2002 Demonstration and Information Transfer Program Evaluation

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EXECUTIVE SUMMARY

This report summarizes the results of an evaluation of Southern California Edison Company's 2002 local crosscutting Demonstration and Information Transfer (DIT) program. In this report, we provide an overview of the program design and objectives, review PY2002 program activities and progress toward goals, and provide an overall assessment of the program.

Program Description and Objectives

The DIT program seeks to identify new technologies that are in the research or early commercialization phases of development and to fund and test these ideas in a way that will 'push' them further in the development cycle. The program focuses on energy efficient applications with significant market potential, and commercial energy efficient applications with low market penetration. Demonstration projects, conducted at either customer sites or in controlled environments, provide design, performance, and verification of novel energy efficient systems, helping to reduce the market barriers to their wider acceptance.

The intent of the program is to accelerate the introduction of viable energy efficient technologies, applications, and analytical tools that are not already widely adopted in Southern California Edison's (SCE) service territory. Program efforts are therefore directed toward new technologies and design practices targeting both residential and nonresidential customer segments, including new construction. It is understood that some of the new demonstrations undertaken within the DIT program might indicate that the technologies are not suitable for commercialization, but this is not by any means regarded as a failure. Some technologies may be more mature but program support is justified because the technologies are being applied in a new area or in a market where there is not a large adoption rate.

The DIT program is closely related to the statewide Emerging Technologies (ET) program, but is local in scope. That is, the technologies and services selected for investigation by the program are of particular interest to customers located within SCE service territory. Getting these technologies or models "out of the lab" means the DIT program serves as an incubator for statewide implementation through such programs as the Express Efficiency program or the statewide Emerging Technologies program.

The DIT program is an "information only" program that focuses on the dissemination of emerging technologies to all customers. The program was selected for implementation based upon the potential for long-term market transformation as opposed to the resource value generated by the program.

Although the Local DIT program does not have specific goals for the hard to reach market segments, the information the program generates through its demonstration activities is intended to benefit all customers. One of the aims of the program is to explore the potential technical and economic feasibility a new technology may have in various market segments, in an effort to characterize the widest possible deployment opportunities. Thus, the information transfer is intended to leverage the utility's overall efforts aimed at hard-to-reach customers.

PY2002 Projects

The CPUC filing for this program sets out the following goals for the program:

> SCE will perform three Emerging Technology Application assessments. The technology-application assessments may consist of a diversity of project types including: feasibility studies, simulation analysis, field demonstrations, controlled environment tests, commercial product development, design methodologies and tool development. These assessments may take up to three years to complete.

Based upon our evaluation, SCE has met these goals. The SCE Local DIT team selected six projects for funding and analysis that fit the established criteria. These projects, as well as the budget for each project, are shown in Table 1, below.

Table ES-1: PY2002 DIT Program Projects

Project	Budget	% of total
High Speed Hands Dryer	$15,000	4%
Spray-on Radiant Barrier	$47,000	12%
Low-e Pigment Paint	$56,500	14%
Improved HVAC Performance Using UV Light	$15,000	4%
Advanced Heuristic Thermostat Control System	$30,000	8%
Integrated Design for Nonresidential Retrofit Bu	$233,000	59%
Total	**$396,500**	**100%**

The full impact of the PY2002 DIT program will not be known until after each of the individual projects reviewed herein has been completed. Based upon this interim review, however, it appears that the program is successful in achieving its objectives. Six projects were selected for funding and significant progress was made in each. The one project that has advanced the furthest in the process – the Integrated Design pilot – appears to be, by all accounts, quite successful in advancing integrated design strategies in a retrofit setting. Moreover, this work is advancing the development of a statewide initiative addressing energy efficiency opportunities during school modernization in California.

Recommendations

Based upon our review of program materials and discussions with program staff, there are several areas in which we feel the program may be strengthened further.

- **Refine Program Theory** -- Our review of the program theory, as filed for this program, suggests that it may not fully reflect the DIT program. With the exception of the Integrated Design project, the primary objective of the majority of projects selected in 2002 is to determine whether or not dissemination and information transfer are warranted. Once it is determined that such efforts are, in fact, warranted there may be a Phase II effort in which more aggressive demonstration and promotional efforts are

undertaken. At present, such phasing of the efforts is not accounted for within the program theory.

- **Track and Document Project Selection** -- Program staff mentioned that they are receiving calls throughout the year from customers, vendors, and manufacturers, asking questions about or requesting the demonstration of new and potentially valuable energy-savings products. Handling these calls in themselves is a valuable service to SCE's community; and oftentimes the response provided satisfies the inquirer's needs. Other inquiries require research and follow-up by DIT staff to determine what research, testing, and demonstration has already been performed. When the team identifies a product or service with sufficient promise, but lacking in previous demonstration, it is considered for inclusion in DIT. The program does not currently log and track each inquiry, nor does it at this point have a well-defined project selection process. As such, the magnitude of thought that is put into the identification and final selection of projects is not fully appreciated.

  Our recommendation is that DIT program staff develop a formal log and tracking system to record each query and document what actions have been taken. This simple log should indicate how the query was resolved if it was, or where it currently stands in the process chain, including: initial research, considering funding, formal DIT project, and post project communication. The intent of this log is not to formalize the selection criteria, as we believe the informal selection process is appropriate for this program; but instead to document the complete range of projects that are considered for inclusion, and the reasons for selecting the final projects. The queries received by SCE for this service are many, and to document both the magnitude and the range of such requests will help to demonstrate the important role of this program.

- **Develop an up-front business / implementation plan for each project** -- In conducting this evaluation research, the question we asked of each interviewee is to "tell us about your project." Aside from very brief written descriptions included in CPUC filings, the projects are lacking in documentation. To provide for clearer documentation internally at SCE, and among various stakeholders in the DIT program, we recommend that an individual project "business plan" be prepared to document and communicate the following items: (1) rationale for selection, (2) goals and objectives of the project, (3) target audience for the project, (4) timeframe, (5) anticipated outcomes or possible scenarios, and (6) plan for disseminating results. Having such a plan will aid in several areas. First, it will provide a reference point against which progress may be assessed. Second, it will provide a means of communicating with others about the project. Finally, it will ensure that the intended information dissemination approach is thought through in advance of initiating the project.

- **Develop final information dissemination plan for each project** -- The information dissemination efforts for each project are, at this point, very informal. Given the level of innovative work that is being done in each of the projects, the program would benefit from a more concrete plan that identifies specific audiences and is tailored to get the word out to these audiences. It is therefore recommended that, upon completion of each

project, a final information dissemination plan be prepared. This plan, building upon the initial plan contained within the project business plan, will serve as a roadmap for staff and others who play a role in publishing and promoting information about the projects. Again, the idea is not to impose a burdensome requirement, but rather to implement a discrete strategy that reflects the unique market for each of the technologies and / or services considered in each project.

- **Prepare project close-out report** -- As the program continues into the future, having final project reports that provide a discrete summary of project results would be helpful to document the experiences and results obtained, as well as key lessons learned and next steps. These reports, once archived, will provide valuable information for future project managers.

1. INTRODUCTION

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1.1 Methodology

The DIT program was newly implemented during PY2002 as a local program approved by the CPUC. Within the overall DIT program, there are individual projects. The overall program was not approved until May 2002, thereby resulting in a limited set of project-related activities during 2002. It is important to understand that, given the nature of the program, the development and execution of individual projects may take as long as three years. Since there was limited program activity to assess, the scope of this evaluation has included a review of planned projects that were funded under the 2002 program, as well as an overall assessment of the program theory and design. To inform the evaluation, we have relied heavily upon in-depth interviews with the program staff to understand in more detail the goals and objectives of the program and each project. One project was sufficiently far along in the process that we were able to interview a number of participants and solicit their feedback to support a more in-depth assessment of that particular project.

