when they have a new power supply certified. These press releases mention that the power supply is available and that it is third party certified.

To mainstream the technology they felt that the end use customer awareness needs to increase. One felt that this could be accomplished by a general marketing flier that discusses features and benefits of 80 Plus power supplies and addresses the price disparity and how the benefits overcome that disparity.

Market Demand

When asked about the market demand for the 80 Plus Power supply, most respondents agree that there is very limited awareness in the customer end use sector, but that business customers are more likely to be aware. They noted the awareness is growing among business customers. The respondents saw the 80 Plus technology as one that needs to be recommended to customers and customers do not generally demand the technology. The anomaly to that observation, however, is the government and school sector. In these sectors, one system integrator stated that 40% of her customers are aware of the technology and that 15% do request the technology. The manufacturers believe that business customers are more likely to be aware of it, but only about 6% of one manufacturer's customers demand it. Another noted that many business customers are aware of it and want the energy efficiency benefits associated with the technology, because it represents a return on investment for them.

Sales

Participants were asked about their sales and projections for systems with 80 Plus power supplies. They found this a difficult question to answer and a disparity is evident in the results. One system integrator said that this year the 80 Plus market share for their company was 15% and she expected that to increase to 30-40% next year. One of the manufacturers felt that the market share was currently at 4-6%, but that it would increase to 8-12% for his company and that overall the market could expect a 15-20% market share for 80 Plus power supplies. It is important to note, however, that the system integrator had many government and school customers who are required to purchase Energy Star systems which have the 80 Plus power supply in them.

Goals with Respect to 80 Plus

When asked about their 80 Plus goals, the response was mixed. Some had no goals, some only wanted to meet or exceed the efficiency levels as long as it still made business sense, others were placing orders for more systems with 80 Plus power supplies, and others were going to higher efficiency levels than 80 Plus.

Barriers to Widespread Adoption

When asked what they thought would prevent widespread adoption of 80 Plus power supplies, respondents had different thoughts. Half felt it was cost and the other half mentioned lack of awareness. The power supply is one small part of a much bigger picture. People do not notice or pay attention to the power supply when they have so many elements to consider when purchasing a system or server.

Future Program Opportunities

Respondents were also asked what they thought future program opportunities looked like with respect to increased power supply efficiency components. Some saw no opportunities, others saw opportunities but would not elaborate, others wanted marketing dollars to market the efficient power supplies, and others wanted to go to even higher levels of efficiency. Although they noted that the decision is ultimately the customers, they did plan on an education campaign on the importance of efficiency.

2.3.2.3 Marketing and Outreach

General Awareness of the Technology

All manufacturer or system integrator respondents, whether they participated or not, knew of the 80 Plus technology. Most had heard of the 80 Plus power supply and the program through Ecos, their vendor, word of mouth, or Climate Savers. When asked what they remembered about the benefits of the program, almost all the participants and non participants remembered the rebate, many mentioned the energy efficiency and customer savings aspects, some remembered the marketing angle it provided them, one mentioned remembering the environment, and one was very interested in the certification of new power supplies

Participation Reasons

Participants had different reasons for participating in the program. One liked the rebates and felt it was a good program that was good for the environment, another found that it was a market trend and felt they needed to join in, a third joined because of the power supply certification piece, and a fourth found it to be a rebate program that was easy to participate in and did not require a lot of their manpower.

Decision Making

Respondents were asked to rate the importance of a variety of elements in their decision making process. These included the incentive, the energy star standard, a vendor's recommendation, previous experience with the technology or the program, standard practice, an endorsement from 80 Plus staff or SCE representative, corporate environmental policy, and payback. These results are shown in the table below. The questions are ranked in the order of importance the respondents and discrepancies are discussed.

Respondents were asked to use a 0 to 10 rating scale, 0 meaning "Not at all important" and 10 meaning "Very important," to rate the importance of each of the following in their decision to incorporate 80PLUS power supplies into the systems they sell. The results are shown in the Table 2-2 below.

Table 2-2. How important are the following elements in your decision to incorporate the 80 Plus power supply into the systems you sell?

How important is____ in your decision to incorporate 80+ in the systems you sell?	Manu. 1	Manu. 2	Sys Int. 1	Sys Int. 2	Average
Payback on the investment (probe for timeframe)	9	8	9	10	**9.0**
Endorsement or recommendation by SCE representative	8	6	7	10	**7.8**
Previous experience with the 80 PLUS program?	8	7	8	8	**7.8**
Your business or corporate environmental policy or guidelines such as "energy efficient, green or sustainable" policies.	8	8	7	8	**7.8**
The Energy Star 4.0 Standard that became effective July 2007	9	10	4	7	**7.5**
Endorsement or recommendation by 80PLUS staff—ECOS Consulting?	8.5	7	6	8	**7.4**
Availability of the 80PLUS incentive	6	7	6	10	**7.3**
Previous experience with this power supply?	5	NA	9	8	**7.3**
A standard offering in your business	0	8	6	8	**5.5**
Recommendation from a vendor or supplier	0	5	6	10	**5.3**

Overall

Most of the elements listed were important in the decision making process. Two elements (standard offering and vendor or supplier recommendation) were not deemed important with average ratings at 5.5 or below. Both a manufacturer and a system integrator mentioned that the customer drives what they sell and that, therefore, a standard offering would not make sense to them. A recommendation from a vendor was extremely important to one system integrator and not at all important to one manufacturer. The other two respondents felt that it was of moderate importance. Overall, a vendor's recommendation would be more valuable to a system integrator than to a manufacturer.

Payback was universally important to respondents with an average score of nine. An SCE endorsement, previous experience with the program and an environmental policy were also important with an average rating of 7.8. The Energy Star standard was more important to manufacturers than system integrators and one saw it as less important, which decreased the overall average score of the Energy Star standard. An endorsement from Ecos consulting staff carried more weight with manufacturers than with system integrators, but this was still fairly important in their decision making process. The incentive was very important to one system integrator, but only of average importance to all others. The incentive does not cover the incremental cost and is fairly low. Previous experience was more important to the system integrators than to the manufacturers. To the system integrators it was highly important. It was not applicable to one manufacturer who designs their own power supply architecture and was only of average importance to another.

System integrator specific decision making elements

In further refining the approach to system integrators, the following elements are important in their decision making processes: payback, SCE endorsement, previous experience with the program, an incentive, a vendor or supplier recommendation, a corporate environmental policy or objective, endorsement from 80 Plus staff (Ecos Consulting), and a standard offering for your business, with payback being most important, and standard offering being least important. Note, however, that often the responses were mixed with one finding it highly important and the other not so highly.

Manufacturer specific decision making elements
The manufacturers found Energy Star standard, payback, a corporate environmental policy, Ecos endorsement, experience with the 80 Plus program, and an SCE endorsement to be important, with payback being most important and SCE endorsement being least important.

Given these finding the messages to manufacturers and system integrators should be tailored to focus on the elements most important to each of them.

Program Concerns

Participants expressed no significant program concerns, the only issue mentioned was a concern about the exposure of the program. Initially, only a few California utilities were participating by providing rebates, but other utilities both nationwide and internationally have joined and that concern has been alleviated. Another also mentioned that there are more efficient power supplies in existence there are 82, 85 and 87 percent efficient power supplies.

Technology Concerns

None of the participants have concerns with the technology; the system integrators see power supplies as interchangeable. Only one of the non-participants had a concern and that was not about the technology, but about being able to sell something that is more expensive.

Marketing Activities

SCE felt that Ecos had an average effectiveness on this program. They felt they did well with System Integrators and with the power supply manufacturers, but they only have two OEMs on board. The general pubic has limited awareness of this program. However, this is appropriate because the program does not target the general public. SCE felt that Ecos could have been more effective in this program by increasing the rebate and by developing a method to tie the rebate check to a specific system so that savings can be tracked. Ecos, however, said that the manufacturers would not or could not provide that information. SCE wanted to see independent verification, more direct outreach to large commercial and institutional customers, and 80 Plus information posted on the large OEM and system integrators websites.

Opinion of Marketing Materials

Respondents felt that Eco's marketing materials were okay and sometimes they were used to help sell the program. One participant mentioned she had never seen the marketing materials and found out about the program in Taiwan. She feels Ecos needs to do more advertising, because many do not know of the technology; governments and schools do, but this needs to be extended out to more businesses and to end-use consumers. Another noted that the website was excellent, although it does assume a basic level of knowledge. He also noted that it is tuned to Internet Explorer and should be tuned to Mozilla as well.

Market Barriers

There are several elements that prevent participation in the 80 Plus program. These include a lack of product availability, a lack of rebate opportunity, a lack of customer awareness, too low an incentive – the incentive does not offset incremental cost of the 80 Plus power supply, and difficulty in changing existing procurement processes – most entities have existing contracts with power supply manufacturers and, if

those power supply manufacturers do not produce an 80 Plus power supply option, there will be contractual obstacles for the company wanting to incorporate 80 Plus power supplies in the systems they offer.

Barriers to Participation

The program had limited participation and SCE felt that there were two key reasons. First, the customers were not aware of the 80 Plus power supplies and second, the incremental cost of the technology was substantially greater than the rebate offered. Ecos agreed with those two points, but also found it difficult to bring the large original equipment manufacturers into the program because of the legal issues involved and, because the power supply is a small part of a large business, they were reluctant to deal with the legal issues presented for such a small part of their business. They also cited the commodity pricing nature of the business. Lastly, they noted that there is uncertainty about a new product and they surmise that the OEM's need to be certain that the new power supplies will work as well as the original before they would make any changes.

The system integrators and manufacturers had interesting insights on the barriers to participation and those barriers covered a broad spectrum. These included: lack of knowledge of the program, the hassle factor, cost, free rider ship issues, and customs and freight issues. Some non-participants had just heard of the program and were considering becoming participants, others cited the hassle factor in claiming the rebate, they objected to providing zip code information to claim the rebate, because it infringes on their customers confidentiality. Respondents also cited the cost differential between the standard efficiency and the 80 Plus power supplies. One non-participant was already incorporating higher efficiency power supplies and did not want to claim funds for something they were doing anyway. In addition, they claimed that the rebate would divert them from their main focus and it presented an accounting issue for them. They also noted that they did not want a mandate for efficient power supplies and then have to deal with differences in every state; they would rather have a voluntary program. Another firm did not want to deal with customs and freight issues and wanted to deal with another Canadian firm to avoid the potential issues. *It was interesting to note that for some systems integrators, the chassis came with 80 Plus power supplies.*

Energy Usage

Energy usage is typically not a factor in what a company sells. Half the respondents did not understand the question and how it related. Two of the respondents (one participant and one non-participant) offer efficiency as an option and one noted the expense of efficiency and felt it was prohibitive.

Corporate Objectives Regarding Energy Efficiency

Non-participants typically do not have a corporate objective that focuses on energy efficiency: it either exists, but is not articulated, the company is working on formulating one, or they don't have one. All the participants had a corporate environmental policy which was fairly important in their decision to participate in the 80 Plus program. They rated it a seven or eight on a scale of zero to ten where zero was not at all important and ten was very important.

2.3.2.4 Implementation and Operations

Operation

SCE and Ecos had different points of view regarding the program's operation. As mentioned earlier, SCE felt the inability to verify installations and to track rebate checks were significant problems. Ecos viewed the program as a market transformation program and, thus, took a long term point of view. Ecos was, however, not happy with how long it took to bring major OEMs on board. They admit that it was a slow start that was exacerbated by the lack of a product for the first six months.

Ecos felt that they needed more marketing dollars up front. As a company they absorbed some of the upfront costs, but expect to see a return as the program became more successful because it is a performance based contract. Ecos would have liked to train SCE reps on the program, but found that the SCE reps were not comfortable with this technology product. For this program, marketing and operations are intertwined and Ecos felt they needed more funds to operate/market the program than they had. SCE felt that the staff and budget were sufficient to effectively manage the program, but that there was a constraint in marketing, although they also mentioned, as Ecos had, that marketing and operations were intertwined. SCE had a mixed reaction on fund sufficiency for marketing. There were times when SCE staff could not connect with Ecos staff in a timely manner. SCE felt Ecos was resource constrained initially, but that it improved over time. There were some larger issues that Ecos was working on such as bringing power supply manufacturers on board and developing the testing protocols for the power supplies that EPRI would use, some of which took months to resolve. In the end, SCE dropped out of the program because few units had moved.

Program Process

Ecos feels they have the right mechanics for operating this program and that the processes are efficient. They note that they have been effective on the power supply side of the equation. Overall, they feel their program processes are efficient. SCE agrees that the certified testing of the power supplies has gone well. However, they are not satisfied with only two OEM signups (one was participating under contract and the other participating without a fully finalized contract) over a 14 month period. SCE notes that although two OEMs have signed onto the program, very few systems with 80 Plus power supplies have been installed.

Program Marketing

Ecos touts their website as their best marketing tool. One difficulty they face is that this is a program rather than a product, which increases the marketing complexity. They believe the marketing has been efficient because the 80 Plus power supplies are now specified in RFPs and 80 Plus is often mentioned in articles. SCE has focused on the end results of the marketing and feels that their marketing to the smaller players has been okay but that the marketing to procurement staff has not been successful. They are viewing the marketing effort from two different points of view. SCE focuses on the end result and Ecos more on the process and the elements that add up to the overall marketing campaign.

Administration

Ecos feels the administrative processes are efficient and very effective. There is currently a small volume of rebates which can easily be processed, but large volumes are coming through as well. SCE notes that verification process is not functional, the checks are not auditable, and the payments cannot be tracked back to the OEM. They can track shipments to a service territory, but cannot track the rebate payments back to a service territory. SCE noted that while reporting was an issue earlier, that issue has been resolved and Ecos is now fairly good at submitting the required reports.

SCE had a few suggestions for improving the processes to make them more effective and efficient. They felt the incentive level needs to be increased to better address the incremental cost issue. SCE notes that some OEMs have signed up, but they have not submitted any rebate applications and they feel Ecos needs to manage that process better, because few rebate applications have been submitted. In addition, one OEM has not signed a contract, but has submitted invoices, SCE feels they should not be paid, because they do not have a contract. They think Ecos should manage the contract better. SCE would also like to see independent verification, a presence in retail stores, and outreach to end users and purchasing agents. From an administrative point of view, SCE would like to see better payment tracking, which is a critical element for SCE.

Effectiveness and Efficiency

Both SCE and Ecos were asked to discuss their views on the effectiveness and efficiency of the program processes, the program marketing, and the administrative processes. The program processes were defined as being big picture processes such as sales and marketing, information delivery and the sign up process for example. The administrative processes were defined as the details of the program that have to happen to make the program work, such as rebate processing and data transfer, which are the details of how the program is implemented.

A highlight of the program was the certified testing of the power supplies, both agree that that aspect has gone well. Manufacturer participation has been limited with only two on board, however, the two are large OEMs in the industry. Ecos feels that once the large players have committed, the smaller ones will follow. However, Ecos also notes that the large manufacturers are likely to be the most difficult to sign on.

Participant Satisfaction

All the participants are satisfied with the program and one wants to drive his company on to even higher efficiency systems.

Suggestions to Increase Participation

When asked how the program could be changed to increase participation, respondents had a few suggestions. They felt that providing zip code information was too onerous, they would like both marketing funds and marketing materials, and would prefer an instant rebate. One respondent thought that, with marketing and advertising the low end of the market could be addressed and the cost differential would disappear. The system integrators mentioned that if the chassis they buy has an 80 Plus power supply in it already, it makes it much easier for them. One company mentioned an ethical issue with free ridership, because they were incorporating the efficient power supplies already and did not feel right submitting a rebate. A few of the non participants were considering participating. The take home message is to provide marketing funds and materials to increase participation and to work with companies that supply chassis to make sure they have a product line with 80 Plus power supplies.

Production Challenges and Solutions

Respondents mentioned a few production challenges and solutions. One discussed the logistics of launching a new system and noted that, because all peripherals must be ready at the same time, introducing a new power supply potentially complicates a product launch. This manufacturer accounted for that by over designing the power supply to ensure that it would meet all minimum standards and then they conducted destructive testing on the new power supply design to ensure operational success. Another manufacturer noted that the supply chain could be an issue. They had to carry two power supply lines, one 80 Plus and one of standard efficiency. They also focused on marketing and education with the aim of increasing efficiency overall. They also mentioned a need to improve their supply chain forecasting accuracy. One system integrator noted the higher cost of the 80 Plus power supply; the lifetime argument for customers to justify the higher cost can be used.

Quality Control

Ecos says they have verification and inspection procedures for installations, but that they have not implemented it due to low volume. They also have the mechanism in place to test power supplies. Ecos says they can verify, just not for the Large OEMs. SCE is the only utility requesting verification. Both SCE and Ecos review the inspection activity reports, the flat file database, and documentation for oddities or out of range responses. Ecos reviews the requests for rebates. Both agree that the end user cannot be contacted for verification purposes 100% of the time. The smaller volume manufacturers can provide that

information but the larger ones either cannot or will not. They do not do a pre inspection, but they do inspect a sample of participants afterwards where they have the end use customer information.

Scalability

This program is designed to be scalable. It is in its early stage of implementation at present, but is ramping up as more power supplies are certified and as more manufacturers and system integrators are joining the program.

Mainstreaming the Technology

Respondents felt that to make the 80 Plus power supply technology mainstream, the price differential needed to be decreased, energy efficiency issues need to be brought more to the forefront, and if the chassis were to come standard with an 80 Plus power supply the technology, it would become mainstreamed more quickly.

The EPA felt that to mainstream 80 Plus, the cost has to come down. A switch to a different power supply is a big undertaking from either a manufacturer's or a system integrator's perspective. As a result, the technology must be available and the cost differential cannot be too great. To this end, Ecos uses EPRI to test and certify power supplies to ensure the soundness of the technology.

Lead Time for Full Production

Lead times to come to full production varied depending on whether it was a manufacturer or system integrator speaking. System integrators can switch over in as little as two days, just long enough for the vendor to ship the product. However, another system integrator mentioned three months. A manufacturer stated that it could take 16 to 20 weeks to design a new power supply architecture, test it, and bring it to full production. They noted that most of that time is spent in the regulatory approval process.

Program Improvement

This program has limited participation to date. Survey respondents noted that providing end use customer information was problematic. In most cases, they did not want to provide it due to its proprietary nature, and in other cases they could not provide it. Due to data-systems issues, one non-participant cited this as one of the reasons for not participating.

Design Improvement

The SCE and Ecos program managers were asked how they could improve the program from both a design and an operations perspective. From a design perspective they thought the incentive level should be increased to cover the incremental cost of the 80 Plus power supplies, this was an element also repeated by the manufacturers and system integrators. The program managers also felt that the outreach to large customers could be increased and again the system integrators and manufacturers also suggested increased marketing to end use customers. The program managers felt that contracts needed to be better enforced and payment should not be made if there was no contract in place. The last item from a design perspective was to clearly label systems as 80 Plus systems. In these systems, the power supply is inside the chassis and there is no overt way of knowing that it is an 80 Plus system. They believe there should be labeling on the outside of the chassis so that individuals can identify that a system is an 80 Plus system. Ideally, all systems would be labeled as 80 Plus, but this proved to be a false assumption. Manufacturers and system integrators would not add another label to the outside of their system.

Operations Improvement

There were four suggestions for improving the program, three from program managers and one from participants. As mentioned earlier the program managers felt that check payments needed to be better

tracked, contracts needed to be negotiated with higher level staff, and verification needed to be improved. Participants were frustrated with the uncertainty on rebate redemption.

The first was to improve the tracking of check payments. The payments need to be tied back to the utility. Currently the manufacturers and system integrators sell the systems and submit for the rebate, but there is no explicit tie back to SCE. SCE needs to be sure the 80 Plus power supplies it is rebating actually went into their service territory.

The second suggestion was to use higher level staff to negotiate contracts. This may be a mute point, because two large manufacturers are signed on now and participation is growing.

The third suggestion involved verification. SCE needs to be sure all the 80 Plus power supplies they rebate are in their service territory. SCE was concerned about customers who got an 80 Plus power supply received a rebate and subsequently redistributed it outside the service territory. This may be mute, because manufacturer staff noted that companies typically do not stock pile computers and servers. Typically, a system is purchased to be used at a specific location. SCE wants to be sure that the unit has an 80 Plus power supply, the units are not labeled, and it is difficult to verify the 80 Plus power supply. Possible solutions would be to track the serial number and the model number and get the customers name, meter the computer, or implement mandatory labeling. The former would be met with stiff resistance by the manufacturers, because they guard customer confidentiality and already find the reporting requirements of zip code onerous. Including serial and model numbers would likely significantly decrease participation. Metering the computers would be difficult to implement without the customer contact information and would be costly. Labeling would ease the verification dilemma significantly, but may be difficult to implement as well. Ecos mentioned attempting to get the systems labeled with the 80 Plus logo, but they met with stiff resistance. Systems have other labeling already and adding yet more labeling is unlikely, especially for only a $5 to $10 rebate.

Participants were frustrated when they submitted large numbers of rebates and only a few were compensated. They would like to know which of their submittals will receive a rebate and which will not. This may be a matter of simply improving the program education so that participants clearly know the criteria for receiving the rebate. They may believe that all the claims they submit fall in SCE service territory, when in fact they do not.

2.3.2.5 Other Program Dimensions

This section presents program elements not already discussed including how this technology influences the industry, how this program influences the industry, what other industry changes are happening and whether they are synergistic with the 80 Plus program, free ridership, the incremental cost issue, success stories of the 80 Plus program, and how the program affects standards such as Energy Star.

80 Plus Technology's Influence on the Industry

Respondents were asked if 80 Plus technology could influence any change in the industry. Some note that Ecos has changed the industry by getting 80 Plus power supply technology into the Energy Star specification. Another noted that because the 80 Plus power supply is smaller, it frees up more space inside the system for other components.

The 80 Plus program will have an effect of increasing the overall efficiency of systems and servers. One manufacturer went on to state that 80 Plus is setting the stage to go to even higher levels of efficiency and noted that we should be seeing more LED and flat panel displays in the future. He felt that it would start with businesses and would then move to the consumer market.

Program's Influence on the Industry

Respondents were asked about how the program influences the industry. They felt that it could do more if the program focused on educating users or if it provided marketing funds the program would effect changes in the industry. A different manufacturer felt that once the volume ramps up, it will be impossible to go back to inefficient power supplies, because they will be obsolete.

Other Industry Changes and Synergism with Program

The computer industry is changing and some of those changes are synergistic with the 80 Pus program. Respondents were asked to address this question and each addressed it differently. Non-participants felt the PC is becoming less of a factor in the market place, because both desktops and servers have been moving toward laptops. Another noted that the performance per watt is increasing and this starts with the power supply. He also noted that there is also a trend towards high resolution graphics cards which use more energy, but this can be solved by using better power management for the graphics card. A third non-participant agreed that there is an increase in system efficiency, but noted that there is a debate about focusing on the component level. The participants agreed that there is a trend toward energy efficiency, but they also point out that people do not know about 80 Plus power supplies with the implication being that we need to educate consumers about 80 Plus.

Free Rider-ship

Respondents were asked to address when they first learned of the 80 Plus program in relation to when they began to incorporate the technology into their systems. This was a difficult question for most to answer, because the technology and the program came about at the same time. One system integrator said it was at about the same time and the other said she had learned of the technology from a vendor before she knew of the program, but learned of the program after they started to incorporate power supplies. Both manufacturers knew of the program before they began to incorporate the 80 Plus power supplies into their systems. One knew of the program before the power supplies were even available.

Respondents were also asked if the program had <u>not</u> been available how likely would they have been to incorporate the efficient power supply into their system. The responses were mixed. One manufacturer felt that it was highly likely that they would still incorporate it. The others all felt it was much less likely giving it a rating of four or less on a scale of zero to ten where zero is not at all likely and ten is extremely likely.

They were further asked if the energy star standard four had not included the 80 Plus power supply what is the likelihood that they would have used the same power supply. Here the results were more mixed, half the manufacturers said it was fairly likely (eight) and half said it was fairly unlikely (three) where zero is not at all likely and ten is extremely likely that they would have included the 80 Plus power supply if the Energy Star standard had not included it.

Incremental Cost Issue

Both the manufacturers and system integrators mentioned that the incremental cost for the 80 Plus power supply is an issue for them. The participant manufacturers said that the incremental cost depends on the specification of the power supply and that the cost of specifying a power supply with international certifications is on the order of $250,000. As volume of a certified power supply increases, the cost can be better spread over the volume of power supplies sold. The incentives are not even close to addressing this certification cost. However, once the power supply is certified and in production, these initial costs are sunk. Even without taking the initial certification costs into account, the incremental cost is still significantly greater than the rebate offered. They believe there is a tipping point where the incentive will meet the incremental cost, but do not know what it is. It would take having a major market, such as the US or Europe, to specify a move to 80 Plus. One manufacturer believes that, at a certain point, power

supply manufacturers will not build the lower efficiency power supplies and this should take place within the next two to three years.

Success Stories

When asked if they had heard of success stories with the 80 Plus program, the manufacturers found this a hard question to answer, because it is hard to talk about a company which has implemented a program and, as a result, their business evolved given all the factors inherent in business success and growth. The 80 Plus program would be but one small part of the overall business success.

Energy Star and 80 Plus History

The 80 Plus power supply program was designed to fit nicely with Energy Star. Ecos, the implementation firm, wanted to address the energy losses when a system is operating. The issue of power losses when a system was not being used had already been addressed. However, no one really knew what the losses were while a system was operating and this program addresses that. The technology was a new idea, it had not even been considered by the industry.

Ecos approached the EPA Energy Star program with the concept, developed power supply testing protocols, and worked to make efficient power supplies available in the market. Typically, Energy Star requires that a technology be prevalent in the marketplace before it is included in Energy Star specifications, however, for this program they worked with Ecos to make sure the technology would become prevalent and included the 80 Plus power supply in the Energy Star specification. Ecos provided most or all of the technical work, proved the efficiency claims, and brought power supply manufacturers on board to produce power supplies that are also efficient at low loads.

EPA included the 80 Plus power supplies in the new energy star specification because they fill a gap. Efficient power supplies are always better than the alternative and 80 Plus power supplies will save energy over a standard power supply. Ecos, with the 80 Plus power supply technology, was very influential with the EPA; they brought something to Energy Star that they could incorporate into their specifications. It would be outside of Energy Star's mission to develop something, so Ecos addressed that issue for the Energy Star program.

Respondents were asked about the program's impact on Energy Star. They felt that the 80 Plus program, and more specifically Ecos consulting, did have an impact on the Energy Star standards. One manufacturer wants to meet the standards and be able to implement it when it is in place. The other manufacturer interviewed takes an approach of anticipating what the standard will be. He also noted that his company builds up the efficiency of his computer to maximize the system's performance using the energy available from the power supply. In this manner, they develop a computer that has maximum functionality given the power supply used.

The EPA noted that energy star specification will be changing in July 2009. While the EPA has not seen the incremental cost of efficient power supplies come down, the hope is that the change in specifications will bring the incremental cost of efficient power supplies down.

2.4 Logic Model Review

Summit Blue Staff conducted a logic model review by evaluating the existing logic model against the input from SCE and Ecos staff. The results of that review are shown below.

2.4.1 Logic Model Review Findings

The existing logic model was substantially complete and provided a nearly accurate picture of the programs' operations based upon the discussions held with SCE and Ecos staff. The original logic model assumed the 80 Plus power supplies and the testing protocols had been developed and were being implemented. As a result, the logic model focused on the roles of sponsors, manufacturers, and system integrators to increase the use of 80 Plus power supplies.

The original logic model included activities by industry actors such as SCE staff, Ecos Staff, Power supply manufacturers, Original Equipment Manufacturers, System Integrators, and EPA's Energy Star Program. It included activities such as recruiting key players and changing the Energy Star Specification to include 80 Plus Power Supplies for personal computers and servers.

The original included short term goals of certification of 80 Plus power supplies, recruitment of manufacturers and system integrators who sold 80 Plus units, and the recruitment of sponsors. The intermediate goals included strengthening program partnerships, enrolling more program sponsors, and increasing the marketing of 80 Plus to potential buyers. Long term outcomes included wide spread production of 80 Plus power supplies, which would lead to more units in the market place.

2.4.2 Revised Logic Model

Summit Blue proposes one revision to this logic model. A key component of the 80 Plus program was to provide a mechanism for power supply manufacturers to develop and certify 80 Plus power supplies. This was not depicted in the earlier logic model. This revision adds the development of testing protocols for 80 Plus power supplies and adds the introduction of an organization (EPRI) to certify the power supplies, thereby adding validity and certainty to the program.

The revised logic model is shown below in Figure 2-1, a linkage table follows which shows the Segments, potential indicators, and success criteria.

