

Final Report

EM&V Report on 2004-05 Sustainable Communities Program 1316-04

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1. Introduction

This report presents the results of our Evaluation, Measurement, and Verification (EM&V) study for the Sustainable Communities Program (SCP or the Program) implemented by San Diego Gas & Electric Company (SDG&E). Quantec, LLC, was selected by SDG&E to conduct the EM&V for the SCP.

Program Overview

Program Description

SDG&E implemented the SCP during 2004 and 2005 working in concert with the cities and counties in its service territory to promote sustainable development, showcase energy-efficient design and building practices, and encourage local developers to incorporate clean on-site energy generation systems in their projects. The SCP combines elements of the two highly successful statewide new construction programs – Savings by Design (SbD) and the California ENERGY STAR[®] New Homes Programs. The SCP provides a range of services and incentives to participating projects.

All non-residential SCP projects receiving incentives were required to exceed the existing Title 24 non-residential energy-efficiency requirements by at least 30% (as compared to the SbD Program, which requires at least a 10% improvement over Title 24). All multi-family residential buildings were required to exceed the applicable Title 24 energy-efficiency requirements by at least 30% (which is another 15% beyond the requirement of other programs).

Upon commissioning their project, participants were required to provide documentation, including selected construction documents, Title-24 documentation, integrated design analysis reports, manufacturer specifications, equipment cut sheets, and incremental cost verification, as requested. SDG&E then completed an on-site verification and incentives were paid upon successful building commissioning and verification.

For multi-family residential projects, projects were eligible for incentives of \$165 per unit, up to a maximum of \$30,000 per project. For non-residential projects, owners received incentives based on the calculated electricity and natural gas energy savings (up to a maximum of \$120,000 per project). In addition, non-residential projects were eligible for design team incentives also based on energy savings, up to a maximum of \$30,000 per project. Finally, projects were also eligible to receive incentives to cover up to half the LEED certification associated fees (up to \$4,500).

Program Goals and Objectives

The two-year goal of this Program was to create sustainable energy and demand savings by developing a network of demonstration projects in SDG&E's service territory. The projects were intended to incorporate the following:

- High performance energy-efficiency and demand reduction technologies
- Clean on-site generation
- Water conservation
- Transportation efficiencies
- Waste reduction strategies

Its longer-term goal was to help “mainstream” new energy-efficient technologies and sustainable design practices by documenting the benefits and lifecycle cost savings achieved by these demonstration projects. Ultimately, the goal was to pave the way for future code upgrades and implementation of a Statewide Sustainable Communities Program. The SDG&E Program Manager believed that one measure of success would be if the Program led to a situation where no design premium were charged for green buildings.

As noted earlier, projects selected for this Program were required to exceed Title 24 energy-efficiency requirements by a minimum of 30% and were strongly encouraged to pursue Leadership in Energy and Environmental Design (LEED) certification.¹ Although it is not a requirement, SDG&E also actively encourages and supports incorporation of clean on-site generation.

As defined by the Program Plan, the measurable objectives of the 2004-'05 Program were:²

- Create a network of sustainable community projects throughout SDG&E's service territory that achieve total estimated net savings of 1,684,774 kWh, 390 kW, and 31,774 therms.³
- Select and fund eight to ten projects that demonstrate the application of sustainable design practices to different building types.
- Prepare and distribute two-page informational flyers for *all* SCP projects.

¹ LEED is a rating system developed by the U.S. Green Building Council that assigns points and ratings of certified, silver, gold, or platinum for projects that meet specific requirements.

² San Diego Gas & Electric Company, 2004. Sustainable Communities Program – Procurement.

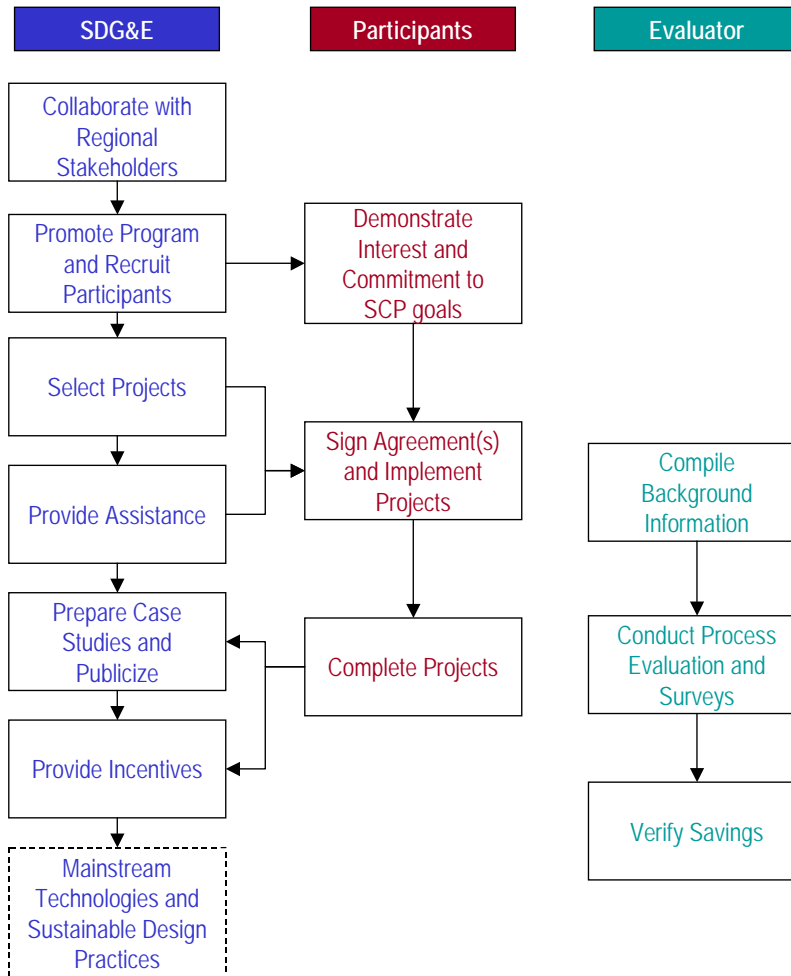
³ The Program Plan indicates “Savings estimates and cost effectiveness calculations contained in this proposal are based on recruiting and funding of eight to ten commercial projects and 300 multi-family dwelling units over the two-year program period. The actual mix of residential versus non-residential projects may vary slightly based on the types of projects submitted by developers. The residential to non-residential mix is not expected to have a significant impact on the energy savings that are achieved over the course of this program.”

- Prepare detailed case studies for five to six projects to document and quantify the benefits of sustainable design practices and the viability of exceeding Title 24 energy efficiency requirements by a minimum of 30%.
- Publicize individual project results in cooperation with participating cities, local building departments, San Diego Association of Governments (SANDAG), San Diego Regional Energy Office (SDREO), American Institute of Architects, and trade associations such as the Building Industry Association (BIA) to increase community awareness and promote widespread local adoption of sustainable design practices.
- Set the stage for future code upgrades and “mainstreaming” sustainable development practices on a statewide level, potentially leading to a statewide program offered by all four California Investor –Owned Utilities.
- Actively target “hard-to-reach” markets such as multi-family apartments, affordable housing projects, or leased properties.
- Select and showcase at least one hard-to-reach project.
- Support the State of California Energy Action Plan goals of increasing the proliferation of renewable energy systems and promoting customer- and utility-owned distributed generation.

EM&V Overview

Our EM&V approach uses the applicable California Public Utilities Commission (CPUC) Energy Efficiency Policy Manual and established EM&V methods to evaluate the SCP’s success. The evaluation is primarily to provide measurable and quantifiable results in the form of achieved levels of energy and peak demand savings by the Program. The success of the Program is also being gauged through a process evaluation and participant survey. The relationship of the evaluation to the SCP is illustrated in Figure 1.

Figure 1. Program Overview



Our evaluation activities were intended to provide 1) ongoing feedback and corrective guidance regarding Program implementation and delivery and 2) verification of energy and demand savings estimates of Program impacts. The energy and demand savings verification include verification of measure installation and tabulation of the *ex ante* energy and demand savings.

As specified by SDG&E, the process evaluation focuses on the following issues relating to the SCP:

- Was the Program implemented as designed?
- Were there any changes in the design over the Program’s operation?
- Are the target audiences being reached?
- What changes, if any, are recommended for the Program design and implementation?
- Have previously recommended changes been implemented?

In addition, we have attempted to answer the following questions that are essential to assess and ensure the success of the Program:

- To what extent had the measures implemented through this Program already penetrated the market?
- Have marketing and promotional efforts been effective?
- Is the participation process simple and easy to understand?
- Are the incentives and technical assistance effective and sufficient?
- Have the case studies been effective?
- How effective have efforts been to include renewable energy generation in projects?
- What opportunities exist for energy-efficiency upgrades among the various targeted customers?
- What factors encourage such customers to make efficiency upgrades?
- What barriers limit efficiency upgrades and other green building practices by these customers?
- How are decisions made about efficiency upgrades and application of green building practices?
- What types of promotional efforts are most successful with different customers in the target markets?

For this study we conducted the following evaluation activities:

- Interviewed Program Manager
- Interviewed key stakeholders
- Verified project measure installation
- Assessed *ex ante* energy and demand savings
- Interviewed Program participants

Our EM&V plan called for selecting a sample of completed projects to include in the verification, energy/demand savings assessment, and participant interviews. However, as of the end of 2005 only three projects had been constructed and verified so we conducted these activities for a census of the projects.

The next chapter of this report presents information from an interview with the Program Manager and a review of Program materials.⁴ Chapter III presents information from our stakeholder interviews. The next chapter summarizes feedback from Program participants to date. The fifth chapter presents verification results and our assessment of energy and demand

⁴ Toward the end of 2005 the Program Manager at SDG&E changed. The information presented here is based on our interview with the original manager who was also the main Program designer.

savings. The final chapter presents summary findings based on the Program's goals and objectives and some observations on how the Program could be modified to increase its effectiveness.