1.2 Report Organization

This report first provides a summary of the program design, including the underlying program theory. We then provide a summary of the projects initiated in 2002. An in-depth look at one of the PY2002 projects is provided, based upon in-depth interviews conducted with program participants. Finally, based upon our review of the program and current projects, we provide a summary and recommendations for improving the overall program.

2. PROGRAM OVERVIEW

In this section, we provide an overview of the program, including a general description of the program, a review of the underlying program theory, and a description of the project selection process, project execution, and information dissemination.

2.1 Program Description

The DIT program seeks to identify new technologies that are in the research or early commercialization phases of development and to fund and test these ideas in a way that will 'push' them further in the development cycle. The program focuses on energy efficient applications with significant market potential, and commercial energy efficient applications with low market penetration. Demonstration projects, conducted at either customer sites or in controlled environments, provide design, performance, and verification of novel energy efficient systems, helping to reduce the market barriers to their wider acceptance.

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The DIT program is an "information only" program that focuses on the dissemination of emerging technologies to all customers. The program was selected for implementation based upon the potential for long-term market transformation as opposed to the resource value generated by the program.

Although the Local DIT program does not have specific goals for the hard to reach market segments, the information the program generates through its demonstration activities is intended to benefit all customers. One of the aims of the program is to explore the potential technical and economic feasibility a new technology may have in various market segments, in an effort to characterize the widest possible deployment opportunities. Thus, the information transfer is intended to leverage the utility's overall efforts aimed at hard-to-reach customers.

2.2 Program Theory

The underlying theory for this program is based upon that of the statewide Emerging Technologies program. This theory, described in detail below, is based upon a *diffusion-of-innovation* framework.

Within this framework, the technology adoption life cycle involves five stages, each characterized by a particular type of consumer: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards. Each group represents a psychographic profile – a combination of psychology, demographics, and firmographics - that makes its marketing responses different from those in other groups. Each type of customer is briefly described below (Moore, 1991).

- **Innovators**. They pursue new technology products aggressively. They sometimes seek them out even before a formal marketing program has been launched. Their endorsement reassures the other players in the marketplace that the product does in fact work.

- **Early Adopters**. Like innovators, they buy into new product design concepts very early in their life cycle, but unlike innovators, they are not technologists. Rather they are people who find it easy to imagine, understand, and appreciate the benefits of a new technology, and to relate these potential benefits to their other concerns. They do not rely on well-established references in making these buying decisions, preferring instead to rely on their own intuition and vision.

- **Early Majority**. They share some of the early adopter's ability to relate to technology, but ultimately they are driven by a strong sense of practicality. They know that many of these new inventions end up being passing fads, so they are content to wait and see how other people are making out before they buy in themselves. They want to see well-established references before investing substantially. Because there are so many people/firms in this segment – roughly one-third of the whole adoption life cycle – winning their business is key to any substantial profits and growth.

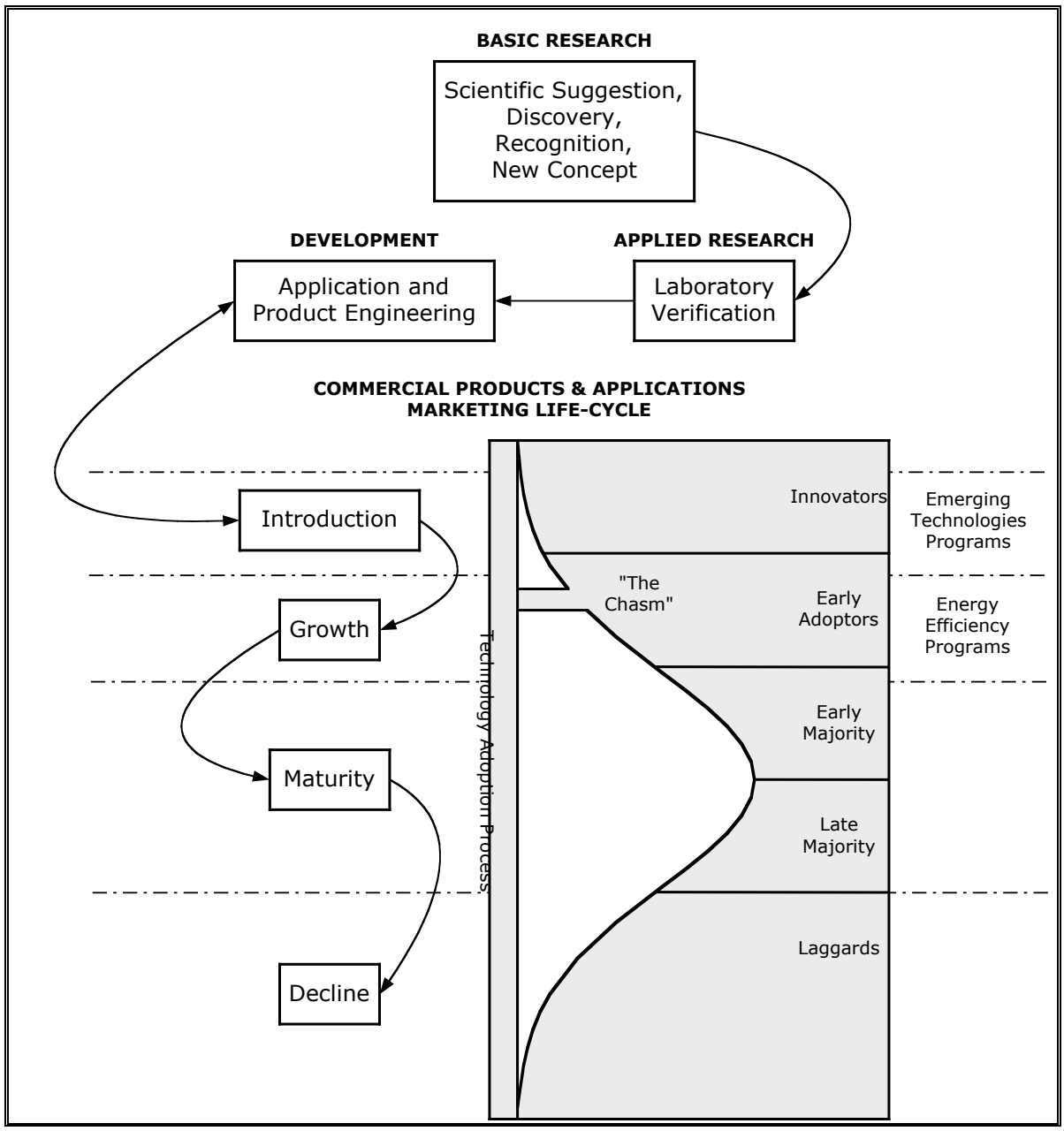
- **Late Majority**. They share all the concerns of the early majority, plus one additional one: whereas people in the early majority are comfortable with their ability to handle a technology product, should they finally decide to purchase it, members of the late majority are not. As a result, they wait until something has become an established standard, and even then want to see lots of support and tend to buy, therefore, from large, well-established companies.

- **Laggards**. These are people who simply don't want anything to do with a new technology, for any of a variety of personal and economic reasons.