Figure 2-1 80 Plus Logic Model Diagram

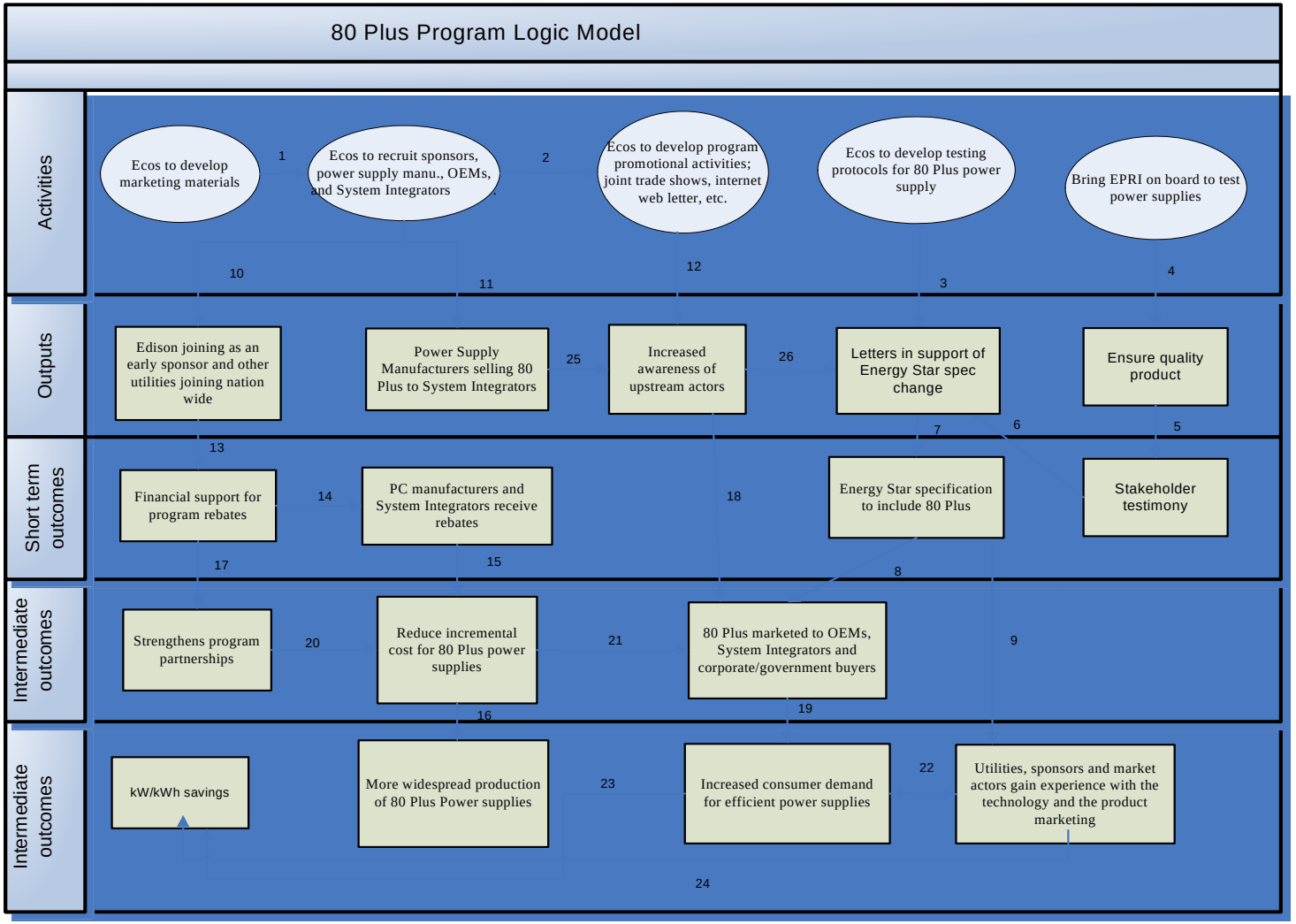

Table 2-3: 80 Plus Logic Model Linkage Table

Link	Segment Theory	Potential Indicators	Success Criteria
1	Ecos to develop marketing materials to recruit: Sponsors, Power supply manu., OEMs, and System Integrators		Marketing materials created
2	Ecos to recruit: Sponsors, Power supply manu., OEMs, and System Integrators using program promotional activities; joint trade shows, internet web letter, etc.	Recruiting materials attract Sponsors, Power supply manu., OEMs, and System Integrators	Number of Sponsors Power supply manu. OEMs, System Integrators signed on
3	Develop testing protocols for 80 Plus power supplies and Bring EPRI on board to test the power supplies using the protocols developed	Established Protocols EPRI doing testing	Established Protocols EPRI doing testing
4	EPRI on board testing and certifying power supplies ensures a quality product	OEMs and system integrators trust the power supplies due to the authority of EPRI testing	Certified power supplies and limited failure of 80 Plus power supply in marketplace
5	Quality product leads to stakeholder testimony		Testimony from various stake holders
6	Stake holder testimony leads to letters in support of Energy Star spec change to include 80 Plus in the Energy Star Spec.		Support letters
7	Support letters cause inclusion of 80 Plus in the Energy Star specification		80 Plus in the Energy Star Specification
8	80 Plus in Energy Star Specification leads to the marketing of 80 Plus to OEMs System Integrators and corporate/government buyers		OEMS System Integrators incorporate 80 Plus power supplies in their systems
9	80 Plus in Energy Star Specification leads to utilities, sponsors and market actors gaining experience with the technology and the product marketing.	Increased knowledge of 80 Plus	Number of firms who know of 80 Plus power supplies
10	Ecos recruiting results in Edison joining as an early sponsor and other utilities joining nation wide		Number of utility sponsors

11	Ecos recruiting results in Power Supply Manufacturers selling 80 Plus to System Integrators		Sales of 80 Plus Power Supplies
12	Ecos promotion results in upstream awareness of upstream actors		Pieces of Ecos promotional materials generated
13	Sponsorship by Edison and others provides financial support for program rebates.		Number of program utility sponsors
14	Financial support for rebates goes to PC manufacturers and System Integrators		PC manufacturers and system integrators receive rebates.
15	Rebates to PC manufacturers and System Integrators reduces incremental cost for 80 Plus power supplies	Mass production of 80 Plus power supplies leads to economies of scale and a greater number of a given power supply sold to spread the development and certification cost over reducing the per unit cost.	Decreased incremental cost for 80 Plus Power supplies
16	Reduced incremental cost for 80 Plus power supplies leads to more widespread production of 80 Plus Power supplies		Number of 80 Plus power supplies certified by EPRI
17	Financial support for rebates strengthens program partnerships		# of program partnerships forged
18	Increased awareness of upstream actors leads to 80 Plus power supplies being marketed to OEM, System Integrators, and corporate/Government buyers		
19	80 Plus power supplies being marketed to OEM, System Integrators, and corporate/Government buyers leads to increased consumer demand for efficient Power supplies		Number of consumer requests for 80 Plus power supplies
20	Strong program partnerships leads to reduced incremental cost for 80 Plus power supplies		Reduced incremental cost for 80 Plus power supplies

21	Reduced incremental cost for 80 Plus power supplies leads to marketing of 80 Plus to OEMs, system integrators and corporate/government buyers		Sales of efficient power supplies
22	Increased consumer demand for Efficient power supply leads to utility sponsors and market actors gaining experience with the technology and the product marketing.		Sales of efficient power supplies
23	Increased consumer demand for efficient power supplies leads to kW and kWh savings.		Sales of efficient power supplies Measurable kW and kWh savings
24	Utility sponsors and market actors gaining experience with the technology and the product marketing leads to kW and kWh savings		Measurable kW and kWh savings

2.5 Lessons Learned and Recommendations

Overall, this evaluation found that this program has been a force in introducing new 80 Plus power supplies into the market and in bringing manufacturers and system integrators into the program. The program has faced a slow start, but momentum is gathering and more potential participants are learning of the program and are considering participating.

Based on the evaluation of the 80 Plus program, a number of lessons were learned and recommendations were suggested. These are presented in the following discussion.

2.5.1 Lesson Learned:

1. Even though reasonable effort can be expended, a program can still have limited participation. In the 80 Plus program, lots of effort was expended, but there were lots of barriers to overcome, some of which could have been foreseen.

2. The incentive is not the only reason to participate in a program. The program may have other benefits that far outweigh the incentive. In this case, certifying power supplies was a very important feature to one manufacturer.

3. For a manufacturer, certifying a new power supply is a monumental undertaking. To have a power supply certified in all countries, it can cost about $250,000, meaning a $5 rebate is not enough to influence this decision for one power supply. However, all the rebates collectively can be used toward certifying new power supplies.

4. Labeling was an issue, systems already have labeling on them and it is difficult to have an additional one added.

5. The 80 Plus program is an international program and it does not allow for individual utility customization.

6. System integrators and OEMs value different elements of a program; as a result, each can and should be approached differently. For example, manufacturers typically specify a power supply and are in control of the architecture, whereas system integrators use the power supply a power supply manufacturer offers. System integrators are more market driven, while the manufacturers are more likely to drive parts of the market.

7. Third party implementers are not completely responsive to requests from SCE. SCE provided input, but not all was incorporated into the program. SCE felt Ecos needed to listen more and to be more responsive.

2.5.2 Recommendations:

1. Increase the incentive to better address the incremental cost issue. This is important in low margin businesses.

2. Work with purchasing agents so they understand what an 80 plus power supply does and why they should want it.

3. Tracking customers is an issue. The OEM's either do not want to or cannot (due to technical difficulties) release that information.

4. Ensure the program website is viewable across all standard web browsers..

5. A general marketing flier which discusses the features and benefits of the 80 Plus power supplies and addresses the price disparity would be helpful for marketing purposes.

6. The approach to system integrators and manufacturers should be further tailored to take different decision making factors into account.
    - System integrators value payback, SCE endorsement, previous experience with the program, a corporate environmental policy or objective, 80 Plus endorsement, with payback being most important and 80 Plus endorsement being least important.
    - Manufacturers value payback, Energy Star standard, a corporate environmental policy, Ecos endorsement, experience with the 80 Plus program, and an SCE endorsement, payback being most important and SCE endorsement being least important.

3 VARIABLE SPEED POOL PUMP PROGRAM

3.1 Program Description

The Variable Speed Pool Pump Program, operated by Pentair for SCE, promoted the installation of a variable speed pool pump over a single speed pool pump for residential pools. This program offered $250 rebates to both the pool owner and the pool pump installer for the installation of a variable speed pool pump. This section includes a description of the firm implementing the program, the design of the program they implement, and a description of the technology implemented through the program.

3.1.1 Implementation Firm

The Pool Pump Program is implemented by Pentair. Pentair is a leading manufacturer of pool and spa equipment and accessories with offices in North Carolina and California.[3] Pentair implemented this program with one staff person and one contractor. They trained pool contractors and builders on the benefits of the Intelliflo variable speed pump and how to install the pump. A third party contractor inspected the first three installations made by a new installer made and subsequently inspects one of every 12 installations.

3.1.2 Program Design

This program provides a $250 rebate to the pool owner and a $250 rebate to the pool pump installer for installing a variable speed pool pump in a residential pool in SCE service territory. The program targets pool builders and pool maintenance people who install pool pumps. The program was marketed in multiple ways. Initially, high end pool builders were invited to a training session where the benefits and installation of the Intelliflo variable speed pool pump were explained. Later pool service personnel were also invited to these training sessions held by Pentair. The training sessions were also advertised at pool distributors and pool shows. Once trained, pool professionals educated pool owners on the program and the benefits of the variable speed pool pump over a single speed pump. The program had a goal to install 775 variable speed pool pumps in SCE service territory and has exceeded that goal, installing over 800 pool pumps.

3.1.3 Technology Description

The IntelliFlo® VS-3050 Variable Speed Pump is a programmable pump that can be used to meet all pool pumping needs. The pump can be set to run at the minimum speed required for a given task causing it to work less and thereby use less energy.[4] The Intelliflo pump uses a permanent magnet motor instead of an induction motor, which is more energy efficient, and when programmed to run at different speeds for specific tasks such as filtering, heating, cleaning, spa jets, and waterfalls, it will consume less electricity than a single speed pump because when it runs slower it consumes less electricity. For example, when the pump speed is cut in half, the energy consumption is one eighth of its former consumption.

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[3] Pentair web site June 28, 2008. http://www.pentairpool.com/contact/index.php

[4] http://www.pentairpool.com/products/products3.php?id=76

This program promotes the installation of the variable speed pump over a single speed pump. The Intelliflo pump used in this program has a permanent magnet rotor and a totally enclosed fan cooled pump design, which makes it a quiet pump. The permanent magnet rotor also reduces wear and tear on the pump and other systems because it produces less heat and vibration than traditional induction motors. This means less maintenance and longer life for the variable speed pump.[5] It is a technologically advanced pump and thus has a higher cost than a single speed or two speed pump. However, it is expected to save enough on electricity cost to pay back the higher first cost in one to two years. It also has built in diagnostics that protect the IntelliFlo VS-3050 from the most common causes of premature pump failure—overheating, freezing, and voltage irregularities.

3.2 Process Evaluation Methodology and Sample Design

A number of different market actors were interviewed by telephone during the evaluation of the Variable Speed Pool Pump Program. The interview guides used to evaluate this program are similar to those of the other five programs in the overall IDEEA group study, although they have been modified to the requirements of this program. The sample design was developed specifically for this program. Both the evaluation methodology and the sample design are discussed in detail below.

3.2.1 Process Evaluation Methodology

For the Variable Speed Pool Pump Program, Summit Blue interviewed two program implementers or sponsors, six participant installers, six non-participant installers, and 40 participating pool owners. The interview guides for each of these groups are attached in Appendix A. The implementer and sponsor interviews were about two hours in duration, the installer interviews lasted about 30 minutes, and the pool owner participant interviews lasted about ten minutes. Each type of respondent is described below.

- The program implementers or sponsors included SCE program management staff as well as third-party implementation staff. The third-party implementation staff respondent was an individual who was primarily responsible for the day-to-day operations of the program and who, therefore, had detailed knowledge of the program and its evolution.
- Participant installers were individuals who had attended the Pentair training and who had installed variable speed pool pumps and submitted at least one rebate application to SCE.
- Non-participant installers were individuals who had attended the Pentair training but who had not submitted a rebate application to SCE. In some cases, these individuals had actually installed a variable speed pool pump but had not submitted the rebate to SCE.
- Pool owner participants are pool owners who had a variable speed pool pump installed by a vendor or installer who had been certified by Pentair to install the variable speed pool pumps.

All interviews were conducted by senior Summit Blue team members. The implementation staff, which included SCE program management and Pentair staff, was asked about the program's goals, design and operations, improvements, as well as specific issues. Vendors and pool owners were asked to discuss their background, the marketing of the program, their decision making processes for participating in the

[5] Website http://www.pentairpool.com/pdfs/intelliflovsDS.pdf IntelliFlo® VS-3050, Intelligent Variable Speed Pump By Pentair Pool Products®

program, the program's delivery and implementation, their concerns about the program, free ridership, and spillover.

Summit Blue staff interviewed SCE and Pentair program managers. In these executive level interviews, the program managers were asked to discuss program goals, program design and operations, marketing effectiveness, program scalability, program evaluability based on specific issues brought up in an earlier program evaluability research effort, quality control, and program improvement from both a design and an operations perspective. These interviews lasted about two hours and the program managers were very forthcoming about the program and its operations.

In the vendor participant survey, Summit Blue Staff interviewed six installers who had attended the Pentair training and who have subsequently installed variable speed pool pumps. Of 296 possible respondents, ten were called and six interviews were completed. The respondents were grouped into three participation levels;

1. One to two installs (2),
2. Two to ten installs (1), and
3. More than ten installs (3).

The three respondents in the last category were installers who were seasoned installers and had each installed more than 35 pumps.

The vendor non-participant survey was administered to six non-participant installers. These were installers who had attended the Pentair training but who subsequently did not request a rebate from SCE for a variable speed drive pump they had installed. Some of the non-participant installers did install a variable speed pump but did not request a rebate.

The respondents were all owners of their company with seven to 30 years of experience. Individually they have installed between 15 and 500 pool pumps, and, of those four to 250 were variable speed drive pumps. Most of the participant installers said the variable speed pumps was "an easy sell," however, those who had installed fewer pumps felt they had to work to convince people to install the pumps. Some of the installers who have installed many pumps no longer give their customers an option. One said he installs the variable speed pump and will later remove it if the customer is unhappy.

3.2.2 Sample Design

The evaluation of this program included phone interviews from a variety of players in the program to represent views from multiple perspectives. The sample frame used for this evaluation is shown below in Table 3-1.

Table 3-1. Sample Design for the Variable Speed Pool Pump Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Implementer / Sponsor	3	2
Vendor participant	6	6
Vendor non-participant	6	6
Pool Owner participant	40	40
Total Respondents	55	54

Multiple interview guides were developed for the process evaluation of the Variable Speed Drive Pool Pump Program. These included the SCE program manager interview, the third party program manager interview, participant installer interviews, non-participant interviews and pool owner interviews. These were all completed between January and May 2008.

Respondents for each of the interview guides were chosen depending on the guide they were responding to. The 12 respondents for the vendor participant and vendor non-participant interview guide were chosen based on their participation level in the program.

The vendor non-participant installers were contacted if they had a phone number listed and were chosen based on installer ID number. The non-participant installers were rank ordered by ID number. The list of rank ordered ID numbers was divided into 6 groups, and one individual from each group was called.

The 40 pool owners were chosen at random from a list of program participants. Where no phone number was available, the next randomly chosen participant was called. Respondents were each called at least three times. Callbacks were conducted at different times of day and on different days of the week.

3.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the program from a process perspective. The results of these discussions are presented below.

3.3.1 Overview

Both SCE and Pentair agree that it was a well run program and were happy with the outcome. Pentair learned that the service industry could dependably market the program to pool owners. In the beginning, they thought it should only be offered to high end pool builders but when they opened up the training, they found that members of the service industry can be quite effective in promoting and installing variable speed drive pumps.

SCE learned the value of having a committed capable contractor. It made a significant difference in achieving the program goals. Pentair had more at stake than SCE did, and as a result, SCE had no significant problems with this program. SCE also found that not ‘everyone will come to you, you have to go to them’ applies to installation contractors The early training sessions were eight hours in length and required the pool contractors to miss a day of work to attend the session. When they shortened the

session and located it at a pool show where the installers were in attendance, they got much higher turnout.

SCE also found price to be an important component. Decreasing the price differential between technology options is a very important element of a program.

Timing of the program is an important element. This program started late (June rather than January) and as a result required an additional six months to meet its goals. Had the program started earlier so that installers were trained to coincide with pool use season they would likely have attained the goal within one year.

The program was adjusted when necessary and resulted in an effective program.

3.3.2 Detailed Results

The results from each of the interviews are compiled below to address the program design, market conditions, marketing and out reach, implementation and operations, and other program dimensions.

3.3.2.1 Program Design

Summit Blue Staff asked about the design and operation of the program. Respondents were asked to discuss:

- About the implementation firm.
- If the program was implemented as designed.
- If there were unjustified design assumptions.
- If there were any problems with the program's design as implemented.
- If the program was meeting its goals.
- About the evaluability of the program.
- About Non energy benefits of the technology.

Implementation firm

Both the SCE and Pentair program managers felt that the program ran smoothly. SCE staff felt that the subcontractor valued their reputation and would not tolerate any customer problems. Pentair felt that SCE was a very smooth utility to deal with as compared to other utilities they have worked with. They felt they were able to continually improve the process and felt that any changes that met the intent of the program would be allowed. .

Implemented as designed?

Both program managers said the program was implemented as designed. Pentair wanted a slow controlled ramp-up, which did occur. In the beginning, the program was targeted to high end pool builders and designers, the program was subsequently also made available to the service trade. With this and three additional changes, implementation increased significantly. In the beginning, Pentair trained 30 installers in six months implementing the three changes discussed below they trained 30 installers every week or two.

Unjustified design assumptions

There were not any problems with the design explicitly, but one assumption, according to the Pentair program manager, was restrictive. Pentair had developed two variable speed products, but had submitted the more advanced model for the program. The second pump was simpler, less expensive, and had a similar energy savings potential. SCE would not allow this second, less complicated pump into the program.

Problems with implementation

During the course of the implementation, the program underwent three changes:

1. It was opened to the service trade,

2. The training was shortened to four hours instead of eight, and

3. The training was conducted at pool shows where the potential installers are likely to attend.

SCE staff noted that the assumption of an eight hour training session was excessive, and that four hours of training would be sufficient. The initial program design assumed that pool pump installers would come to a training session. However, it became evident that installers have a difficult time devoting a whole day to training. When Pentair scheduled the training at a pool show where the pool pump installers were in attendance already and decreased the duration of the training, their training participation rate increased significantly.

Meeting Program Goals

Both the SCE program manager and the Pentair program manager felt that the pool pump program contributed to the IDEEA program goals. SCE mentioned that the program introduced a new technology to the market. They further noted that during the course of the program, other manufacturers began producing variable speed pumps. Pentair felt that they brought a new emerging technology from early acceptance into mainstream usage. The program also met and exceeded its implementation goals.

Evaluability

An earlier research effort identified eight evaluability issues in Pentair's Variable Speed Drive Pool Pump Program. Summit Blue Staff asked both the SCE and Pentair program managers if the following eight issues had been addressed in the program.

1. Does the implementer document all assumptions made to estimate energy and demand savings? Answer: Pentair submitted a proposal before the project got started. They used the E3 calculator and estimated 1950 kWh savings; however, field studies have found greater energy savings than claimed with the E3 calculator method. We recommend the savings be updated through a metering study for the E3 calculator.

2. Does Pentair specify pre and post installation data to be maintained? Answer: Yes.

3. Clarify measurement activities they propose to perform. Answer: Pentair is not required to do measurements after the pool pump is installed. They were not tasked with instrumenting each pump installed. However, the pool pump has its own watt meter making post installation data easy to obtain.

4. Have they assessed swimming pool motor installation practices to establish a baseline for the new construction market? Answer: Pentair is close to the new construction market with this product.

Pentair has promoted the installation of their product to big names in pool construction in CA. Pentair has not established a baseline, although PG&E has. Other references include Title 20 and DEER. Unfortunately, DEER does not have the savings for variable speed pool pumps.

5. Have they specified database fields? Answer: Pentair built a database and thus has specified database fields.

6. Have they provided a list of key contacts with contact information for program implementation, training, and inspection staff? Answer: Yes, the SCE program manager has a list of all trained installers.

7. Has Pentair provided a list of all contacted vendors and installers, including contact information? Answer: Yes. Pentair has a list of people who installed pumps under the program and who have been trained.

8. Do the vendors and installers have a database of customer contacts indicating those who refused? Answer: Neither SCE nor Pentair has a list of non-participant pool owners. To find non-participant pool owners, they recommend contacting installers who tried, but failed to sell the variable speed drive pool pump to a pool owner.

Non Energy Benefits

The variable speed pump does have some non energy benefits. It is quieter, programmable, and other pool features can be added without adding an additional pump.

3.3.2.2 Market Conditions

The market conditions section addresses general awareness of the technology, barriers to widespread adoption, and future marketing ideas.

Awareness of technology

Vendor non-participants had all heard about the variable speed pool pump program, because they had participated in the Pentair training, however, they have not submitted rebate applications. Most of the non-participant installers found out about the program in different ways. Half heard about it from their supplier. The other three learned of it either at a pool convention, a Pentair class, or from IPSA (Independent Pool Spa Service Association). All felt that the source was reliable and several commented that Pentair is a reputable company and one they trust.

Barriers to Widespread adoption

Increasing code standards represents one barrier to widespread adoption. The new code requires two speed pumps to be installed. However, most installers do not know of the requirement and if they do, they ignore it. If the market becomes code compliant, it may be less likely that pool owners will install variable speed pool pumps because the incremental cost still exists but the incremental savings are not as great between two speed and variable speed pumps. They may opt to install the base code requirements a two-speed pump rather than a variable speed pump.

Future program ideas

The SCE program manager suggested a possible program alternative for variable speed pool pumps. He suggested the idea of forming a pool of contractors who agree to a discounted installation price in return for a guaranteed number of installs. In this scenario, Pentair would agree to a discounted price and in return be assured a greater sales volume. The customer would receive a variable speed pump for the same

cost as a single speed pump, the energy savings would accrue, and volume would drive the price of variable speed pool pumps down.

3.3.2.3 Marketing and Outreach

This section contains findings on general awareness of the technology, remembered program benefits, participation reasons, program concerns, technology concerns, marketing activities of the third party implementer, opinions on the third party marketing materials, market barriers, barriers to participation, energy usage, and reasons for non-participation.

General awareness of the technology

Only one installer had put in a variable speed pool pump before the program, and that was in his own pool. The other five said that before the program they were not aware of the variable speed pool pump technology. Participants depended on Pentair to learn about the program. Most respondents (four of six) said that they learned of the program when Pentair contacted them. Other respondents learned of the program from a trade show or pool show, an insurance company (IPSA - Independent Pool Spa Service Association), or from the SDG&E program, each respondent could list multiple responses.

While no one avenue is best, pool suppliers are a very effective means of disseminating information about the program, because they are a trusted information source and because all the installers rely on a pool supplier. However, a multi-pronged marketing approach will yield the greatest results.

Program benefits remembered

Most non-participant vendors remembered the rebates as a program feature; note, however, that one installer specifically commented that although the rebate was nice, they never took the rebate, because of the hassle factor. Utility bill savings were also remembered as a benefit by half the participants and one-third remembered energy efficiency. Others mentioned improved pump performance and education as benefits of the program

Participant vendor respondents remembered three benefits of the program. More than half (three) mentioned the rebate, half (three) remembered that they would be able to help customers save money on their electric bill, and a third (two) mentioned energy efficiency as a benefit of the program. Respondents could list multiple benefits if they chose. Several respondents presented the energy efficiency and power bill savings possibilities as selling points when talking with customers. One installer did not give their customers any other option, another simply installed the variable speed pump and told the customer, “if you do not like it, we’ll take the pump out and replace it for you.” Both methods were effective.

SCE marketing campaigns should focus on the rebate, utility bill savings and energy efficiency, because these elements resonate with the installers. Currently the savings listed in the E3 calculator are understated; these savings should be studied and adjusted to reflect reality. These increased savings can become a larger feature in the marketing campaign. However, SCE should improve on the rebate redemption element, because this aspect of the program has been frustrating for participants.

Participation reasons

Vendor participants said the most important benefits in their decision to participate in this program included the rebate, energy efficiency, helping customers with decreasing their electric bill, company differentiation, and the pump’s quiet operation. The rebate was most important with five mentions. Energy efficiency was second most important to the group surveyed, with three citing that option.

Program concerns

When asked, installers mentioned being concerned about the high cost of the variable speed pool pump and the difficulty they would have in selling such an expensive item. They also were wary of the savings claims.

Technology concerns

The majority of the installers (four) had no concerns with the Pentair variable speed pump. The one element that did concern a few installers was the newness of the technology. However, given that Pentair was the manufacturer it was a non-issue for this program. The installers felt that Pentair was a reputable company and, because it was Pentair, they had no concerns. The other concern focused on the amount of effort required to maintain the pool due to the variable speed pump. One respondent felt that the slower pump speed would cause him more work when he cleaned the pool.

Marketing activities of 3rd party implementer

Pentair held training sessions on how to sell and install the variable speed drive pool pump. Respondents repeatedly said that they trust Pentair and would rely on information they presented. For this program, the third party implementer was an effective marketing channel. However, this success is based on the positive reputation Pentair has built for itself. Other manufacturers may not be as effective in marketing a new technology. See section 4.2.4 for more detailed information on marketing.

Opinion of third party marketing materials

Pentair is held in very high regard by all parties. Vendors who attended the Pentair training session said the information presented was good and they trusted Pentair. Respondents felt that the information provided was clear, but that it depended on the background of the recipient. Some felt that it would have gone over their heads if they did not have the background that they did. They noted that some of the questions asked at the training sessions substantiated this observation. Pentair presented the training in a training session to installers, and overall program participants were satisfied with the information and its clarity.

Market barriers

The variable speed drive pool pump is not appropriate for all pools. A small single body pool with no spa only requires a 2-3 HP pump, and while the variable speed drive would work in this situation, it is much more pump than is needed for the pool.

Barriers to participation

Non-participant vendor respondents cited a variety of factors, which influenced their decision to not install a variable speed pump as shown in the following list. These are not ordered based on response or importance.

- Lack of promised savings (two).
- High first cost and difficulty selling the product because of the high first cost. One installer went on to say that it was difficult to sell an expensive item, because he felt people would be suspicious of his motives.
- Lack of customer request for the variable speed drives. Some believe it should be customer driven and they will install what the customer wants.
- High learning curve. Some installers cited the difficulty in programming the pump systems, others who had no difficulty programming the pump suggested the difficulties were based on operator error rather than issues with the pump itself.

- Incompatibility with the pool system. One installer noted that if the pump was installed with a solar pool system, the pump would shut down and go into priming mode and, thus, was too sensitive to use with a solar system.
- Not as good an option as a standard pump. One installer felt that the variable speed drive pump was not as good an option as the standard pump.
- Maintenance concerns. Some felt that the maintenance effort and or cost would increase with the variable speed pump. Another installer thought that the technology would affect the cleanliness of the pools he maintained.
- Issues with SCE. One individual wanted to participate, but could not, because SCE lost his paperwork, although he submitted it multiple times. This installer also noted that the pool owner would not save much money with this pump and he thought the pump would break down more often, which would necessitate an expensive repair. Yet, he still wanted to participate.
- Hassle factor. The hassle factor of the rebate process was also cited as a reason for non-participation. One installer did install the variable speed drive pumps, but did not submit the rebate information to SCE, because of the hassle factor.

Future training should focus on more clearly describing the pump technology. There is a misconception about how this pump works and concerns about how it will work with other pool equipment. Education about the technology will address this concern. Introducing region specific data about the energy savings in comparison to the other pump may address the effectiveness and cost issues. The programming issue has arisen multiple times, not only in this survey, but also in the pool owner and participant vendor surveys. This programming issue needs to be addressed. Other installers mentioned that programming the first time was rather difficult, but that it became easier on subsequent efforts. Increased training on programming for the installers combined with simplified instructions for the pool owner would address this concern.

Energy Usage a factor?

Almost all participant vendor respondents (five of six) said that energy usage did factor into their decision about what kind of pump to recommend. For these respondents, there was no question that it was important. The one respondent, who did not factor it in, felt that it was the client's decision, not his. He would install the pump requested by the client. However, if the client requested the variable speed pump, he would recommend it. He was primarily concerned with first cost and believed that his clients did not have the money to invest in an expensive pool pump.

When non-participant vendors were asked if energy usage factored into their decision making about which pool pump to install, the results were mixed. Half the respondents do factor energy usage into the decision, two do not, and one said "maybe." This individual also included the cost to install the system in his decisions.

3.3.2.4 Implementation and Operations

This section will address the implementation and operation of the variable speed pool pump program. Topics addressed include: operation, program process from the program managers perspective, program marketing, program administration, program effectiveness and efficiency, participant satisfaction, product availability, installation issues, quality control, scalability, program improvement, design improvement, and operations improvement.

Operation

SCE felt that Pentair devoted sufficient resources to operate the program and that they were motivated and had the infrastructure to run a good program. As a company, Pentair did not try to recoup all of their costs and provided in-kind funding, they felt SCE paid them a fair amount and their greatest benefit was in selling the product.

Program process (PM perspective)

Program process was defined as the big picture and overview of the program. It included sales and high level marketing, sign up, installation, delivery, and incentive payments.