2. Program Implementer Views

This chapter documents Program information provided by SDG&E. It is based primarily on an interview we conducted with SDG&E's original Program Manager on April 7, 2005. It also reflects information from our team's review of Program reports and materials, and additional information provided in early 2006 by the second Program Manager.

Our initial Program Manager interview began with a review of the preliminary program theory that Quantec developed for our EM&V plan. We discussed the consistency between the theory, as shown in Figure 2, and Program implementation. The Program Manager indicated that the theory accurately captured the way the Program was planned, the causal links, and the anticipated outcomes.

Program Staff, Activities, and Outputs

Until early 2005, the Program was staffed primarily by the Program Manager with a 20% allocation of engineering support. In early 2005, the staff was expanded to include a Project Manager. The Program Manager felt that the Program had been understaffed and the addition of the Project Manager would help. He felt that additional engineering support was important too, but that project volume would have to increase substantially to justify hiring a full-time engineer.

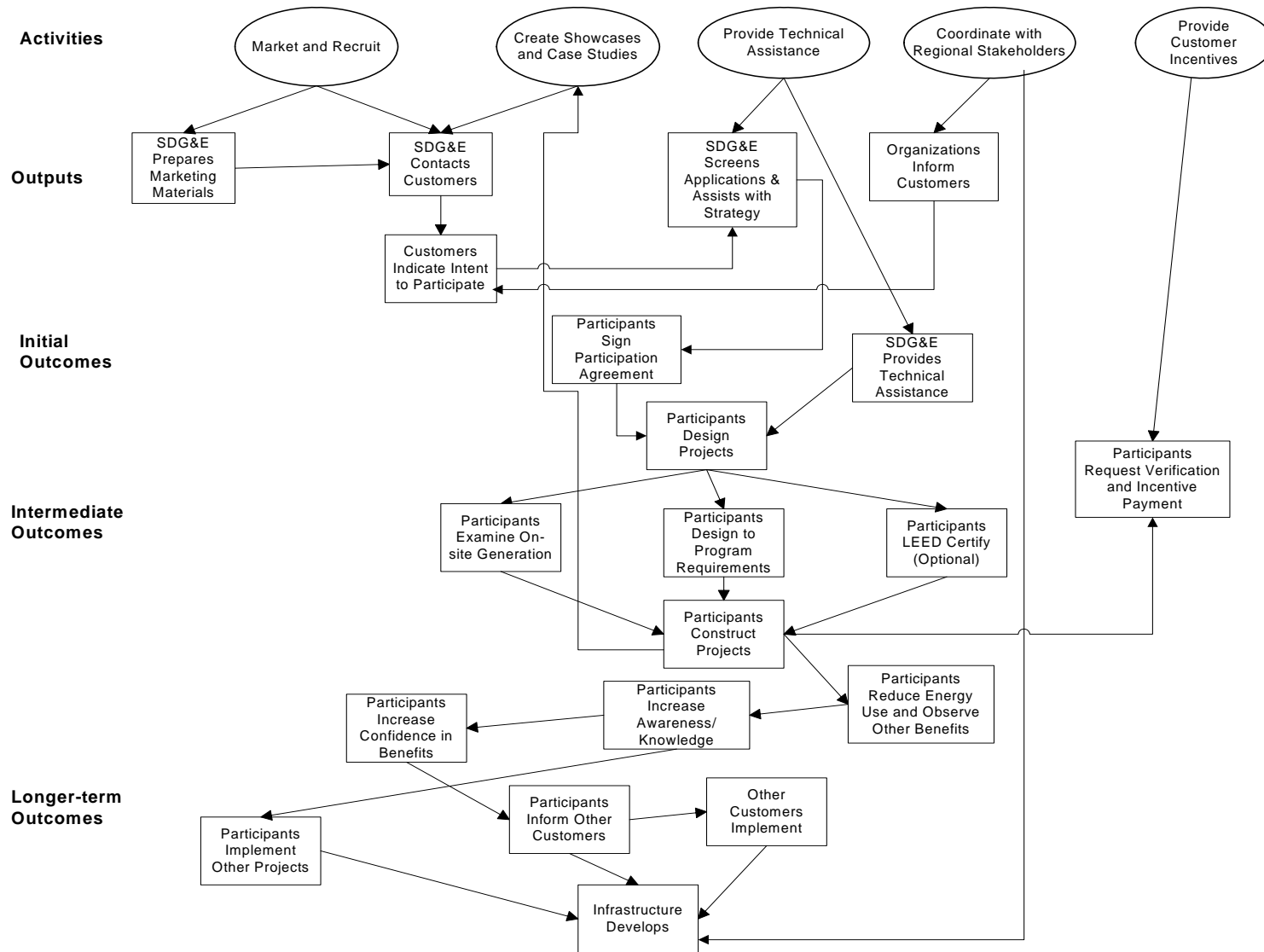
The activities implemented by SDG&E are summarized as follows:

- Marketing and recruiting
- Creating showcases and case studies
- Providing technical assistance
- Coordinating with regional stakeholders
- Project oversight and provision of customer incentives

Marketing and Recruiting

Marketing and recruiting were being conducted through various channels, but a heavy reliance was placed on leveraging SDG&E's Account Executives' contacts. Their assistance is primarily through the network of existing contacts developed in conjunction with the SbD (non-residential) and ENERGY STAR[®] (residential) programs. The emphasis on utilizing Account Executives was a component of the Program plan, and it appears that it is being used very effectively.

Figure 2. Program Theory



The Program plan also proposed using collaborative partnerships established with trade organizations and coordinated with city/county building departments and organizations as well as the U.S. Department of Energy (DOE). The SCP has had a presence at local U.S. Green Building Council meetings but has relied less on collaboration and coordination with other entities than it has on leveraging the Account Executives' contacts. Chapter 3 provides feedback on the Program from three external stakeholders.

As planned, the Program also has used more traditional marketing and outreach methods including distribution of informational materials and presentations. SDG&E has participated in the following activities in support of Program outreach:

- Presentations of a case study on the TKG project at the 2004 and 2005 West Coast Energy Management Seminars
- Presentation about the Program at Solar Power 2004 conference
- Presentation to local International Facility Management Association chapter
- Sponsorship and help creating "Build Green San Diego," an annual local green building conference.
- Presentation at a local U.S. Green Building Council (USGBC) event
- Recognition of two completed projects from a local environmental organization
- Article and advertisement placement in special section of the *San Diego Daily Transcript*

Two marketing brochures have been developed, and 3,000 have been mailed out to designers. As planned, the SDG&E website provides information on the Program with links to Program materials and related websites.

The Program marketing has been most successful at reaching designers and less so at involving engineers in the Program. SDG&E recognized this and looked for ways to broaden outreach. One obstacle to reaching a broader range of groups in the buildings community has been the utility's lack of the kind of existing relationships and credibility that have been established with designers through other programs.

Showcases and Case Studies

The Program plan indicated that individual demonstration projects would be promoted through the creation of showcase sites and educational displays and that case studies of completed projects would be prepared and disseminated. The showcases were intended to demonstrate to other prospective participants the measured benefits of incorporating sustainable features within a project. The case studies were to provide information to potential participants about how projects were accomplished, what features they incorporated, project impacts, project financial information, and lessons learned.

SDG&E prepared a case study on the first project completed, the TKG building; distributed it; and made it available on the utility's website. As of early 2006, one other case study was being prepared.

The utility has conducted a number of activities to showcase projects. These have included

- Private tours of the TKG building for prospective participants
- Nomination of the TKG and Sun Harbor projects for San Diego EarthWorks Awards (TKG won one in 2004 and Sun Harbor received one in 2005)
- Participation in the 2004 Green Built Tour sponsored by EarthWorks

The TKG building has a display in its lobby that visitors can access to monitor performance of its systems. For several months, one or two tours of the building were conducted each week. TKG has received considerable visibility and exposure to potential clients from its participation in the Program. The Sun Harbor building has a room dedicated to displaying information describing the green features of its building for visitors to review and other green building information.

Technical Assistance

To ensure that potential participants have the technical expertise needed to carry out their projects, the utility recommends to customers that they hire a green design team. The utility works with participants to

- Select the best strategy to meet the performance requirements
- Complete the required energy analysis
- Obtain LEED certification (if appropriate)
- Review renewable energy generation options

SDG&E's ability to provide technical assistance on individual projects is limited by the availability of the Program's staff resources. The Program can leverage the technical expertise available from the San Diego Regional Energy Office (SDREO). The opportunities to do so have been fairly limited so far, but this is an available option.

Another general type of technical assistance provided by the Program is assistance to local jurisdictions to create green building policies, programs, and capabilities. SDG&E has provided this type of assistance to Chula Vista, La Mesa, San Marcos, and several other local cities.

Coordination with Regional Stakeholders

As described above, SDG&E has been working with local organizations to promote the Program. The coordination with SDREO provides access to technical expertise for participants. The City of San Diego has established an expedited permitting process for sustainable buildings (following the development of a similar process for affordable housing); however, uncertainties remain about how to define a sustainable or green building.

As noted earlier, Chapter 3 specifically discusses feedback about coordination of the Program with other activities. It provides the results of interviews with three individuals representing different stakeholder groups.

Project Oversight and Customer Incentives

Since the Program began in early 2004, SDG&E has worked with developers and other likely participants on at least nine potential projects.

As of February 2006, three projects had been through the entire process, including the payment of incentives. Seven others have been included in the Program and, because construction is not yet completed, SDG&E has reserved the incentive amounts for them to be paid when the projects are finished.

Program Design, Accomplishments, and Implementation

The Program has been implemented basically as proposed in the Program Plan and illustrated in Figure 1. The activities, outputs, and initial outcomes to date agree closely with the Program Plan.