The "*chasm*" in Figure 1 represents the area of need regarding emerging technologies and the focus of the ETP efforts. The chasm is: ". . .a discontinuity in the product life cycle that occurs from early adopter to the mass market." That is, the chasm separates the early adopters from the early majority. Crossing the chasm requires that those in the early majority receive something

that the early adopters do not need, the needed assurances from trusted sources regarding new technologies. Many new products fail because they are not able to cross the chasm in terms of new product design and marketing strategy, from the early market (early adopter) to the mass market (early majority).

Figure 1: Product Diffusion Lifecycle



SCE delivers the program to its customers through custom demonstration projects. Information Transfer will be disseminated through many different outlets, including the SCE Energy Centers, utility personnel, and community organizations. The Information Transfer activities are intended

to leverage SCE's overall energy efficiency communication efforts. Through the demonstration projects, comprehensive design methods and tools may be developed and disseminated, along with the performance information of the energy efficient emerging technology measures. The program pursues projects targeting both residential and nonresidential customer segments, including new construction.

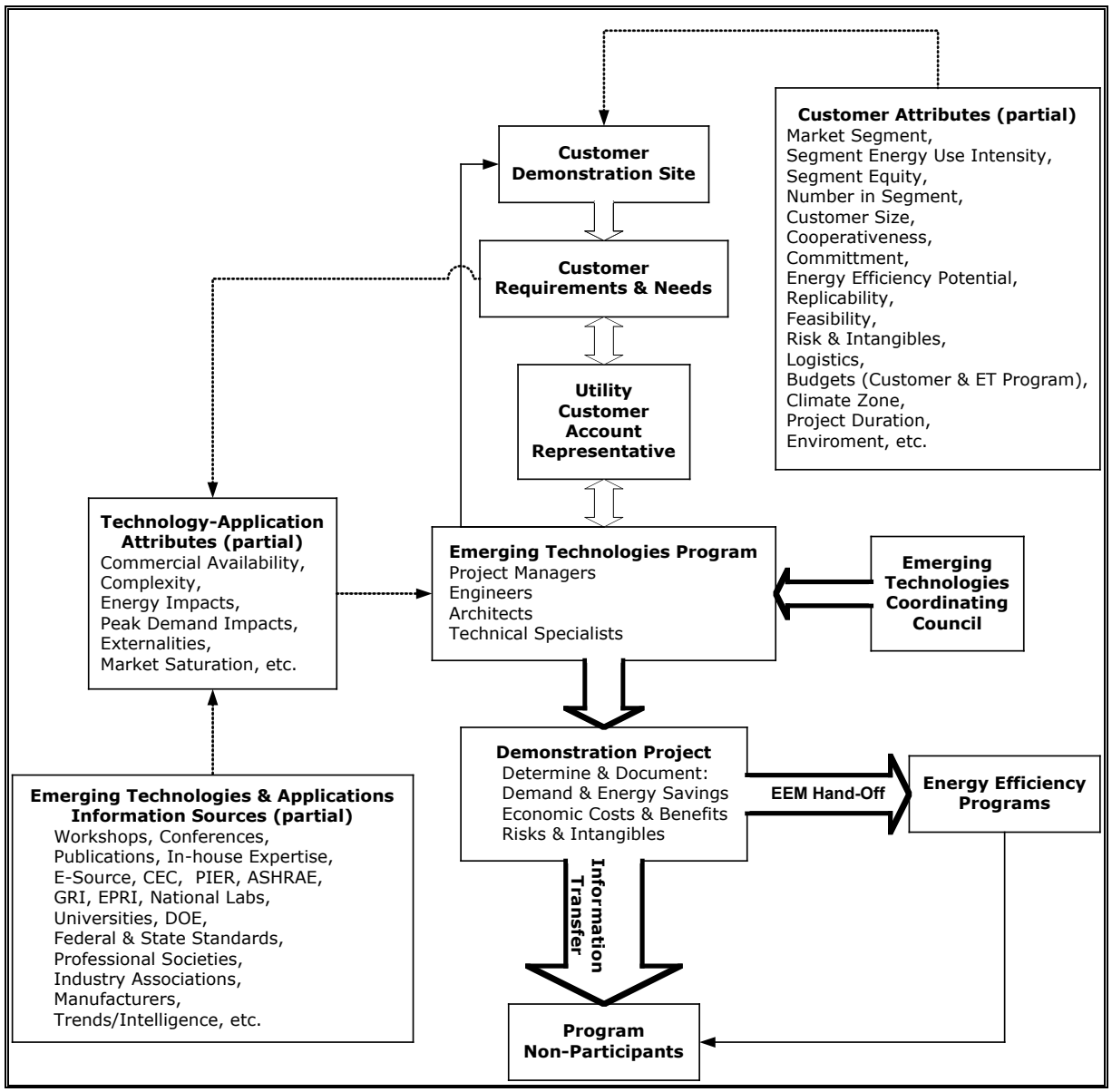
These demonstration projects may come about in one of two ways:

- *Customer "Pull."* A utility account representative may approach the program staff on behalf of a customer interested in pursuing energy efficiency. The program staff will help the account representative address the customer's needs, and at the same time, consider a range of potential energy efficient emerging technology applications.

- *Technology "Push."* The second manner that a project may come about is when a significant new technology application emerges. The program staff then approaches the utility account representatives for a particular market segment, inform them about the new technology application, and ask them to help identify a potential demonstration site from among their customers.

Figure 2 shows many of the considerations that go into demonstration projects at customer sites.

Figure 2. DIT Program Demonstration Process.



As is evident from the above discussion, the program does not follow a mass marketing approach, but a targeted approach to work with "innovators" that may further influence other customers. Some projects may not require a field demonstration at a customer site to evaluate equipment performance. But even for those types of projects, the program staff seeks to understand customers' needs and requirements. This helps ensure that project objectives are aligned with customer needs and expectations.

2.3 Project Selection

The demonstration projects selected for the program are intended to help measure, verify, and document the potential future energy savings of specific applications in different market segments. Information Transfer efforts disseminate project results and are customized to the targeted markets.

Throughout the course of a given year, consumers call SCE with questions regarding potential technology applications. Often, these consumers are wondering about the accuracy of energy-savings claims made by product manufacturers. Manufacturers also contact SCE with requests that the utility test their products and recommend them to customers. Although SCE is not in a position to endorse particular products, the company is interested in assessing the potential value of products that may be beneficial to their customers through improved energy efficiency.

Requests for project demonstrations are not formally tracked. Rather, projects are considered on an on-going basis and, once each year, staff members are asked to nominate potential projects for consideration by the program manager. These projects are reviewed and then, based upon a variety of factors, selected for inclusion in the portfolio of projects.

Projects are selected because they may have future widespread application in California or significant savings within a more focused market niche with SCE customers. There is an ongoing awareness, among staff, of market sector and equity issues. Once a project has been selected, there are typically several legal agreements that need to be executed between the various parties. Therefore, since most projects involve the cooperation of other parties, it can sometimes take months or longer to actually get all of the parties to agree to the project.

2.4 Project Implementation

A research plan is developed for each project that is formally signed and included in the DIT portfolio. These informal plans establish the protocols under which the demonstration will be conducted, the data will be collected, and the results will be measured. Each project plan is individually specified taking into consideration the research issues and the particular operational constraints at the demonstration site or sites. Implementation periods vary significantly among the projects. These periods may also reflect various stages or iterations of testing. Initial results often suggest additional conditions needing testing, or further refinement to the testing protocols.

Each project has an assigned project manager who is responsible for developing and implementing the project. At the outset, this task is focused on defining the project scope and finalizing all legal arrangements between the parties involved in a project. This may, in some cases, involve a three-party contract between the utility, the customer hosting the demonstration, and the contractor involved. Once these arrangements have been finalized, the project manager is responsible for all logistical and technical coordination that may be required to execute the project. Upon completion, the project manager is also responsible for documenting results and developing information materials appropriate for dissemination to target audiences.