Program marketing

This program targeted pool owners and pool professionals and was successful in reaching both. Pentair provided the technology, the training, and the marketing; the pool professionals received the training in both selling and installing the pumps and the pool owners absorbed the information and chose to pay the higher cost of the variable speed drive pool pumps.

This program targets the residential pool market in SCE territory of approximately 600,000 – 800,000 pools. However, the variable speed drive pool pump is not appropriate for all pools. This reduces the potential market to about 400,000 pools in the SCE service territory. The current program delivered 800 variable speed drive pumps and could do many more. Pentair trained almost 600 companies, but 60 of those companies account for 90% of the installations. The program has promoted early retirement of pool pumps. In the past, only failed pumps were replaced, now, due to the savings (about $4.25 per day in utility bill savings), pool owners are replacing old, but working pumps with variable speed drive pump systems. This replacement is due both to high energy prices and to the program.

Pentair employed grass roots marketing using distributors and found it to be effective. The company has an extensive network of pool builders and distributors and this was an effective marketing channel, because many of the installers mentioned learning of the program from the distributors.

On marketing, the opinions diverged. While both felt Pentair did a great job, Pentair felt that SCE was not very effective at marketing on their end. Pentair felt that SCE could have done more with the SCE website and better coordinated this program with SCE's existing pool pump program. Pentair stated that this program was not promoted via SCE's website and that call center staff was not well informed about the existence of the Pentair program. For example, the call center staff could not tell customers to call on the INDEE program rather than the IDEEA program for information about this program. This lack of coordination was also mentioned by customers in the participant interviews.

Program Administration

Administrative processes were defined as the details and behind the scenes work, such as rebate processing, data transfer, and the details of how the program is implemented.

Effectiveness and efficiency

Summit Blue staff discussed the effectiveness and efficiency of the program with both SCE and Pentair. In these discussions, we addressed program process, program marketing, and administrative processes. Respondents felt that the information provided was clear, but that it depended on the background of the recipient. Some felt that the information would have gone over their heads if they did not have the background that they did. They noted that some of the questions asked at the training sessions substantiated this observation. Pentair presented the training in an installer session, and overall program participants were satisfied with the information and its clarity.

SCE felt that Pentair was both effective and efficient in all three areas. Pentair felt that the program processes were effective at a high level, but they would have liked more exposure to SCE customers. Pentair requested bill stuffers and felt they would have been a good opportunity, but SCE would not approve their implementation. Pentair felt that administratively, SCE was easier to work with than other utilities had been. SCE was fair and equitable, they did not burden Pentair with unnecessary work, and they felt that all SCE requests were reasonable.

Overall, the vendor respondents felt that the certification process was easy. They also felt that they had a good relationship with Pentair and that both the Pentair and the installers' roles were clearly defined. However, they noted that early on, the program changed often requiring monthly updates. They felt that they had limited interaction with SCE (a two on a scale of one to ten, where one was a little and ten was a lot). They had limited additional comments, but did want more information from SCE on the savings that could be attributed to the variable speed pumps.

Participant satisfaction

All six participant vendors were "Very Satisfied" with their decision to participate in the program and no one had concerns about participating in the future. The majority (four) felt that the training provided by Pentair was about right, in fact, most of those respondents said the training was perfect. Two installers felt that the training provided was inadequate. These two felt that it took some on the job training to master it. They also felt that the training should have been targeted to the audience. They thought that the existing training was fine for advanced installers, but for less advanced installers, there should have been a more in-depth training session.

Product Availability

Typically, the variable speed pumps were available when installers wanted them. However, some mentioned that they would stock pile the pumps, so that they would have them on hand when they needed them. One mentioned that, early on in the program the pumps were backordered.

Installation issues

The majority (five) of installers had no problems with the variable speed pool pump during the installation process. The installers only mentioned problems with programming the system, which was also mentioned in the pool owner survey. The installers felt that the programming process is an involved one, but that once they understood it, it was not a problem. The respondent who mentioned programming problems had only installed a few systems. Since programming is involved, this could be an area to increase training, especially for new installers entering the program

Quality Control

The quality control process for this program is excellent. They have well documented verification and inspection procedures for installations. A subcontractor personally inspects the first three installations of any new contractor, and subsequently inspects one of every seven installs. SCE confirms that a participant is eligible for a rebate, that the rebate is received, and that the equipment is functional. Pentair reviews the installation activity reports and spot-checks the database and documentation for oddities and out of range responses. However, the database has safeguards built into it that limit such oddities or out of range responses. SCE reviews the SCE inspections to ensure that the participant was an SCE customer and that they received their rebate. In an effort to verify the equipment schedule, the installers have been instructed to set the system so that it does not run from 12 pm to 6 pm. With this setting, the equipment schedule can be verified, and the end user can be contacted for verification purposes.

Scalability

Both SCE and Pentair view the program as scalable, but in different ways. Pentair believes the model will work, but that SCE needs to deal with the issue of administering two different programs: the InDEE

and the IDEEA program. Pentair already has a marketing and installation force in place that can be expanded. However, there was a difficulty in transitioning that force to the other SCE pool pump program. Pentair wanted to sign up all the qualified installers in the other program, but SCE required that each installer sign themselves up. This has been difficult for some installers. For example, in the vendor interviews, some installers mentioned that they have been unable to sign up for the program, although they have submitted the paperwork to SCE. Pentair believes that they should have been able to sign up the installers by transferring the names to the other program and that all the trained qualified installers should be signed up retroactively.

The SCE program manager provided a far different method of scaling up the program. He suggested forming a pool of contractors who agree to a discounted installation price in return for a guaranteed number of installs. Pentair would agree to a discounted price, because they would be selling in greater volume. SCE would still provide funding and the customer would receive a variable speed pump for the same cost as a single speed pump. This scenario depends on volume to drive the price down.

Program improvement

Both program managers were asked to discuss how the program could be improved. This is a well-run program, but a few suggestions were still offered. Some installers complained that they were being asked for too much information. Pentair has since simplified the information requested. There were a few barriers to customer participation. Both mentioned first cost. These systems typically cost $1,800 for a fully installed system, as compared to $450 for a single speed pump. The variable speed system is also more complex and the programming has been difficult for some owners. However, the maintenance requirements are the same. Pentair would have liked access to a list of known pool owners from SCE for marketing purposes, but that was not provided to Pentair.

Design improvement

The program managers were also asked explicitly how the program could be improved from both a design and an operations perspective. SCE suggested making the E3 calculator easier to use. Pentair mentioned bringing the distributor into the equation. If the installer were to get an instant rebate from the distributor, it would eliminate the long reimbursement time of which participants complained. This would also allow SCE to issue one check to the distributor for multiple pumps.

Operations Improvement

From an operations perspective, Pentair wants to implement a more effective method to verify double dipping between the two pool pump programs. Currently, SCE requires a week for this verification process. SCE thought the program ran well and had no suggestions.

Non-participant installers suggested the following three program changes, which would enable them to participate. The installer who wanted to sign up but could not suggested that SCE track paperwork better. Another felt that pool owners need more information about the technology especially information about speed, power, and pressure. Some installers feel that it should be a customer rather than installer driven program; thus, if pool owners had this information, they would be more likely to request the variable speed pump. One respondent suggested a larger rebate. Others felt the program was solid and had no advice to offer. SCE processes need to be improved to make participation easier for potential participants

3.3.2.5 Other Program Dimensions

Other program dimensions are discussed in this section. They include incremental cost, data collection, free ridership, and spillover.

Incremental cost issue

Those installers who had recommended a variable speed pump, but had not installed it, said it was due to the high first cost. One installer mentioned that he installs the pumps for customers and agrees to take them out if they do not like them using the "try it you'll like it method." He has not had to remove any of the pumps he installed.

The high incremental cost is an issue, but not an insurmountable one. It was the less experienced installers who mentioned the issue. More experienced installers said these systems sold themselves and did not consider the high cost to be a drawback given the benefits. Training may be one method to overcome this issue for new installers. In addition, the rebate is important given the high incremental cost

Data collection

When asked about data collection most (five) installers found it very easy or somewhat easy (one) to collect pre-installation program data such as pump serial number, capacity, and horsepower. Only one found it somewhat difficult.

Free Ridership

When participant vendors were asked if some of the pool pumps that were replaced or upgraded were going to be replaced or upgraded anyway, the responses were mixed. Half the respondents said they would not have replaced or upgraded the pump anyway. The other half said that 50-75% of the pumps they installed were going to be replaced or upgraded anyway. One installer approached home owners who were having new pools installed and persuaded them to replace the pump the pool builder had just installed with a variable speed pump.

On average, a high percentage of pool owners do replace working pool pumps. The installers in this survey said that more than half the pumps they replace are in working order, one installer said that 100% of the pumps he replaces work. Energy savings was the most common explanation for replacing a working pump. However, installers also cited better performance, higher pump quality, age, and quiet operation as additional reasons for early pump replacement.

If the Edison program did not exist or the installers were not aware of the variable speed pool pump program, it is not likely that the installers would have installed the variable speed pump. Four said it was somewhat or not at all likely that they would have installed the variable speed pump. One went on to say that "without the incentive, why would I;" however, these individuals also said that the economics of the energy savings sell the pump. Two installers said it was somewhat or very likely that they would install the variable speed pump. This program is important and, for the vast majority the rebate is a key selling point, in addition the economics are also very convincing for customers.

Spill Over

All participant installers agreed that they would recommend installing the variable speed pool pumps with incentives in the future. Half the respondents said they would make that commendation if it was at the owners' expense. Most of the installers (four) thought the program was very influential in their decision to install a variable speed pump. Two thought it was only moderately or not at all influential. One installer stated that 'the rebate is a bonus." This program has had an effect on the installation of variable speed pumps Installers have been trained in how to promote and install the more expensive variable speed pump and the goals of the program were met.

3.3.3 Pool Owner Survey

The team started with a list of 954 verified SCE participant customers and narrowed the list to the 702 with listed phone numbers. We randomly selected 125 participant pool owners, called 87, and completed 40 interviews. Each potential subject was allowed three callbacks before moving to the next randomly selected participant. The surveys were conducted by one Summit Blue Staff person. Results of these interviews are discussed below.

Pool owner survey: Background

Most respondents to the pool owner survey are established long-term pool owners. 93% have owned their pool for more than a year, while only 8% have owned it for less than one year.

Table 3-2 Number of years of Pool Ownership

How long have you owned your pool?	Percent
10 + years	40%
1 - 9 years	53%
Less than 1 year	8%

More than half (55%) of the respondents used this program to replace their pool pump and another 23% had previously replaced a pool pump in an existing pool. 20% of the participants of this survey installed the variable speed pool pump in a new pool,

Table 3-3 Pump replacement

How often have you replaced a pool pump?	Percent
Once with SCE Program	55%
One time before program, and then once with SCE rebate program	23%
EE Pool Pump installed w/ New Const of Pool	20%

The respondents to this survey use their pools regularly. About a third use it daily, another third use it several times a week. 8% have weekly or monthly uses and 30% don't know how often it is used. Most qualified the statement with summer usage.

Table 3-4. Pool Usage

How often is your pool used?	Percent
Daily	30%
Several times a week	33%
Weekly	3%
Monthly	5%
Unknown	30%

Pool owner survey: Marketing and outreach

Learning about the program

Pool owners rely on pool contractors and other pool professionals for their information about pools and pool equipment. 70% of the respondents said they learned of the program from their pool contractor, while 15% learned of the program either from a local pool supply store or a pool builder or designer. 15% saw advertisements, viewed websites, or learned of it from SCE. For this question, survey respondents could choose more than one marketing channel. Note that, because of the small sample size, 3% reflects only one survey participant. This program should focus on pool contractors, builders, and designers for marketing purposes, because advertising and reliance on the company yield limited results.

Table 3-5. Marketing impact

How did you learn about the Pool Pump program?	Percent
Pool contractor	70%
Other	15%
Other Website	5%
Friend relative or neighbor	5%
Advertisement	3%
SCE	3%

Experience with the program

When asked about their experience in this program, most respondents felt that the information was clearly communicated by the pool contractor. In a few cases, they received their information about the program from a news letter, word of mouth, the city, or from Hartford Insurance. A few thought the information was incomplete and almost a quarter (23%) could not remember how they learned of the program. Typically, the information was delivered verbally and in some cases, via literature, which people said was clear.

Memory of program benefits

Respondents were asked about their understanding of the benefits of the program. They could list multiple benefits unaided by the interviewer. Most remembered energy efficiency, the rebate, and utility bill savings. Only one person respondent mentioned the environment as a benefit of the program.

Table 3-6 Recall of program Benefits

What is your understanding of the benefits of the Program	Percent
Energy Efficiency	80%
Rebate	75%
Utility Bill Savings	70%
Help Environment	3%

Pool owner survey: Decision making

Decision making elements

Respondents typically factored multiple benefits into their decision making process. Monetary benefits were clearly an important factor for participants: 63% valued the rebate and 70% of the respondents

valued utility bill savings. The second important theme was energy savings: 58% focused on energy efficiency.

Table 3-7. Decision making factors

Which benefits were most important to you in making your decision to participate?	Percent
Energy Efficiency	75%
Utility Bill Savings	70%
Rebate	63%

The rebate is a key element in this program, as expected, given the significant cost differential between a variable speed and a single speed pump. Due to new rulings in California, pool owners in the future will only be considering the difference between two-speed and variable speed pumps as single speed pool pumps should no longer be an option. However, this ruling has limited enforcement and pool owners are still installing single speed pumps. Future marketing efforts should focus on rebates, bill savings, and energy efficiency. An approach that focuses only on the environment will have limited appeal, because only one respondent factored the environment into their decision making process.

Seeking outside information

Most people (75%) do not seek outside information before making a decision about what pool pump to install; the other 25% of respondents do seek outside information. Respondents who sought outside information relied primarily on websites (70%) which included pool manufacturer sites, online magazines, and pool equipment websites. Other sources, cited by 30% of the respondents, included city newsletters, competitors' pump information, and warranty information. Only 20% of the respondents relied on the advice from their pool maintenance person, although 70% of the survey participants said they had learned of the program from their pool maintenance person. Only 10% relied on manufacturer's literature. Interestingly, no one relied on friends, neighbors, or relatives.

People who are going to participate in a program, which involves high cost, advanced technology, do not tend to seek out confirmatory information when the program is recommended by a reliable source. If they do, the most popular resource is pool websites. The team thought they would rely more heavily on their pool contractor, but given that they typically had heard of the program from their pool contractor in the first place, other information sources were likely used to confirm the pool contractor's information.

Table 3-8 Outside Information

Do you seek outside information when making a decision of this type?	Percent
Yes	25%
No	75%

Table 3-9 Outside Information Source

For this installation; what information source did you use to help you make a decision on the equipment choices for your pool? Information Source	Of all respondents	Of respondents who sought outside information
A website	18%	70%
Other	8%	30%
Advice from a pool maintenance person	5%	20%
Manufacturer's literature	3%	10%
Friends, neighbors, relatives	0%	0%
NA	75 %	NA

Technology concerns

The vast majority of participants (73%) had no concerns about the variable speed pool pump. Of those who were concerned, 20% wondered if the extra cost would be justified, or if the pump (8%) would be compatible with their pool system. 5% did not think the energy savings would justify the higher cost, and 3% thought the variable speed pump would increase the effort required to maintain the pool. People were not concerned with effectiveness, reliability, or pump maintenance cost. Most people are happy and have no concerns. For those who have concerns, payback is the primary issue with equipment compatibility a minor concern.

Table 3-10. Concerns about the technology

Do you have any concerns about the variable speed pool pump that was installed under the SCE program?	Percentage
No concerns	73%
The extra cost may not be justified	20%
I think it will have compatibility problems with my system	8%
I don't think that I will get the energy savings to justify the higher cost of the variable speed pool pump	5%
I think that the effort required to maintain the pool will increase with the variable speed pump	3%
It was a new pool	3%
I don't think the pool pump will be as effective as my other pump	0
I don't think the reliability will be as high as my existing pump	0
I think that the maintenance cost will increase with the variable speed pump	0

Pool owner survey: Delivery and Implementation

Installation problems

For most participants, the pump installation was relatively problem free. Only 5% had problems with the installer and 18% had a problem with the pump. Typically, the problems were related to programming or system sensitivity. Multiple respondents had difficulty with programming the pump after installation. The installers also noted that programming their first system was not entirely intuitive. Some pool owners found the system to be too sensitive. They found that debris in the pool could affect the system and shut down the pump.

As a result of these findings, Pentair should address the programming issue. They can either provide better training/directions on how to program the pump or they could simplify the programming. Pentair could submit their product for usability testing which shows manufacturers how end users are confused by their product.

Table 3-11 Pump Installer Problems

Did you experience any problems with the pool pump installer or the variable speed pool pump any time during the installation process?	Installer Problems Percent	Pump Problems Percent
No	95%	83%
Yes	5%	18%

Pool owner survey: Free Ridership

Timing of program and pool pump replacement

About half (45%) had planned on replacing their pool pump before they learned of the program and 38% said they were not planning on replacing the pump before hearing about the program. For 18% of the respondents, the upgrade was for a new pool, which had already had a pump installed. Of those who were going to replace the pool pump before learning of the program, 44% were replacing a broken pump and 56% were going to replace an old but working pump.

These results show that less than half of the respondents were planning on replacing the pool pump before the program, however, this does not necessarily mean they would have installed a variable speed pump, they may have replaced their pump with technology similar to what had been in place.

Table 3-12 Replacement plans

Were you planning to replace your pool pump before you learned about the pool pump rebate?	Percent
Yes	45%
No	38%
It was a new pool	18%

Pump replacement without program

Many of the pool owners (68%) said it was somewhat or very unlikely that they would have replaced their pool pump with a variable speed pump without the program. More than a quarter (28%) said that it was somewhat or very likely that they would have done so. Only 8% said they were likely to replace the pool pump with a variable speed pump without the program, and 5 % were neither likely nor unlikely to take this action.

Table 3-13 Free Rider ship

Assuming the Edison program did not exist or you were never made aware of the program, what is the likelihood that you would have known about and considered installing a variable speed pool pump?	Percent
Very Likely	8%
Somewhat likely	20%
Neutral	5%
Somewhat unlikely	15%
Very unlikely	53%

We see free ridership as very low for this program. However, when this program started, there were no variable speed pool pumps available on the market. Since the program's inception, numerous other pool pump manufacturers now offer a variable speed pool pump. Therefore, it is more likely that free rider ship could become an issue in the future.

Pool owner survey: Market/Customer Response

Satisfaction with pump and program

Most participants are satisfied with both their pump and with the program. Participants like the pump, 90% said they were very or somewhat satisfied with the pool pump and only 10% said they were somewhat or very dissatisfied with the pool pump. Participants also liked the program. 93% said they were satisfied with the program and only 3% of those were dissatisfied with the program. As a result, we conclude that the technology has been accepted and the delivery mechanism is effective for the pool pump program.

Table 3-14 Participant Satisfaction

	Are you satisfied with your new variable speed pool pump?	Overall how satisfied are you with the program?
Very Satisfied	78%	80%
Somewhat satisfied	13%	13%
Neither satisfied nor dissatisfied	0	5%
Somewhat dissatisfied	8%	0%
Very dissatisfied	3%	3%

Decreased power bill

Less than one-third (30%) noticed that their electric bill had dropped after installing the variable speed pool pump, while 40% did not notice a decrease. Some of the respondents (15%) had no basis on which to judge, because the pool was a new pool, and one survey respondent did not know if their bill had dropped or not. We concluded that while some participants did notice the drop in their power bill, not all did. Therefore, a decrease in power bills would not be the best selling feature of the program, because the participant may not necessarily notice the drop.

Table 3-15 Effect on Power bill

Did you notice if your electric bill dropped since you had the new pool pump installed?	Percent
Yes	30%
No	40%
Unknown	3%
It was a new pool	15%

Installation of other energy efficiency equipment

The majority of people who installed a variable speed pool pump have also installed other energy saving equipment. Only 20% of the respondents had not installed other equipment. The other 80% have installed a wide variety of energy efficient equipment, which includes: compact fluorescent light bulbs, refrigerators, freezers, dishwashers, clothes washers and dryers, water heaters, windows, insulation, air conditioning, whole house fans, swamp coolers, solar panels, and solar blinds.

Table 3-16 Installation of Other Measures

Have you installed any other energy saving equipment besides the pool pump?	Percent
Yes	80%
No	20%

Participation in other programs

The majority of respondents (78%) have not participated in any other energy efficiency programs offered by SCE; 18% have participated in other programs, and the remainder do not recall if they participated in other programs. Respondents who participated in other programs mentioned the following technologies: whole house fan, Energy Star water heater, HVAC, thermostat, and wall insulation.

Table 3-17 Participation in Other Programs

Have you participated in any other energy efficiency programs offered by SCE?	Percent
Yes	18%
No	78%

Pool owner survey: Suggestions for Improvement

People liked this program and70% had nothing specific they wanted to tell SCE on how they could improve the program. Multiple respondents suggested increasing the advertising; others felt that roles and responsibilities should be more clearly defined. For instance, both the pool owners and the installers were unclear about who should apply for the rebate. Participants also complained about the length of time it took to get the rebate check. Some participants found the pump difficult to program. They mentioned having to constantly reprogram it, because it had lost the program they had set earlier. One respondent also mentioned that the pool pump was incompatible with other pool equipment.

3.3.3.1 Evaluation Issues

In the course of this effort, two evaluation issues (baseline and health code) were identified. The first concerns the baseline from which savings are measured for this program. The code requires a two-speed pool pump, but standard practice is a single speed pool pump. Installers typically do not know that code requires a two-speed pump and if they do, they routinely ignore the code and install a single speed pump. The second issue concerns public pools, which include hotel, and motel pools. Health code for public pools has requirements of water turn over every four to six hours. Health officials were not sure if the variable speed pump could meet that code. Further testing on how well a variable speed pool pump can meet health codes would be a researchable area.

3.3.4 Overall Results

This program has been very successful, it completely met its goals and an infrastructure is now in place to continue to install variable speed pool pumps. Pentair proved to be a capable, committed contractor who adjusted the program as needed to meet program goals. An additional six months were required to meet program goals, but this is due to its late start. The program missed the start of the pool season and therefore started slowly and needed to hit the next pool season to meet goals. Following are the major findings from this study.

3.3.4.1 Program Design

1. Both SCE and Pentair felt the program ran smoothly, was implemented as designed, and that there were no unjustified design assumptions.

2. All but one of the evaluability issues were addressed in this program. Neither SCE nor Pentair has a list of non-participant pool owners.

3. The variable speed pool pump has non-energy benefits; it is quieter, programmable, and additional pool functionality (spas, waterfalls, etc.) can be added without the addition of another pump.

3.3.4.2 Market Conditions

1. Vendors have typically heard of the technology through a variety of sources.

2. A barrier to wide spread adoption is a code change wherein two-speed pumps are now the minimum. This decreases the savings potential, but is not a well known change and is commonly ignored.

3.3.4.3 Marketing and Out Reach

1. Installers were concerned about the incremental cost, the accuracy of the savings claims, and the lack of pool owner demand.

2. Few installers had any concerns about the technology. However, this was primarily because of Pentair's positive reputation.

3. Pool suppliers are an effective means of disseminating program information.

4. Pentair had expected more marketing assistance from SCE.

3.3.4.4 Implementation and Operations

1. Participant installers were very satisfied with their decision to participate in the program.
2. Product availability was not an issue.
3. Most felt the training was appropriate.
4. Most installers had no problem installing the pump.
5. Pool owners like the program, but complain about the length of time to receive the rebate

3.3.4.5 Other Program Dimensions

1. Energy usage was a significant factor for the installers in deciding to recommend this pump.
2. Non-participation reasons included: lack of belief that the energy savings would justify the cost, the perceived hard sell, fear of increased maintenance effort and cost, loss of paperwork by SCE, and pump programming difficulty.
3. Free ridership may be an issue. Many working pool pumps were replaced, but installers said they were unlikely to install a variable speed pump without the program.
4. Incremental cost was an issue.

3.4 Logic Model Review

An earlier logic model was reviewed based on the information gathered in the interviews conducted. Any changes are noted here with a revised logic model included below. This revised logic model also includes a linkage table.

3.4.1 Logic Model Review Findings

The existing logic model was substantially complete and provided a nearly accurate picture of the programs' operations. The original logic model focused on offering training on the operation and sale of the Intelliflo variable speed drive pool pump to pool sales companies, pool installers, and service companies, so that they understand the energy benefits and savings potential available with the new system, the program intends to increase market acceptance and market penetration of this technology. The increased market penetration will increase sales volume and Edison's support will help address first cost issues by reducing the cost of the Intelliflo pool pump system. In addition, additional variable speed pool pump models will be introduced into the market. The program educates installers so they can educate consumers about the benefits of variable speed drive pool pump systems. Installation of this controller technology would optionally allow SCE and other utilities to control the pool pump systems during demand response period and further reduce peak demand.

3.4.2 Revised Logic Model

We propose two revisions to this logic model that include the addition of consumer education, and health inspector training for the health community. By adding a consumer education piece to the variable speed pool pump program, SCE will educate pool owners about the energy and money saving benefits of the variable speed drive pool pump. Currently, many of the non-participating installers are reluctant to mention the variable speed pool pump, because of its significantly higher first cost. However, educated consumers can request the variable speed pumps and create a market pull for them.

A second addition to the program logic model is health inspector training. Currently, this program is only offered to homeowners. However, there are many commercial applications such as hotels where a variable speed pump would be applicable, but is not allowed by health inspectors due to a perceived health risk increase for commercial settings. Health inspectors need to be educated about the effectiveness of the variable speed drive and its ability to meet the water turnover requirements for commercial pools. The revised logic model is shown below in

Figure 3-1 Pool Pump Program Logic Model

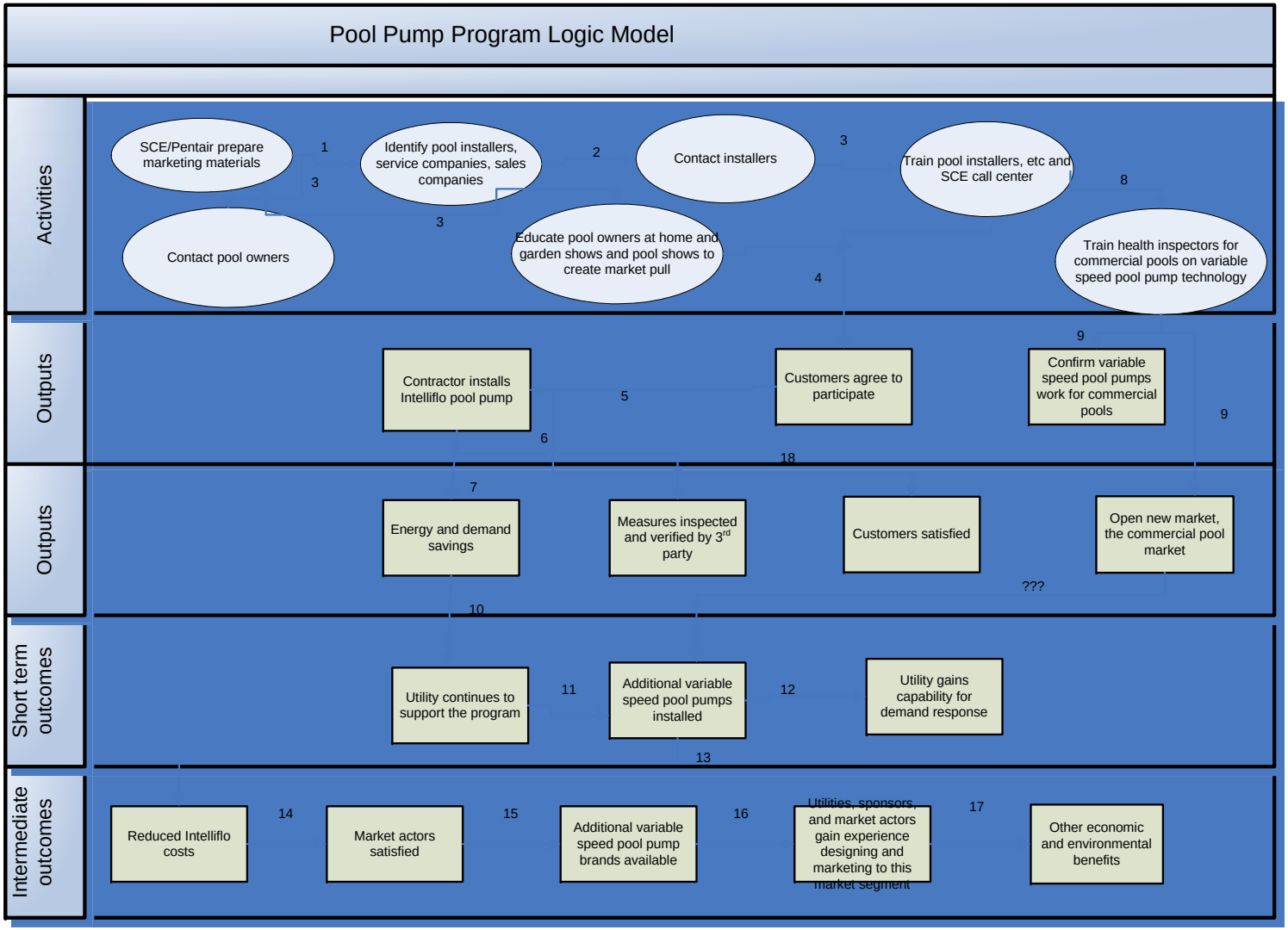


Table 3-18 Linkage table for revised pool pump logic model

Link	Segment Theory	Potential Indicators	Success Criteria
1	SCE and Pentair prepare marketing materials targeted at identified pool installers, service companies and sales companies		# of bill inserts, program announcements, and promotions # of pool shows attended
2	Identify pool installers, service companies, sales companies etc. and contact them		# of installers, and companies identified and contacted
3	Contact Installers and train them as well as the SCE call center		Trained pump installers
4	Train installers and educate pool owners	Increased awareness of variable speed pump and its benefits	# of trained installers # of educated pool owners.
5	Customers agree to participate and contractor installs pump		# of pumps installed
6	Contractor installs pump which is inspected by a 3rd party.		# of inspected pool Pumps
7	Installed pool pump leads to energy and demand savings	# of installed pool pumps	kW and kWh savings
8	Trained installers and SCE train health inspectors on variable speed applications for commercial pools	# trained installers and health inspectors	Change of commercial code to allow variable speed pumps
9	Trained health inspectors allow variable speed pumps in commercial pools which opens new market for variable speed pool pumps	# trained and health inspectors	Change of commercial code to allow variable speed pumps

10	Energy and Demand Savings leads to continued utility support of program	kW and kWh savings	Continued utility budget for program
11	Continued support increases number of installations	# of installations	# of installations # of kWh and kW savings
12	Additional installations allows utility to implement demand response on the participating pools	# of installations	Demand response program for pool pumps
13	Additional installations reduces Intelliflo costs due to volume	# of installations Market share of variable speed pumps	Decreased cost of pool pump
14	Reduced pump costs satisfies market actors		Lower pump cost
15	Satisfied market actors request more variable speed pool pumps and new brands enter market		Number of brands of variable speed pool pumps available.
16	Additional brands available leads to experience in designing and marketing to this market segment		Additional programs develop for pool owners and installers
17	Experience in the sector leads to other economic and environmental benefits		Measurable economic and environmental benefit

3.5 Lessons Learned and Recommendations

Overall, this evaluation found that this was a well run program, SCE program management staff, the third party implementer, the participating installers, and the participating pool owners are happy with the program. This program was successful because it utilized sound technology, had a committed well organized third party implementer, and was corrected mid-course when issues such as the overlong training sessions were found. Based on these findings, a number of lessons were learned and recommendations suggested. These are presented in the following discussion.