Implementation has revealed several challenges for the Program and affirmed expectations about market barriers. It also has provided instructive lessons and led to insights about potential Program modifications.

Accomplishments

As described earlier, three projects have been through the entire Program process and another seven are signed up as participants with their incentives to be paid upon completion. SDG&E had an inventory of about 30 projects identified in the Program pipeline as potential participants.

Since the Program started, the number of LEED registered projects in the San Diego area has grown from four to more than 30. Although not all of this growth can be attributed to the Program, it is likely that the SCP has had some influence on the growth in green projects.

Program Challenges

None of the three projects completed were multifamily residential buildings. Discussions occurred with potential developers of some projects, but it appears that the 30% efficiency improvement over Title 24 is quite challenging and that adding green features on top of increased energy efficiency has presented serious obstacles to developers. In addition, a residential version of LEED is not available (pilot tests of a proposed system began in 2005), so there is no applicable system that developers can use to rate green residential projects.

Incorporation of renewable energy generation in SCP projects has been problematic. The SCP provides no financial incentives for installation of renewable generation, but SDG&E refers participants to other programs that could provide incentives. The primary source of potential funding is the Self Generation Incentive Program (SGIP) administered by the SDREO. However, this program was oversubscribed for Tier 1 resources (which include photovoltaics) and the program stopped accepting Tier 1 applications as of March 4, 2005. There is another program through which SDG&E can site utility-owned clean generation with green building projects. In

the TKG project, SDG&E was able to apply this innovative approach to install photovoltaics (PVs) and a fuel cell. The utility is leasing space (including the roof) from the building owner to install the utility-owned generation equipment. Given the costs of renewable energy generation technologies and the status of the SGIP, incorporating renewables in SCP projects is a significant financial challenge.

Another challenge for the Program is the long lead-time required for new building projects. The Program materials were not available until the second quarter of 2004 and construction had to begin by December 31, 2005; consequently, the maximum amount of time available between Program application and the construction start date was about 20 months. Large projects could easily require this much time for planning and decision-making. Nevertheless, SDG&E has been able to develop a substantial inventory of potential projects.

Finally, SDG&E has had some difficulty gaining exposure and credibility with building community members beyond A&E firms. The utility had already established credibility with A&Es through its other programs, but it has been necessary for SDG&E to spend some effort convincing other market actors of its technical expertise.

Lessons Learned and Potential Program Changes

From the Program Manager's perspective, SDG&E has learned useful lessons from its experiences with the Program and the challenges that have been encountered. Several lessons are related to how difficult it has been for potential participants to meet the Program performance requirements.

For multifamily residential projects, the level of the energy-efficiency requirement limited participation. The lack of a LEED residential rating system and additional costs associated with building green have also aggravated the problem of recruiting multifamily project participants.

While the energy-efficiency requirements have posed less of a hurdle for non-residential projects to meet than for residential projects, the combination of energy efficiency, green building features, and renewable generation were difficult for non-residential projects to achieve. Midway through the Program, SDG&E discussed the idea of increasing the incentive per unit of energy saved, while *requiring* participants to get LEED certification rather than being "strongly encouraged to pursue" certification. For the Program beginning in 2006, SDG&E decided to require LEED where applicable, but allow flexibility for projects to use different pathways to demonstrate sustainability in cases where LEED was not applicable. In addition, SDG&E modified the Program to permit projects to receive incentives equivalent to the SbD if they were unable to meet the energy-efficiency levels required by the SCP due to factors beyond their control. To address the renewable generation aspect, SDG&E will be making more use of the option where the utility locates renewable generation equipment at project sites. In addition, SDG&E will work with participants to modify their designs in ways that will facilitate future installation of renewables if they are not installed initially. The Program Manager also noted that the knowledge base on renewables needed to be expanded and during 2004 and 2005 worked with the City to explore ways to do this.

To take fuller account of the benefits of green buildings, the Program Manager wanted to see more focus on other impacts, such as solid waste reduction and water efficiency improvements. SDG&E has worked with the City to deal with some of these issues. The Program Manager suggested covering these issues as part of the EM&V activity, and our report addresses these to a limited extent.

SDG&E believes that it would be useful to implement the SCP statewide. The utility proposed a follow-on Program for its service area starting in 2006, with the features described above. Although there are no plans for a single statewide program, SDG&E worked with the other utilities and each one developed its own version of the Program for its service area. Though some differences exist, there are considerable similarities across the utility programs.

Title 24 Changes

In 2005, new Title 24 standards were developed and scheduled to go into effect in 2006. Given that the SCP sets energy-efficiency requirements relative to Title 24, it was necessary to examine how the new standards would affect the efficiency requirements of the Program.

SDG&E used building simulation files for ten buildings that showed energy savings of about 30% beyond the 2001 Title 24. They were analyzed using EnergyPro, the software used to show compliance with the Program's energy-efficiency requirements. These analyses showed that, compared to the 2005 Title 24 standards, the energy savings averaged about 20% instead of 30%. As a result, SDG&E established new percentage savings targets for its 2006-'08 Program.

3. Stakeholder Interviews

This chapter presents feedback and observations from the perspective of three entities who are stakeholders in the SCP: SDREO, City of San Diego Sustainable Communities Program, and a private green building consultant who was instrumental in the development of the SCP.⁵

The information presented here was obtained through interviews with three individuals. Most of the comments are from a representative from SDREO.

Overview of Regional Programs

The SCP and both San Diego entities—SDREO and the City—have implemented a range of policies, services, and activities in support of green buildings. Table 1 summarizes the offerings of each program or organization.

Table 1. Overview of San Diego Green Building Programs

| | SDREO | City | SCP |
|---|-------|------|-----|
| Green Building Education | Yes | Yes | No |
| Technical Assistance (Gov't and Private) | Yes | No | No |
| LEED Registration and Certification Funding | No | No | Yes |
| Case Studies | Yes | No | Yes |
| Renewables | Yes | Yes | Yes |
| City Policy | N/A | Yes | Yes |

Integration: Services, Funding, and Policy

The strongest connection between SCP and other local activities is with SDREO’s Green Building Education and Technical Assistance services. This link was intentional since CPUC funding of the SCP was based on the integration of both programs. In general, the SDREO provides educational and technical assistance programs and SCP provides financial support to owners and design teams to implement LEED and green building.

The following is a list of comments from our interviews addressing the integration of SCP, SDREO’s program, and the City’s program.

- **Complementary Services.** SDG&E customers that need technical assistance come to SDREO and those that need money go to SDG&E. “There isn’t a problem with duplication. We make an effort to include marketing information on each other’s program. We’re in collaboration in the full spirit of the CPUC’s approach. These programs are great in that regard.”

⁵ Since the City and SDG&E programs have the same name, we use “SCP” to refer to SDG&E’s Program and the “City’s program” when referring to the City’s effort.

- **Coordination.** Since the SCP and SDREO offer distinct services and scope, coordination in terms of forms, requirements, or clarification on who is going to do what and when is not necessary. There is coordination between SCP and SDREO in technical assistance project reports.
- **Marketing.** The SCP and SDREO cross-market each other's programs.
- **City Policy Supports SCP.** The City of San Diego passed its Sustainable Buildings Policy in 2003; it requires LEED Silver for all City-owned new construction and renovation projects. Despite the City's policy, there's little integration at lower levels like cross-marketing or design resources provided for green building. No city buildings have participated in SCP yet.
- **Distinguishing between Savings by Design (SbD) and SCP.** SbD is well known in San Diego. It has been closely aligned with SCP because they both focus on new construction. There may be some overlap between SbD and SCP and not enough distinction. SbD offers design assistance and incentives and primarily focuses on energy efficiency. To avoid double-dipping, SCP focuses on other green building aspects, PV's and LEED registration and certification fees. "It's a little confusing to keep it all straight but [SDREO's] finding ways to make it clear."
- **Photovoltaics Fit with SCP.** "The SCP is focused on new construction only; but photovoltaics as part of the pilot PV program are installed on new and existing buildings. So there's some confusion on how the new pilot PV program fits with the SCP. Should it be another tool in SDG&E's tool box or is it a part of the SCP?"
- **Funding Renewables.** SCP's new pilot PV program pays for the installation of a system on a customer's roof or site.
- **City Goal Supports Renewables.** The City of San Diego's Mayor's goal is to install 50 Megawatts of renewable energy at city facilities, and this is consistent with objectives of the SCP. Potential projects include using methane gas from landfills for cogeneration plants, using methane at a sewage treatment plant, and hydroelectric generation from outfall of a sewage treatment plant.
- **Funding LEED.** SCP provides funding for LEED registration and certification fees.
- **City Policy Supports Energy Conservation.** City of San Diego's Environmental Services Program implements energy conservation, which is a direct link to SCP.
- **Smart Growth.** SCP and the City's Planning Department conducted a smart growth survey for the City's program and the SCP.

SCP Benefits for Other Programs

The SCP benefits other programs in a several important ways:

- **Funding.** SCP provides funding for LEED registration and certification fees.
- **Marketing Awareness.** SCP creates marketing materials that promote the SCP and they also benefit the SDREO.

- **More than Energy.** “As an energy-focused organization, [SDREO] concentrates on energy because that’s the driver economically and our expertise, but we also discuss other green building issues like site and materials. SCP’s support for green issues besides energy benefits other programs, like ours, focused on site, materials, and other green issues.”
- **Examples.** Examples of constructed buildings are critical. “We can’t point to enough projects that are green, especially commercial ones. If we don’t have San Diego projects for promotional purposes, people will think this is all just hot air.”
- **LEED Showcases.** “It’s a good way to showcase LEED case studies and illustrate cost benefit analysis.”

Other Programs’ Benefits for SCP

The relationship between the SCP and other programs is a two-way street. The following are examples of how the SDREO and City programs support the SCP.