Since many of these projects involve an assessment of whether or not products truly provide energy efficiency benefits, an important consideration for each project is the monitoring and verification element. Based upon our discussions with project managers, it appears that careful and thorough attention is being given to these measurement issues.

It is important to note that some demonstration projects may require three years or more to complete, commencing on the date an agreement is signed with a customer. The time required to complete a project will vary due to such things as how complex a new technology application is, construction schedules, building and process commissioning, and other logistical issues.

2.5 Dissemination of Project Information

As highlighted in the program theory, information dissemination plays a key role in the overall success of the program. The objectives of the information dissemination effort are to publicize the results or findings resulting from a demonstration project and to use this information to move the market forward along the adoption curve.

There are numerous potential audiences for this information, but they may be grouped broadly into two categories: internal and external. Internal audiences include energy efficiency program managers at SCE and at other utilities who may benefit from learning about the results from a project. Internal audiences may also include the Statewide Emerging Technologies Program and SCE energy efficiency program managers. External audiences may include a variety of market actors, including manufacturers, distributors, contractors, designers, and even customers themselves.

For both internal and external audiences, there are a variety of potential means of disseminating information. These include combinations of any number of the following dissemination tools:

- Detailed project reports,
- Design documentation,
- Professional and industry forums,
- Technical and non-technical publications,
- Trade journals,
- Trade shows,
- News stories,
- Video documentaries,
- Case studies,
- Detailed project brochures and fact sheets,
- Newsletters,
- Site visits and tours,
- Internet web pages,
- Analytical tools,
- Community-based organizations,
- Workshops, seminars, conferences, and

- Mainstream energy efficiency programs such as the utilities statewide Express Efficiency, Standard Performance Contract, and third party offerings.

3. OVERVIEW OF 2002 DIT PROJECTS

The CPUC filing for this program sets out the following goals for the program:

> SCE will perform three Emerging Technology Application assessments. The technology-application assessments may consist of a diversity of project types including: feasibility studies, simulation analysis, field demonstrations, controlled environment tests, commercial product development, design methodologies and tool development. These assessments may take up to three years to complete.

Based upon our evaluation, SCE has met these goals. The SCE Local DIT team selected 6 projects for funding and analysis that fit the established criteria. These projects, as well as the budget for each project, are shown in Table 1, below.

Table 1: PY2002 DIT Program Projects

Project	Budget	% of total
High Speed Hands Dryer	$15,000	4%
Spray-on Radiant Barrier	$47,000	12%
Low-e Pigment Paint	$56,500	14%
Improved HVAC Performance Using UV Light	$15,000	4%
Advanced Heuristic Thermostat Control System	$30,000	8%
Integrated Design for Nonresidential Retrofit Bu	$233,000	59%
Total	**$396,500**	**100%**

A detailed description of each project is provided below. These descriptions serve to document the rationale for project selection as well as the objectives and intent of each project.

3.1 High Speed Hand Dryer

2002 Funding: $15,000

Objective: Test and document potential energy savings resulting from high velocity dryers.

Target Audience: Restaurants and other facilities with high traffic restrooms.

This project is intended to test a newly designed high velocity hand dryer that provides potential for significant energy savings as well as non-energy benefits. Utilizing high-speed fans that enable the use of a much smaller heater, and smart controllers that turn off the machine when hands are not moving below the out-take, the new dryers appear to save energy because they use less energy for heating and they operate for shorter periods. In some restrooms, the owners have disconnected the heating elements from the dryer.

This new product for the commercial market is supported by initial studies that highlighted the medical (*e.g.* clean hands, less bacteria) and environmental benefits (*e.g.* no waste paper), but the energy savings estimates have not been adequately verified/quantified. With this high efficiency

unit, it is estimated that connected loads will be reduced from 2,000 watts to 960 watts, and a reduction in time that the load is incurred from 30 seconds to 16.9 seconds.

For this project, SCE has installed a dryer in a public restroom at the company's CTAC training facility. The prime focus of the project is to document energy savings and then disseminate that information to the market that uses both hand dryers and paper products. In order for this to be a viable statewide program, SCE will need to understand better the local market segments (especially restaurants where dryers are common and they are subject to strict regulatory requirements) that would benefit from the product.

Information transfer will potentially occur via SCE representatives providing information to customers, facts sheets that may be published on the ETP website, and staff presentations at conferences. For SCE, investigation and support of this new technology represents a potential opportunity to secure energy savings at relatively low cost with potential to roll-out/implement in short period of time. If the demonstration results are favorable, another barrier that will need to be addressed is that of finding a second manufacturer for the technology so that SCE is not put in the position of favoring a particular manufacturer. Another outcome could be the promotion of automatic shut-off for all hand dryers since the reduced runtime is a significant contributor the projected savings from this unit.

3.2 Spray on Radiant Barrier

2002 Funding: $47,000

Objective: Test and document potential energy savings resulting from spray-on radiant barriers.

Target Audience: Residential retrofit and new construction.

This project is intended to assess the potential energy savings benefits of a spray-on radiant barrier. This barrier is a low emissivity coating that is sprayed on the underside of roofs as an energy efficiency feature. To obtain the radiant barrier qualities, a special pigment is added that may potentially be added to any paint. The spray-on feature allows the barrier to be applied in a more cost-effective manner and, potentially, in areas of a building that may not otherwise be easily accessible. This product is aimed at the residential retrofit market, however it also has significant potential in residential new construction where radiant barriers have become a common means of meeting Title 24 requirements.

SCE is working with product manufacturers and three customers have been signed for test participation. In selecting projects, SCE has looked for smaller buildings that are skin dominated rather than internal load dominated and located in a desert area that will maximize air conditioning savings from reductions in attic temperatures. SCE is also researching and developing a pre-and post monitoring instrumentation plan. The pre/post comparisons will be normalized for weather.

SCE staff selected this project because of the significant potential for this product to provide compelling energy savings at low cost in the residential retrofit market, particularly in areas with high air-conditioning loads. The test applications will be limited to three low-income residential customers with various insulation levels and occupant habits.

In assessing energy savings potential, SCE will measure outdoor temperature on the north side eave, attic temperature, indoor temperature, and solar radiation measured at the SCE Service Center in Coachella Valley. There will be a monitoring period with no radiant barrier to measure base case characteristics and to test the instrumentation. The radiant barrier will then be added and monitoring again undertaken. Data will be adjusted to correct for solar radiation on non-horizontal surface, surface type, indoor conditions, and attic ventilation.

If demonstration test results are favorable, information regarding this technology will be disseminated to architects, builders, and residential developers.

3.3 Low E Pigment Paint

2002 Funding: $56,500

Objective: Test and document potential energy savings resulting from Low-E pigment paints.

Target Audience: Small Commercial, Residential.

This project is supporting the testing of a low E pigment exterior paint that is similar to the radiant barrier project but instead addresses wall sections rather than roofs. The technology is targeted at small commercial and residential market segments and, in concept, could provide significant energy benefits at relatively low cost.

When staff was interviewed, this project was in the very early stages of implementation. The development of a detailed implementation plan has started and three participants have signed on for installations of the paint. SCE is developing the appropriate monitoring and evaluation strategy. There are challenges with metering instrumentation (e.g. temperature sensors), but the protocols will be similar to the radiant spray and will be based upon indoor and outdoor surface temperature measurements. In addition to energy savings, DIT staff will be looking into deterioration and maintenance issues because the program does not want to recommend a product that might increase maintenance costs for customers. While they will be considering O & M issues the project will not include any accelerated testing of non-energy related issues (*e.g.* pigmentation, durability).