3.5.1 Lesson Learned

1. There is a difference in the knowledge base of installers. Training sessions should be targeted to specific audiences and the audiences should be grouped according to the knowledge base.

2. A well regarded company makes a difference in the outcome of the program. A well regarded top line company can deliver a successful program.

3. Be willing to change course midstream. Early in the program participation was limited to high-end pool builders only and the installation rate was low. When the program was subsequently expanded to include pool maintenance people, the installation rate increased dramatically and these individuals performed well.

4. Maintain a single program manager for the duration of the program. Partway through this program, SCE assigned a new program manager to the program, which made it difficult for Pentair. Consistent program management would have been helpful for Pentair.

5. Expecting pool contractors to devote a full day to training is too much to expect, a half day met the implementers' time limitations and provided a quality training session.

6. Hold training sessions where the installers are likely to be anyway such as at pool shows. This change increased participation dramatically.

3.5.2 Recommendations

1. Develop training for installers. Training on the energy efficiency aspects and payback of variable speed pumps could help installers support of the program. Additionally, develop training on programming. Programming VFD controllers is involved and new installers mentioned difficulties with programming.

2. Market the program to pool owners as well as installers.

3. SCE marketing campaigns should focus on the rebate, utility bill savings, and energy efficiency, because these elements resonate with the installers. SCE should also provide more information on the savings that could be attributed to the variable speed pumps.

4. A separate pool pump program was running while Pentair ran their program. This caused confusion amongst participants. If these programs remain separate, there is a need to improve Edison's call center staff training on the Variable Speed Pool Pump Program and to create a way for participants to transition between programs.

5. Gather information on existing equipment that includes operations schedule and specifications.

6. Expand the qualifying equipment list to allow new technologies hat meet the intent of the program.

7. For this and other seasonal programs, ensure the program can start on time to coincide with the appropriate season.

8. Improve the rebate redemption process. Multiple participants complained about the length of time required to receive a rebate. Limit the amount of information installers are required to provide; they found the amount of information they were required to provide to be onerous.

9. Bring distributors into the program. Many installers depend on their distributors for information.

4 NIGHTBREEZE PROGRAM

4.1 Program Summary

This section of the report provides a brief overview of the program. It describes:

- The program design, including target markets and market factors influencing the program's design, marketing strategy and implementation method,
- The technology used in the program, and
- The implementation firm and their use of resources to implement the program.

4.1.1 Implementation Firm

The program is managed by Intergy, Inc., an energy services company with offices in California. Intergy has three people staffing the program, including a program manager, Intergy's director of engineering, and a marketing support person. Intergy's staff is responsible for marketing the program to builders and HVAC contractors. Intergy manages all system installations and customer relations, including inspection of units after installation to verify their proper operation.

The NightBreeze system is manufactured by Advanced Energy Products, a spinoff of Davis Energy Group (DEG). DEG developed the system and provides technical and M&V support to the program. DEG has one person providing full-time technical field support, including M&V and one of DEG's principles acts as DEG's business liaison with Intergy.

DEG's staff provides field technical support to builders and contractors to ensure proper system installation and commissioning. DEG conducts the program M&V activities to estimate the impact of NB units. DEG also provides nominal after-market service support for NB units, working with participating HVAC contractors and builders.

4.1.2 Program Design

The NightBreeze program promotes a particular technology, the NightBreeze® system, to new construction builders and heating, ventilation, and air conditioning (HVAC) contractors. The target market for the program initially was cities and associations of governments, as a channel through which to reach production builders and new home they build in various developments in targeted geographic areas having arid climate zones.[6] Currently, the program directly targets production builders, their HVAC contractors, and now retrofit markets through HVAC contractors directly.

Market factors influencing the program design are dominated by climate zone requirements. Due to the system's current design limitations that constrain its application to arid climates, the program is geographically focused on arid climate zones. The slumping market for new homes has influenced the

[6] This strategy was based on Intergy's having been involved in various energy-related services involving city governments that could exploit Intergy's network of contacts in the government sector.

program's design in that production builders have become extremely cost-conscious, forcing the program and the technology to evolve to serve HVAC retrofit markets in arid climate zones.

The marketing strategy for the program initially was to contact local associations of governments (specifically, the Southern California Association of Governments) and various cities in target climate zones, to utilize those organizations' ties with developers and production builders. That strategy was modified soon after the program began, to directly approach builders and contractors with the program. The implementation method is straightforward: establish one-on-one relations with prospective builders and contractors, promote the features and benefits of the NB system, provide a significant incentive to offset the system's direct hardware costs, obtain builder commitments to incorporate the NB system in selected new homes being built (essentially a series of trial installations that, if successful, builders would then offer as a feature in homes they build), verify installations as working, and disburse the program incentive.

The program has a goal of installing 150 units, with the current target date for meeting them being September 2008.

4.1.3 Technology Description[7]

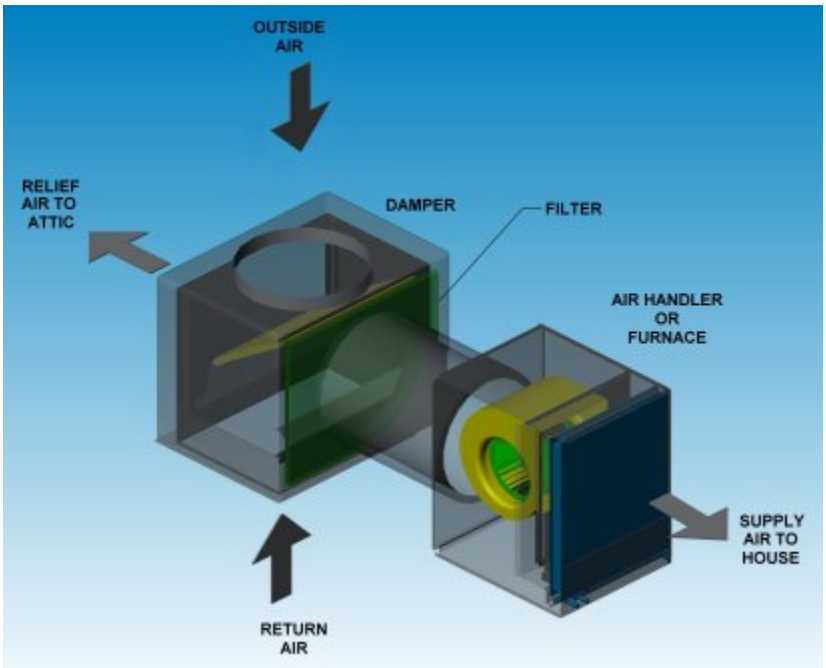
For centuries, people have cooled their home by opening windows at night to let in the cool nighttime air and closing them in the morning to trap the cool air inside.

The principal of ventilation cooling is to circulate cool night air through buildings, thereby cooling (removing heat from) interior mass surfaces such as walls, concrete floors, and furnishings. During the day, this cool mass absorbs heat from the air, keeping indoor temperatures more comfortable. Studies have shown that ventilation cooling can eliminate the need for air conditioning in coastal-influenced California climate zones and can substantially reduce both total and peak demand air conditioning energy use in the inland valleys.

However, opening windows may be objectionable from a security standpoint, is not effective on very still nights, and may introduce dust and pollen to the house. Sound may also be an issue in neighborhoods with excessive traffic noise. Window fans and whole house fans provide increased airflow and improve cooling, but also require windows to be opened.

[7] This description and accompanying illustrations are excerpted from Davis Energy Group's NightBreeze web site: http://www.davisenergy.com/technologies/nightbreeze.php.

Figure 4-1 NightBreeze functional diagram



NightBreeze®, developed by Davis Energy Group and manufactured by Advanced Energy Products, is a unique integrated night ventilation cooling system with intelligent adaptive controls that optimize security, cooling comfort, and energy and demand savings. It also filters the outside air to create a healthier, more comfortable environment. The system is designed to operate in low humidity climates.

Figure 4-2 NightBreeze Thermostat

The NightBreeze system integrates heating, ventilation cooling, and air conditioning. It provides fresh-air ventilation for maintaining indoor air quality. During the summer, if the house is warm and the outside temperature is cool, the NightBreeze system automatically brings outside air into the house through a special damper and ventilation duct. In the winter, NightBreeze heats the house using heat from the water heater or from a conventional gas furnace and periodically introduces outside air into the system air

stream to provide adequate ventilation. The NightBreeze thermostat maintains the homeowner's comfort level by setting minimum and maximum temperatures for the home, maximizing comfort and the use of natural ventilation.

Figure 4-3 NightBreeze air handler

NightBreeze can be used in:

- New construction of single family homes.
- New construction of multi-family homes.
- Retrofit of select single family houses with a large attic and attic-mounted furnace.
- Select commercial spaces.

The technology as an intelligent ventilation system is akin to larger commercial economizer systems and, as such, does not replace current technology; there previously being no such systems available for the residential market. Functionally, however, it replaces manually controlled whole-house attic fans that have been used in a small percentage of residential homes since the 1950s. The patented system is fully described at the Davis Energy Group's NightBreeze web site, which includes links to full system specifications and links to installation and owner's manuals. See: **http://www.davisenergy.com/technologies/nightbreeze.php.** A model for more humid climate zones that would include a dehumidification component is also being considered.

The system's kW, kWh, and heating fuel impacts are being determined as part of the program by in-field measurement and verification testing, using alternate-week on/off usage settings to provide user-normalized baseline off and operational on impact data.

4.2 Process Evaluation Methodology and Sample Design

A variety of market and utility actors were interviewed by telephone or in-person during the evaluation of the NB Program. The interview guides used in this effort are generally similar to those of the other five

programs in this study,[8] though modified to meet the requirements of this program. The sample design was developed specifically for this program, but has similarities to the other programs in the study, targeting key upstream market actors using in-depth telephone interviews. Both the evaluation methodology and the sample design are discussed in greater detail below.

4.2.1 Process Evaluation Methodology

The method used for this evaluation was to obtain qualitative information from interviews with key market actors regarding the program's various processes and outcomes, combined with a review and update of the program's logic model given the results of the market actor interviews.

The primary effort focused on the in-depth interviews with key market actors involved with the program. These included program staff of SCE, the staff of the program implementation firm, Intergy, staff from the technology developer and technical support provider, Davis Energy Group, and selected builders and HVAC contractors. Interview guides were developed to address the perspective of each type of market actor and the interviews were conducted via telephone.

The in-depth discussion guides are shown in Appendix A. On average, program manager interviews lasted from one to two hours, participant interviews lasted 15-30 minutes, and nonparticipant interviews lasted about 15 minutes. The interviews were conducted by senior Summit Blue staff in early to mid-2008.

The SCE and Intergy program managers and the Davis Energy Group staff were asked to discuss, in relation to their program role:

- Program goals, design and operations,
- Concerns about participating (and for nonparticipants, reasons for not participating), and
- Program improvements and lessons learned.

The participating builders and HVAC contractors were asked to discuss – again, in relation to their role – the program's marketing to them, their participation decision, the end-customer marketing and administrative/technical support provided by the program implementer, their operational experience, market and customer response, and free ridership/spillover.

Nonparticipants were asked about the program's marketing to them, what concerns they had that led them to not participate and what might make the program more attractive to them.

The interview findings were utilized to guide the subsequent review and revision of the program logic model. The logic model initially had been developed during an early measurement and verification review conducted in 2006-2007.[9]

[8] 80 Plus, Escalator Power Genius, Innovative Pool Pumps, Grocery Area Network, and Plugging the Consumer Power Gap.

[9] Quantec, LLC for Southern California Edison. "Early M&V Review Final Report," Portland, OR, November 2007.

4.2.2 Sample Design

The evaluation of the NB program included phone interviews from a sample of the organizations involved in the program to represent views from multiple perspectives. The final sample frame included the following:

- SCE's program manager,
- The program manager and director of engineering for the implementation firm, Intergy,
- Two representatives of Davis Energy Group, the technology developer who also provides technical support and M&V services,
- Two participating builders and one HVAC contractor,
- Three non-participant builders, including one who initially committed to the program but subsequently dropped out, and
- One end customer who had a NB system retrofitted to his existing home.

See Table 4-1.

Table 4-1. Sample Design for the NightBreeze Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Sponsor (SCE) and Implementer (Intergy) Staff	2	3
Technology Developer/technical support provider (Davis Energy)	1	2
Participating Builders	2	2
Builders who never participated	2	2
Dropout builders	2	1[10]
HVAC contractors	2	1
Early retrofit customer	0	1
Total Respondents	11	12

[10] A second dropout builder was to be interviewed but they had gone out of business – the primary reason they dropped out of the program.

4.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the program from a process perspective. High-level results are summarized first, followed by a more detailed discussion of the various findings.

4.3.1 Overview

The program well fits the intent of the INDEE program, which has provided a platform for testing new technologies such as NightBreeze. As such, the program was implemented as designed, though its initial marketing strategy, to use government channels[11] to recruit builders, was not productive and so marketing was re-focused to directly recruit new-home builders and HVAC contractors.

The technology appears to have good potential for improving the efficiency of residential space conditioning. The technology is robust and the units installed so far are working as designed. In addition to the technology's direct energy benefits, it offers non-energy, security, and health benefits to residential customers using the system. From a process evaluation perspective, the energy and non-energy benefits are attractive to builders and home buyers.

Installations have gone smoothly so far. The lone reported problem was an easily corrected wiring error. HVAC contractors who have installed units indicate the system is relatively straightforward to install.

The technology is costly, however, even though a substantial incentive of $1,500 per unit is offered. DEG is unsure whether the system's cost could be reduced significantly. However, citing the experience of other similar technologies that have seen scale production economies result in up to a 30% lower cost in mass production; there may be some potential for reducing the unit cost. Such a reduction would largely offset costs not covered by the program incentive (primarily ancillary construction costs and the incremental cost of an ECM furnace fan motor). The current cost of the system raises concerns among builders and HVAC contractors who have been forced by the slowing economy and associated new-home construction downturn to cut costs despite known benefits of the NB system. The primary consequences of the downturn have been 1) that all the initial builders recruited to the program opted out of their commitments, forcing a renewed marketing effort to builders, 2) renewed marketing efforts to builders and HVAC contractors have been required, without additional funds to cover the cost of this effort, and 3) the program scope has been expanded to include retrofit applications.

The expanded scope of the program to tap the retrofit market is hampered by the system's size dimensions. The unit as originally designed often requires substantial drywall and framing modifications to build it into the home's attic, and attic dimensions can be problematic. A retrofit version of the unit, with a smaller damper box, is being designed to address this problem.

There have been furnace fan motor compatibility and associated warranty concerns related to the need to reprogram motors and adapt to serial communications required by the motors of a number of furnace brands and models so that the NB system can properly communicate with and control the furnace fan when the system is operating. The cost to address fan motor compatibility was unanticipated and contributes to the general concern over the technology's economics.

[11] Cities and government associations; particularly the Southern California Association of Governments

With renewed marketing efforts to builders and expanding to include retrofit applications, the program has begun to regain traction, with over 230 NB units committed by builders and HVAC contractors through early spring of 2008. As of June 2008, six units had been installed compared to a goal of ten units installed by the end of June; one unit has been submitted for rebates to date, with the remainder undergoing installation verification. Thus, while the program has much promise technologically, it continues to struggle with the overarching challenges of the housing market in trying to meet its goal of 150 units by the end of September 2008.

4.3.2 Detailed Results

The following sections discuss the overall results in further detail.

4.3.2.1 Program Design

The basic program design, to offer an incentive to builders to install the NB system in new homes in arid climate zones of SCE's territory, was initially well-received by a small initially recruited group of builders. The program is able to exploit the NB technology's ability to provide non-energy as well as direct energy benefits, including both security and health benefits. In addition, the program has a respected technical support agent, Davis Energy Group, who not only developed the NB technology, but also provides expert technical advice to the program, including measurement and verification services. Thus, the design, in theory, is very robust.

The program design targeted production builders, assuming that production builders could more readily replicate installations across their standardized home designs than it would be for custom-home builders. Furthermore, production builders and their standardized home designs would more readily support measuring the impact of NB systems using the builder's non-NB homes as a baseline to compare with the same home design where NB systems would be installed. In retrospect, targeting custom builders as well as production builders may have helped the program weather the market downturn, as custom builders work with generally more well-off home buyers who, perhaps, could have better afforded the NB system. Custom builders also are more used to undertaking the design and engineering tasks needed to fit NB into a home design.

The design per se has not been a critical issue with any builders or, for retrofits, HVAC contractors. Builders who did participate, including those who dropped out when the market turned down, feel the technology has something to offer their prospective clientele. A typical commitment was to install at least one unit as a test in selected housing developments in which they were building.

One issue that Intergy discovered, however, was that the program is isolated from a broad, menu-driven new-home energy efficiency program. Builders do not see how NB helps them fulfill Title 24 energy efficiency requirements, and they are looking for more options that a menu-driven program would provide. In this sense, NB suffers from being isolated from other home-efficiency programs.

Far more problematic, was that the program design proved no match for the sudden and precipitous downturn in the new-home construction market. Being a new technology and having limited funds to overcome all the costs involved with the NB system's installation, the participating builders, traditionally risk-averse as they are, felt their business survival required them to avoid as many costly add-ons in homes they build, in particular, the NightBreeze system.

The program's incentive design covered the cost of the NB unit itself. While the $1,500 per unit incentive amount is substantial, in practice, this amount was not sufficient to cover additional costs

builders and contractors incur. Two additional cost components, the typically $500 incremental cost of a variable-speed fan motor plus an estimated $700 in ancillary construction costs, present a significant barrier even in a robust housing market. Indeed, the added costs became a fatal barrier once the housing market collapsed. From SCE's longer-term perspective, for the program to ultimately be folded into SCE's mainstream new homes program, the incentive needs to be reduced to improve cost-effectiveness. For additional program funding to be considered, the impacts of NB need to be empirically demonstrated. If the units perform as predicted, they should be able to stand more on their own economics rather than the large incentive currently offered. A side effect of this incentive/cost-effectiveness dilemma is that larger incentives mean less money is likely to be available for other program needs, particularly marketing.

The funding structure for the program's marketing requirements presented problems for the program implementer. It front-loaded the marketing budget based on NB unit commitments by builders. The effect was that these funds were spent before any NB units were actually installed. As a result, there were no contingency funds for further marketing of the program should the unit commitments not materialize.[12] When the new-housing market collapsed in 2007, all the builders participating at the time opted out of the program, leaving the program with no installed units and yet no further funds to recruit replacement builders and HVAC contractors. At the same time, incentive funds, being back-loaded and reserved for payment upon actual installation, were not available, either. This put Intergy in the position of having to tap its internal resources and re-market the program to additional builders and HVAC contractors without further promotional funding from SCE. Nevertheless, Intergy proceeded with another marketing campaign, which is described further in section 4.2.3 below. SCE staff felt that, if they could obtain more details on labor and other costs Intergy was incurring, perhaps the program could have been managed better from this perspective, thus overcoming some of the problems caused by how the program's funding was designed. SCE staff felt that there needs to be greater flexibility in how the purchase order is designed for programs like this, to address the unique dynamics associated with home construction and the housing market generally.

One other concern about the program's design was the timeline assumed by which NB units would be installed. The program expected a much faster turnaround from when a builder commits to the program to when NB-equipped homes would be built. The program needed an extension of time. In the future, such programs need to more closely match up with the construction cycle time builders actually experience. This is especially the case as was shown when the new-home construction market collapsed.

4.3.2.2 Market Conditions

As noted in section 4.2.1 above, the severe downturn in the new-housing market proved to be the most critical factor in the program's initial offering. Every initial builder who had committed to participating in the program opted out and Intergy had to undertake a new campaign to recruit replacement builders and in expanding the scope to include retrofit applications, HVAC contractors. Despite the continuing downturn in the housing market, both new construction and for heating system retrofits, Intergy was successful in recruiting additional builders and increased awareness of the technology with a large number of builders and HVAC contractors. In the process, Intergy believes that, when the housing market rebounds from its current recession, the company's extensive marketing efforts will have broadly increased builders and contractors' awareness of the NB system. The hoped-for effect is that the technology will be poised to make significant inroads in both new and retrofit situations.

[12] Incentive funds are reserved for payout upon verified installation.

Market conditions also affect the length of time production builders experience in homes they build. It takes much longer to sell production-built homes, which are built on a more speculative basis than the custom-home market that was not the target market for this program.

4.3.2.3 Marketing and Outreach

As already discussed, the program was successfully marketed to an initial set of new-home production builders, though only after an unsuccessful attempt to use city government and association of governments channels to help recruit builders. A direct-to-builder marketing strategy proved more efficient. Marketing was done primarily by telephone and personal contacts. Builders understood the program concept and the technology as described to them through the one-to-one outreach efforts made by Intergy.

The initial marketing of the program was hampered, however, by the need for additional marketing staff. Intergy addressed this directly by hiring additional staff dedicated to marketing, with good results in that the initial goal of 150 units was fully subscribed to by several builders' commitments.

Builders understood the program's marketing thrust and NB's main benefits. Those who chose not to participate initially and those who dropped out of the program after initially participating felt that those benefits were outweighed by the cost of the system and, to a lesser extent, because it is a new technology that carried perceived risks. One non-participant decided for internal reasons not to participate – though not because of market conditions, but because they commissioned a design project with a local engineering university that produced a similarly functioning system, to provide design experience to the school's students.

SCE staff feel that the program's initial marketing materials could have been more helpful in describing the program concept and NB features/benefits, but once those had been developed it then became too late to change them given the program's limited scope and timeframe. Between this concern and the initial marketing efforts not being seen as sufficient, SCE staff did not feel the program's marketing was either as effective or efficient as it might have been, at least initially, citing the need for more personalized marketing. Given the overarching market situation, however, it is highly uncertain whether the program's marketing effort could have been effective, while the efficiency of the marketing effort was critically undermined by the collapse of the housing market. Intergy and Davis Energy Group have responded by adding marketing staff to conduct more individualized marketing, and have developed more information (for example, DEG's web site has fairly extensive background information as well as technical information). SCE staff felt they could more closely supervise the implementation firm's efforts and perhaps a more innovative approach to marketing the program might come from greater collaboration between SCE and Intergy.

The bottom line for the program's marketing effort is that about 60 builders have been contacted and familiarized with the NB system and program. Some 234 units were committed to by early spring of 2008, well above the 150 unit goal. Getting all those units installed by September 2008, however, remains uncertain, as only six units were installed by the end of June.

4.3.2.4 Implementation and Operations

Implementation from a program logistics perspective (versus a marketing perspective) has been largely free of difficulties, though the embryonic, low-volume nature of the program precludes knowing how effectively and efficiently the program would work on a larger scale. Some difficulties – now resolved – were encountered coordinating program tracking with SCE's SMART tracking system.

Builders and HVAC contractors have been provided very good technical support by both Intergy and Davis Energy Group. The most frustrating technical difficulty relates to furnace fan motor compatibility with the NB thermostatic control. Initially, only Lennox and Amana furnaces were compatible in that their variable-speed motors come preprogrammed to settings that enable the NB system to communicate with and properly control the fan motor. For other brands, DEG has begun a test program whereby they will test and re-program the motor to make it compatible; only one brand so far has not proved adaptable. DEG has begun approaching manufacturers to persuade them to preset their variable-speed motors so as to be compatible with the NB controls.

The compatibility concern has become more complicated as other variable-speed motors come on the market, including the introduction of General Electric motors requiring serial communications. The NB system uses pulse-width modulation based communications porting and protocols, and so to communicate with the different communications specification, the NB communications design needs to be changed for the system to be compatible with serial-communication motors.

One contractor interviewed said it would be helpful to have a better stock of parts in order to more quickly fix problems with system components. He also indicated that, while DEG was able to provide him the information he needed to properly complete installations, additional, non-technical customer service and associated end user information would be operationally helpful to the homeowner and demystify the technology. This view was countered to some extent by the first customer to have a NB system retrofitted to his home, who said he was satisfied with the system and its automated operation. Intergy has been working to develop additional information to rectify such concerns, particularly to promote NB to the retrofit market where mass-market approaches to disseminating NB information are needed because it is the homeowner and not a more centralized builder making the decision to install the system.

HVAC contractor training would be a very helpful program component to develop further, though such enhancements are more typical of programs that have been mainstreamed.

All homes having the NB system installed are verified on-site by Intergy. DEG provides measurement and verification services to determine the system's impact; thus far, two homes have been instrumented to provide various data for this determination. No pre-installation inspections are done as this is a new technology and the primary target market has been new homes.

4.3.2.5 Other Program Dimensions

One of the evaluability issues raised in the Early M&V study done for this program was whether Intergy has maintained data on participants' buildings and equipment. Participating builders are indeed required by Intergy to track a variety of relevant data including furnace manufacturer, model, heating zones, thermostats, furnace efficiency rating and fan motor type.

Another of the evaluability issues raised in the Early M&V study done for this program was whether the base case home assumed for the program complies with current Title 24 and air conditioner efficiency standards. Since the program was, by definition, designed for the new-home market, any new home in which an NB system is installed is *de facto* already compliant. For retrofit situations, only air conditioner efficiency standards compliance is a consideration, and that is secondary as the NB system is designed to reduce the utilization of any air conditioner being installed – and new air conditioners sold are required to meet minimum standards.

It is clear that the program is the sole influence on builders deciding to install NB systems, as no directly comparable system is available on the market and because the NB system has just been put into play

through this INDEE program. Thus, free ridership is nonexistent. Whether any spillover will occur is yet to be seen.

4.4 Logic Model Review

This section presents the findings and conclusions of the NightBreeze program logic model review.

4.4.1 Logic Model Review Findings

The initial logic model developed for the program is shown in Figure 4-4. That model reflects the initial program design to work through cities and government councils to develop leads with new-construction developers and builders, to whom NightBreeze systems would be marketed for installation in new homes being built in target climate zone areas. General outputs were identified to reflect the outreach and education process with builders and developers, and recruit builders to participate.

Initial, short-term outcomes were to be initial installations in new homes, with measurement and verification undertaken on the first two installations to document energy and demand savings, and 10% of units thereafter. Intermediate outcomes identified were to expand the number of installations and incorporate the technology, as part of SCE's 2009-2011 California New Homes Program. Further outcomes identified included growing utility, builder and other market actor program experience with the new-home market segment, achieving other economic and environmental benefits, and having builders more widely incorporate NightBreeze systems in new construction. Ultimately, new-home buyers would be satisfied with their NightBreeze systems and come to ask for such systems when purchasing homes in the target climate zones optimal for the NightBreeze technology.