- **Referrals.** SDREO refers customers or leads to the SCP.
- **Tipping Point.** “Maybe SDREO’s involvement is pivotal to making a project go forward . . . maybe it’s a tipping point. While an owner may receive direct payments from the SCP, that may or may not make or break their decision to use LEED.”
- **Confidence.** SDREO’s referrals to SCP raise the owner’s or architect’s confidence. SDREO plays the SCP up and tells them the SCP nicely complements SDREO so it makes those projects more likely to go forward since they have both programs to support it.
- **Knowledge of Other SDREO Programs.** SDREO offers many other energy programs that are discussed with customers to make them aware of all their energy-efficiency options.
- **Technical Assistance.** SDREO provides in-depth and comprehensive assistance. It’s hard to say how far customers would go without this Program. SDREO is hearing “Without your Program, we would not have done a specific technology or design solution.”
- **New Ordinance:** The City is in the process of creating a construction demolition ordinance that is consistent with green building practices.
- **Design Tools and Technical Support.** The City creates a few design tools and other resources, but it defers to SDG&E and refers people to the utility. “SDG&E is a lot smarter than [the City] and better at this sort of thing. And we refer designers to LEED and its website.”

Barriers to Sustainable Development

The interviewees were also asked to identify barriers to green buildings and sustainable development, and to discuss the role of the SCP.

Specific Barriers

The following is a list of sustainable development barriers identified by the interviewees, both in general and specific to San Diego.

- **Cost.** There's a perception that green building costs more.
- **Financial.** "It's not a technology problem. You have to overcome some challenges; you need to have clear, concise documentation that there are environmental benefits. It has to pencil out, and if it doesn't, it needs a financial argument to make it work compared to the old way."
- **Loans/Mortgage.** "The environmental performance of commercial or residential properties is not tied to bank loans, income generation, or property value. If it was, homeowners might ask for green buildings."
- **Lack of Knowledge.** "Plenty of people (construction property management, owners, and investors) don't know enough to make calculated decisions on how to proceed. SDREO's programs have helped overcome a lack of understanding on what this is all about. There's lots more clarity on what green building is and LEED has helped with that."
- **Designer's Learning Curve.** "[Designers] will have to spend more time to be able to design green buildings. Over time the market will say you should do it now with no cost. There's a rub, they will eat the extra cost in the short-term. In the long-term they can market their new expertise."
- **Owners.** "Owners that lack good leadership or don't have a sense of environmental stewardship retard sustainable development."
- **Mindset.** "The private-sector's mindset resists change."
- **San Diego Is Conservative.** "Some of the contractors, if they're national, are getting feedback from their other or corporate offices telling them about green. But the locally grown construction firms are not getting or adopting it as well as they could be. They say 'we've always done it that way so, unless the owner says otherwise, we don't push it.' If the value engineering doesn't give benefits to the project, it doesn't get done; if it's an environmental benefit and it doesn't pencil out, it doesn't happen."
- **It's Too Early.** "We're still early in the process for our program; we're in 'start up mode.' Once everything is developed, systems in place, and marketing materials on the street, you'll see a lot more projects."
- **City's Knowledge Level.** "The City's Development Services Department is responsible for reviewing plans; often they are not up to speed on recent sustainable building practices and may throw up bureaucratic barriers."

SCP Role Reducing Barriers

The interviewees identified several ways in which the SCP addresses some of the barriers directly.

- **Costs.** “It provides a kick-start on LEED fees. It pays for the \$1,000 to \$3,000 LEED registration and certification fees. For large projects, the certification fee doesn’t seem like much, but it really helps with smaller projects.” “It helps make onsite generation from renewables cost-effective. Owners get funding to do this.”
- **PVs.** “Even though SDG&E’s new PV pilot program is not a part of SCP, it ties into green building; it’s a nice connection to reduce barriers to installing PVs.”
- **Validity.** The SCP adds validity to green projects. For example, a marketing flyer on a LEED Gold project was recently mailed and information on this local project reduces barriers.
- **Defines Green Building.** “SCP addresses green building directly; it helps define what green building is.”
- **Mindset.** “There are misconceptions on how much [green building] costs, the benefits, and how to do it. More education is needed. It’s probably a little easier in San Diego because . . . the city has experience, strong USGBC and AIA programs, and SDG&E.”

SCP Effectiveness Reducing Barriers

We asked the interviewees how effective they thought the SCP had been at breaking down some of the barriers to sustainable development and green buildings. One respondent said, “Clients haven’t bothered to tell us, but I’m sure it has made positive impacts on barriers because it has publicized projects.” The other interviewees said they really didn’t have adequate information or evidence to answer the question.

Summary

When these interviews were conducted, the SCP was relatively new. This had implications for the degree of integration with other programs, the number of projects completed, and the amount of feedback from design teams that have gone through the Program.

The SCP appears to be well integrated with SDREO’s Green Building Education & Technical Assistance Program. There is less integration, however, between the City’s activities and SCP, and both entities could benefit from enhanced coordination and integration.

The fact that the SCP was so new limited the ability of stakeholders to provide fully informed feedback on the Program. Nevertheless, we believe that the comments provided were valuable as an early indicator of whether the Program was going in the right direction and what types of changes could improve its effectiveness.

According to the SDREO, there is a lot of regional interest in green buildings and growing communications on a wide variety of issues. In summary, one interviewee felt it was too early to

determine whether the SCP would be successful or not, but, even though it was in its early stages, a lot had been accomplished so far.

4. Participant Interviews

We designed a standard questionnaire to gauge participant energy-efficiency awareness and perceptions about barriers, effectiveness of marketing materials, and overall satisfaction with the Program. Because the SCP addresses sustainable design, we also included questions on broader areas including water efficiency, solid waste, and other sustainability issues.

These interviews supplement the impact information collected on the three participant projects (discussed in next chapter). We conducted one phone interview, while two of these interviews were conducted during our site visits.

Project Descriptions

The following three projects were completed under this Program:

- ***Sun Harbor Marina:*** There were two buildings in the Marina that participated in the SCP; a third, similar building housed a restaurant and participated in SDG&E's SbD program instead. The participating buildings are each about 5,000 square feet and are primarily office space. They achieved both gas and electricity savings and received both the design team and standard incentives. As of December 2005, the LEED certification process was underway.
- ***TKG Engineering Corporate Office:*** This project was a major renovation of an existing office building of nearly 19,000 square feet. It provided both electricity and natural gas savings. The project qualified for both the design team and energy-efficiency incentives. It received a LEED Gold certification and SDG&E installed PVs on the roof and a fuel cell.
- ***Kaiser Permanente Office Building:*** This new 34,000 square foot office building achieved both electricity and natural gas savings. It qualified for the SCP design team and energy-efficiency incentives. The original intention was to obtain LEED certification, but the project will not because of problems with the contractor and corporate policy (discussed later).

Program Awareness

Marketing and Outreach Approach

Based on the Program plan, initial marketing activities focused on recruiting progressive and motivated developers, building owners, architects, engineers and energy design professionals, and contractors whose upcoming projects would meet or exceed SCP requirements. Potential participants were to be recruited primarily through "word-of-mouth" and the individual contacts that SDG&E's Savings by Design and ENERGY STAR[®] New Homes Account Executives had established with major developers, A&E firms, and design professionals in the region. SDG&E also planned to work through collaborative partnerships with trade organizations to inform

members about the Program. Marketing and outreach efforts also were intended to be closely coordinated with city and county building departments and other regional entities.

Marketing and promotion also used more traditional methods including distribution of Program applications, direct mailings, handouts at trade shows, the preparation of project-specific flyers and case studies, articles published in trade association newsletters, presentations and participation in training workshops, and on the SDG&E website.

Participant Awareness

Based on our interviews, the Program was successful at reaching progressive and motivated market actors. At least two of the Program participants were generally motivated to be “early adopters” with varying levels of knowledge and commitment to green buildings and sustainability. One participant said “I’m doing this for my grandchildren . . . I wanted my building to be a prototype for green buildings.” Two of the participants said they definitely would have built energy-efficient buildings even without the Program.

Given that they were early participants, we found that two of the projects had begun construction before the Program had become available. The third participant was made aware of the Program before construction commenced.

In all cases, direct SDG&E staff contacts played an important role in making these early participants aware of the Program. One had started as an SbD project that, over the course of working with SDG&E, eventually turned into an SCP project. One participant became aware of the Program after participating in a residential SDG&E program and was informed about the Program either directly by the utility or the design contractor.

The participant who signed-on prior to construction became aware of the Program through a regular charrette held by his SDG&E contact. Program details and materials were provided during this initial meeting, but the most effective informational source identified by the participant was the SDG&E contact. Staff at this company frequently allocate time to this trusted contact, who in turn keeps the business informed of opportunities such as the SCP.

Participants were unable to provide much feedback on other sources of information about the Program. This was not surprising given that they were early participants and had not had the opportunity to be exposed to other promotional and marketing materials.

Influence of the Program

Baseline Practices

As noted above, these three participants came to the Program with some level of commitment to green building practices. Both the projects that were in construction prior to being admitted into the Program had been planning to incorporate green practices. Beginning as a SbD participant, one of the buildings had been striving to include energy-efficiency and green building measures adequate to achieve a silver LEED rating. Under the SCP, it achieved a gold rating. The

developer of the other project indicated that she had already intended to incorporate green features, although the types of features were not specified before joining the Program.

The third participant stated that his company typically tries to exceed the California Title 24 energy-efficiency standards, but to a limited extent. He felt that, without participating in the SCP, the project may have been designed to be about 5% more efficient than required by the standard.

In an effort to gauge their “normal” decision-making process, participants were questioned about the criteria their organizations use to make energy-efficiency and sustainable design decisions, and how they differed from their normal capital investment process. In two of the three cases, however, the participants’ SCP project was the only facility or other major capital investment they had been involved in, so the question was not very relevant. In one of these two cases, a simple budget was established and the decisions were worked out within those financial parameters. The second participant used the lack of prescribed standards as an opportunity to work with a blank slate in an effort to “do the right thing.”