3.4 Improved HVAC Performance and IAQ Using UV Light

2002 Funding: $15,000

Objective: Test and document potential energy savings resulting from the application of UV light to reduce microbe build-up on cooling coils.

Target Audience: Small Commercial roof-top units, Residential.

The underlying premise for this technology is that UV light can reduce spore/microbe build-up on the exterior of cooling coils and therefore improve HVAC unit performance and improve indoor air quality (IAQ). This project originated from a request to review the manufacturer's energy savings claims; the manufacturer claimed a 30% energy savings, and there was a need for independent testing. Data already exist documenting that UV light can improve IAQ[1].

DIT staff worked with an equipment distributor to test whether UV light could in fact eliminate spores and improve performance on HVAC cooling coils. As an initial test, AC units at SCE's CTAC facility were being replaced so SCE used this as a test site. They monitored for four weeks before activating the UV lamp, collected sample data at entry, exit, and condensate, then looked at the coils to determine what type of growth there was, how significant it was, and then activated UV and monitored for another couple of weeks.

After collecting data, they looked at pressure differential across cooling coil, humidity and temperature entering and leaving, and other measurements and then completed their analysis. Initial results were not as expected, with no savings found. A possible explanation for these results is that, because the test was conducted in an industrial area, and because air pollutants in the area may have created an unhealthy environment for mold build-up, the coils were cleaner than might otherwise be expected. This AC unit was reportedly different from others that the manufacturer had previously encountered, in that it had absolutely no bacteria growth observed on 'leaving' side of the cooling coil.

Based upon these results, SCE plans to find another unit and test it in a controlled environment. They will be looking for units that have been in service for 10-12 years and with substantial build-up.

3.5 Advanced Heuristic Thermostatic Control System

2002 Funding: $30,000

Objective: Test and document potential energy savings resulting from advanced thermostat systems.

Target Audience: Commercial, Schools.

[1] *Defining the Effectiveness of UV Lamps Installed in Circulating Air Ductwork*: Final Report, Nov. 2002, Douglas Van Odsell, Karim Foarde, prepared for Air-Conditioning and Refrigeration Technology Institute under ARTI 21-CR Program Contract #610-40030.

This is a special thermostat that can interface with programmed occupancy sensors and learn the usage patterns of building occupants. While there has been a good amount of research with this technology in restaurants and hotel control systems, SCE is looking to test/demonstrate system performance in a school district in one of their hard-to-reach neighborhoods (for equity/balance purposes). Arcadia Unified School district is signed on to participate in the testing.

3.6 Integrated Design for Non-residential Retrofit Buildings

2002 Funding: $233,000

Objective: Test and document potential energy savings resulting from integrated design practices in large-scale retrofit construction.

Target Audience: School retrofits and modernization.

The intent of the Integrated Design project is to push new energy efficient technologies throughout the design process. By taking an active role in the non-residential retrofit design (as opposed to new construction) and by providing financial assistance for energy analysis and system modeling, SCE hopes to demonstrate the variety of benefits of integrated planning as well as the efficacy of specific technologies. SCE's involvement strives to impact specific facilities and to create broader awareness and motivation among members of the design team to incorporate energy efficient design in future projects.

The coastal school district of El Segundo was selected as the first client for this pilot project. The school district had contracted for extensive new construction and retrofit projects involving many buildings on their primary campus. The architect team that was hired by the school district had seen a presentation by SCE staff that defined the Integrated Design process. This design team then approached SCE to participate in an integrated design process. The school district was considered an attractive candidate from the perspective of SCE because, statewide, there is significant funding to retrofit and modernize schools (estimates total approximately $50 billion). Successful demonstration of the Integrated Design model could therefore provide an important means of influencing other school construction projects throughout the SCE service area.

This particular project involves the renovation of existing buildings and the construction of new facilities. These projects are in various phases of design and construction and have an aggressive build schedule. Given the size and scope of renovation, there are a number of participants involved in the design process. These include:

- Architect
- Mechanical engineer
- School board and Superintendent
- School district personnel
- Electric lighting contractor (2)
- HVAC contractor
- DOE2 simulation contractor

- Value engineer

Before a customer site demonstration project could take place, a legal agreement acceptable to both the customer and the utility was developed, negotiated, and signed. This agreement addresses the terms of the project, maximum duration, dispute resolution methods, termination provisions, and general liability. The El Segundo school district was recruited to participate in the program and signed an agreement during the fourth quarter of 2002.

This project is unique because it involved modernization of an existing campus rather than new construction. This project was put in the local program because it encompasses specific local issues and climate zones. A significant barrier in this market is the fact that designers do not get paid to consider innovative ideas and energy efficiency within the scope of their fees. The program addresses this barrier by providing analyses that are not otherwise included in the design process.

A key objective of this project is to see if the process is one that can be replicated. SCE hopes to leverage this concept to work with diverse and less wealthy school districts. To disseminate the results of this project, there will be a fact sheet, reports, final as-built documentation, handouts for districts, put on ETCC website, and integrate into California High Performance Schools CHPS program material.

4. CASE STUDY REVIEW: INTEGRATED DESIGN PROJECT

4.1 Overview

Because the majority of DIT pilot projects were in the early stages of planning and implementation during 2002, it is not feasible to evaluate the efforts of a majority of the projects until they are completed. One project in particular, however, – Integrated Design for Nonresidential Retrofit Buildings – was determined to warrant detailed review due to the fact that there were a number of external participants who could provide feedback and because of the relatively substantial level of resources devoted to the project.

In order to better understand this pilot project, we conducted a series of in-depth interviews with the various participants and stakeholders in order to gain specific understanding of how the Local DIT project efforts functioned throughout the project cycle and, more importantly, to determine the extent of its impact. For the in-depth interviews, we designed an interview guide that sought to explore, with each participant, the following topics:

- How they became involved in the project and what was their role
- If they considered the process to be successful
- How the Integrated Design pilot process will influence the outcome
- Perceived strengths and weaknesses of the process
- Productive ways to promote the DIT successes most effectively in the future

The interviews were conducted over a two-week period. Each interview lasted between 30-45 minutes and included these project participants:

- SCE DIT program manager
- Senior Associate with Anshen and Allen, Architect
- Quest Energy Group, LLC, and modeling analyst
- IBE Consulting Engineers, mechanical engineer
- Superintendent, El Segundo Unified School District
- Assistant Superintendent, El Segundo Unified School District

Through their participation in the design process, SCE and the architects have addressed a variety of efficiency issues confronting the campus including aspects of lighting and daylighting, HVAC system design, and fenestration, while considering productivity and maintenance issues for the facilities. Our discussions with these individuals were able to provide specific and anecdotal feedback as to how the Local DIT process influenced an ambitious and complex project. Each participant told part of the story. Collectively, they revealed a collaboration that involved strict budget limitations and demanding timelines and design challenges.

The following section provides more details on the participants and their roles and perspectives on the collaborative process. From each participant's interview, we have identified and highlighted the key themes s/he described as relevant to the collaboration.

4.2 Project Objectives

We first spoke to the DIT Program Manager to discuss the rationale for DIT's involvement in the program and the objectives he hoped to gain from SCE's involvement. With respect to the Integrated Design project, he indicated the intention as being simply, to push design teams and their clients as far as possible in adopting energy efficient materials, design practices, and technologies in any specific project. By bringing resources (both educational and financial) to bear upon the project that could articulate the short and/or long term benefits of specific design choices, SCE will be able to influence specific design decisions and, hopefully, convince the project participants to become more and more committed to energy efficiency in subsequent building projects. In the case of this particular project, SCE became an active member of the design team and contracted a consultant to conduct DOE2 simulations. The DOE2 modeling was a key asset in the Integrated Design process.