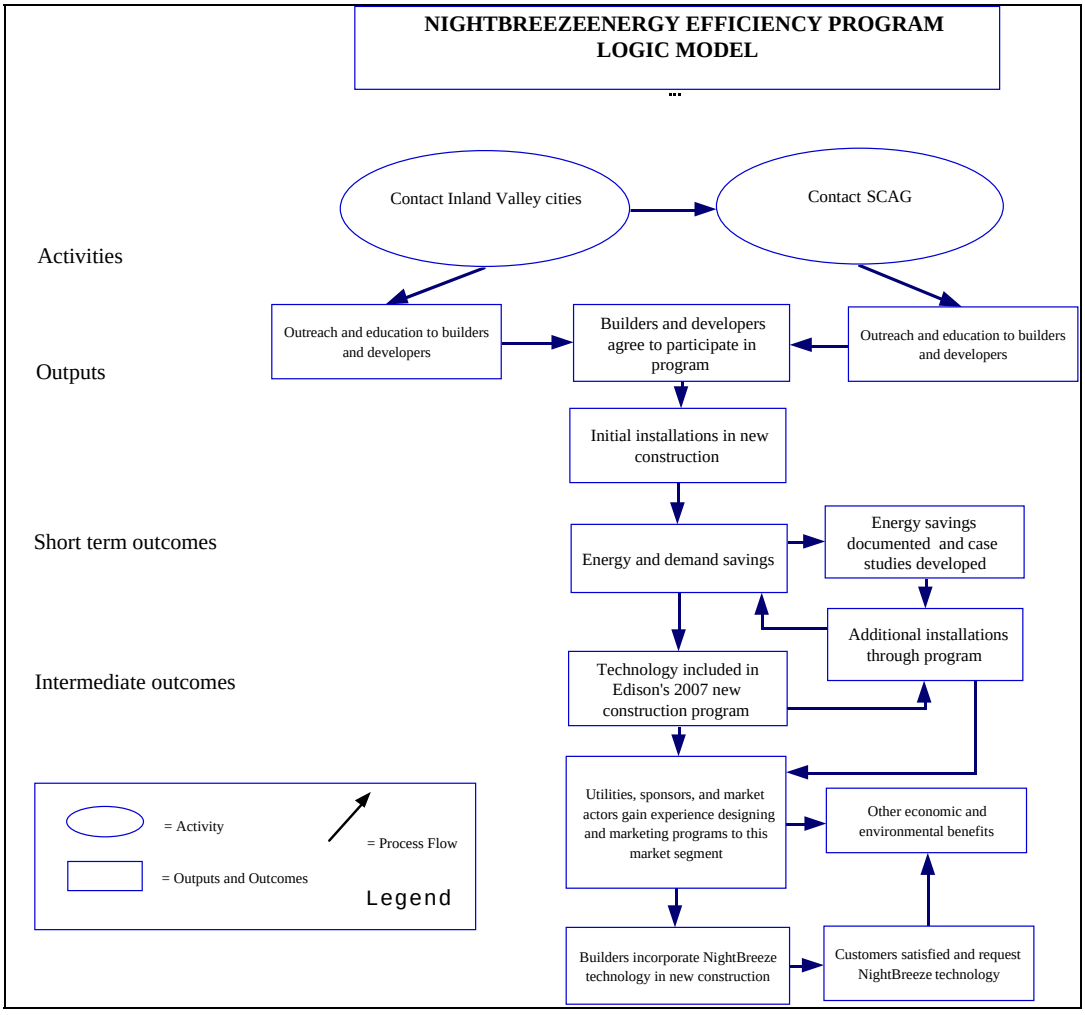
This model was reviewed in light of the current evaluation's findings and the requirement to add appropriate detail to the model to guide future evaluation efforts and measure program success. Several issues were identified that influence modifications to the logic model:

- Working through cities and government councils was not as productive as marketing the program directly to new-construction builders and their HVAC contractors, so that activity has evolved to work directly with builders and HVAC contractors.
- The new-housing market collapsed and the initial participating builders opted out of the program. This delayed the program's initial outputs and subsequent short-term and intermediate outcomes noted in the logic model, and required a substantial continuation of the program's activities to recruit a new set of builders.
- The NightBreeze system's cost and design requirements are significant barriers that have required substantial additional efforts to educate, recruit and train builders and HVAC contractors; this confirms the activities and outputs of the initial logic model, and subsequent outcomes.
- With the collapse of the new-construction market, the program has expanded its scope to pursue retrofit applications. That market presents its own set of challenges to the program in terms of finding prospective homeowners and HVAC contractors interested in the system and also homes that can be properly retrofitted, suggesting an expanded scope in the logic model of outreach activity to the retrofit market.
- In addition, the intermediate outcome to mainstream NightBreeze into SCE's new-home construction program, there is a need to also qualify NightBreeze as a technology eligible for Title 24.

Furthermore, the initial logic model was constructed at a high level and, as such, did not identify outputs and outcomes to the level of detail now desired by SCE.

The initial program logic model is substantially complete and accurate, even with the collapse of the new-home construction market that has dampened builder interest in the NightBreeze system. Additional detail in the various parts of the logic model would make it more robust for evaluation and performance measurement, however, and additional program scope (the retrofit market) needs to be incorporated in the model.

Figure 4-4 NightBreeze Program – Initial Logic Model[13]



4.4.2 Revised Logic Model

A revised logic model was developed based on the review summarized above. Both a diagram and a segment theory table were constructed to describe in greater depth the various process dimensions of the program. These are presented in Figure 4-5 and Table 4-2below.

Quantec, Inc., Early M&V Review Final Report, November 2007

Figure 4-5 NightBreeze Program – Revised Logic Model

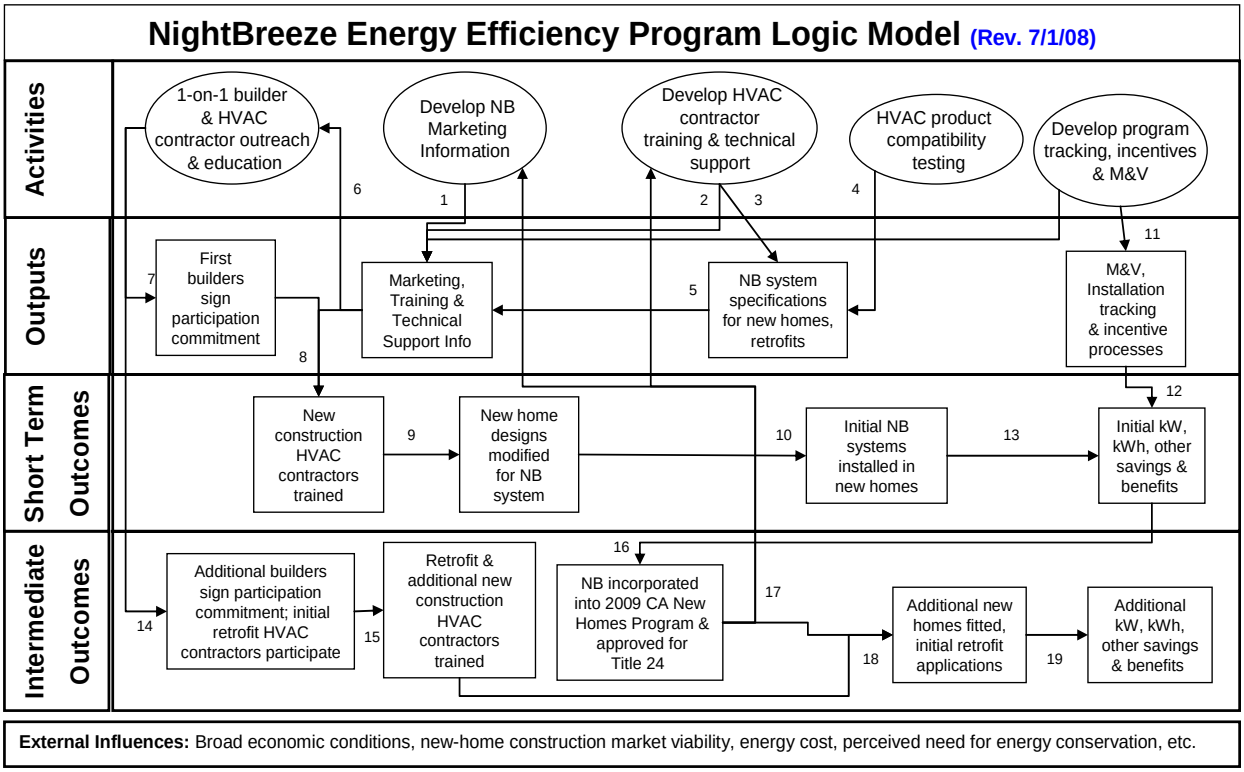


Table 4-2 NightBreeze Program – Revised Logic Model: Link, Segment Theory, Potential Indicators and Success Criteria

1	Develop NB features & benefits information for builder/HVAC contractor marketing and training	Program marketing collateral produced	Prospective builders & HVAC contractors understand program marketing materials
2	Develop builder/contractor training and technical support information for training and technical support	Training and technical support information produced	Informal survey of trainees indicates understanding of information
3	Builder/contractor technical support information includes general specifications for new homes and retrofits	New home and retrofit NB specifications produced	Builders/contractors able to apply specifications to home design/construction
4	HVAC product compatibility testing identifies and resolves compatibility problems	System compatibility testing undertaken for major brands	All major furnace/AC brands typically used in target climate zones tested and compatibility issues resolved
5	NB system specifications provided as part of marketing, training and technical support information	Specifications available to interested builders/contractors	Builders/contractors able to modify home design/construction to incorporate NB system
6	Builder/contractor marketing contacts initiated using NB marketing information	Builders receptive to NB marketing information	3-4 builders recruited
7	Initial builders sign participation agreement	Participating builders identify developments/homes where NB systems to be installed	3-4 builders commit to installing 150 units total
8	Participating builders and their HVAC contractors trained using NB training and technical information	Attendance at training sessions	3-4 Builders/contractors trained to install NB
9	Trained builders/contractors incorporate NB design into selected new homes	Home plans modified	NB system specified in home plans
10	Modified designs constructed with NB systems		150 NB systems installed by 9/08
11	Program administrative processes developed: tracking, incentives, M&V, etc.	SMART system tracking established, M&V procedures developed, incentive processes tested	Installed NB systems tracked, incentives accurately disbursed, M&V conducted on initial installations

NightBreeze Energy Efficiency Program Logic Model, continued			
Link	Segment Theory	Potential Indicators	Success Criteria
12	Tracking, M&V processes applied to estimate demand, energy and other impacts	Data from technical support, M&V and tracking system utilized to prepare impact estimates	Initial impact estimates published
13	Initial NB systems installed and their impacts estimated using technical support information and M&V process	Data from technical support, M&V and tracking system utilized to prepare impact estimates	Initial impact estimates published
14	Continued marketing efforts recruit additional builders/contractors, including retrofit applications	Additional builders/contractors responsive to marketing effort	Additional builders/contractors sign participation agreement (# not established at present)
15	Additional new participating builders and their HVAC contractors trained using NB training and technical information	Attendance at training sessions	Newly participating Builders/contractors trained to install NB
16	Initial NB program experience provides evidence for including NB in CA New Homes program and to qualify as a Title 24 measure	SCE reviews NB for possible inclusion in new home program, advocates for Title 24 qualification	NB incorporated in new home program and qualified for Title 24
17	NP program revised per new home program and Title 24 incorporation	Program revisions undertaken to modify marketing and other aspects of the program	Revised program launched
18	Additional new and also selected retrofit homes have NB systems installed		150 unit goal achieved, additional goal decided
19	Expanded impacts from additional installations		150 unit goal achieved, additional goal decided, with kW, kWh and other impacts compiled

4.5 Lessons Learned and Recommendations

In this section, we review the lessons learned in the course of the program to date, and develop selected recommendations for consideration by SCE.

4.5.1 Lessons Learned by SCE Program Manager

SCE staff cited several issues that suggest lessons learned by this program. These are as follows:

1. Be very cautious regarding the projected state of the economy and housing market, as well as the influence of those factors on the ability to innovative technology programs such as NB to gain a foothold. Builders are traditionally risk-averse even in good times; in a recession environment,

they are completely reticent to undertake any risks associated with innovative technologies. The condition of the economy in general, and the new-home construction market in particular, is critical to the program's success. Without a robust economy and housing market, innovative technologies like NB are exceedingly difficult to sell to builders.

2. Become very familiar with the nuances of new technologies, as they are often incompatible in subtle, yet costly ways with typical builder/contractor practices and technologies they already install. NB's motor communications and control compatibility have been difficulties that were not fully anticipated and have added to the costs borne by the program's implementer and the technology's developer.

3. Structure the program budget more along the lines of specified deliverables from the program implementer. Avoid lumping program tasks together and paying on unit commitments and installations; other deliverables, especially those related to recruiting participants and getting to the unit commitment point, perhaps should be identified and remunerated per se. Allow the purchase order to be customized to the program. In the case of this program, the budget for NB marketing was front-loaded and many tasks were lumped together (unlike other IDEEA/INDEE programs), such that funds were spent recruiting the initial builder group with the expectation that that group would be sufficient to meet the program's goal of 150 units. Yet when the economy turned down and the initial group of builders opted out of the program, no additional funds were available to engage in another round of marketing.

4. The construction timeline of builders must be considered when planning the program, in that new homes may take longer to be built than the program's progress milestone requirements allow. The program's initial life cycle was too short to take into consideration the fact that builders are unlikely to undertake wholesale changes in their new-home designs until they have experienced the technology long enough to feel comfortable with its reliability, cost, etc. Sufficient time is needed for the program to work through builders' trial periods for the technology.

5. Anticipate problems with program tracking. Tracking NB program participation was difficult in that SCE's SMART tracking system had to be accommodated, yet the program did not readily conform to the SMART system.

6. Marketing resources need to be more robust and very personalized to the target trade-ally audience, for programs like NB. Extensive, personalized contact and education efforts with prospective participants are needed, particularly for builders and HVAC contractors who have a very high sensitivity to risk and potential liability issues. The NB program's marketing became substantially more effective when a dedicated marketing person was added by the program implementer. It would be very helpful to establish an alliance with builders associations.

7. Well-designed marketing materials that effectively address prospective participants' concerns are important to provide decision support to prospective participants, as is follow-on training to ensure high-quality follow-through on system installations and associated aftermarket service.

4.5.2 Lessons Learned by Intergy and Davis Energy Group

Intergy and DEG staff also cited several issues that suggest lessons learned by this program:

1. Incorporate NB with SCE's broader new-home energy efficiency program. Doing so enables more cross-marketing influence, improves marketing efficiency, puts the NB system in a favorable context with other energy efficiency technologies, and provides builders a one-stop convenience for working with SCE on improving the energy efficiency of new homes. This lesson pertains as well to Title 24 requirements in new homes, whereby NB needs to be included as a qualified measure in Title 24.

2. Incentives need to address ancillary costs. In the case of NB, these include the incremental cost of variable-speed motors and additional construction costs. Alternatively, find ways to substantially reduce the cost of the NB system so that the program can be made cost-effective; something it cannot achieve were the current incentives increased to cover such ancillary costs.

3. Anticipate unforeseen technical problems. Fan motor programming compatibility and associated warranty concerns is a non-trivial problem for the NB technology, as it has required additional field work by DEG to reprogram fan motors of various furnace brands/models. The situation has prompted DEG to undertake a costly campaign with manufacturers to convince them to change fan motor default settings and also to accommodate serial as well as pulse-width communications specification.

4.5.3 Other Lessons Learned

1. Builders continue to believe comfort is the top priority when designing and installing heating and cooling systems, with environmental concerns and energy efficiency being secondary. Programs such as NB need to recognize this belief, which builders see as reflecting home buyers' top priority as well and, if possible, incorporate appropriate information addressing this priority when selling the system.

2. Builders interviewed confirmed SCE staff's belief that home construction timelines often stymied participation, in that the program's sunset of September 2008, meant that NB-fitted homes had to be completed within that timeframe.

3. Expect that builders will not consider extensive installations of a system like NB until they have had experience with one or a few trial installations, and they and their HVAC contractors become familiar with the system.

4. Especially for new technologies, HVAC contractors want timely parts and service support so that they can quickly fix problems due to faulty components.

5. To the extent possible, even in a pilot-type program work to develop at least a basic set of promotional, education and training materials and processes to ensure that trade allies and end customers can be confident that the technology works, that contractors know how to properly install the equipment, and customers can properly operate the equipment features as well as understand the technology's benefits.

4.5.4 Recommendations

The foregoing discussion of results and lessons learned suggest a number of recommendations:

1. The program is technologically viable, but too costly for the current housing market. SCE has decided to discontinue the program and the evidence gathered in this evaluation to some extent supports that decision. However, given the potential of the NB technology to reduce air conditioning loads and the likely continuing upward direction in energy prices, a way should be sought to continue support to DEG and Intergy to further develop the technology. The focus should be on ways to reduce the first cost of the NB unit itself, as well as ancillary costs. DEG's efforts to design a retrofit configuration and also a variation of the system that works in climates that are more humid also should be supported in some way, given the very large potential market for such variants on the technology.

2. Consider incorporating the NB technology as part of the new-home program menu of energy efficiency measures – including making it eligible as a Title 24 measure – in order to take advantage of program scale economies and cross-marketing opportunities.

3. Consider restructuring the program budget of analogous future INDEE programs to provide contingent marketing funds so that, if unexpected factors beyond the program's control cause a loss of participants, additional marketing can be undertaken to regain momentum and recruit additional participants.

4. More broadly, work to be more flexible with the program timeline for programs having unique market circumstances that result in product installation timeframes that do not match typical calendar-year program timeframes.

5 PLUGGING THE CONSUMER ELECTRONICS GAP PROGRAM

5.1 Program Description

This section of the report provides a brief overview of the program. It describes:

- The implementation firm and their use of resources to implement the program,
- The program design, including target markets and market factors influencing the program's design, marketing strategy and implementation method, and
- The technology used in the program.

5.1.1 Implementation Firm

The program is implemented by Energy Solutions, Inc., an energy services company with offices in California. The firm operates this program in addition to other energy efficiency programs, and provides a variety of demand-side energy management services. One individual manages the program, a variant of which is also implemented in the territory of Pacific Gas & Electric (PG&E) and is managed by another individual. Energy Solutions staff are responsible for marketing the program to electronics retailers, providing promotional support to the retailers and coordinating all administrative aspects to track program activities, sales of eligible monitors and incentive payments from SCE.

5.1.2 Program Design

The program promotes the sale of ultra-high efficiency liquid crystal display (LCD) computer monitors that are at least 25% more efficient than the current Energy Star™ qualifying level for LCD monitors. The sales channel used is large electronics retailers, who are recruited by the program to act as marketing agents for the program, to display, advertise and otherwise promote eligible computer monitors they sell. The primary marketing channel objective for the program, therefore, is to influence electronics retailers' decisions on the type of monitors to promote, and increase the shelf space available for eligible monitors. Thus, there is a dual target market: electronics retailers and, through the retailers, their end customers (either individuals or businesses).

The program provides a $5 incentive per eligible monitor sold. The incentive is paid to the retailer.[14] The program's goal is to have 30,000 eligible monitors sold by November 2008, out of an estimated market of 700-800,000 monitors in SCE's territory.

Market factors that influenced the program's design included the marketing channels through which people purchase computer monitors, that there is a significant fraction LCD monitors made by a number

[14]In the PG&E program the incentive was $10 per eligible monitor, and is paid to the retailer with the initial expectation that the rebate would get passed through to the end customer. This approach is currently being modified to eliminate the requirement for the end-customer to receive a rebate.

of manufacturers and available to retailers, and the fact that eligible monitors typically do not have a price premium over less-efficient monitors.

The program's product strategy is to focus on computer monitors as a first step toward a larger base of electronics equipment. The program's marketing strategy is to contact large retailers' corporate monitor buyers, influence the buyers (and, through the buyers, others in the retailers' organization) to participate in the program, and with Energy Solutions' assistance, coordinate production and in-store placement of point-of-purchase and other advertising materials. Once the program is set up within a retailer's operations, Energy Solutions coordinates sales tracking and incentive disbursement through an online rebate system at www.caefficientelectronics.com, which was designed and maintained by Energy Solutions.

5.1.3 Technology Description

The technology promoted by the program is LCD computer monitors that are at least 25% more efficient than the current Energy Star™ standard for such monitors. Estimated unitary impacts are about 50 kWh/year and 7 watts of coincident peak demand reduced. Fifteen manufacturers currently produce nearly 800 models that are eligible for the program.

This technology replaces a variety of older technologies including cathode-ray-tube (CRT) technology as well as less-efficient LCD and other flat-screen monitor technologies. The technology's benefits are that it provides greater energy efficiency while also providing features and performance similar to non-qualifying monitors. Eligible monitors are typically no more costly than their non-qualifying counterparts.

5.2 Process Evaluation Methodology and Sample Design

A variety of market and utility actors were interviewed by telephone or in-person during the evaluation of the PCEP Program. The interview guides used in this effort are similar to those of the other five programs in this study,[15] although it has been modified to meet the requirements of this program. The sample design was developed specifically for this program but has similarities to the other programs in the study. Both the evaluation methodology and the sample design are discussed in greater detail below.

5.2.1 Process Evaluation Methodology

The method used for this evaluation was to obtain qualitative information from interviews with key market actors regarding the program's various processes and outcomes, combined with a review and update of the program's logic model given the results of the market actor interviews.

The primary effort focused on the in-depth interviews with key market actors involved with the program. These included program staff of SCE, the staff of the program implementation firm Energy Solutions, retail store directors and computer monitor buyers, and retail store sales staff. A set of interview guides was developed to address the perspective of each type of market actor, and the interviews were conducted via telephone.

[15] 80 Plus, Escalator Power Genius, Innovative Pool Pumps, Grocery Area Network, and NightBreeze

The in-depth discussion guides are attached in Appendix A. On average, program manager interviews lasted from one to two hours, participant interviews lasted about half an hour, and nonparticipant interviews lasted about fifteen minutes. The interviews were conducted by senior Summit Blue staff in February, April, July and August 2008.

The SCE and Energy Solutions program managers were asked to discuss, in relation to their program role:

- Program goals, design and operations
- Concerns about participating (and for nonparticipants, reasons for not participating)
- Program improvements and lessons learned

The participating retailers were asked to discuss the program's marketing to them, their participation decision, the end-customer marketing and administrative/technical support provided by the program implementer, their operational experience, market and customer response, and free ridership/spillover.

Nonparticipants were asked about the program's marketing to them, what concerns they had that led them to not participate and what might make the program more attractive to them.

The interview findings were utilized to guide the subsequent review and revision of the program logic model. The logic model initially had been developed during an early measurement and verification review conducted in 2006-2007.[16]

5.2.2 Sample Design

The evaluation of the PCEP program included phone interviews from a sample of the organizations involved in the program to represent views from multiple perspectives. The initial sample frame included the following:

- SCE's program manager
- Two program managers for the implementation firm, Energy Solutions
- Two participating retail store directors (Circuit City) and one corporate computer monitor buyer for those stores,
- Two store sales people working in participating stores, and
- Four non-participant retailer corporate staff

See Table 5-1.

[16] Quantec, LLC. "Early M&V Review Final Report," November, 2007.

Table 5-1. Sample Design for the PCEP Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Sponsor (SCE) and Implementer (Energy Solutions) Staff	2	3
Participating Retailer Staff : Circuit City Store Directors, Monitor Buyer	3	3
Participating Retailer: Sales Staff	2	0
Non-participating Retailer Staff – Best Buy, Fry's Electronics, Office Depot: Corporate staffs	4	4
Total Respondents	11	10

Of the initial sample frame's target interviewees, substitutions were required as there had been staff turnover with Circuit City's Buena Park store director and their corporate monitor buyer position. No store sales staff interviews were conducted because of the program situation changing, whereby neither store contacted for an interview was currently promoting the program and so their sales staff by definition had no awareness or experience selling program-eligible monitors. This is unfortunate because when the stores actively promoted the program, they were selling a higher percentage of qualifying monitors.

5.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the program from a process perspective. High-level results are summarized first, followed by a more detailed discussion of the various findings.

5.3.1 Overview

The bottom line for the program is that, while its design has a number of attractive and potentially influential aspects, it has not yet met the volume goal of 30,000 rebated monitors. This is largely due to the narrow product offering and geographic focus. The program has succeeded in two ways, however. First, the program played a role in getting Circuit City, a major monitor retailer, to roughly double their stocking of ultra-efficient monitors in 2007. Second, the program fulfilled the intent of the InDEE programs to identify and test program ideas to determine whether they have potential to fill gaps in SCE's portfolio. A direct result is that SCE is pursuing a broader electronics program to include plug loads such as ultra-efficient monitors, computers and TVs. The PCEG Program has played a key role in "priming" the market and identifying key issues to address during the next round of utility sponsored electronics programs.

Key among the program's difficulties has been that retailers are reticent to participate because the program's incentive is too small to overcome the real and perceived costs of accommodating the niche aspects of advertising and tracking eligible monitor sales for just one product type, computer monitors, in one geographic area (SCE's service area, particularly as the adjacent PG&E service area has a similar program having critically differing incentive design; further, the LADWP service area is not part of the program, exacerbating the geographic problem). Both participating and non-participating retailers believe

the program needs to encompass more product types and a broader geographic area to make the program one with which they would be willing to partner. Hopefully, a broader-based electronics program will overcome such difficulties.

5.3.2 Detailed Results

The following sections discuss the overall results in further detail.

5.3.2.1 Program Design

The program design has positive features, which suggest the basic program concept is sound, particularly its strategy of targeting of mass-market retailers as a key touch point in the value chain. Also, the program design seeks to focus on information rather than outright incentives to effect results, by demonstrating to retailers and their end customers that there is a large supply of eligible monitors being produced by numerous manufacturers. Further, with the monitors' being even more efficient than the Energy Star standard, retailers are provided an opportunity to demonstrate their commitment to promoting "green" products and thereby gain competitive advantage.

The program's advertising message is simple, though it requires a relative understanding of the Energy Star rating system, of which apparently not all retailers are yet cognizant.

The program's incentive was designed to be given to the retailer, to help offset the internal costs of coordinating the program with the program implementer and setting up the retailer's store displays, track eligible monitor sales and associated other costs. This approach of paying incentives to the retailer was preferred by retailers over an incentive approach requiring the retailer to pass on the incentive to end customers (such as in the PG&E version of this program) because it avoids the need to modify the retailer's pricing information and presentation to end customers – a significant added cost which retailers who were interviewed found problematic.

Yet, despite these positive aspects of the program design, ultimately the design is coming up short in producing significant sales of eligible monitors. This is because the program was an introductory program, targeted solely at computer monitors sold in SCE's service area. In effect, it was a niche program, though its broader intent is as a precursor to a larger consumer electronics program.[17] A narrow product and geographic scope was intended for simplicity, to test the program concept. It turned out to present a significant barrier in marketing the program to retailers, however, as they considered the program to have too narrow in both its product and geographic scope in light of the requirements it put on them to integrate the program into their marketing, sales and inventory control processes.

The program design also contemplated additional support to individual stores, not only through advertising support on a corporate and individual store basis, but also on-site sales training of store sales personnel. This aspect of the program design appears to not have been successful, however, as program resources were insufficient to implement both the top-end, corporate decision support and associated product management follow-through (e.g., production of display ads and corporate guidance on monitor display setup to make eligible monitors more visible to end customers) *and* follow-through with

[17] At the time of the program design, there were no Energy Star standards on other consumer electronics equipment, such as all-in-one printers, set top boxes and TVs.

individual store sites to ensure that product placement and display advertising were being carried out, and store personnel were trained to promote the program and eligible monitors.

5.3.2.2 Market Conditions

The most critical market condition that has affected the program's performance is the structure and corporate strategy of large electronics retailers. The condition is that large retailers such as Best Buy do not organize around local variations in end markets; rather, they operate on a national basis and have organized their inventory control, marketing and sales and other retail functions on a national basis. This condition makes programs like PCEP difficult to assimilate into these retailers' pricing, advertising and logistic (inventory control, etc.) systems, particularly given the modest incentive involved. The situation is exacerbated by the bureaucratic nature of large electronics retailers, whereby decisions to participate in programs like PCEP must be vetted through a large number of departments and individuals. The decision process as a result can take a very long time, and opportunities abound throughout the process to sidetrack or entirely derail the program from consideration by the retailer.

Another market condition has been related to the program itself, in that the program has a mid-stream sibling in the form of PG&E's monitor efficiency program also implemented by Energy Solutions. The PG&E program has critically different aspects to it regarding both the level and recipient of the incentive. These differences caused further confusion for both participating retailers having stores in both SCE and PG&E territory, and non-participants who saw the program differentiation as a barrier to participating.

The program encountered a lack of Energy Star awareness among some retailers. As a result, Energy Solutions staff had to create general awareness not only of there being monitors that have greater efficiency than the Energy Star baseline, but Energy Star itself.

One major retailer chose not to participate in part because they felt that, of the monitors they offer, there are too few qualifying monitors.[18]

5.3.2.3 Marketing and Outreach

Energy Solutions staff contacted all the national "big-box" and on-line retailers who sell monitors in California. These included Circuit City, Best Buy, Wal-Mart, Wal-Mart.com (a separate business unit from Wal-Mart's bricks-and-mortar stores), Office Depot, Dell, and also a number of large regional retailers such as Fry's Electronics. Circuit City and Wal-Mart.com agreed to become participating retailers, and Energy Solutions continues to believe that Dell may eventually become a program partner. In all, about 30 Circuit City stores were to become active in promoting the program along with Wal-Mart.com's internet-based partnership.

Energy Solutions found that some retailers were not yet fully aware of the Energy Star™ label and program, which made the marketing effort more difficult because the PCEP program implicitly builds off the Energy Star brand and efficiency standard. Thus, Energy Solutions staff had to make additional efforts in some cases to build Energy Star awareness, and then educate prospective retailers about the

[18] It may be that this is a technical issue regarding how model numbers are assigned to monitors, whereby this retailer has a unique set of model numbers to reflect the feature sets the retailer offers. Further, from the interviews conducted with the key contacts for this retailer, it is not clear that there is an Energy Star baseline established for their monitors that would enable a good matching process to determine either Energy Star or PCEP program eligibility.

particulars of the PCEP program itself. In one sense, Energy Star is a barrier to programs like PCEP because some retailers (as evidenced by the discussion in one interview with a retailer) see Energy Star as affirming a product's energy efficiency – and that further differentiation to promote super-efficient products above the Energy Star level are confusing and unnecessary.

Retailers consistently raised the overarching concern regarding product and geographic scope, which made selling the PCEP program to retailers very difficult. Added to this overarching concern was the extensive bureaucratic networking that had to be undertaken to gain the support and buy-in of others throughout these large companies' bureaucracy. The effort required to effectively communicate and persuade the many areas and functions within the retailers' organizations often stymied the program, to the point where program resources could not drive a favorable participation decision in companies such as Best Buy or, so far, Dell. Ultimately, Energy Solutions' marketing efforts were unable to overcome these bureaucracy issues; even with Circuit City who had agreed to participate in the program, the program's priority with Circuit City's monitor buyers was not very high and, with monitor buyer staff turnover, the program has lost traction, with the internal coordination and support needed to keep it active among the stores in the SCE territory no longer being provided.

Further outreach in the form of on-site training of store personnel, visual inspections to ensure that the program was being implemented properly in terms of display advertising and such, was not carried out to the extent needed to build and maintain program momentum in stores. This was due to program resources not being sufficient (PCEP being a pilot program) to adequately canvas all the 32 Circuit City store sites and do so on a continuing basis such that the program would continue to receive a high priority in the retailers' various product and service promotions.

5.3.2.4 Implementation and Operations

Participating retailers, including both corporate monitor buyers and associated staff and also individual stores, were provided program information that they were to incorporate into in-store display advertising and sales information. For example, Energy Solutions worked with Circuit City to produce "Bonus Tags" which highlighted eligible monitors when affixed to eligible display units. Monitor displays were also modified to make eligible monitors more visible to end customers.

An initial wave of program-based monitor sales resulted in 4,317 monitors being sold and tracked through January 2008; all of these units were sold by Circuit City. No units have been reported by Wal-Mart.com. The sales were successfully tracked into the Energy Solutions on-line system, and incentives disbursed without major problems reported.