The one participant whose organization had been involved in other capital projects said that, for building projects, they draw from an alliance of architect firms who hire mechanical, electrical, and plumbing (MEP) engineers to do the work. They leverage their involvement with SDG&E, using utility sponsored charrettes as informational tools, and in this case followed the LEED scorecard to stay on track. This participant did not provide any specific information on financial or investment criteria used in their decision making.

Barriers and Effects of the SCP

We asked the participants what barriers impeded the adoption of green building practices and how the Program had helped overcome these barriers.

Cost

All three of the participants stated that they considered cost to be a barrier to the use of energy-efficient and sustainable building practices. However, none of the participants could provide a very accurate estimate of how much more it cost to meet the green-building requirements of their project. One participant said that design and construction costs were probably around 5% higher than for typical buildings, but this was based more on information from the literature than empirical data for their project. The most precise estimate was an additional cost of between \$80,000 and \$100,000 on a project involving about \$1.6M for construction.

In general, participants did not find the SCP incentives to be very significant in terms of offsetting the additional costs they attributed to their green building projects. However, in two of the three projects, the incentive played an instrumental role in the project. In one, “it helped make sure that the engineers were paying attention to get the savings. It gave the engineers an incentive to follow through.” In the second, the developer said, “The financial incentive made a big difference because it allowed us to cover the added design and consultant costs. . . . It made my partner more comfortable spending the money to hire a green consultant.”

Lack of Knowledge and Education

All three participants identified lack of knowledge and education as barriers to the growth of green building practices. The perspective varied some among the participants. Because of the nature of his firm's business, one was already quite knowledgeable about energy-efficient and sustainable building practices, but felt that the clients for the firm's engineering services were not. Another noted that education on the effectiveness of different measures and features, guidance on how to identify green measures and practices, and a common definition of "green" would be very helpful.

Another related barrier was a lack of confidence in the benefits of green buildings, including estimated energy savings. One participant specifically mentioned lack of knowledge about the costs of green buildings as a potential barrier.

The Program helped to alleviate these barriers to an extent. In one instance, the participant felt that the Program allowed them to demonstrate a technology in a pilot project, thus allowing them to "test the waters" for a green-building measure. Overall, the project allowed this organization to try out concepts, materials, and equipment that they otherwise would have passed on. Successful completion of this "pilot project" may pave the way for green options in the organization's future construction projects.

One participant specifically mentioned that they took advantage of the technical assistance provided by the Program and they found it to be useful even though they already had a strong knowledge of the technology.

In at least one case, going through the LEED process specifically proved to be an educational experience that helped the participant become more informed about green building practices.

Other Barriers

One participant had a series of problems with their general contractor, and the green features of the building may have compounded the problems. The participant felt that the contractor did not know how to coordinate with other people and organizations.

This is important since one cornerstone of green building is application of an integrated design and construction process. While a sustainable building program, such as the SCP, can encourage designers and contractors to function in a more integrated process, failure to do so is likely to be more evident and can have potentially larger negative consequences than in a standard building project.

Program Benefits

When asked about energy savings, only one participant was confident that the expected energy savings were achieved. This project had the most comprehensive monitoring in place.

Both of the other projects had encountered some problems with equipment (such as controls and economizers) not functioning properly and improper system balancing. At the time our

interviews were conducted, these problems were being addressed and, until they are resolved, it is impossible to quantify energy savings.

Participants were also questioned about non-energy benefits of the green design. Those benefits are discussed briefly below.

Water Savings

Only one of the participants claimed that their building was achieving significant water savings: while they had increased the amount of water using equipment, the monthly bill had decreased.⁶

In one of the other projects, the respondent said that he did not see this information, but he felt that there were some savings. In the third project, the interviewee felt that there were savings, but they were very small.

Stormwater Reduction

None of the participants claimed a reduction in the amount of stormwater runoff. Given the location of these projects and the relatively small amount of rainfall, this was not expected to be a significant benefit.

Construction Waste Reduction

One of the participants had made plans to incorporate waste reducing practices in the construction process. However, those plans fell through when financing was delayed and the contractor rushed through the process once they were able to proceed with the project.

Construction waste that was generated by another of the participants was sent to Mexico for recycling.

Increased Occupant/Employee Productivity, Comfort, and Satisfaction

Only one of the participants claimed specifically that employee productivity had increased. However, he thought the benefit was a result of having larger workspaces, not necessarily from green design. In another case, the respondent indicated that they did not expect to see an increase in productivity because their previous workspace was already very conducive to high productivity.

In the building that was having control problems the respondent indicated that he was hearing occupant comfort complaints. In his view, however, the complaints were not unusual.

The developer of the one building with leased space provided very positive feedback about the benefits to occupants. Based on 25 years of leasing similar space, she noted that “The best indicator is that all the tenants are doing well. Tenants love the new space, though they may not

⁶ Note that our review of the water bills did not confirm this, but our analysis taking into account changes in the amount of water using equipment did demonstrate water savings.

be fully aware that it's because of reduced toxins, consistent light levels, and the use of daylighting. Tenants are also happier that they're not stuck in spaces that have the heat or air conditioning running at all times."

Spillover and Other Benefits

One of the respondents said that his engineering firm had received a lot of positive feedback on its new space and had seen an increase in business due to the LEED rating. Their neighbor moved to a new space and was inspired by the participant's project to make their new space "green."

One participant indicated that the recognition and prestige associated with building a LEED or green building was very important to her. Beyond the sense of pride associated with becoming a prototypical green building and a destination for green building tours, the long-term impacts of sustainability were seen as benefits to coming generations. This vision for the future stemmed from the conscious effort to get away from the "bottom line mentality" in an effort to create a building to be proud of. Overall, the number one factor for this participant was that the tenants were doing well as a direct result of the green practices.

This project also had impacts that extended well beyond the project. The developer indicated that the project had influenced the Port of San Diego to implement a policy requiring LEED on new building projects. We contacted an official at the Port, and he stated that the Port had already been considering requiring LEED in its request for proposals (RFP) and the Sun Harbor project demonstrated that building to LEED was feasible. The Port's Board has now adopted a working policy requiring all new projects to be LEED certified. The Port worked with the SDREO and used the technical services they made available to develop their policy. In the official's view, "Though the Sun Harbor project didn't drive the policy, it set the bar and showed it can be done. There's always resistance to change, but Sun Harbor provided an example and demonstrated that green building is not going to go away." SDG&E has followed up with the Port and made a presentation to them about SPC.

Effects on Views about Renewables and LEED

To gauge the effect of SCP on participants' views about renewables and LEED, participants were asked about their experiences in these areas of the Program.

On-Site Renewables Generation

Only one of the participants had renewables generation installed in conjunction with the SCP. Through its companion program, SDG&E leased the roof space and installed PVs. The participant did not have to cover any of the costs and felt this was a great approach. This participant never would have done it otherwise, as they were looking at a 10- to 12-year payback even with tax credits.

The other two participants were willing but unable to participate. One was willing to lease roof space to SDG&E for the installation of PV panels, but said that the utility did not proceed. This participant was unwilling to pay anything additional to install renewable generation. The third

participant was very interested in a PV installation but was told by SDG&E that their roof space was too small. In her view, “Most green buildings are government or large commercial buildings; mine is one of the first private green building projects, and this is a better example than government buildings to show what can be done, including installing renewables. I would like to install some flexible PVs as a carport in front.”

LEED

One of the participants got involved in the SCP so far along into their project that the Program had little influence on their understanding or view of LEED.

The other two felt that the linkage between the SCP and LEED was a strong point of the Program. One noted, “This whole process was good—having the charrettes and looking at the LEED scorecard.” For the other participant, LEED enabled the installation of a number of measures that may have otherwise been overlooked or dismissed. Seen as a daunting process to carry out alone, having the SCP and LEED available made the process a more comfortable one. It was seen as a very positive experience to have a large organization such as SDG&E rewarding their efforts, which provided self confidence and support to move ahead.

It is important to note that one participant, the Kaiser Permanente facility, limited its pursuit of LEED certification because of corporate policy. We contacted a corporate representative who confirmed this. Kaiser Permanente, though a supporter of LEED, has opted to apply the *Green Guide for Healthcare* to all its facilities. This guide is quite similar to LEED, but Kaiser Permanente has decided to use it instead because they feel that 1) it is as demanding as LEED in general and 2) it incorporates requirements that address health issues, and 3) they are reluctant to pay the costs of LEED certification.

Program Promotion by Participants

The ability to use SCP participants to help promote the Program is a valuable opportunity. However, experiences from these three projects were varied.

One participant has been quite proactive. As part of her SCP project, a LEED and green building informational room was set aside. It will display Program brochures and information about the building. This participant is also hoping to be able to win and display awards for the building.

One of the participants indicated that they had hesitated to promote SCP because there is some confusion over how it differs from SbD. Their project was covered in a Program case study, but they hadn’t received many calls about the SCP because it was not well differentiated from SbD.

The respondent for the Kaiser Permanente project said that he had not promoted the Program to the rest of his organization because many facilities are located in other utilities’ service areas and many have their own staff who focus on green building issues. In addition, the issues related to LEED discussed above probably limited the level of Program promotion.

Program Satisfaction and Recommendations

During our interviews, we enquired about five specific aspects of the Program to gauge participant satisfaction with the Program as a whole. These are discussed below.