4.3 Perspectives on Integrated Design Process

We examined project experiences from a variety of perspectives, each of which is presented below, including:

- Project Architect
- Mechanical Engineer
- DOE2 Modeler
- School District

Project Architect

The architecture firm involved with this project was hired by the school district 5 or 6 years ago (i.e., 1998) and was contracted to modernize the entire campus. The project has since been defined by different phases of the renovation of existing structures as well as the construction of new facilities. SCE's involvement began in the fall of 2002.

In describing the project, the project director had a very favorable impression of the collaboration with SCE. The first and most important point of emphasis he made was that his firm was willing to seek outside assistance and this was the essential first, key ingredient to this successful collaboration. Without this willingness, the project would not have been successful. The principal of the architecture firm was interested in learning about integrated design, green buildings and energy efficiency, and recognized that their skill levels were not on the cutting edge of energy efficient building design. As noted by this architect:

> "Our firm's consciousness wasn't that high to begin with and this project has been a real eye-opener for us. We weren't aware of CHPS and we hadn't done a great deal of work in the K-12 market. Our director was motivated by SCE. He was impressed by a presentation made by Gregg Ander of SCE regarding integrated design and subsequently approached Gregg about the possibility of collaborating together. So our involvement with SCE came from the top."

The project manager highlighted the challenges inherent in any design process and mentioned some internal reluctance to fully embrace the utility as a design partner since it was not readily evident why the utility would be interested in energy efficiency and whether or not they would have relevant qualifications. "We questioned the ability of a utility to adequately understand and relate to the rigors and issues that we (as architects) deal with everyday," noted the project manager. This skepticism was quickly alleviated by the professionalism and knowledge of SCE staff, specifically the project lead. Edison was, according to the project manager, very useful in providing timely information, answering questions, and, perhaps most importantly, getting the client to buy into and make a commitment to an energy efficient design approach. "Despite our initial questions, it quickly became clear that he (Gregg) was the driver. He challenged us all and ultimately we took it much farther than any of us would have expected." According to the project manager, the collaborative process was ultimately extremely positive. It resulted in bottom line benefits for the client (El Segundo) and created deeper awareness for the architect team members of the benefits of energy efficiency design.

Another critical issue that the project manager mentioned was the budget. Obviously, on any building project of any size, the budget defines what is, and what is not, possible. In this case, dealing with public funding of schools there were significant limitations on the budget. The project manager said, "Cost is THE challenge. School districts simply don't have a lot of money. One of the challenges (for us) is to contrast first cost barriers with long term cost (O & M) issues. SCE did a very good job of cost-to-benefit analysis." The project manager concluded by suggesting that, without the financial resources SCE provided (for the modeling) the benefits provided to their client would not have been possible.

The Mechanical Engineer

We interviewed the principal from the mechanical engineering firm that was hired by the architect. They have been involved in the project for the past 3 years and have been responsible for all aspects of mechanical and plumbing design of new and existing buildings. The firm has extensive experience in the institutional and educational marketplace, with approximately 80% of their work involving building renovation. According to the principal, the firm is distinguished in their field with respect to sustainable design practices.

In describing his perspective on the El Segundo project, the mechanical engineer contrasted his "typical" experiences with design teams with this project in a very favorable light. In so doing, he noted several important aspects of the design process.

According to the engineer, one of the most important aspects of successful design is making sure that all members of the design team are clear and grounded with the overall expectations of the project. He described previous projects in which this did not occur, resulting in predictably poor results. The El Segundo project was, from the engineers' perspective, a model of how clearly defined and realistic expectations can provide good results. "From the beginning, the entire team had very reasonable expectations. We knew this was not a big project with a modest budget. The team was experienced. Very "real world." Every project has issues with deadlines and cost.

The key is to not exacerbate these issues. In this case, the people who were brought to the table were excellent and that didn't happen."

The engineer proceeded to describe other projects in which clients are interested in utopian design but are unwilling to pay for the additional work required to determine the best design elements. The major challenge is, again, cost. DOE2 modeling is reportedly not standard practice. Both architects and engineers traditionally have less sophisticated modeling mechanisms that they rely upon. "The fact that Edison was paying for this was huge. The modeling verified many of our design recommendations and, architecturally, they might have had an impact (too.) It is hard to say what decisions would have been made without their (SCE) involvement, but I'd guess they wouldn't have been nearly as advanced."

Another critical issue that the engineer mentioned was successful collaboration with the design team. He suggested that collaborative design processes can often include personality conflicts. The best way to navigate this potentially disruptive issue is with clear communication. In this regard, he noted, "From the beginning, the collaboration process worked. There was clear communication and, therefore, a shared understanding of project goals and objectives and an understanding of who would be doing what. This project started out on good footing. It was particularly important because the project had a very short timeline."

The DOE2 Modeling Consultant

We interviewed the consultant who was hired by SCE to conduct the DOE2 modeling of the various design proposals for both the building retrofit/renovation. DOE2 modeling is a complex simulation program that allows detailed modeling of all energy related aspects of building designs. By inputting variations on building footprints, HVAC and duct systems, window/fenestration systems, lighting and daylighting systems, building materials and controls, and occupant load, DOE2 can provide users with detailed cost/benefit analysis on the long term operational costs of variations in building designs. This consultant performs modeling and efficiency consulting on all types of commercial construction and renovation projects and has a successful history of collaboration with SCE.

According to the consultant hired by SCE, "Anytime we can provide modeling up-front, we can make projections about the impact of all aspects of building design and turn these into dollars and cents, the client gets enormous benefit. They receive depth of information and are better able to make decisions. We provide detailed life cycle cost estimates that no builder should be without. Without this modeling, it is simply guess-work." On this project, the focus of DOE2 modeling was on lighting, daylighting, and natural ventilation.

If the ability to provide different "what-if" scenarios based on different design elements can provide design teams with more information upon which they base their decisions, then why isn't this accepted common practice? While DOE2 is a sophisticated and valuable tool, it is also time-consuming and costly. The majority of the design/build community does not usually invest in DOE2 modeling, preferring instead to use simpler modeling programs or techniques. This issue of time and money (*e.g.* "it takes too long, we have deadlines to meet," or "we don't have money to pay for that") represents a significant market barrier. The consultant spoke at length about the specific, important benefits that this kind of modeling could provide building owners.

However, owners aren't demanding this and, given the cost competitive business environment, the architects often don't recommend it either.

"Most customers don't get the quality or depth of information they deserve. Ninety-nine percent of new buildings don't include this degree of forecasting. Everyone focuses on first costs rather than real life-cycle costs. It is not usually on the radar screen and there is staggering lost opportunity (to make buildings more efficient.)."

From the modeling contractor's perspective, the project timeline was a challenge. He was asked to work with a two-month turnaround. "We are often under these kinds of deadlines. In this case, it certainly didn't effect the outcome for the client, it just made my job more difficult."

School District

With an interest in better understanding the perspective of the client/building owner, we spoke with two representatives for the school district -- the Superintendent and the Assistant to the Superintendent. Because of their different responsibilities within the design/build process, each provided unique insight into the Integrated Design process. The superintendent was able to provide good insight into the big-picture issues and decision-making processes of the school district and school board. The Assistant to the Superintendent has been involved in the day-to-day management and communication issues surrounding the project. Her responsibilities include attending all construction meetings, managing the bid processes, reviewing all change orders and managing all the documentation related to permitting and construction.