As noted above, however, the program suffered operationally because of inadequate resources to follow through on the initial decision to participate, and provide the ongoing support necessary to keep the program visible to prospective end customers. Given the narrow product and geographic scope that has been fundamentally problematic for the program in recruiting and maintaining corporate-level support and activities needed to disseminate the program to stores, not having sufficient back-end operational support has resulted in the program no longer being supported by the initially participating retailers. Proof of this is threefold: 1) no additional incentive applications have been received by Energy Solutions since January, 2008; 2) current store directors who were interviewed claim no knowledge of the program; and 3) the original monitor buyer for Circuit City, who left that company in late 2007, was of the opinion that the program at Circuit City was "done" as of June, 2007. From an evaluation perspective, therefore, the program appears to be foundering.

This conclusion needs to be put into a broader perspective, however. Energy Solutions needed to continue communicating with major consumer electronics retailers in order to meet the PCEG program

goals, but those outreach strategies significantly overlapped with the larger statewide electronics program being jointly developed by the three California IOUs. Since there was a strong potential for repetitive outreach to these valued retailer contacts, Energy Solutions and SCE tentatively agreed in mid-2008 to halt outreach to major retailers in order to avoid sending conflicting messages with the much larger statewide consumer and business electronics program. Therefore, the ability to make progress toward program goals in 2008 was halted.

Nonetheless, there is a clear lesson for future programs of this type as to the need for continuous, bottom-up as well as top-down support throughout the value chain.

5.3.2.5 Other Program Dimensions

One of the evaluability issues raised in the Early M&V study done for this program concerned reviewing the data in Energy Solutions' tracking system wherein retailers upload their sales via a website each month. The data provided so far have been validated. Though the unit sales data do not match the SCE SMART tracking system's basis, which is to pay for kWh energy impacts versus the program's incentive structure, which is on a unit basis, the program has been able to translate its unit sales into the SMART system's tracking format.

A second issue raised in the Early M&V study was the desire to track end customers' contact information, to better enable end-customer surveying and impact analysis. This issue is difficult to address because it creates an additional barrier with retailers, to track ultimate the requisite information on customers who purchase eligible monitors. Impact analysis is seen by SCE program staff as being better handled through other means, such as through the Database on Energy Efficiency Resources (DEER) and its ongoing supporting research efforts.

Based on the interviews conducted with store personnel, free ridership is uncertain but may be in play because of how the program has played out in stores. That is, without resources to continue supporting the program at the individual store level, and with the one participating retailer who has submitted incentive applications apparently no longer promoting the program, current sales of eligible monitors may largely be free riders except for some residual program influences such as in-store monitor displays continuing to make eligible units visible to end customers. Whether any spillover will occur is yet to be seen, though spillover is likely negligible, again because the program has withered at the one retailer who initially was most active in the program.

5.4 Logic Model Review

This section presents the findings and conclusions of the PCEP program logic model review.

5.4.1 Logic Model Review Findings

The initial logic model developed for the program is shown in Figure 5-1. That model reflects the initial program design to focus on upstream market actors (primarily electronics retailers but also manufacturers) whom the program would recruit to act as program marketing agents to promote eligible monitors.

Initial, short-term outcomes were to be an increased awareness of product efficiency among downstream market actors (retailers and their end customers) and a relative increase in the number of eligible monitors

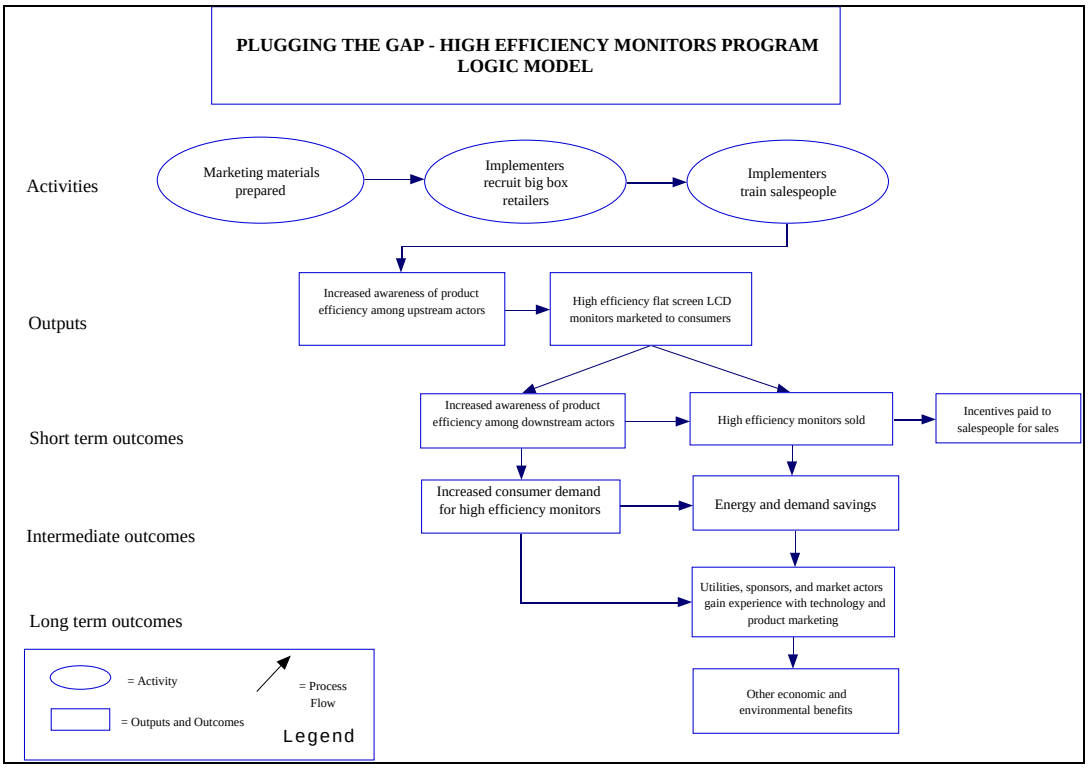
being sold to end customers, including payment of program incentives to retailers.[19] Further outcomes identified included increased end customer demand for ultra-high efficiency monitors and initial energy and demand savings. Ultimately, utilities would gain experience marketing such programs to retailers and become better able to promote such technologies through programs that build on the experience of PCEP and similar programs.

This model was reviewed in light of the current evaluation's findings and the requirement to add appropriate detail to the model to guide future evaluation efforts and measure program success. Several issues were identified that influence modifications to the logic model:

- It was not clear what marketing materials would be developed.
- The differences between the SCE and PG&E programs were not explicitly acknowledged, yet the programs' differences could be a key issue in retailers' decision to participate in the program. Thus, a utility program coordination effort suggested itself.
- The program's short-term outcome of paying incentives to sales people was not put into effect; rather, incentives are paid at the retailer corporate level.

In addition, the initial logic model was constructed at a high level and, as such, did not identify outputs and outcomes to the level of detail now desired by SCE.

Figure 5-1 Plugging the Consumer Electronics Gap Program – Initial Logic Model[20]



[19] The initial model contemplated incentives being paid to store sales staffs to reward them for promoting eligible monitors.

[20] Quantec, Inc., Early M&V Review Final Report, November 2007

The initial program logic model is substantially complete and accurate, except for the fact that store sales staffs are not paid the incentive but rather it is paid to the retailer at a corporate level. Additional detail in the various parts of the logic model would make it more robust for evaluation and performance measurement.

5.4.2 Revised Logic Model

A revised logic model was developed based on the review summarized above. Both a diagram and a segment theory table were constructed to describe in greater depth the various process dimensions of the program. These are presented in Figure 5-2 and Table 5-2 below. The enhanced model more closely reflects the program's various activities to carry out its mission, and provides specific details concerning program performance metrics related to its activities, outputs and outcomes.

Figure 5-2 Plugging the Consumer Electronics Gap Program – Revised Logic Model

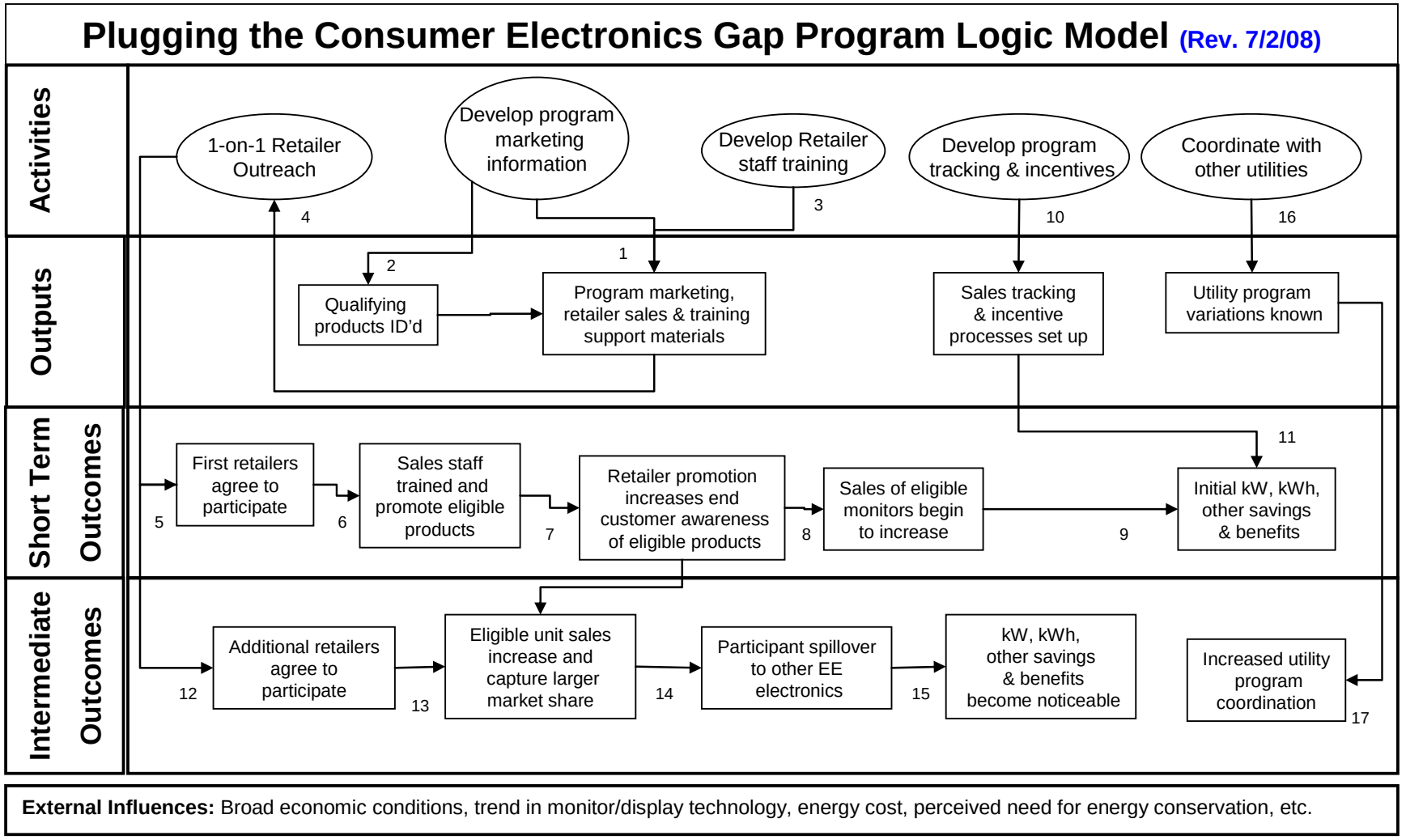


Table 5-2 Plugging the Consumer Electronics Gap Program – Revised Logic Model: Link, Segment Theory, Potential Indicators and Success Criteria

Link	Segment Theory	Potential Indicators	Success Criteria
1	Produce program marketing and retailer sales collateral for outreach marketing and retailer staff training	Completed marketing and sale support collateral	Retailers understand marketing information, retailer staff satisfied with sales support information
2	Identify eligible monitors as part of overall marketing information development	# of monitors identified that use at least 25% less than Energy Star™ standard	Sufficient number of sizes/models identified to enable program offering
3	Retailer sales staff training process developed	Training procedures developed and ready for use in the field	Retailer staff become knowledgeable about program offering
4	Marketing information compiled for dissemination to prospective retailers, with focus on big-box chains and internet/direct retailers	Program information and sales support collateral developed	Retailer staff understand program and sales support information
5, 12	Outreach efforts to targeted retailers, with initial and subsequent additional retailers agreeing to participate	Number of (additional) retailer contacts by Energy Solutions	1+ major retailers agree to participate in program
6	Retailer staff training sessions provide retailer sales staffs knowledge to effectively promote eligible products	Retailer sales staffs able to promote eligible monitors	Retailers actively promote eligible monitors to meet initial program goal of 30,000 units by 11/08
7	Initial participating retailers promote eligible products	Retailer sales staffs include discussion of eligible products in selling to customers, and promotional materials displayed	Customers purchase eligible products instead of ineligible products; goal of 30,000 units by 11/08
8	Retailer promotions increase customer awareness of eligible products, increasing eligible product sales	Increased eligible product sales - # of units sold	Program reaches initial goal of 30,000 units sold by 11/08
9	Documented product sales produce initial demand, energy and other savings and benefits	Tracking reports documenting eligible product sales - # of units sold	Program reaches initial goal of 30,000 units sold by 11/08
10	Program tracking and incentive systems set up	Tracking and incentive processes tested and operational	
11	Documented product sales produce initial demand, energy and other savings and benefits	Tracking reports documenting eligible product sales - # of units sold	Program reaches initial goal of 30,000 units sold by 11/08

Link	Segment Theory	Potential Indicators	Success Criteria
12	See #5 above		
13	Additional retailers agree to participate, further increasing eligible product sales and market share	Increase in number of participating retailers - # of retailers	Program considers increasing goal for 2009
14	Increased eligible product sales and market share begin to drive spillover into other electronics products	Increased customer interest in energy efficiency of other consumer electronics at participating retailers compared with non-participating retailers	Customer inquiries about and purchases of other electronics that are ultra-efficient
15	Expanded eligible product sales and associated spillover increase kW, kWh and other savings/benefits to a noticeable level	Tracking reports documenting eligible product sales - # of units sold	Program reaches initial goal of 30,000 units sold by 11/08, program extended into 2009 with increased goal
16	Utility program coordination develops understanding of differences among similar programs offered by other utilities	Differences in utility programs understood by program staff	Program able to work in parallel with other similar utility programs
17	Utility inter-program coordination increases	Program coordination opportunities developed; potential convergence of program offerings to strengthen regional potential	Retailer concerns about differing programs are addressed; program differences addressed such that additional retailers decide to participate.

5.5 Lessons Learned and Recommendations

In this section, we review the lessons learned in the course of the program to date, and develop selected recommendations for consideration by SCE.

5.5.1 Lessons Learned by SCE Program Manager

The SCE Program Manager learned a number of lessons from this program, as follows:

1. Retailers are national and struggle with local programs like PCEP. A uniform national program sponsored by many utilities is much more likely to get large retailers' attention.

2. Participation takes much longer than one typically would estimate, drawing out the program's marketing efforts and resulting in additional cost to shepherd the program through large corporate bureaucracies.

3. The product focus was too narrow; a broader electronics program covering the entire computer system or electronics generally, for example, is likely to be more successful.

4. Target incentives for mid-stream programs like PCEP at the retailer so that the retailer doesn't have to undertake the costly effort to modify their pricing and set up a differential pricing configuration. This also gives retailers some flexibility in how they can apply the incentive: internally to support the program's promotion through in-store displays, provide a discount to customers buying eligible equipment, or whatever application of the incentive the retailer sees being most productive.

5. The $5/monitor incentive is too low to cover the cost to retailers for their efforts to participate in the program, including their effort to develop and promulgate to stores advertising and sales staff training information for the program, and the effort to modify their inventory control systems to track the units being sold.

6. Back-end support is critical, at least as critical as the initial partnering with retailers' corporate buyers and marketing staff. Retailers need to encourage their sales staffs to promote the program, but this means the program implementer has to train store personnel and provide in-field advertising support and inspections that ensure stores are properly working the program. Efforts need to be continuing at a corporate level as well, to maintain program momentum as staff turnover and as retailers' corporate marketing strategies evolve.

7. General end-customer marketing, especially to build awareness among customers, is an important complement to in-store advertising and sales.

5.5.2 Lessons Learned by Energy Solutions

Energy Solutions also found the program to be a major learning experience. Lessons they learned include all of those expressed by the SCE program manager, as noted above. In addition, Energy Solutions staff noted the following:

1. Programs like PCEP are reliant upon the Energy Star brand and prospective participants' awareness and understanding of that brand, because the program touts impacts over and above what Energy Star has as a baseline standard.

2. Administratively, programs like PCEP are feasible and can adapt to the tracking and other administrative requirements utilities have for administering programs.

5.5.3 Recommendations

The program appears to have lost traction with its constituent partners, particularly Circuit City, though this is largely due to the development of a broader consumer electronics program that resulted in PCEG support to partners being discontinued to avoid confusion with the new program. A key prospect, Best Buy for Business, has discontinued its initial interest because of losing its primary internal champion to a corporate reorganization. Rather than recommending an effort to revitalize the program in its current form and, especially, product and geographic scope, the following actions are recommended.

1. Coordinate with other utilities to develop a nationally based electronics efficiency program that has Energy Star™ as its basis and that provides incentives to go beyond Energy Star's baseline efficiency level (possibly to establish a *platinum* brand). In particular, organizations such as the

Consortium for Energy Efficiency (CEE) provide a venue through which utilities can cooperate and coordinate development and operation of a national program.

2. Broaden the product scope to include other computer components and, perhaps, electronics products generally.

3. Budget sufficient resources to undertake both corporate-level and in-store marketing and other support for the program on a continuing basis until such time as evaluation efforts find the program has transformed the market or has reached diminishing returns in program impacts. In particular, in-store advertising and sales training, such as has been done for laundry efficiency programs, is critical to build and maintain program momentum "on the ground."

4. To the extent possible, utilize the Energy Star sales tracking process developed for other types of equipment as a common reporting base that also has achieved credibility with manufacturers and distributors, in order to enable reasonably accurate tracking and impact evaluation efforts.

6 GROCERY AREA ENERGY NETWORK (GAEN) PROGRAM

6.1 Grocery Area Energy Network Program Description

This section of the report provides a brief overview of the program. It includes a description of:

- The firm implementing the program — Shelf Control Inc.;
- The program as designed and implemented including market strategy, the goals of the program, and the implementation method; and
- The description of the technology.

The two most important GAEN program objectives are to achieve energy savings and to introduce the technology into the market. SCE wants to monitor and test the technology to ensure they are achieving the anticipated savings, to confirm that the technology is reliable and meets minimum levels of customer satisfaction.

6.1.1 Implementation Firm

Shelf Control is the third-party firm awarded the contract for implementing the GAEN program. Shelf Control is a start-up company headquartered in New York City. While Shelf Control developed the technology for the program, a consultant was hired to assist in developing the proposal for SCE.

Shelf Control's responsibilities included:

- manufacturing sensor controllers and replacement lighting;
- presenting the benefits of the retrofit to the customer;
- auditing the facility to determine the need for the sensor control units and lighting retrofit;
- sub-contracting the installation of the sensor control and lighting units; and
- verifying the units are working properly after installation.

Manufacturing of the units is located in China in plants owned by Shelf Control. A consultant was hired to assist Shelf Control in developing the original program proposal. He was retained during program implementation, provided Shelf Control with IT services for the implementation data and supported Shelf Control in their interactions with the program manager and other SCE staff.

6.1.2 Program Design

The GAEN program delivers energy efficient lighting and humidity sensor controls to stand alone refrigeration units in grocery stores.

The program was innovative in a number of ways. GAEN was designed to develop relationships with small and medium grocery stores, a market segment that has been difficult to penetrate with energy efficiency programs.

Shelf Control designed the control and lighting technology, marketed the program and installed the technology in grocery stores. In addition, Shelf Control staff verified the installations and provided customer support. Because this program was a direct install program, there was no payment to Shelf Control until the units were installed. Twenty percent of the installations were randomly verified by SCE engineering staff.

Target Market

The revised target market is small, medium and large grocery stores with stand alone refrigeration units within the SCE service area. The original target market was mini-markets and medium-sized grocery stores but Shelf Control found that many of them had few or no free standing refrigerated coolers. Shelf Control brought in the SCE account executives to open the door for marketing the program to larger grocery stores and chain grocery stores.

Marketing Strategy

The original strategy was to market the technology to grocery stores, especially smaller stores, liquor stores, and big box stores like Costco. The sub-contractor who was hired to install the heaters and lighting was to contact small and medium grocery stores that participated in a previous program. Shelf Control found that most of the smaller stores had built-in refrigeration equipment rather than stand-alone refrigeration equipment. The technology is currently not compatible with built-in refrigeration equipment. Therefore, most of the smaller stores did not qualify for the program.

Shelf Control shifted their resources to market to larger grocery stores and chain customers who have a previous relationship with a SCE account executive. Customers were first contacted about the program in one of two ways. SCE account executives called some customers to introduce the program and schedule the Shelf Control presentation where the SCE account representative and/or the Program Manager may also be in attendance. Alternatively, Shelf Control called smaller grocery stores directly to set up the presentation. This was more efficient in the sense that there was ‘more bang for the buck’ and that the account executive was able to open doors for Shelf Control. Relying on the SCE account representative also slowed down the marketing of the program because it:

- competed with many other important account representative job pressures for attention;
- had to be sold to the account representative first and then to the customer; and
- must be evaluated by different layers of management in larger stores and chains.

Implementation

The GAEN Program offered grocery stores a humidity heater control device and lighting upgrade for free-standing refrigeration units only. The technology was not compatible for built-in refrigeration units. The incentive included the heater device, the energy efficient lighting and installation of both heater and lighting. Shelf Control marketed the program directly to some small and medium customers but asked SCE to make the first contact with larger customers.

A sub-contractor installed the units after the customer agreed to the retrofit.

Implementer Goals

Shelf Control had a stated goal of 80 sites for the program which was not met. However, they installed a total of total of 863 controller and lighting units for 14 SCE grocery customers and saved 5.5 kW and over 40,000 kWh.

Factors Leading to Program Inception

The grocery store market has been a marketing challenge for many utilities. With the slimmest of profit margins, a cut-throat competitive market and critical lighting, refrigeration and cooling loads, few grocery stores have the funds to invest in energy efficient equipment or the inclination to take risks on new technology.

The program was designed to mitigate all of these issues: it was delivered to customers at no charge; it reduced direct energy costs; the technology was understandable and solved a known problem by reducing cooler door fogging; and as a retrofit product, it posed little risk for grocery customers.

6.1.3 Technology Description

The GAEN program provides customers with two technologies that work together. First, a humidistat controller is installed that reduced the humidity level in the refrigerated cooler. This reduces energy usage and prevents the door from fogging over. The second technology is a lighting retrofit that provides energy efficient lighting within the refrigerated unit. The humidity controls reduce the cooling load and accounts for about 60% of the energy savings of the unit; the lighting retrofit accounts for the other 40% of the energy savings. The technology not only saves energy, but reduces the humidity level within the refrigeration unit and prevents moisture buildup on the inside of the cooler door. The energy efficient lighting component reduces energy use while providing an acceptable level of illumination on the product.

The program was originally designed to provide a Web monitoring feature that would link up the lighting demand to allow customers to monitor their lighting usage in real time and to, eventually, allow SCE to dim the lighting remotely by about 5% under peak load conditions. This system has not yet been developed as a functioning system.

6.2 Process Evaluation Methodology and Sample Design

A variety of market and utility actors were interviewed by telephone during the evaluation of the GAEN Program including SCE and Shelf Control Program Managers and program participants. The interview guides used in this effort are similar to those of the other five programs in this study (80 Plus, Escalator Power Genius, Innovative Pool Pumps, Night Breeze, and Plugging the Consumer Power Gap), but were modified to meet the requirements of this program. The sample design was developed specifically for this program but has similarities to the other programs in the study. Both the evaluation methodology and the sample design are discussed in greater detail below.

6.2.1 Process Evaluation Methodology

The process evaluation assessed the implementer's delivery of the GAEN programs, identified barriers and possible solutions for overcoming these barriers, and reviewed the program's logic models. These core researchable issues were addressed:

- Has the program been successful in contributing to core objectives of the IDEEA program?
- Are there any problems with each program's design or operation?
- Are the available resources sufficient to effectively operate the program?
- Are the program processes efficient and effective?
- What target audiences are each program trying to reach, and do they offer a substantial potential for scaling up the program?
- Are there any unnecessary barriers to customer participation?
- Are there any unwanted behavioral responses by customers or other market actors that may impede the program in achieving its goals?
- In what ways, if any, could the program designs and operations be improved?

For the GAEN Program, the team interviewed the SCE program manager, a consultant of Shelf Control, a representative of Shelf Control's upper management, and four program participants. Non-participants were dropped from the sample design as the only non-participants associated with the GAEN Program were small grocery stores with no compatible free standing refrigeration units. All grocery store owners who were offered the refrigeration controls and lighting by either SCE or Shelf Control agreed to participate in the program. Eventually, about 80 control and lighting units were installed in 27 grocery stores, mostly in early 2008.

Each respondent answered questions from one of three types of questionnaires tailored to their program participation. The in-depth discussion guides are attached in Appendix A. On average, program manager's interviews lasted from one to two hours and participant interviews lasted about half an hour. They were conducted by Summit Blue analysts in January and February 2008 and in May and June 2008.

The SCE program manager and two members of the Shelf Control staff were interviewed and asked to discuss the program. Their interview guides included a discussion of the programs' goals, the program's design and operations, program marketing, program definitions, program evaluability, quality control, program improvement, barriers to participation, and lessons learned.

Program participants interviewed for this study include representatives of a chain of nine large grocery stores, a chain of seven medium-sized stores, a medium-sized grocery store and a liquor store. Titles included Vice President and General Manager, Executive Assistant and Store Manager. All of the customers who were listed as program participants were called at least once for this study although not all answered their telephones. Two of the customers on the participant list were familiar with the program but indicated they were not program participants. One of them had agreed to participate but never heard from Shelf Control to install the technology.

The Program Participant interview guides included topics such as the respondent's background, program marketing and outreach, program delivery and implementation, the decision making process, the current market for the GAEN technology, free ridership and spillover and customer satisfaction.

6.2.2 Sample Design

The evaluation of this program includes phone interviews from a variety of players in the program to represent views from multiple perspectives. The sample frame used for this evaluation is shown below in Table 6-1. Interviews were completed with the SCE program manager, a representative of Shelf Control, and the consultant who was instrumental in developing the proposal for the GAEN Program and with four program participants.

There was no list available for non-participants for the GAEN program. The only customers who were offered the program and did not participate were those who did not have any free standing, qualifying refrigeration units. The GAEN control and lighting technology was installed free to qualifying SCE grocery customers.

Table 6-1. Sample Design for the Grocery Area Network Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Implementer / Sponsor	3	3
Program Participant	4	4
Program Non-Participant	4	0[1]
Total Respondents	11	7

6.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the Grocery Area Energy Network (GAEN) Program for Southern California Edison from a process perspective. In-depth phone interviews were completed and the results of those interviews are presented in the following sections: an overview of the evaluation, the detailed results from the interviews with program staff, and the detailed results from interviews with program participants.

6.3.1 Overview

The control network that would provide customers with real time access to monitor their energy demand was never implemented past the planning stage. Major unjustified design assumptions included the unrecognized need for UL certification, the need to market the program to larger grocery customers, and the distribution of free-standing compatible refrigeration unit in small grocery stores.

The largest barrier to marketing the GAEN program initially was the lack of UL approval. The slow start negatively affected the financial health of Shelf Control, and they found it necessary to suspend marketing and reorganize before continuing the program.

All of the grocery owners with free-standing refrigeration units agreed to participate in the program, according to program management. However, some customers on the participant list had not received the units at the time of the interview. Program participants agreed the sensor control units and energy efficient lighting saved money but they were not able to detect the savings on their bill.

Customers participated in the program to save energy and money, to take advantage of new technology, and to reduce energy problems locally and nationally.

6.3.2 Detailed Results

The topics discussed in this section include program design, marketing and outreach issues, program implementation and operations issues, program participant results, and other program dimensions.

Development of the SCE Incubator Program

One of the major policy changes developed by SCE because of the GAEN program was to develop an incubator program to help companies develop and market brand new technologies. While the GAEN Program was originally designed for products that were offered to a new market and for new technologies, SCE learned that many programs involving emerging technologies need more technical and marketing support and more development time than the IDEEA/InDEE program offered. One of the main requirements of the IDEEA/InDEE program is that the proposals for new technology are offered as turnkey programs. In this case, there was an emerging technology marketed by a startup company with manufacturing located in China. In retrospect, it seems like a recipe for problems (risk + risk + more risk). Luckily, SCE extended the implementation deadline and used this experience to develop an incubator program that would help nurture new ideas. The Program Manager said:

> "The (GAEN) program wasn't designed initially to support emerging technology. But we are an example of an emerging technology that has the capacity to really help SCE meet their objectives. So SCE is developing an incubator program which I think is a good idea because you don't know what little idea is out there…."

The representative from Shelf Control was encouraged by SCE's willingness to explore and benefit from emerging technology. She said:

> "Rather than look at just look at established technology, we need to open their eyes by …to consider emerging technology (that) they have found that to be potentially very fruitful for them. It should further their commitment to emerging technology which they need to benefit their own goals as well as supporting the companies goals."

6.3.2.1 Program Design

Implemented As Designed?

Both SCE and Shelf Control representatives agreed that changes were made to the program design during implementation. The program was originally designed to provide a control network accessible by the customer for monitoring and managing their refrigeration demand via the Web. Plans were also made to allow SCE to control the lighting in critical demand situations. Shelf Control explored how to implement this service but did not fully develop and implement the service as part of this program.

Program/Design Improvements

SCE and Shelf Control agree that customers are very satisfied with the program. They like the energy saving and the way the lighting looks.

However, there are multiple ways the program design could have been improved. These elements include UL testing, technology testing and data tracking and data transfer issues. These issues are further elaborated on below.