- **Application process.** Each of the participants required assistance from SDG&E on some level during the application process. Overall, SDG&E representatives were found to be very helpful and knowledgeable during this process, and their assistance was described as both “wonderful” and “incredible.” One of the participants mentioned SDG&E’s ability to rerun their building’s EnergyPro analysis, when necessary, as a plus.
- **Written materials.** Written materials did not appear to be very effective. While one felt that the materials that were provided were “good” overall, the participants were more prone to maintain personal contact with the Program representatives rather than rely on written materials for information. This could be a reflection of the fact that these respondents were early participants and not all the materials (such as case studies) were available or disseminated.
- **Technical assistance.** Feedback on SDG&E’s technical assistance was fairly limited. One participant already had a high level of technical expertise and really didn’t need much technical assistance; however, this respondent did say that their team went further in their project because SDG&E’s technical experts encouraged them to do so. One respondent said that SDG&E worked with his technical staff, but he had no direct knowledge of the technical assistance provided. The third participant said that SDG&E’s technical assistance was very helpful; in particular, she was very positive about how the utility’s lighting consultant helped the project team redesign their lighting to meet a lighting requirement.
- **Incentive levels.** Though glad that the incentives were in place, and larger than amounts provided during past programs, the incentive levels were generally found to be minimal, or “not a big deal.” The design team incentive was a welcome component of the Program because it helped defray some of the added design costs.
- **Utility responsiveness and timeliness.** All the participants were very happy with the quality of their interactions with SDG&E. Responses included “great” (from two participants) and “very good—has always been good.” The positive feedback in this area probably stems from the personal contact that the utility representatives maintain with each of the participants.

The recommendations for Program improvement were fairly limited. They included the following:

- **Better advertising.** “Get the word out.” SDG&E should do more to distinguish the SCP from SbD.
- **Direct advertising.** Provide information directly to building owner/developer rather than relying on the designer or other professional to inform the participants about the Program.

- ***Pro-active assistance.*** Have utility representatives prevent problems rather than help to solve problems; get them to the site during construction, not after the building is completed.

5. Program Impacts and LEED Compliance

This chapter provides the results of our verification activities for each of the three completed projects. These results encompass 1) the energy-efficiency improvements and 2) the other green building measures implemented in each project and LEED compliance.

Verification of the energy-efficiency aspects of each project involved these steps:

1. Identification of energy-efficiency measures beyond code requirements
2. Site visit to verify installation and operation of each measure
3. Review of compliance and incentive forms
4. Re-analysis of each project using EnergyPro

Verification of the other green building measures and assessment of LEED compliance required the following steps:

1. Identification of other green building measures
2. Verification of installation and operation during site visit
3. Review of any supporting calculations and documentation
4. Assessment of compliance with LEED

In addition to the project verification activities, we also addressed program savings and cost effectiveness. Energy savings are discussed here for each project. Cost effectiveness for the Program is discussed in Chapter 7.

Results are presented for each project in turn. The findings from our verification of the energy-efficiency measures and energy savings calculation are presented first. Results for the other measures and LEED compliance follow.

In addition to these completed projects, SDG&E signed up an additional seven projects as Program participants. These projects were not completed by the end of 2006, but SDG&E has reserved the incentive funds for these projects, which will be paid to the participants upon completion. These projects are described briefly at the end of this chapter.

Sun Harbor Marina

Energy Efficiency and Savings⁷

The Sun Harbor East building was 41.3% more energy efficient than the Title 24 standard required. We received an Energy Pro model from SDG&E and verified that the model was

⁷ Energy consumption and savings are reported for the three projects in kBtu/sq.ft.-year. The “compliance margin” is reported in the same units.

correct. Table 2 shows the energy savings for each energy component. There was a 100% realization rate for all savings estimates based on our verification that the model was constructed correctly and all measures were installed and working properly.

The biggest energy savings were found in space cooling (compliance margin = 40.09 kBtu/ft²-yr) and lighting (compliance margin = 15.49). Sun Harbor East had a total of 6 packaged rooftop cooling units ranging in energy efficiency. They had two Carrier 48GXN060 units (EER = 10.5), three Carrier 48GXN024 units (EER = 10.4), and one Carrier 48GXN036 (EER = 10.4). The use of a tight, well-sealed envelope also plays a role in the space cooling energy consumption. The installed windows having a U-value of 0.29 and SHGC of 0.36, and the installation of R-19 insulation in the walls and R-30 insulation in the roof minimizes the envelope heat transfer. The lighting savings can be attributed to the use of compact fluorescent lights (CFLs) and efficient fluorescent ceiling fixtures. The Title 24 standard lighting requirement for this building was 1.30 W/ft² while the building achieved 0.77 W/ft².

There were smaller, but still significant, savings found in the indoor fans (compliance margin = 10.3 kBtu/ft²-yr).

There was minimal energy savings in space heating (0.80 kBtu/ft²-yr) and the domestic water heating (0.10). The domestic water heating system TAKAGI T-M1 is more efficient than standard equipment, but the minimal savings are due to minimal hot water usage.

Table 2. Sun Harbor East Energy Components and Energy Use, kBtu/ft²-yr

| Energy Component | Standard Design (Title 24) | Proposed Design | Compliance Margin | | | |
|---|----------------------------|-----------------|-------------------|-----------------------------|-------------|-------------|
| Space Heating | 2.75 | 1.94 | 0.80 | | | |
| Space Cooling | 55.51 | 15.42 | 40.09 | | | |
| Indoor Fans | 36.38 | 26.08 | 10.30 | | | |
| Heat Rejection | 0.00 | 0.00 | 0.00 | | | |
| Pumps & Misc. | 0.00 | 0.00 | 0.00 | | | |
| Domestic Hot Water | 3.28 | 3.18 | 0.10 | | | |
| Lighting | 38.27 | 22.78 | 15.49 | | | |
| Receptacle | 25.43 | 25.43 | 0.00 | Gross Savings, Total | | |
| Process | 0.00 | 0.00 | 0.00 | kWh/year | kW | Therms/year |
| Total | 161.62 | 94.83 | 66.78 | 32,786 | 14.2 | 46 |
| <i>Percent better than standard = 41.3%</i> | | | | | | |

The Sun Harbor West building was 41.2% more energy efficient than the Title 24 standard required. We received an Energy Pro model from SDG&E and verified that the model was correct. Table 3 shows the energy savings for each energy component. There was a 100% realization rate based on our assessment that the model was constructed correctly and all measures were installed and working properly.

The biggest energy savings were found in space cooling (compliance margin = 56.96) and lighting (compliance margin = 37.53). Sun Harbor West had a total of 6 packaged cooling units

ranging in energy efficiency. They had one packaged rooftop Carrier 48GXN024 units (EER = 10.4), two split system Carrier 38QRC060 units (EER =9.9), and three split system Carrier 38QRC024 (EER = 10.0). The use of a tight, well-sealed envelope also plays a role in the space cooling energy savings. The windows having a U-value of 0.29 and SHGC of 0.36 and the use of R-19 insulation in the walls and R-30 insulation in the roof minimizes the envelope heat transfer. The lighting savings can be attributed to the use of CFLs and efficient fluorescent ceiling fixtures. The Title 24 standard lighting requirement for this building was 1.731 W/ft² while the building achieved 0.458 W/ft².

There is minimal savings associated with the space heating (1.16) and indoor fans (2.53). The space heating savings are a result of an efficient envelope (insulation and windows) rather than a heating equipment efficiency upgrade.

The domestic water heating system TAKAGI T-K2 (EF=0.84) is more efficient than standard equipment, but the minimal savings of (0.40) are due to minimal hot water usage.

Table 3. Sun Harbor West Energy Components and Energy Use, kBtu/ft²-yr

| Energy Component | Standard Design (Title 24) | Proposed Design | Compliance Margin | Gross Savings, Total | | |
|---|----------------------------|-----------------|-------------------|----------------------|-------------|-------------|
| Space Heating | 3.91 | 2.76 | 1.16 | | | |
| Space Cooling | 38.73 | 23.40 | 15.33 | | | |
| Indoor Fans | 17.53 | 15.00 | 2.53 | | | |
| Heat Rejection | 0.00 | 0.00 | 0.00 | | | |
| Pumps & Misc. | 0.00 | 0.00 | 0.00 | | | |
| Domestic Hot Water | 6.84 | 6.44 | 0.40 | | | |
| Lighting | 51.00 | 13.47 | 37.53 | | | |
| Receptacle | 20.20 | 20.20 | 0.00 | | | |
| Process | 0.00 | 0.00 | 0.00 | kWh/year | kW | Therms/year |
| Total | 138.22 | 81.27 | 56.96 | 24,788 | 11.3 | 25 |
| <i>Percent better than standard = 41.2%</i> | | | | | | |

Other Measures and LEED Compliance

The Sun Harbor developer intends to receive LEED certification but had not completed the process at the time this report was being prepared. Figure 3 presents a preliminary assessment of Sun Harbor’s rating under the LEED system. The LEED credits are shown for each of the LEED rating category areas consistent with the categories in the standard LEED checklist. Those credits that the project probably will receive are marked with an “X” in the first column and the total number of probable credits in each category is shown at the top of each category. The possible points for each category are shown in the next to last column on the right, and the points that could be achieved for each credit are shown in that column next to the credit name. For Energy Credit 1, the value in the column is the estimated energy efficiency points that the project would earn.

The ratings are based on information provided by the project developer. Although we were able to verify some of the credits during our review, we did not conduct a thorough assessment and the official certification has to be conducted by the USGBC. Many of the credits are marked in the “?” column because the developer’s team believes they are likely to receive the credits, but more information or analysis has to be provided. Based on this assessment, the project would receive credits in at least 19 areas and at least 24 points. It is very likely that several of the 14 credits that require further analysis will be awarded and the project will reach the Certified, and possibly the Silver, level once the submittal is complete.

The most points occur in the Energy & Atmosphere category because of the energy efficiency of the project. One unique feature of the project is the purchase of 100% wind power. Several credits are anticipated in the Innovation & Design Process category, often for far exceeding the basic LEED requirements for a specific credit.