Clients depend on the architect and design team for expertise and guidance. From both the superintendent's and assistant superintendent's standpoint, the school district relied heavily on the architect to drive the dialogue and details surrounding energy efficient and green building design issues. While the district took great care in selecting an architect that could best represent the needs of the community, district personnel and students, once selected, they deferred to the architect. The Superintendent said, "We are not in the construction or energy business. We are in the school business. We are not engineers or architects or construction people. When the architect suggested that larger up-front costs would provide long-term savings, we were willing to listen." Both understood it was the district's responsibility to participate in and to manage the design process but, at the end of the day, the architect was the educator. The Assistant to the Superintendent said, "The design team convinced the board, the administration and the community that this (Integrated Design model) will work; it will be worthwhile in the long run."

The Superintendent (who at the time of the interview was employed with another, larger school district) spoke at length about how the district responsibility is to serve the needs and interests of the community. The El Segundo community lent itself to this type of progressive collaborative process. She said, "Each school district is different. They each have their own cultures and administrative structures. El Segundo is unique. It is a small, community driven district. The campus is the center of the community. Other school districts can be much more bureaucratic and have very pronounced (administrative) cultural boundaries. The school district I'm in now has a strong 'leave it to the experts, they know best' mentality. This kind of culture can prevent the kind of design benefits that we have in El Segundo from being realized." She iterated her

opinion that the end-users (in this case the teachers, students and building services/maintenance) are the ones that should have the voice in the design process and it was the districts responsibility to see that they were fairly represented throughout. The Assistant to the Superintendent said, "Our committees were very hands-on. Their participation made a big difference to the (design) outcome. Construction contractors do good work, but they don't live here, they are not teachers. They do their job and move on. The people who remain are the ones that matter the most. We took care of every teacher. We didn't make assumptions that the architect would do that." She continued, "We are in the kid business. We love our kids and this process reflects that."

It is interesting to note a contrast in perceptions among project participants on the role that SCE played in the Integrated Design process. From the design team's standpoint, SCE played a key leadership role in pushing the Integrated Design. From the Superintendent's perspective, SCE was a silent partner. The Superintendent said, "I couldn't tell you one thing Edison did for us." While this may be perceived as a negative reflection on the program, it may actually be quite positive in that the ultimate objective of this effort, from a market transformation perspective, is to effect change within the community of design professionals who are advising schools in this regard.

4.4 Emergent Themes and Critical Success Factors

The previous section provided some insight into how the participants experienced the integrated design process. In this section, we summarize their perspectives with regard to critical success factors for the project. We asked each participant whether they considered the Integrated Design collaboration to be successful. There was uniform agreement that the process was successful on a variety of levels. A few significant themes emerge from the analysis of these interviews that will be helpful to program managers as they consider the prospects for future demonstration and information transfer of this type of project.

Project Success? Yes, But Let's Wait and See

The architect was effusive in his assessment of SCE's involvement and their influence on the design. SCE "had a strong influence on the design outcome. The overall design has been successful. Our relationship with our client has been successful. They raised the awareness of our firm and our client. The design team embraced SCE. They were useful in getting the school district to buy off on things." The architect was hard pressed to criticize anything about the process. "Any problems we have encountered along the way may have been our responsibility. There were challenging deadlines. Maybe we didn't get Edison involved soon enough, so we might have missed some opportunities early on."

Both the mechanical engineer and DOE2 modeling contractor attributed the success of the program to providing the school district with great value. The modeling contractor said, "99 percent of building owners don't get the quality and depth of information we provided, with the degree of information and forecasting." Both engineer and architect praised the benefits of an experienced design team with realistic goals that were grounded in the real world.

The school district, however, has a more pragmatic, "wait and see" attitude. Because the construction on the projects in question has not been completed, the long-term success, as measured in sustained energy savings over time, cannot be measured yet. The Assistant to the Superintendent expressed this most succinctly. She said, "we have become advocates of green building and energy efficient design but we haven't seen any evidence of the benefits yet. How well will the ventilation system perform? We don't know. All these are benefits that we expect to realize, but we don't know for sure." She concluded by saying that she didn't believe the Integrated Design process has adversely affected the district in any way. "I don't think this process created any more work for us. Maybe the architect has more work or the construction manager, but my work load would be the same." From the client's standpoint, the process has been positive and no more burdensome than any other design/build project.

Commitment to New Ways of Thinking

A number of interviewees acknowledged that new design practices challenge people (architects and builders) to re-examine traditional ways of thinking. The architect noted, "More expensive, new design practices will always be met with resistance. People (management and facilities) are often wary or overly sensitive to new technologies. It takes pretty serious commitment to stick with it because there are always excuses to revert to 'standard practices'." He added that the modeling that SCE provided offered a depth of information that addressed specific concerns and reservations yet it takes a serious commitment from all design team (client in particular) to take the necessary extra steps. "This project could not have happened if it hadn't been for my boss' commitment. It could not have happened without the district's commitment. And it could not have happened without the talent and perseverance of the resources that SCE brought to bear. In the end, they (SCE) pushed us more than we were willing to go and the district is better off for it."

The Matter of Resources

For any commercial construction project, whether a building retrofit or new construction, the budget is the defining challenge. The fact that Edison provided the resources to model design options and recommendations is essential and, quite clearly, this project would not have transpired as it did without them. In order for Integrated Design to establish a foothold in the commercial retrofit market, it will take considerable time and effort before the majority of builders and architects proactively budget for the type of modeling required to provide the most benefit. The modeling contractor said: "the costs of modeling are not the norm. Maybe utilities will need to pay for this strategically. They will need to target owners to create a demand for this and continue to educate architects. But it is the building owners who need to understand the long-term benefits of this kind of forecasting. They will need to push design teams to do this."

4.5 Recommendations

We asked each interview subject what recommendations they could provide in order to make the Integrated Design intervention more successful on a broader scale. The following summarizes the feedback they provided.

Marketing to Architects

The architect spoke about the need for both broad and general education and outreach and much more detailed information about specific design issues. "There a quite a few firms that are in need of remedial learning and they will require basic prescriptions as to how to integrate energy efficient and green building strategies into commercial designs. There are also firms out there that are using these tools day to day. For them, you do not want a program that is too prescriptive." He continued, "Part of what was valuable for us was that we explored all (these) possible options. We weren't given simple formulas to follow. When you find designers that are good at thinking outside the box, let them be free to experiment."

The mechanical engineer suggested that, for this type of program to be widely accepted, it will be important to ensure that everyone involved gets appropriate recognition. Awards and recognition are good for the ego and (often) good for business. The engineer said, "It wasn't just Edison that did this work. When sharing the merits of the project with the wider world, they need to draw attention to all of us that understand the real applications of this (Integrated Design)."

Our interviews provided some mixed messages as to the value of marketing the Local DIT program via professional conferences. Some said that making presentations at conferences is a productive possibility because people there are "pre-selected. Your audience wants to be there." Another said that marketing programs through conferences is not the best means of effecting real change in design practices. "I am not big on conferences. My experience with them is that they take a good deal of time and energy but don't result in significant changes (in practice)."

Marketing to Building Owners

The modeling contractor was most adamant about the need to have building owners drive the market for higher efficiency in the retrofit and new construction market. He said, "I am a strong advocate of teaching owners. Architects and design teams embrace this but only if someone else is paying for it. Yet owners usually rely on the architects for their information so it is something of a Catch-22."