- SCE should perform more testing on the technology for INDEE programs. The Program Manager requested internal testing of the technology on his own after the program was implemented. This testing should have been done before program implementation.
- Shelf Control would also liked to have invested less time and effort in the tracking and data transfer tasks for the program.

6.3.2.2 Meeting Program Goals

The program manager identified two program goals: 1) to achieve energy savings 2) and to introduce the technology into the market. In addition, SCE also wants to monitor the new technology to ensure the anticipated savings levels are reached and that the proper testing is done. Overall, SCE is concerned that the technology is reliable and that customers are satisfied with the program.

Shelf Control representatives also believed that the program was meeting the SCE goals for achieving energy savings and introducing a new technology into the market. In early 2008, they thought they were on track for meeting their installation goals. Shelf Control had a stated goal of 80 sites for the program.

Sales and installation of the GAEN technology were very low in 2007 because of the delays in full scale marketing of the program. Most of the installations were made in the early months of 2008. It appears that the program did not meet its sales goals.

Evaluability

The Early M&V Review of the IDEEA programs, prepared by Quantec in November of 2007,[21] identified a number of recommendations for the evaluability of the GAEN program. Each issue is addressed explicitly in Table 6-2.

Generally, most of the data identified in the earlier evaluation is currently being tracked, although two important pieces of information - metering of the anti-sweat heaters and the hours of store operation - were not tracked. There were a few discrepancies between the SCE Program Manager and the Shelf Control consultant on the topic of what data is being tracked during program implementation, but those discrepancies were minor.

SCE has been independently testing the lamps to verify the wattages. They collected operating hour data from grocery store representatives at the beginning of the program but did not meter operating hours as recommended in the Early M&V Review.

Verification of the installations was also a component of the evaluability of all energy efficiency programs. In this program there was dual verification of the installation - one by SCE and another by Shelf Control. SCE verifies 20% of all completed installations that are randomly chosen by the Smart Database software. A SCE engineer is then assigned to verify these installations. Shelf Control, however, verifies 100% of the installations and monitors the sites after the initial inspection weekly for three to four weeks to verify the units and lighting are working correctly.

[21] Early M&V Review Final Report, Prepared for: Southern California Edison, November 26, 2007, Quantec, LLC.

Non-Energy Benefits

One non-energy benefit of the program was the opportunity to develop a stronger relationship with a hard to serve market, grocery stores, and the experience SCE gained with a new technology program. Customers gained the benefit of increased visibility of consumer products in the refrigerated cases.

Table 6-2. Evaluability Recommendations for the GAEN Program

Data Needed for Program Evaluations	SCE Program Manager	Shelf Control Consultant
Pre and post metering of anti-sweat heaters	No	No – not required
Pre installation data:		
Fixture type	Yes	Yes
Fixture wattage	Yes	Yes
Ballast type	Yes	Yes
Operating hours	Yes	Yes
Anti sweat heater capacity	No	Qualified Yes
Heater control method	Yes	Unsure
Refrigerator compressor capacity	Maybe	No
Post Installation Data:		
Lighting equipment counts	Yes	Yes
Lighting equipment specifications	No	Yes
Anti sweat heater counts	Yes	Yes
Anti sweat heater specifications	No	Yes
Persistence of lighting installations	Yes	No one has asked to remove one
Store size	No	No
Store hours	No	Yes
Metered lighting hours to verify assumption of 18 hours a day	No	No
Tracking number of refrigerated cases per store	Only the ones that qualify	Yes

6.3.2.3 Marketing Conditions

Marketing conditions includes a number of macro factors that impact the success of the program such as market awareness of the technology, market demand, sales, future program opportunities, and barriers to widespread adoption of the GAEN technology.

Awareness of Technology

None of the participants were aware of this technology before they encountered the presentation by Shelf Control.

Market Demand for the Product

All study participants were positive about the future market demand for this product. Estimates ranged from thousands in the SCE service area to potentially every refrigerated unit in the country.

Future Prospects for the GAEN Program

Fertile ground was found in the grocery market as stores struggle to save on operating costs to increase slim profit margins. Savings on energy costs are attractive to store managers because they bring immediate relief to the bottom line. Program participants agreed that other stores would be interested in this technology because everyone is trying to save money in any way they can. One customer said the long term market for this product was excellent and thought that the product could even be sold in the residential market.

The SCE Program Manager and the Shelf Control representatives all agreed that the GAEN Program could be easily scaled up for a wider audience. Few customers would look at the technology right now, however, without a subsidy from SCE even if customers would save money in the long run. However, budget limitations are a challenge to scaling the program up, according to the SCE program manager.

Shelf Control would like SCE to continue to endorse the product after the program ends. They think SCE's approval would be critical in their ability to mainstream the technology. Program participants offered the following ideas to help the refrigeration case efficiency technology to enter the mainstream market:

- work with refrigeration equipment companies to bundle the controls with new refrigeration units;
- increase levels of marketing;
- maintain its current free status; and
- notify the public of the technology.
- Barriers to Widespread Adoption

Three barriers to widespread adoption of the technology were identified in addition to cost issues. They are the limited compatibility of the product, the product configuration, and product availability.

1. Product Compatibility. Currently, the controllers are designed for installation in free-standing refrigeration units and are not compatible with walk-in refrigeration units or horizontal refrigeration units. Shelf Control is experimenting with how to expand the compatibility of their product to these other types of units.

2. Product Configuration. Other program improvements under development include dimming capabilities and stronger lighting output. The representative from Shelf Control admitted the product is not meeting the needs of all customers but they hope to have improvements, such as stronger lighting output, dimming capabilities, and compatibility with walk-in refrigeration and horizontal units, in the next generation of the control technology.

3. Product Availability. Shelf Control worked out a procedure for ensuring the availability of the units that were manufactured in China. With widespread adoption of the technology, product availability may become more of an issue depending on the manufacturing capabilities of the factory.

6.3.2.4 Marketing and Outreach

In this section, a number of topics are discussed including how the technology might fare in the marketplace given the marketing activities of the third-party implementer, customer reactions and acceptance of the technology, program benefits and barriers to adoption of the program.

Marketing Activities

A major change in marketing the GAEN program was made in response to the smaller than expected number of free standing refrigerated coolers in small and medium stores in the target market. It became clear early in the marketing process that this was not working, and they began marketing the program to larger grocery customers with more free standing refrigeration units. The SCE account executive was recruited to contact their customers and open the door from the Shelf Control presentation. Access to the decision makers in larger stores and chain stores was important for the success of this program.

Both parties think the program would have gone smoother if they had known that the GAEN technology was best marketed to larger grocery stores with more free standing refrigeration units. SCE thinks Shelf Control should have tested or researched their marketing plan more thoroughly. Shelf Control thinks SCE should increase their level of support to open the doors to market the program to larger customers. The representative from Shelf Control thought that it was SCE's responsibility to market the program while SCE expected a turn-key program that did not rely on SCE resources. From Shelf Control's perspective, it is clear that cold call marketing to large grocery stores with no intervention from SCE is not productive.

Program Marketing

It appears that Shelf Control did not have the deep pockets necessary to finance their part of the program effort as the marketing schedule slipped from mid-2007 toward mid-2008. This may have partly been a function of the under-bidding of the cost of the control and lighting technology and its marketing and installation. The willingness of SCE to extend the program into 2008 was due to the small investment on the part of SCE in 2007 based on the small number of units installed. According to the program design, Shelf Control was only reimbursed upon installation of the controller and lighting units. The SCE Program Manager said that had the GAEN Program been financed by SCE during 2007, it would not have been extended into 2008.

On the other side of this issue, the slow start had a negative impact on Shelf Control. For a couple of months, they were not able to market the program. After a financial reorganization, more funding was available for investing in marketing and installing the sensor and lighting technology. However, the representative from Shelf Control pointed out that, "We will (have sufficient resources), but we will be operating at a loss."

Both program participants and the SCE program manager said the marketing materials developed by Shelf Control were well-written, understandable and effective.

Participation Reason

Reasons for participating in the GAEN program were to save energy/money, to take advantage of the free technology, to support new technology, to help SCE, and to reduce the energy problems in our country. One customer only installed the energy efficient lighting portion of the technology as this particular store had experienced no problems with the foggy doors because of the dry climate. This same customer owns another store where the humidity is a problem, and he would like to enroll this other store in the program. However, this customer had not heard back from Shelf Control at the time of the interview.

Program participants admitted that, while they did not have formal energy policies, they are always trying to reduce their energy use and find ways to be as energy efficient as possible in their decision making.

Program Benefits

Program participants believe that the program benefits were to save energy or money on their electric bill. They further believe that the program is delivering on that promise. However, none of the participants have had much evidence of these savings to date. In two cases, customers reported it was too early to see savings on their energy bills. In the other two cases, the customers believed their bills had decreased but could not confirm it. They expect to detect more savings during the summer months.

Concerns with Program/Technology

A participant wondered what would happen if the store lights went out because of the new equipment. In this case, Shelf Control agreed that it would be their responsibility to remove the equipment if it impacted store operations.

Prior to installation, the largest program participant was concerned that Shelf Control would not deliver on their promises. However, during the first installation he found them to be professional and competent, which alleviated his concern.

Market Barriers

The two major barriers, lack of compatible free standing refrigerated cases and lack of UL approval, have been discussed elsewhere. All of the customers contacted were eager to participate in the program and accrue the benefits of the energy savings but smaller customers had few or no compatible refrigerated cases. A few customers perceived reduced lighting levels with the new equipment as compared to the old equipment but also thought that the difference was not enough to reject the installation.

Once the startup problems of the programs were resolved by SCE and Shelf Control, program implementation was further delayed by the winter holiday season. One issue with marketing to grocery stores was the need to be sensitive to their busy seasons when store managers are overwhelmed with operational problems and not receptive to energy efficiency information.

6.3.2.5 Implementation and Operations

In this section, we discuss a number of topics such as the program administration, quality control, and operations, program installation issues, customer satisfaction, and ways to increase customer satisfaction.

Highlights of Program Accomplishments

All interviewed customers thought that this was an excellent program and that SCE should use their account representatives and refrigeration maintenance companies to promote the program to other customers.

Program Administration

SCE reported that there have been minor problems with program implementation but that Shelf Control took care of these issues immediately. With the implementation delays, SCE extended the program to the end of the second quarter in 2008. However, Shelf Control experienced some issue with the program processes such as the SMART Database and the invoicing process.

Program Quality Control

Shelf Control invoices SCE after the measures are installed by uploading their data to the SMART database – that process notifies the database the project is ready for inspection. The database selects certain projects for inspections automatically and a SCE engineer is sent to inspect the chosen sites. After the measures are released, Shelf Control can invoice for those sites and sends the program manager the paper documentation forms for his inspection. The invoice is then released to enter the SCE approval process.

SCE verifies the lighting equipment and anti-sweat heater counts, the number of qualified refrigeration units at the site, and the persistence of the measures. They collected operating hours at beginning of the program but have not conducted any metering to verify those hours.

Shelf Control also implemented quality control procedures. They inspect all of the installed units twice a week to verify their performance. They immediately address any problems they find. For instance, they found that one lighting unit was not working even though the customer did not notice the problem. They also verified the equipment counts and the persistence of the measures. No customers asked for any units to be removed. They were tracking the number of units installed per store to verify the original program assumptions for small, medium and large stores.

Program Operations

Shelf Control thought that it would have been helpful to have a better understanding of how SCE works internally before they began the program. One of Shelf Control's challenges was the uncertainty of continually evaluating SCE's commitment to the GAEN Program, even though the program was championed by the SCE Program Manager. SCE support for GAEN may change based on factors outside the GAEN Program. Under some conditions, "they may reevaluate how they proportion their funds. I think it would be helpful for the participants to get an overview of the context that leads SCE in their decision- making process which then impacts the company (the profitability of Shelf Control)."

The program manager has been very supportive of the program and has treated Shelf Control fairly. While SCE commitment to the GAEN program has been consistent, the company representative went on to say that the uncertainty was difficult:

> "– at this point they have been good and generous to us but I do see how things shift in the organization and priorities change. At this point we haven't been hurt by it but we didn't know that at the outset. So it is very useful to get a summary of what their general process is and within that the

forces that are impinging on them such that they may change commitments over time."

This is one example of the cultural differences between a start-up entrepreneurial company qualified to bring a new technology to market and the requirements of a regulated utility. Each will naturally experience frustration with the other in the areas of speed of decision making, ability to make firm commitments for the organization and the importance of the program to the overall organization. SCE should not discount how these issues may negatively impact the health, and possibly, the future existence, of the third-party firm responsible for an INDEE program.

Operations Issues

The SCE Program Manager values Shelf Control's use of the Smart System data tracking software. The SCE Program Manager worked with Shelf Control to develop the software to easily load the data from the Shelf Control tracking system into the Smart System.

Shelf Control's perspective on the use of the SMART database was not as positive. The SMART Database presented a hurdle for a small company like Shelf Control. For instance, not all Shelf Control representatives found the software interface easy to use or efficient especially for the implementation of small programs like the GAEN program. They expressed the following concerns about the difficulties of working with the SCE tracking database including:

- The amount of manual paperwork needed to track the program;
- The need to develop their own interface with SCE computer software protocols;
- The need for all parties to be notified when an invoice is received by SCE;
- The perceived lack of information processing of the software (collating, sorting, tabulating) within the SMART database reports. Shelf Control's solution was to print the SMART software reports and input the data into a spreadsheet for ease of analysis; and
- The lack of user friendliness in SCE SMART software reports.

During the recruitment process, we found that at least two customers were incorrectly identified as program participants. They agreed to participate in the program but the units were not installed yet.

Program Installation Issues

Some installation problems were encountered. For instance, the units' brackets did not always fit properly in the available space. The SCE Program Manager talked about the early days of the program where "The configuration of the product was an issue. The first couple of installations there was a learning curve. They (the Shelf Control installers) had to have a bracket redesigned so the brackets would fit."

A few problems were encountered with customer equipment during the installation of the controllers and lighting. In a few cases, the new controller equipment interfered with other refrigeration equipment. The grocery store would then need to call their refrigeration maintenance person or an electrician to solve the problem. In another case, one of the controllers quit working. In each case, Shelf Control identified the problem early and worked with the store to find the solution. Most customers were not upset because the problems were handled immediately. However, one store owner reported that two of the three lights only worked intermittently, and Shelf Control has not visited the store to resolve the problem, even after repeated requests over a three month period.

The customer who experienced problems with the lighting installed by Shelf Control was disappointed with the verification visit. The SCE engineer came to the store when he, the store manager, was not available and asked questions of an employee who was not knowledgeable about the technology. This customer wanted to inform SCE about the problems he has with the lighting and with the lack of response from Shelf Control to fix the lighting. This customer also expressed concern about the availability of replacement parts if Shelf Control does not come to fix his lighting problem. He notes that three parties are involved in this relationship and the complexity can cause problems.

Participant Satisfaction

Program participants agree that they are very satisfied with the program and with the GAEN technology. The largest program participant retrofitted all of their stores but two, with another store planned. The GAEN Program equipment has not been installed long enough for customers to see a reduction on their electric bill. However, as a retrofit program where the sensor units and lighting are installed at no cost to the customer, it is not surprising that customer satisfaction is high.

Program participants were also satisfied with the Shelf Control presentation and reported that all of their questions were answered. The information contained in the presentation was easy to understand and had an impact on the decision to participate in the program. One participant said: "I understood what they (Shelf Control) were saying and what they were going to do."

Customer response to the program was positive and both SCE and Shelf Control agreed that customers were satisfied with the program.

Suggestions to Increase Participation

Program participants also had ideas for program improvements:

- One customer would like SCE to expand the program to include a walk-through visit to identify other steps that they could take to save money. For instance, he was wondering if the GAEN lighting technology could be applied to the over-head fluorescent lamps and whether retail standards for presenting product could be applied in their liquor stores.
- This same customer also thought it would be helpful for Shelf Control to bring an example of the control and lighting technology to their presentation, so customers are better able to visualize what changes would be made to their stores.
- Another idea was for SCE to share with customers the savings results of any testing they conducted to confirm the Shelf Control savings estimates.

6.3.2.6 Other Program Dimensions

In this section, we look at the customer decision to participate in the GAEN Program.

Customer Decision Making

Program participants depended on Shelf Control and/or their SCE representative and their internal experts as sources of information. Shelf Control visited two of the stores directly, while the other two customers were contacted by SCE customer representatives prior to their meeting with Shelf Control. None of the participants surveyed considered removing any of the equipment.

The owner, the store manager or a vice-president were involved in the decision to install the GAEN technology in the grocery store. Sometimes, it was a joint decision between the two top decision makers in the store.

In general, this decision did not differ from any other equipment purchase decision made in the store. The decision making process differed, however, by store. In one store, small dollar decisions were made by the department supervisors while larger decisions were made by the president. In a second store, the owner asks for input and then makes a final decision. In the smallest grocery store, the store manager decides based on his budget and need. In the final store, decisions are made by the store manager and his partners.

All but one of the program participants installed all of the units offered to them under the program. They have installed or plan to install the units in all of their stores. The exception was the liquor store. The store manager planned to install both the humidistat controllers and the lighting in the second store but has not yet done so.

Three of the customers said they might install the equipment outside of the program if the payback was two years. One of the store managers wanted more confirmation from SCE that the payback estimate was correct. The third indicated that they had previously installed energy efficient lighting in all their stores with a 3-year payback.

One customer participated in a gasket replacement program recently and two others participated in the SCE lighting rebate program a couple of years ago. One customer specifically said that his decision to participate in this program was based on the positive experience he had with the previous Edison program.

6.4 Logic Model Review

In this section we review and update the logic model for the GAEN Program.

6.4.1 Logic Model Review Findings

The existing logic model was substantially complete and provided a nearly accurate picture of the programs operation. The original model focused on the activities of identifying small and medium size grocery stores, preparing marketing materials and contacting customers to educate them about the program. The outputs of the program activities were that the customers would agree to participate in the program and that they would learn more about other SCE programs. After the installation and inspection of the sensor control units and lighting technology, customers would enjoy energy and demand savings and SCE would collect the technical data needed for future program evaluations. All of the parties involved in the implementation of the program would learn more about designing and marketing programs to this market segment and would build stronger relationships with the program participants. Grocery stores participating in the program would gain awareness of other SCE energy efficiency programs, participate in additional SCE programs and achieve additional energy savings. Other environmental and economic benefits would also be achieved.

6.4.2 Revised Logic Model

Significant changes were made to the marketing of the program and are incorporated into the logic model. First, Shelf Control was not able to market the program exclusively to small and medium grocery stores.

Because the technology was only compatible with free standing refrigeration units, the program was marketed to medium to large grocery stores. The larger stores and chain stores were first contacted by SCE account representatives to provide Shelf Control access to the decision makers within the targeted grocery stores. In some cases, the SCE account representative accompanied Shelf Control to the program presentation. Smaller customers were contacted directly by Shelf Control.

The second major change involved the inspection process. In this situation, details were added to more accurately reflect the process as implemented. After the control units and lighting were installed, Shelf Control inspected the units and verified they were working correctly. They continued inspections of the installations on a semi-weekly basis to ensure that the technology continued to work as designed. In addition, documents from every site were reviewed by the SCE program manager before approval of the invoice for the site and 20% of the sites were verified by an SCE engineer.

The revised model is shown below in Figure 6-1. Table 6-3presents the segment theory for the GAEN Program Logic Model.

Figure 6-1. Grocery Area Energy Network Program Logic Model

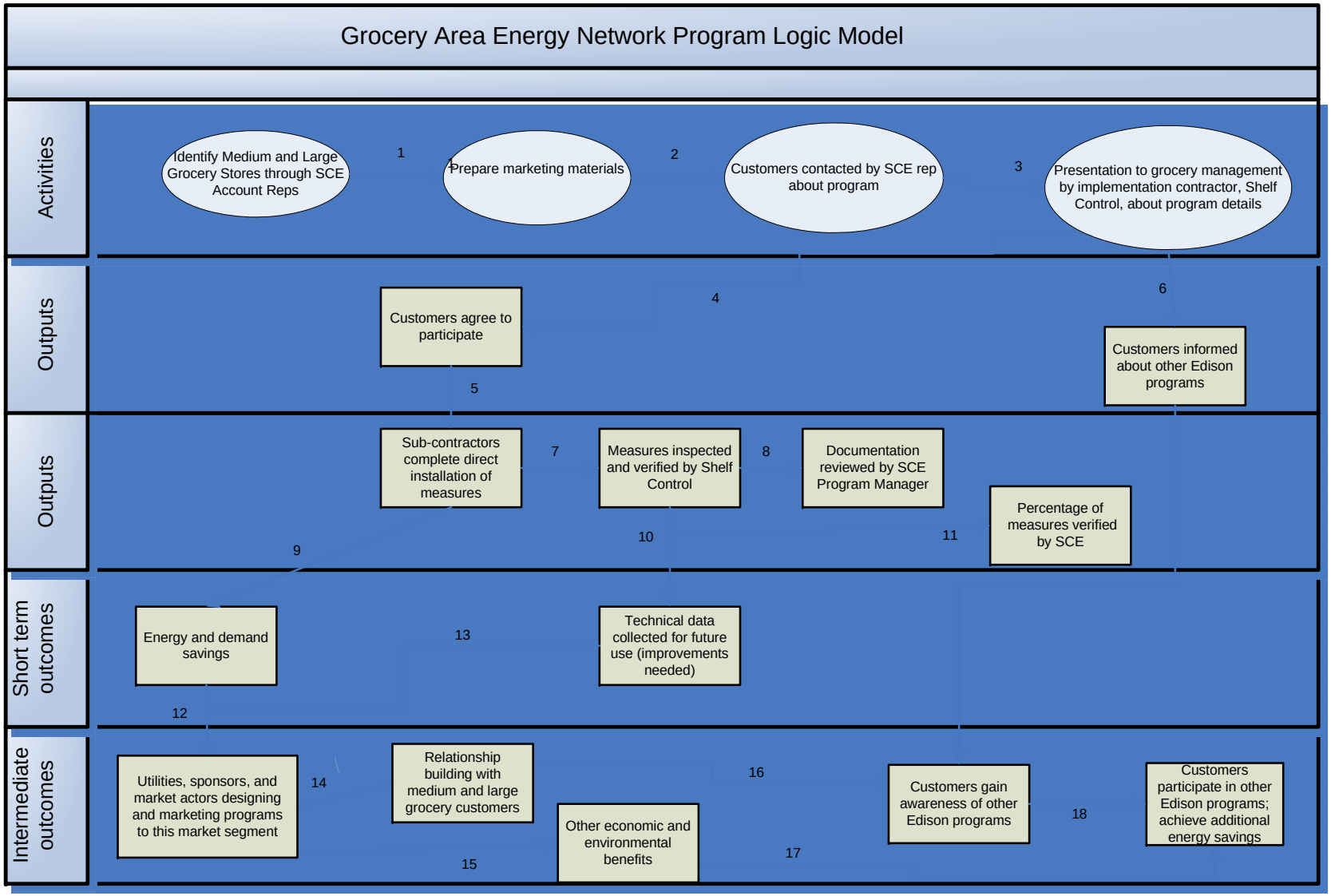


Table 6-3. Grocery Area Network Program Logic Model

Link	Segment Theory	Potential Indicators	Success Criteria
1	Coordination between program implementers and SCE Account Representatives to identify potential medium and large grocery stores; Shelf Control markets to some small customers directly	# of potential customers to contact who may be interested in the program and whose stores have the appropriate refrigeration equipment	
2	Deliver program material to potential program participants	# of customers contacted by Shelf Control # of brochures/promotional materials developed	
3	Present benefits of the program in a presentation to store management	# of customers receiving Shelf Control presentation	# of contacted customers who agree to participate in the program
4	Customers are enrolled in the program by Shelf Control	# of enrollees in Smart Database	
5	Shelf Control completes direct installation of control and lighting measures	# of completed installations tracked	
6	Store managers are informed about other Edison programs	Follow up contacts by SCE Account Representative Account Reps are more informed about store plans for remodeling or expanding	
7	Post installation verification by Shelf Control that control and lighting measures are properly installed	# of completed installations that are verified Documentation sent to SEC program manager for review	
8	Quality control inspection of installation documentation by SCE program manager	# of documentation inspections completed	
9	The installation of the control and lighting measures leads to reduction in kW and kWh use	Verified energy or demand savings	Part of impact evaluation
10	Technical data on energy savings and installation details collected and entered into Smart Database	Technical data available for process and demand program evaluations	Part of impact evaluation
11	20% of installations verified and inspected by SCE engineers	# of installations inspected	
12	Utilities and other market actors search for additional ways to serve the grocery market	SCE promotes other programs to medium and large grocery stores	
13	More accurate program savings estimates based on better input		

Link	Segment Theory	Potential Indicators	Success Criteria
	data		
14	Improved relationship with small, medium and large grocery customers	Increased contacts with grocery customers	
15	Increased economic and environmental benefits	Increase in customers' ability to market themselves as 'green'	
16	Increased customer awareness and participation of other SCE energy efficiency or demand response programs	# of other EE programs successfully marketed to GAEN program participants	Part of impact evaluation
17, 18	The program leads to increased penetration of other SCE programs and additional energy savings	Market share measurement of energy efficiency measures via Smart database tracking	

6.5 Lessons Learned and Recommendations

In this section, we review the lessons learned by the SCE Program Manager, by Shelf Control, the program implementer, and develop a few recommendations for consideration by SCE.

6.5.1 Lessons Learned by SCE Program Manager

The SCE Program Manager learned three programs that can be used by SCE in future program design:

1. Development of the SCE Incubator Program;
2. The need for UL certification for new technology; and
3. The effectiveness of the SCE account representative in selling new technology to large commercial customers.

6.5.2 Lessons Learned by Shelf Control

Representatives from Shelf Control also found the GAEN Program to be a huge learning experience. Lessons learned by Shelf Control include:

1. Complete honesty when problems arise can inspire trust between partners;
2. Knowledge that SCE moves slow;
3. Action is needed to invigorate the slower paced culture of the utility;
4. Knowledge that what is said can change tomorrow; and
5. Financial problems arise when the start up costs cannot be recovered.

Here are a few quotes for Shelf Control to illustrate these ideas:

> "Complete transparency works. We have seen, on several occasions that issues arise that might be show stoppers and have not hidden it from them (SCE). Our honesty has inspired tremendous trust between them and the _____(Program Manager). Some people would say that would be a take away for them"
>
> "Know that you are dealing with a slow moving entity." "You can be more aggressive, but not in a negative way. You don't need to fall into the corporate culture that they have – you can invigorate them. It may be encouraging and rewarding to them to have someone that can get things done."

6.5.3 Recommendations

1. Conduct an impact study of energy savings from GAEN technology.

2. The program should be redesigned to include a customer investment to gain knowledge on the price sensitivity of the grocery store market. It is difficult to judge the potential market for a technology delivered through a direct install program at no cost to the customer because the price signal is missing.

3. Assuming that a customer investment would be required in the future, market to larger stores or chain store organizations that will generally have more investment dollars available and may apply a 2-3 year payback criteria to an investment like the GAEN technology. Small to medium grocery stores, may find it difficult to justify an investment in this technology.

4. Explore the possibility of partnering with refrigeration sales companies to market this technology with replacement refrigerator units.

5. A committed and patient SCE Program Manager such as the one assigned to the GAEN program is essential to the success of an emerging technology program. SCE underestimated the amount of resources that many innovative technology programs may need. The addition of the Incubator Program is an indication of SCE's recognition that innovative technologies need more Program Manager involvement than other types of pilot programs. It also indicates there could be important synergies being overlooked between IDEEA programs and the Emerging Technology Program operated by SCE.

6. For the Incubator Program, SCE may want to look at a multi-year funding cycle as new technologies are unstable, require design changes and often have production issues creating a slow start.

7. SCE should expect to have emerging technologies such as GAEN and other participants in the Incubator Program to be tweaked in the field during the program.

8. Although not required under their contract, Shelf Control verified that the controls in every site were working as expected on a weekly basis. SCE may want to establish an expectation of close monitoring by both SCE and the third-party and the third party implementer of the first sites new technology is involved.

9. Many entrepreneurial companies, like Shelf Control, will lack the resources necessary to deal with the data reporting requirements of SCE and the SMART Database. SCE may want to develop a standard interface for the database to lift the burden of translating the data from an Excel or Access database into the Smart Database format.

10. Require all new electro-technologies to be approved by the Underwriters Laboratory before considering adding to the program.

7 ESCALATOR POWERGENIUS™ PROGRAM

7.1 Program Description

The program description section of this report provides a brief overview of the program. It includes a description of:

- The firm implementing the program, Matrix Energy Services, Inc. (Matrix ESI)
- The program as designed and implementing including market strategy, the goals of the program and the implementation method.
- The description of the technology

The two most important Escalator PowerGenius™ objectives are to deliver energy savings and reduce demand by installing PowerGenius™ controllers on at least 270 escalators.

7.1.1 Implementation Firm

Matrix Energy Services, Inc. (Matrix ESI) is a professional services corporation providing research and consulting services in applied energy engineering and economics to utilities nationwide. Matrix ESI's headquarters are in Sacramento, California with regional offices in southern California (Los Angeles). From these offices, Matrix ESI's staff conducts energy-related studies and projects for a variety of utility companies, government agencies and other clients.[22] They were awarded the third party contract for implementing the Escalator PowerGenius™ Program.

The services Matrix ESI provided primarily related to program design and implementation for energy efficiency and demand reduction. Their responsibilities included:

- Ordering the units from the manufacturer
- Presenting the benefits of the escalator controller to the customer
- Arranging for a qualified escalator company to install the controller
- Verifying the units were installed by observing the installation process.

The Escalator PowerGenius™ program delivers energy and demand savings through the installation of a controller that reduces the voltage to the escalator while under partial load. The program was designed by Matrix ESI to provide the product free to customers; the customer would pay their escalator service company directly for installation.

There have been some slight modifications to the program. Escalators must be inspected by licensed, union escalator service workers once a month. Originally, Matrix ESI thought that the controllers could be installed during the monthly service call. However, not all of these service companies were interested in becoming involved in the program. Matrix ESI assumed responsibility for the marketing task when the escalator companies neglected to market the program. The maintenance staff that provides the monthly

[22] Matrix ESI Web site, August 8, 2008 WWW.Matrixesi.com.

service inspections does not necessarily have the expertise needed to install the PowerGenius™ controller. Matrix Inc. provided training for a couple of service contractors to get them more comfortable with the technology and the installation process.