We were able to specifically review the savings analysis for water using fixtures. The developer’s engineer provided his calculations and we determined that the assumptions were reasonable and the calculations accurate. As noted, however, these and the other analyses had not been through the official LEED review process when our report was prepared.

Figure 3. Sun Harbor Interim LEED Rating Checklist

LEED-NC Version 2.1 Project Checklist

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

| Yes ? | | | Comments |
|----------|----------|---|---|
| 4 | 3 | Sustainable Sites | 14 Points |
| X | | Prereq 1 Erosion & Sedimentation Control | Required |
| | | Credit 1 Site Selection | 1 |
| | | Credit 2 Development Density | 1 |
| X | | Credit 3 Brownfield Redevelopment | 1 |
| X | | Credit 4.1 Alternative Transportation , Public Transportation Access | 1 2 bus lines |
| X | | Credit 4.2 Alternative Transportation , Bicycle Storage & Changing Rooms | 1 Outside shower |
| | | Credit 4.3 Alternative Transportation , Alternative Fuel Vehicles | 1 |
| X | | Credit 4.4 Alternative Transportation , Parking Capacity and Carpooling | 1 |
| | | Credit 5.1 Reduced Site Disturbance , Protect or Restore Open Space | 1 |
| | | Credit 5.2 Reduced Site Disturbance , Development Footprint | 1 |
| | X | Credit 6.1 Stormwater Management , Rate and Quantity | 1 Original imperviousness>50%, reduced >25%; more information required |
| | X | Credit 6.2 Stormwater Management , Treatment | 1 |
| | X | Credit 7.1 Landscape & Exterior Design to Reduce Heat Islands , Non-Roof | 1 75% vegetated coverage in 5 years and high-albedo materials; more calculations needed |
| | | Credit 7.2 Landscape & Exterior Design to Reduce Heat Islands , Roof | 1 |
| | | Credit 8 Light Pollution Reduction | 1 |
| Yes ? | | | |
| 2 | 1 | Water Efficiency | 5 Points |
| | X | Credit 1.1 Water Efficient Landscaping , Reduce by 50% | 1 Drip irrigation; difficult to acquire information needed |
| | | Credit 1.2 Water Efficient Landscaping , No Potable Use or No Irrigation | 1 |
| | | Credit 2 Innovative Wastewater Technologies | 1 |
| X | | Credit 3.1 Water Use Reduction , 20% Reduction | 1 |
| X | | Credit 3.2 Water Use Reduction , 30% Reduction | 1 Calculations provided did not confirm, but waterless urinals planned |
| Yes ? | | | |
| 3 | | Energy & Atmosphere | 17 Points |
| X | | Prereq 1 Fundamental Building Systems Commissioning | Required |
| X | | Prereq 2 Minimum Energy Performance | Required |
| X | | Prereq 3 CFC Reduction in HVAC&R Equipment | Required |
| X | | Credit 1 Optimize Energy Performance | 6 Estimated energy savings relative to Title 24 were 41% |
| | | Credit 2.1 Renewable Energy , 5% | 1 |
| | | Credit 2.2 Renewable Energy , 10% | 1 |
| | | Credit 2.3 Renewable Energy , 20% | 1 |
| | | Credit 3 Additional Commissioning | 1 |
| X | | Credit 4 Ozone Depletion | 1 |
| | | Credit 5 Measurement & Verification | 1 |
| X | | Credit 6 Green Power | 1 Purchasing 100% wind power |

| Yes ? | | | | Comments |
|-------|----|--|-----------|--|
| 1 | 4 | Materials & Resources | 13 Points | |
| X | | Prereq 1 Storage & Collection of Recyclables | Required | |
| | | Credit 1.1 Building Reuse , Maintain 75% of Existing Shell | 1 | |
| | | Credit 1.2 Building Reuse , Maintain 100% of Shell | 1 | |
| | | Credit 1.3 Building Reuse , Maintain 100% Shell & 50% Non-Shell | 1 | |
| | | Credit 2.1 Construction Waste Management , Divert 50% | 1 | |
| | | Credit 2.2 Construction Waste Management , Divert 75% | 1 | |
| | | Credit 3.1 Resource Reuse , Specify 5% | 1 | |
| | | Credit 3.2 Resource Reuse , Specify 10% | 1 | |
| | X | Credit 4.1 Recycled Content , Specify 5% (post-consumer + ½ post-industrial) | 1 | Tire door mats, partitions recycled plastic, metal roof and railings; more data needed |
| | X | Credit 4.2 Recycled Content , Specify 10% (post-consumer + ½ post-industrial) | 1 | More data needed |
| | X | Credit 5.1 Local/Regional Materials , 20% Manufactured Locally | 1 | All roofing assembled on site; more data needed |
| | X | Credit 5.2 Local/Regional Materials , of 20% Above, 50% Harvested Locally | 1 | |
| X | | Credit 6 Rapidly Renewable Materials | 1 | Kirei board of sorghum, bamboo flooring |
| | | Credit 7 Certified Wood | 1 | |
| Yes ? | | | | |
| 5 | 5 | Indoor Environmental Quality | 15 Points | |
| X | | Prereq 1 Minimum IAQ Performance | Required | |
| X | | Prereq 2 Environmental Tobacco Smoke (ETS) Control | Required | |
| X | | Credit 1 Carbon Dioxide (CO₂) Monitoring | 1 | |
| | | Credit 2 Ventilation Effectiveness | 1 | |
| | X | Credit 3.1 Construction IAQ Management Plan , During Construction | 1 | More information needed |
| | | Credit 3.2 Construction IAQ Management Plan , Before Occupancy | 1 | |
| | X | Credit 4.1 Low-Emitting Materials , Adhesives & Sealants | 1 | Information needed; very likely |
| X | | Credit 4.2 Low-Emitting Materials , Paints | 1 | Safecoat paints |
| X | | Credit 4.3 Low-Emitting Materials , Carpet | 1 | |
| | | Credit 4.4 Low-Emitting Materials , Composite Wood & Agrifiber | 1 | |
| | X | Credit 5 Indoor Chemical & Pollutant Source Control | 1 | More information needed |
| | X | Credit 6.1 Controllability of Systems , Perimeter | 1 | More review needed |
| | | Credit 6.2 Controllability of Systems , Non-Perimeter | 1 | |
| | X | Credit 7.1 Thermal Comfort , Comply with ASHRAE 55-1992 | 1 | More analysis needed |
| | | Credit 7.2 Thermal Comfort , Permanent Monitoring System | 1 | |
| X | | Credit 8.1 Daylight & Views , Daylight 75% of Spaces | 1 | |
| X | | Credit 8.2 Daylight & Views , Views for 90% of Spaces | 1 | |
| Yes ? | | | | |
| 4 | 1 | Innovation & Design Process | 5 Points | |
| | X | Credit 1.1 Innovation in Design : Clean Marina Program | 1 | |
| X | | Credit 1.2 Innovation in Design : Double Green Power Purchase | 1 | |
| X | | Credit 1.3 Innovation in Design : 40% Water Savings WEc3 | 1 | |
| X | | Credit 1.4 Innovation in Design : Educational Signage and Case Study | 1 | |
| X | | Credit 2 LEED™ Accredited Professional | 1 | |
| Yes ? | | | | |
| 19 | 14 | Project Totals (pre-certification estimates) | 24 | |

TKG Engineering Corporate Office

Energy Efficiency and Savings

The TKG building was 30% more energy efficient than the Title 24 standard required. We received the final EnergyPro model from SDG&E and verified that the model was correct. Table 4 shows the energy savings for each energy component. There was a 100% realization rate based on our assessment that the model was constructed correctly and our verification that all measures were installed and working properly.

The biggest energy savings were found in space cooling (compliance margin = 22.96) and lighting (compliance margin = 8.26). TKG had a total of 14 small DX cooling units ranging in energy efficiency. They had seven Trane YCZ050 units (SEER = 16.0), three Trane YCZ036 units (SEER = 16.05), and three Trane YCZ060 (SEER = 15.2). They also had a unit in their server area that just met the minimum Title 24 requirement. The lighting savings can be attributed to the use of CFLs, efficient fluorescent ceiling fixtures, and other efficient lighting options. The Title 24 standard lighting requirement for this building was 1.29 W/ft² while the building achieved 1.01 W/ft².

There were smaller, but still significant, savings found in the domestic water heater (compliance margin = 3.95) and indoor fans (compliance margin = 3.57). The domestic water heater was a gas-fired Lochinvar ETN051 with a 76% efficiency and energy factor of 3.0.

All of the DX cooling units had a natural gas burner for the space heating. The space heating energy savings (compliance margin = 1.12) represents about 3% of total savings. All units had an 80% AFUE.

Table 4. TKG Energy Components and Energy Use, kBtu/sq.ft.-year

| Energy Component | Standard Design (Title 24) | Proposed Design | Compliance Margin | | | |
|---|----------------------------|-----------------|-------------------|-----------------------------|------|-------------|
| Space Heating | 5.01 | 3.89 | 1.11 | | | |
| Space Cooling | 35.27 | 12.31 | 22.96 | | | |
| Indoor Fans | 23.54 | 19.97 | 3.57 | | | |
| Heat Rejection | 0.00 | 0.00 | 0.00 | | | |
| Pumps & Misc. | 0.00 | 0.00 | 0.00 | | | |
| Domestic Hot Water | 4.79 | 0.84 | 3.95 | | | |
| Lighting | 37.99 | 29.73 | 8.26 | | | |
| Receptacle | 23.76 | 23.76 | 0.00 | Gross Savings, Total | | |
| Process | 3.66 | 3.66 | 0.00 | kWh/year | kW | Therms/year |
| Total | 134.02 | 94.16 | 39.86 | 64,020 | 34.8 | 955 |
| <i>Percent better than standard = 29.7%</i> | | | | | | |

Other Measures and LEED Compliance

The TKG building received a LEED Gold certification prior to our review and the company provided the project checklist. We discussed the list with a TKG representative and obtained detailed information on some of the measures.