Marketing to the Impact Schools

The market for schools is most compelling. Throughout the state of California, this is a huge period for modernization and new construction. There were three recommendations summarized as follows:

- Target (few) architects: There are a limited number of architects and designers who are firmly established in this market and they should clearly be a target for promoting Integrated Design.
- Target school administrators *and* school boards: The Superintendent of the El Segundo said that the state and national conferences for school administrators and school board members provide captive audiences and they should be strategically targeted. She specifically mentioned the California School Board Association Conferences. Champions can be found in both camps.
- A picture is worth a thousand words: Boards of Education and other decision makers would benefit from actually seeing the benefits. The Assistant to the Superintendent said, "Show them how (it) works. Let them see it in action. Provide testimonials. We could make one like, 'our gym used to be unbearably hot but our investment in natural ventilation has been worth while."

In trying to establish significant changes in this market, there is a question about who leads. Do school districts have to buy into this first? Should their voice lead the architect and challenge them to think more creatively? Or, does the leadership come from the architectural community? These are important considerations yet there is no one answer. The Superintendent summarized both the challenge and the opportunity when she said, "champions can come from anywhere. It can be a teacher, an administrator, a facilities person, an architect, a member of the community or a board member."

Incentives

The question of incentives is clearly significant. There are, of course, different kinds of incentives that can impact the marketplace.

- Direct financial incentives: All participants agreed that incentives are an important driver both in terms of this project and future opportunities. There was agreement that incentives are best directed at the owner (in this case school district) rather than the architect or design team members. One person interviewed was critical of the Savings By Design model of rewarding designers rather than owner/client. "We don't need incentives. We get paid to do our work, period. It is the owner that should receive the benefit."
- The modeling consultant said, "These incentives are good but I think the best way to change the market would be to legislate that every school (or any building that involves public/tax dollars) should be required to have a certain level of life cycle cost analysis. You could stipulate that any project over "x" sq.ft must have simulation work completed. Leverage federal, state and local funding to make sure this is happening."
- The Assistant to the Superintendent said, "Money is always a big motivator. The important questions for us are, 'Can you help with direct costs? Can you save us money? Can you help defer costs?' For the good of the students is good. For the good of the students and the bottom line is better." She suggested putting the specific benefits of Integrated Design and energy efficiency in writing. "Show us the equations: this action results in x amount less maintenance, y amount less water, and z amount less electricity. The sum is this amount of savings."

- Expedited plan checks were identified by both the district and the architect as an incentive that could be helpful to the process.

In conclusion, SCE's Local DIT program has, through the Integrated Design Pilot, clearly had an impact on both the design process and the outcomes. From the perspectives of the participants, the pilot has been a success and is deserving of more broad dissemination into the market. The role of SCE in this case has been to advance new design and construction practices. With SCE resources, both the architect and school district were pushed to higher levels of efficiency. An in-depth case study of this project within the DIT is certainly warranted, as well as a clear plan for getting the word out to other school districts.

5. SUMMARY AND RECOMMENDATIONS

The full impact of the PY2002 DIT program will not be known until after each of the individual projects reviewed herein has been completed. Based upon this interim review, however, it appears that the program is successful in achieving its objectives. Six projects have been selected for funding and significant progress made in each. The one project that has advanced the furthest in the process – the Integrated Design pilot – appears to be, by all accounts, quite successful in advancing integrated design strategies in a retrofit setting. Moreover, this work is advancing the development of a statewide initiative addressing energy efficiency opportunities during school modernization in California.

Based upon our review of program materials and discussions with program staff, there are several areas in which we feel the program may be strengthened further.

Refine Program Theory

Our review of the program theory, as filed for this program, suggests that it may not fully reflect the DIT program. With the exception of the Integrated Design project, the primary objective of the majority of projects selected in 2002 is to determine whether or not dissemination and information transfer are warranted. Referring back to the product diffusion curve presented earlier, the objective in these cases may be to see if the product is even on a curve or deserves to be in the marketplace. Once it is determined that such efforts are, in fact, warranted there may effectively be a Phase II DIT effort in which more aggressive demonstration and promotional efforts are undertaken. At present, such phasing of the efforts is not accounted for within the program theory.

Track and Document Project Selection

Program staff mentioned that they are receiving calls throughout the year from customers, vendors, and manufacturers, asking questions about or requesting the demonstration of new and potentially valuable energy-savings products. Handling these calls in themselves is a valuable service to SCE's community; and oftentimes the response provided satisfies the inquirer's needs. Other inquiries require research and follow-up by DIT staff to determine what research, testing, and demonstration has already been performed. When the team identifies a product or service with sufficient promise, but lacking in previous demonstration, it is considered for inclusion in DIT. The program does not currently log and track each inquiry, nor does it at this point have a well-defined project selection process. As such, the magnitude of thought that is put into the identification and final selection of projects is not fully appreciated.

Our first recommendation is that DIT program staff develop a formal log and tracking system to record each query and document what actions have been taken. This simple log should indicate how the query was resolved if it was, or where it currents stands in the process chain, including: initial research, considering funding, formal DIT project, and post project communication. The intent of this log is not to formalize the selection criteria, as we believe the informal selection process is appropriate for this project; but instead to document the complete range of projects that are considered for inclusion, and the reasons for selecting the final projects. The queries

received by SCE for this service are many, and to document both the magnitude and the range of such requests will help to demonstrate the important role of this program.

Develop an Up-front Business / Implementation Plan for Each Project

In conducting this evaluation research, the question we ask of each interviewee is to "tell us about your project." Aside from very brief written descriptions included in CPUC filings, the projects are lacking in documentation. To provide for clearer documentation internally at SCE, and among various stakeholders in the DIT program, we recommend that an individual project "business plan" be prepared to document and communicate the following items: (1) rationale for selection, (2) goals and objectives of the project, (3) target audience for the project, (4) timeframe, (5) anticipated outcomes or possible scenarios, and (6) plan for disseminating results. Having such a plan will aid in several areas. First, it will provide a reference point against which progress may be assessed. Second, it will provide a means of communicating with others about the project. Finally, it will ensure that the intended information dissemination approach is thought through in advance of initiating the project.

Develop Final Information Dissemination Plan for Each Project

The information dissemination efforts for each project are, at this point, very informal. Given the level of innovative work that is being done in each of the projects, the program would benefit from a more concrete plan that identifies specific audiences and is tailored to get the word out to these audiences. It is therefore recommended that, upon completion of each project, a final information dissemination plan be prepared. This plan, building upon the initial plan contained within the project business plan, will serve as a roadmap for staff and others who play a role in publishing and promoting information about the projects. Again, the idea is not to impose a burdensome requirement, but rather to implement a discrete strategy that reflects the unique market for each of the technologies and / or services considered in each project.

Prepare Project Close-out Report

As the program continues into the future, having final project reports that provide a discrete summary of project results would be helpful to document the experiences and results obtained, as well as key lessons learned and next steps. These reports, once archived, will provide valuable information for future project managers.

Future Evaluation Efforts

Future evaluation efforts will need to include on-going tracking of these PY2002 projects, as well as projects that are initiated subsequently. The development of a project-specific implementation plan, as well as final information dissemination plan for each project, will aid considerably in evaluating the long-term success of the program. We suspect that this program could play a potentially very significant role in introducing new technologies and services to the statewide portfolio of energy efficiency initiatives. This will, in turn, place greater emphasis on the evaluation of how technologies are picked for consideration. This will also place greater emphasis on understanding the critical success factors within the program, as evidenced through case-study types of analyses for individual projects such as that which is included in this report for the integrated design project.