Originally Matrix ESI planned to install the PowerGenius™ controllers on at least 240 escalators. However, according to the database 100 controllers were installed in 13 sites. Of these controllers, three customers contacted for the evaluation indicated they had removed the controllers or were not able to participate in the program. A more realistic estimate based on current information is 76 controllers were installed in 10 sites.

7.1.2 Technology Description

Power Efficiency's technology (branded as PowerGenius™) "reduces the amount of electricity used by a lightly loaded motor operating at constant speed. Based on technology originally licensed from NASA, Power Efficiency has developed critical patented and patent-pending improvements to NASA's technology. Power Efficiency's energy saving technology works on constant speed/variable load applications. It can be retrofitted onto existing equipment or included as a component for original equipment manufacturers". [23]

The controller "is a device designed to work with an electric motor and optimize the motor voltage at partial loads to reduce magnetic losses in the motor core. This action reduces the electrical demand and energy consumption of the electric motor. This type of motor controller is most beneficial in reducing losses for motors running for long periods at low loads, usually below 30%. Other benefits, such as soft start capability and the potential for longer motor life may influence a user's decision to install a motor controller, but do not impact electric utility operations…"[24]

7.2 Process Evaluation Methodology and Sample Design

A variety of market and utility actors were interviewed by telephone during the evaluation of the Escalator PowerGenius™ Program. The sample design was developed specifically for this program but has similarities to the other programs in the study. Both the evaluation methodology and the sample design are discussed in detail below.

7.2.1 Process Evaluation Methodology

The process evaluation assesses the third-party implementer's delivery of the Escalator PowerGenius™ program, identifies barriers and possible solutions for overcoming these barriers, and reviews the program's logic models. These core researchable issues were addressed:

- Has the program been successful in contributing to core objectives of the IDEEA program?
- Are there any problems with each program's design or operation?

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[23] www.power-genius.com

[24] NEVADA POWER TECHNOLOGY FIELD TRIALS PROGRAM – Final Report ***Power Efficiency Corporation Performance Controller April 26, 2006. Paragon Consulting(page 4)***

- Are the available resources sufficient to effectively operate the program?
- Are the program processes efficient and effective?
- What target audiences are each program trying to reach, and do they offer a substantial potential for scaling up the program?
- Are there any unnecessary barriers to customer participation?
- Are there any unwanted behavioral responses by customers or other market actors that may impede the program in achieving its goals?
- In what ways, if any, could the program designs and operations be improved?

The SCE program manager and two representatives from Matrix ESI were interviewed for this evaluation. The program manager interview guides included a discussion of the programs' goals, the program's design and operations, program marketing, program evaluability, quality control, program improvement, barriers to participation and lessons learned.

The Program Participant interview guides included topics such as the respondent's background, program marketing and outreach, program delivery and implementation, the decision making process, the current market for the PowerGenius™ technology, free ridership and spillover and customer satisfaction.

7.2.2 Sample Design

The sample frame used for PowerGenius™ Program evaluation is shown below in Table 7-1.

For the Escalator PowerGenius™ Program, the SCE program manager, an engineer and a member of management at Matrix ESI, three participants, one program drop-out, one nonparticipant and one manufacturer's representative were interviewed. Program participants included the Operations Manager for a 1.1 million square feet mall with four anchor stores, a second mall Operations Manager, the Manager of Facility Services for a chain department store, an Energy Manager for county government, and the Field Maintenance Supervisor for an escalator manufacturer. All 13 SCE customers on the list of program participants were called during this evaluation. Two of the customers said they did not participate in the program; one of them agreed to an interview. The Energy Manager for the theme park reported that a few controllers were installed and then removed.

The in-depth discussion guides are attached in the appendix. On average, program manager's interviews lasted from one to two hours and participant interviews lasted about half an hour. They were conducted by Summit Blue analysts from January and February 2008 and in May to August 2008.

Table 7-1. Sample Design for the Escalator PowerGenius™ Program

Type of Respondent	Number of Proposed Interviews	Number of Completed Interviews
Program Implementer / Sponsor	3	3
Program Participants	6	3
Program Dropout	0	1
Program Non Participant	6	1
Escalator Manufacturer Representative	0	1
Total Respondents	15	9

7.3 Process Evaluation Results

This section presents the findings of the interviews conducted to evaluate the Escalator PowerGenius™ Program for Southern California Edison from a process perspective. In-depth phone interviews were conducted and the results of those interviews are presented in the following sections: an overview of the evaluation and the detailed results from the interviews with program staff, program participants, program dropouts and an escalator service company.

7.3.1 Overview

Escalator service companies played a central role in the delivery and potential success of this program but not the role originally planned by Matrix ESI. The original program was designed around the assumption that the escalator service company would market the escalator controls to their current customers. Escalator service technicians were unfamiliar with the technology, disinclined to take on the marketing role and were not enthused about the additional work load. Not all technicians were equally skilled and some companies did not have any technicians with the appropriate skills. Because of the contractual relationship between the SCE customers and the escalator service company to conduct the mandated monthly inspection of the escalators, the service company was in a position to control the destiny of the program. At least one of the four or five service companies in the SCE service area refused to participate in the program.

The third-party implementers would improve the program with a larger budget to train the technicians, incent them to support the control technology, subsidize the installation and extend the length of the program. The SCE program manager agreed that a direct install program would have been more successful in this case.

It is unclear if the Escalator Power Genius Program met the goals of the IDEE program as a dispute arose during the program about the capability of the controller to deliver measureable energy savings to customers. Matrix ESI metered about six sites to verify the electric savings, but critics claim the electric savings cannot be detected by the average utility billing meter.

Escalator control technology is slowly penetrating the new escalator market but the retrofit market, while substantial in size, will continue to be a difficult market to enter. Both the SCE Program Manager and

Matrix ESI agreed that the costs and benefits of the program need to be more accurately quantified before the market for the program is expanded.

Matrix ESI marketed the program directly to SCE customers who found them to be very supportive and professional. A few customers found their escalator service company to be much less cooperative.

The cost of participating in the program was an issue for some customers. The SCE customer received the controller at no cost but was responsible for the installation costs. Price was an issue as some escalator service companies took advantage of their position to over-bid the controller installation.

Ideas for improving the program included more training for the escalator technician and the customer and an increased level of interest from SCE.

7.3.2 Detailed Results

The topics that will be discussed in this section include program design, marketing and outreach, program implementation and operations, program participant results and other program dimensions.

7.3.2.1 Program Design

Implemented as Designed?

The original program design was for the escalator service technician to install the controllers during the monthly service call. The unjustified design assumptions were:

- Escalator service companies played a much smaller role in marketing the program than expected as they did not have the skills or inclination to market the program.
- The propensity for escalator service companies to be enthused about additional work load. Most escalator technicians are fully booked without the demands of the PowerGenius™ program.
- Escalator service technicians must have special training, have a valid state license, and are union workers. Some are more highly skilled and are assigned to repair escalators. Others are less skilled and are assigned monthly inspections. The original plan was for the service company to install the controller during the monthly inspection. However, not all escalator service technicians were skilled enough to install the controllers, a situation not anticipated by the program designers. Some firms have few or no technicians qualified to install the controllers. Scheduling an installation time with qualified technicians that was convenient for the customer slowed the implementation process.

Program/Design Improvements

The third-party implementers voiced these ideas for improving the program:

- More discretionary money in the budget for training. To help mitigate the concerns of the service providers, dollars should be invested to pay the escalator service workers to be trained on the new technology. This would take away their fear of the equipment.
- Subsidize the installation.
- Develop relationships with escalator service providers and incent them to market the program to their customers. They could do the first contact and the third-party implementer would follow up.

- Need longer time frame to launch the program. This type of program should be long term not short term. You need to find the difficulties and fix them before the program can be successful

The SCE Program Manager gave these ideas for improving the program:

- The third party implementer should partner with someone who has more access to the market
- A better approach would be a direct install with no out of pocket expense to the customer
- Better leveraging of the SCE account executives. Using the account executives to contact the customer first makes the sell easier

Meeting Program Goals

In January, the SCE Program Manager reported that the program was not meeting program savings goals. The program was extended for six months in hopes that it would be more successful by mid-year. The program was terminated at the end of July, 2008 and the Escalator PowerGenius™ Program was not able to meet its projected goals. Matrix representatives believed that the program would have been more successful with another six month extension. Their evidence is that in the last month of the program they installed as many units as the first 17 months of the program.

It is unclear if the Escalator PowerGenius™ program was meeting the SCE INDEE program objective of saving energy although it was clearly targeting equipment with low market saturation that is not normally a target of energy efficiency programs, according to the Matrix Program Manager.

Evaluability

Matrix ESI representatives asserted that they were continually tracking as much information as they could on the SCE customer and the details of the installation.

The Escalator PowerGenius™ Program suffered from two severe problems in the area of evaluability:

- Since only licensed escalator service workers are allowed in the pit area of an escalator, it was not possible for either SCE or Matrix ESI to verify that the PowerGenius™ controllers were installed and installed correctly.
- Controversy arose over the ability of current technology to confirm that the controllers achieve bill savings. The manufacturer and Matrix ESI both found that the controllers were able to reduce energy use by about 30% and achieved an acceptable payback. However, a utility engineer asserted that current metering technology would not detect the energy savings, and that, therefore, the energy bill would not be reduced by the escalator controller. The issue that was raised is whether the savings are ‘real’ or not.

In response, Matrix placed meters on 6 or 7 controllers to verify the savings estimates. They were able to verify manufactures claims of savings between 20% and 40%. Critics claimed that the measurements do not verify savings at the utility meter level. More sophisticated metering techniques will be needed to settle this controversy.

Non Energy Benefits

While Matrix ESI did not explicitly market the non energy benefits of the controller, a few customers mentioned that the ‘soft’ start of the controller increases the life of the escalator motor and other equipment. Customers also gained the benefit of ‘being green’.

7.3.2.2 Marketing Conditions

Marketing conditions include a number of market factors that impact the success of the program such an awareness of the technology, market demand, sales, future program opportunities and barriers to the widespread adoption of the escalator control technology.

Awareness of Technology

Customers were somewhat aware of control technology but were not aware of how it could be applied to escalator equipment. However, there was lack of awareness and resistance from the escalator service firms toward the control technology.

Market Demand for the Product

Matrix ESI estimated there were about 2,000 escalators in the SCE service territory. Many of them would be in the market for an escalator controller if SCE demonstrated the energy savings and if they continued to support the program. The savings estimates do not provide a two year payback without the support of the SCE incentive.

Future Prospects for the PowerGenius™ Program

Escalator control technology is slowly making its way into the new escalator market but awareness in the retrofit market is very low, according to the escalator manufacturer that participated in this study. She believes that utility support is needed to market the technology

Neither SCE nor Matrix ESI suggested scaling this program to a wider audience until its implementation problems, especially the issues with the service providers and savings verification, are solved.

For this technology to become mainstream, program participants said it will be important for the costs and benefits to be quantified and for the utility rebates to include the installation costs.

Barriers to Widespread Adoption

A major barrier to widespread adoption of the escalator control technology is the cost. The payback for the cost of the controller and the installation is about four years. Most program participants indicated they need a one-to-two year payback on energy efficiency investments.

The second major barrier is the escalator service company. The details of the program's relationship with the escalator service company are discussed elsewhere in this report.

7.3.2.3 Marketing and Outreach

In this section, a number of topics are discussed including how the technology might fare in the marketplace, customer reactions and acceptance of the new technology, program benefits and market barriers to the adoption of the program.

Marketing Activities

Once Matrix ESI realized that escalator service companies were not successfully marketing the program, they began marketing the program directly to malls, department stores and casinos. They were most successful with malls and department stores. Matrix ESI devoted resources to contacting the appropriate

decision makers. SCE provided contact names and opened doors for the first contact with some customers.

The second step was for Matrix ESI to send their marketing materials and schedule a presentation for interested customers. Program participants found the presentation to be professional, well written and informative.

Participation Reasons

Program participants included malls, department stores and an amusement park. They all participated in the program to save money on their energy bill.

Concerns with Program/Technology

Participants were concerned about their shoppers' or guests' comfort and safety and about the ability to move customers from one area to another.

Most of the program participants had all of their questions answered by Matrix ESI, understood the technology and did not have any concerns.

One customer did have concerns because they had installed a controller on their escalators some time ago and it sped up unexpectedly and was removed for the safety of the guests. Matrix ESI convinced him to install the new controllers and they experienced a similar problem. One of the down escalators suddenly sped up and threw guests to the ground. Some of them jumped to the up escalator to escape. No one was seriously hurt in the incident but some guests received scratches and bruises. All of the controllers at this site were bypassed or removed because of this incident. Matrix ESI representatives think the controller was undersized for the escalator motor. Escalator service companies are provided with detailed instructions on how to properly size and install the controllers. Matrix ESI argues that the escalator service company was at fault for improperly installing the controller.

Market Barriers

The cooperation of service companies was the most significant market barrier.

Another barrier to the success of the program was the risk adverse nature of the customers in the target market. The retail industry is fickle, according to the third-party implementer, and their goal is to move people through the store. Store Managers do not want the escalators down or risk then going down; energy savings are not their primary focus. Store and mall managers wanted to install a couple of controllers, meter them, and then go through an approval process with upper management before installing more controllers. This process delayed the program significantly.

7.3.2.4 Implementation and Operations

In this section, we discuss a number of topics such as the program administration, quality control and operations, program installation issues, customer satisfaction scores and ways to increase customer satisfaction.

Highlights of Program Accomplishments

Matrix ESI delivered the program effectively and efficiently once the start up problems were solved. The program was extended six months and ended in July, 2008.

Program Administration

Matrix ESI was effective and efficient in maintaining the SCE SMART database during the program.

The Program Manager and Matrix ESI found the marketing brochure to be ineffective; it was abandoned in favor of direct selling. One of the Matrix ESI representatives agreed that mailing out brochures was probably necessary but did not lead to sales. He found that direct contacts and emailing information was more effective.

Most Energy Managers were risk averse and needed upper management buy-in for the program. Some of them wanted to install two controllers as a test before they made a commitment for the entire mall or building.

The impact of the problems with the program administration was that the sales cycle was much longer than anticipated.

Program Quality Control

Matrix appeared to have met the SCE requirements for quality control. They kept detailed records that were uploaded to the SMART database in a timely manner.

Program Operations

Most program participants were satisfied with the technology and the performance of Matrix ESI. Program operations improved once Matrix ESI began marketing the program more aggressively, according to the third party implementers. They tracked their customer contacts and collected more data as the relationship progressed towards participation. Matrix ESI monitored some of the installations at the panel or the motor.

Matrix ESI were less pleased with the performance of the escalator service companies. One company refused to install the controllers at all. In another company, upper management agreed to participate in the program, but the district offices refused to cooperate with the installation requests. This particular district office wanted a minimum of 30 installation requests to justify assigning a team to the project. From the perspective of the escalator service company, the controller was difficult to install and had the potential to cause more maintenance problems in the future. Another company solved the issue by over bidding the cost of the controller installation to discourage customers from participating in the program.

Another operational issue was the legal requirements for entering the 'pit' where the escalator equipment is installed. The rules are very strict and only trained technicians are allowed. Neither SCE nor Matrix EIS employ a trained escalator technician. This lack of access prevents both SCE and Matrix ESI from entering the pit to inspect the equipment

Another challenge was that the cost of installation was priced excessively by some escalator service companies. It was higher than anticipated, because of the inexperience of the installers and the complexity of some installations. For instance, while Matrix ESI estimated the installation cost given the current hourly rates should range from $800 to $1,000 per controller, some escalator service companies were estimating installation costs from $1,550 to $3,000 per controller. The exclusive relationships between the escalator company and the mall or department store management prevented the customer from avoiding the inflated installation costs. Toward the end of the program, Matrix ESI established relationships with a couple of these escalator service companies and negotiated a fixed price installation cost.

Finding a mutually acceptable time for both the customer and the escalator service company for installing the controllers was an issue for a few installations.

Operations Improvements

Third-Party Implementers shared the following ideas for improving the operations of the program:

- Send the escalator service technicians from each office to the factory for training on how to install the controllers.
- Educate the customers so they can negotiate a reasonable installation price with their escalator service company.

SCE Program Manager also expressed some ideas for improving the operations of the program:

- Need to have more focus from SCE management. The SCE program manager should play a more active role in helping the third party implementer work through issues.
- SCE cannot verify the inspection of the equipment in the pit because of the law allowing only licensed operators in the pit. The current procedure is for an SCE engineer to sit outside the pit during the installation.

Program Installation Issues

The relationship between the customer and the escalator service company was more complex than expected. Since escalators must be inspected monthly according to California state law, facilities with escalators enter into a contractual agreement to ensure their escalators and elevators receive the inspection. If another escalator service company is allowed to breach the escalator 'pit', the contractual agreement would be broken and the warranty invalidated. Some SCE customers wanted to participate in the program but were prevented by their uncooperative escalator service firm. Neither SCE nor Matrix EIS employ a trained escalator technician. This lack of access prevents both SCE and Matrix ESI from entering the pit to inspect and verify the installation of the equipment.

Escalator companies were generally unfamiliar with this technology. Matrix ESI thought the controller installation process was simple. However, the escalator service companies did not trust the control technology, and found that customization was necessary with some escalator models. They may have expected the controller to increase their maintenance responsibilities.

Pricing was another issue for some customers. Matrix ESI expected the escalator controls to take about two hours to install and to cost about $800. Bids for controller installation ranged from $1,100 to $3,600 per escalator pricing some customers out of the market for the controls. According to Matrix ESI, the payback was two years with an installation charge of $1,100.

Higher prices may have been justified at the beginning of the program as even some skilled technicians originally struggled with controller installation. Every escalator brand is unique and the wiring configuration between the escalator and the controller installation must account for the uniqueness of the system, which drove up the cost of the installation to levels unacceptable to customers and contributed to the attitude of escalator service companies toward installing the controllers.

Some specific installation issues were also encountered. One controller developed a noise that could not be fixed. In another installation, the escalator was old and required additional maintenance before the controller could be installed. This service fee was quite costly for the customer.

Participant Satisfaction

Program participants were very or somewhat satisfied with the program and the controllers. One participant said that they controllers do what they say they will do and that program participation was

easy. Two participants mentioned that Matrix was very supportive and worked with the escalator service company many hours to get the controls installed.

The participant that was only somewhat satisfied with the program said that he would have been more comfortable if they were performing the data logging themselves to verify the savings. He pointed out that it is impossible to detect any bill savings because the escalators are metered with the rest of the facility.

Suggestions to Increase Participation

No new ideas were brought forward by customers as ways to increase participation in the Escalator PowerGenius™ Program. The three ideas that were restated were:

- Solve the controversy over the savings potential and provide convincing evidence for the savings estimates
- Rebate both the controller and the installation costs
- Get the escalator service companies to accept the program

Matrix ESI made the following suggestions to increase program participation:

- Invest in the metering equipment to prove or disprove the controller savings.
- Pilot the program in one facility and monitor to confirm meter savings
- Educate the escalator service worker to install the controller more efficiently, educate the customer on a reasonable cost for installation.
- Develop better relationship with the escalator service companies. Develop the relationship to the point where they can conduct the first level of marketing the technology to the customer and feed the names of interested customers to Matrix.

Corporate Energy Policy

Only one study participant said they had a formal energy policy and their organization was part of a multi-national corporation. The non-participant also said they had an energy efficiency policy. Most participants reported an informal policy of attempting to install energy efficient equipment when it was feasible.

7.4 Logic Model Review

7.4.1 Logic Model Review Findings

The existing logic model was substantially complete and provided a nearly accurate picture of the programs operation. The program intended to increase market awareness and market penetration of the escalator efficiency technology. The technology was to be marketed through escalator service companies. Customers would adopt the escalator power genius controller technology. Verifying the energy savings information and sharing it with customers will increase awareness and acceptance of the new technology.

Customers will install additional controllers. The installed power controllers will adjust escalator energy consumption resulting in energy and demand savings in this market sector. [25]

7.4.2 Revised Logic Model

Significant changes were made to the marketing of the program and are incorporated into the logic model below. First, the technology was marketed directly to SCE customers by Matrix ESI rather than through the escalator service companies. Some support was provided by SCE account executives.

Next, the awareness of the technology and its benefits can only be realized through training the technicians and other service company staff. Matrix ESI enjoyed limited success in recruiting technicians for training opportunities. Many technicians were unsupportive of the escalator controller technology and provided limited or no support for the program.

Another area under revision was the issue of verification of installed controllers by either SCE or Matrix ESI. Because unlicensed technical staff were excluded from the escalator pit by law, verifying the installation of the controlling or verifying the controller was installed properly were not possible for this program.

Figure 7-1 presents the segment theory for the Escalator PowerGenius™ Logic Model. Table 7-2 presents the linkage table.

[25] Early M&V Review Final Report, Prepared For: Southern California Edison, November 26, 2007

Figure 7-1 Logic Model for the Escalator PowerGenius™ Program

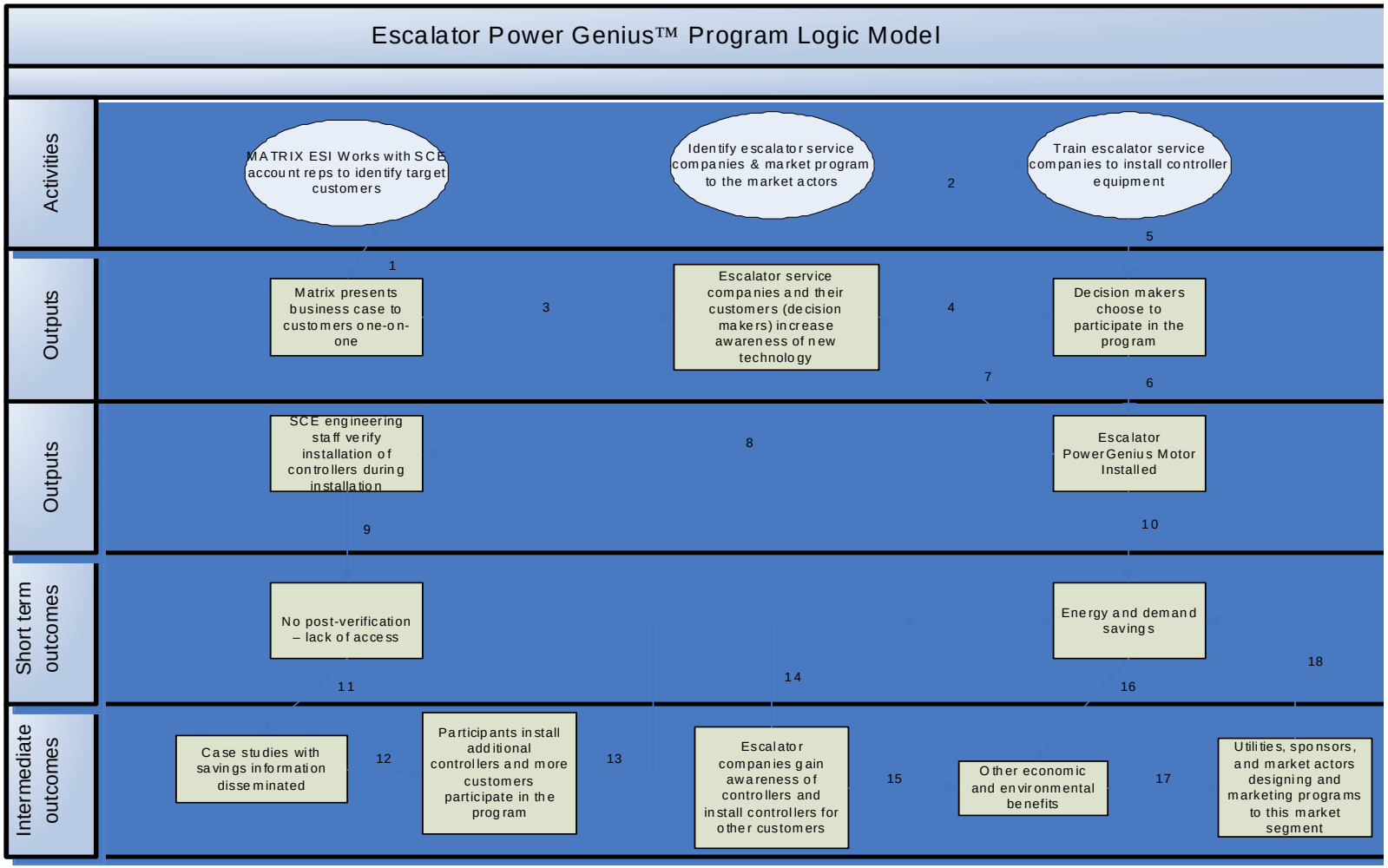

Table 7-2 Escalator PowerGenius™ Program Logic Model

Link	Segment Theory	Potential Indicators	Success Criteria
0	Coordination between program implementers and SCE Account Representatives to identify potential malls, department stores, casinos, amusement park, etc.	# of potential customers with escalators who express interest in the program	
1	Present benefits of the program in presentations to malls, department stores, amusement parks or casinos	# of presentations given by Matrix ESI # of companies who agree to install PowerGenius™ controllers	# of contacted customers who agree to participate in the program
2	Identify escalator service companies and market the program	# of contacts with escalator service companies in SCE service area	Escalator service companies are supportive of the PowerGenius™ controller technology
3.7	Increased awareness of new technology by both escalator service companies and SCE customers		
4	Decision makers choose to participate in the program		
5	Train escalator service company technicians to properly size and install the controllers	# of escalator service company technicians who are factory trained to install the controllers	
6	Escalator PowerGenius™ controllers installed	# of controller installations tracked by SMART database Energy and demand savings	
8	SCE and/or Matrix ESI engineering staff confirms the installation took place during the installation process	# of controller installations with SCE or Matrix engineers present during installation	

9	Post installation verification by either Matrix ESI or SCE engineers limited by lack of access to escalator pit	Documentation sent to SEC program manager for review	
11	Case studies developed from metering data or third party verification of savings	# of case studies developed	
12	Program participants install additional controllers	Energy or demand savings Utilities designing more programs for malls, department stores, etc.	Part of impact evaluation
14	Escalators gaining awareness of the technology and installing controllers outside the SCE program	Energy and demand savings	Part of impact evaluation
15	Other environmental and economic impacts		
17	Utilities, sponsors and market actors designing and marketing programs	Other targeted offerings in the portfolio	
10,13,18	Energy and demand savings	Utilities designing more programs for malls, department stores, etc.	Part of impact evaluation

7.5 Lessons Learned and Recommendations

7.5.1 Lessons Learned

Every program is a learning experience and the Escalator PowerGenius™ Program was no exception. The SCE Program Manager learned a number of lessons from this program:

1. SCE needs to perform a more detailed analysis of the technology programs. A closer look would have revealed that the electrical savings estimates from this technology were controversial.

2. SCE has found that this program and others designed to be delivered by third-party implementers as turn-key programs require more support from SCE than expected. The third-party model is not working as well as they would like in the area of new technology.

3. They may well have under-estimated the program management needs of small programs. SCE program managers are assigned programs of varying sizes with most of the program resources assigned to the larger programs. No matter how small the program some level of over sight is necessary. This program may have been more successful with more active involvement by SCE.

The Matrix ESI engineer responsible for marketing the program directly to SCE customers reported that he learned how to market to commercial establishments and handle technicians can require 'handling'. In addition, he believes that Matrix ESI should have gathered more detailed information about the make and model of the escalator to ensure the correct unit was installed.

Matrix ESI management also learned a few lessons on bidding new technology programs:

1. Ask for more than one year when implementing new technologies in the marketplace. They should have requested at least two years for this program.

2. For new technology programs, bid the marketing budget separately from the budget defined by the savings estimates. The per-unit incentive to Matrix ESI was inadequate to cover the costs of marketing the program on a per unit basis. They spent the budget up front and were not able to install enough controllers to recover their costs.

7.5.2 Recommendations

A number of recommendations have been developed for improving the PowerGenius™ Program and new technology programs and are presented here:

1. Obtain cooperation of the participating escalator service companies. The implementer should develop a partnering relationship with one or more escalator service companies that include training in installation, maintenance and marketing of the control technology.

2. Develop a verification process. In the state of California, any person entering the 'pit' area must be a licensed technician. Neither the third-party implementer nor SCE could access the pit to verify the controller was properly installed.

3. This application and similar applications of control technology are not appropriate for energy efficiency programs until a definitive study confirms or denies the claimed savings estimates.

4. SCE should consider a one to two year or one to three year time horizon for new technology programs. One year was not sufficient for this program to reach its potential. Matrix ESI was contracted to implement the program for one year. SCE extended their contract for an additional six months. IDEEA programs involving new technologies or existing technologies marketed to a new market require more time to be successful.

5. SCE should take a closer look at the marketing plan and the assumptions behind the marketing plan recommended by the implementer. Either SCE or the implementer must take responsibility for marketing the program and the technology rather than assume installers will provide marketing.

6. The SCE Program Manager was not able to devote much time to program administration and oversight. While Matrix ESI professionally marketed the PowerGenius™ Program, it may have suffered from lack of attention to the details of the program.

7. SCE program planning staff should assume that a program that touches customers with assigned account executives will need the assistance of those account executives to market the program.

8. Turn-key program management may not be a sustainable model for new technology programs for either program management or funding. SCE may want to consider an alternate method for funding and managing new technology programs.

APPENDIX A – 80 PLUS PROGRAM INTERVIEW GUIDES

APPENDIX B – VARIABLE SPEED POOL PUMP PROGRAM INTERVIEW GUIDES

APPENDIX C – NIGHTBREEZE PROGRAM INTERVIEW GUIDES

APPENDIX D – PLUGGING THE CONSUMER ELECTRONICS GAP PROGRAM INTERVIEW GUIDES

APPENDIX E – GROCERY AREA ENERGY NETWORK PROGRAM INTERVIEW GUIDES

APPENDIX F – ESCALATOR POWERGENIUS™ PROGRAM INTERVIEW GUIDES