Figure 4 summarizes the TKG project ratings. The project received 40 total points, one more than needed for a Gold rating. One of the most creative aspects of this project is the use of reclaimed water from the city for irrigation and fixture flushing. When we conducted our site visit all the required plumbing was in place; however, this water was still not being used for flushing because of local and state code issues. TKG was confident that this would be resolved. Another creative aspect of this project is the installation of a PV system and a fuel cell, which together generate enough electricity to meet nearly 40% of the facility's requirements. These systems were installed by SDG&E under their other programs and they were integrated with the grid. For Sustainable Sites Credit 4.1 there are two bus stops that are slightly beyond the LEED ¼-mile threshold, but TKG worked with the USGBC to negotiate a LEED credit based on the proximity of commuter rail.

Figure 4. TKG Corporate Office LEED Rating Checklist

LEED-NC Version 2.1 Project Checklist

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

| Yes ? | | Comments |
|-------|--|---|
| 4 | Sustainable Sites | 14 Points |
| X | Prereq 1 Erosion & Sedimentation Control | Required |
| X | Credit 1 Site Selection | 1 |
| | Credit 2 Development Density | 1 |
| | Credit 3 Brownfield Redevelopment | 1 |
| X | Credit 4.1 Alternative Transportation, Public Transportation Access | 1 Commuter rail plus 2 bus stops beyond 1/4 mile |
| X | Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms | 1 |
| | Credit 4.3 Alternative Transportation, Alternative Fuel Vehicles | 1 |
| | Credit 4.4 Alternative Transportation, Parking Capacity and Carpooling | 1 |
| | Credit 5.1 Reduced Site Disturbance, Protect or Restore Open Space | 1 |
| | Credit 5.2 Reduced Site Disturbance, Development Footprint | 1 |
| | Credit 6.1 Stormwater Management, Rate and Quantity | 1 |
| | Credit 6.2 Stormwater Management, Treatment | 1 |
| | Credit 7.1 Landscape & Exterior Design to Reduce Heat Islands, Non-Roof | 1 |
| X | Credit 7.2 Landscape & Exterior Design to Reduce Heat Islands, Roof | 1 Reflective roof |
| | Credit 8 Light Pollution Reduction | 1 |
| 5 | Water Efficiency | 5 Points |
| X | Credit 1.1 Water Efficient Landscaping, Reduce by 50% | 1 |
| X | Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation | 1 |
| X | Credit 2 Innovative Wastewater Technologies | 1 Reclaimed water for flushing |
| X | Credit 3.1 Water Use Reduction, 20% Reduction | 1 |
| X | Credit 3.2 Water Use Reduction, 30% Reduction | 1 |
| 6 | Energy & Atmosphere | 17 Points |
| X | Prereq 1 Fundamental Building Systems Commissioning | Required |
| X | Prereq 2 Minimum Energy Performance | Required |
| X | Prereq 3 CFC Reduction in HVAC&R Equipment | Required |
| X | Credit 1 Optimize Energy Performance | 10 |
| X | Credit 2.1 Renewable Energy, 5% | 1 |
| X | Credit 2.2 Renewable Energy, 10% | 1 |
| X | Credit 2.3 Renewable Energy, 20% | 1 PVs supply 28% electricity (5 year contract), fuel cell provides 12% |
| X | Credit 3 Additional Commissioning | 1 |
| | Credit 4 Ozone Depletion | 1 |
| X | Credit 5 Measurement & Verification | 1 Utility meters for gas/water/electric; electric end uses |
| | Credit 6 Green Power | 1 |

| Yes ? | | | Comments |
|-----------|--|--|--|
| 5 | | Materials & Resources | 13 Points |
| X | | Prereq 1 Storage & Collection of Recyclables | Required |
| X | | Credit 1.1 Building Reuse , Maintain 75% of Existing Shell | 1 |
| X | | Credit 1.2 Building Reuse , Maintain 100% of Shell | 1 |
| | | Credit 1.3 Building Reuse , Maintain 100% Shell & 50% Non-Shell | 1 |
| | | Credit 2.1 Construction Waste Management , Divert 50% | 1 |
| | | Credit 2.2 Construction Waste Management , Divert 75% | 1 |
| X | | Credit 3.1 Resource Reuse , Specify 5% | 1 |
| X | | Credit 3.2 Resource Reuse , Specify 10% | 1 Includes used/refurbished system furniture |
| | | Credit 4.1 Recycled Content , Specify 5% (post-consumer + ½ post-industrial) | 1 |
| | | Credit 4.2 Recycled Content , Specify 10% (post-consumer + ½ post-industrial) | 1 |
| X | | Credit 5.1 Local/Regional Materials , 20% Manufactured Locally | 1 |
| | | Credit 5.2 Local/Regional Materials , of 20% Above, 50% Harvested Locally | 1 |
| | | Credit 6 Rapidly Renewable Materials | 1 |
| | | Credit 7 Certified Wood | 1 |
| 6 | | Indoor Environmental Quality | 15 Points |
| X | | Prereq 1 Minimum IAQ Performance | Required |
| X | | Prereq 2 Environmental Tobacco Smoke (ETS) Control | Required |
| X | | Credit 1 Carbon Dioxide (CO₂) Monitoring | 1 |
| | | Credit 2 Ventilation Effectiveness | 1 |
| | | Credit 3.1 Construction IAQ Management Plan , During Construction | 1 |
| | | Credit 3.2 Construction IAQ Management Plan , Before Occupancy | 1 |
| | | Credit 4.1 Low-Emitting Materials , Adhesives & Sealants | 1 |
| X | | Credit 4.2 Low-Emitting Materials , Paints | 1 |
| X | | Credit 4.3 Low-Emitting Materials , Carpet | 1 |
| | | Credit 4.4 Low-Emitting Materials , Composite Wood & Agrifiber | 1 |
| | | Credit 5 Indoor Chemical & Pollutant Source Control | 1 |
| | | Credit 6.1 Controllability of Systems , Perimeter | 1 |
| | | Credit 6.2 Controllability of Systems , Non-Perimeter | 1 |
| X | | Credit 7.1 Thermal Comfort , Comply with ASHRAE 55-1992 | 1 |
| X | | Credit 7.2 Thermal Comfort , Permanent Monitoring System | 1 |
| | | Credit 8.1 Daylight & Views , Daylight 75% of Spaces | 1 |
| X | | Credit 8.2 Daylight & Views , Views for 90% of Spaces | 1 |
| 5 | | Innovation & Design Process | 5 Points |
| X | | Credit 1.1 Innovation in Design : Exemplary Performance WEC2 | 1 |
| X | | Credit 1.2 Innovation in Design : Exemplary Performance WEC3 | 1 Far exceeded LEED required amounts |
| X | | Credit 1.3 Innovation in Design : Exemplary Performance EAC2 | 1 Far exceeded LEED required amounts |
| X | | Credit 1.4 Innovation in Design : Non-regulated Energy Savings | 1 |
| X | | Credit 2 LEED™ Accredited Professional | 1 |
| 31 | | Project Totals (LEED certified) | 40 |

Kaiser Permanente Office Building

Energy Efficiency and Savings

The energy efficiency of the Kaiser building was 52.4% better than required by Title 24. We received an EnergyPro model from SDG&E and verified that the model was correct. Table 5 shows the energy savings for each energy component. There was a 100% realization rate verifying that the model was constructed correctly and all measures were installed and working properly.

The biggest energy savings were found in the space cooling (compliance margin = 19.15) and space heating (compliance margin = 15.74). A tight envelope has minimized the heat transfer through the walls. The use of 8” concrete walls with rigid insulation along the perimeter walls and R-19 insulation used in the courtyard walls has allowed for minimal cool /hot outside air to enter/exit the building during the season, thus reducing the energy use. The heating unit is a LAARS PNCH750 boiler with an 85% thermal efficiency. The cooling units (2 –York YPAL070NBC, EER = 9.5) exceed Title 24 compliance.

There were also significant savings in indoor fan energy use (compliance margin = 13.00) and lighting (compliance margin = 9.42). The use of a variable frequency drive in lieu of constant speed and premium efficiency motors for the indoor fans accounted for the fan energy savings. The lighting fixtures that were installed in this project achieved a power density of 0.88 W/ft², roughly a 25% improvement over the Title 24 compliance requirement (1.20 W/ft²). While performing the site visit, the utility inspector performed a complete lighting inventory which revealed that 100% of the proposed lighting was installed and functioning.

There was a small incremental savings in the use of pumps and miscellaneous (compliance margin = 1.29).

Table 5. Kaiser Energy Components and Energy Use, kBtu/sq.ft.-year

| Energy Component | Standard Design (Title 24) | Proposed Design | Compliance Margin | | | |
|---|----------------------------|-----------------|-------------------|-----------------------------|-------------|---------------|
| Space Heating | 44.99 | 5.30 | 39.70 | | | |
| Space Cooling | 61.79 | 32.28 | 29.51 | | | |
| Indoor Fans | 32.87 | 7.72 | 25.15 | | | |
| Heat Rejection | 0.00 | 0.00 | 0.00 | | | |
| Pumps & Misc. | 2.82 | 1.53 | 1.29 | | | |
| Domestic Hot Water | 0.00 | 0.00 | 0.00 | | | |
| Lighting | 35.34 | 25.92 | 9.42 | | | |
| Receptacle | 22.70 | 22.70 | 0.00 | Gross Savings, Total | | |
| Process | 0.00 | 0.00 | 0.00 | kWh/year | kW | Therms/year |
| Total | 200.51 | 95.43 | 105.08 | 216,906 | 71.1 | 13,486 |
| <i>Percent better than standard = 52.4%</i> | | | | | | |

Other Measures and LEED Compliance

As noted earlier, Kaiser did not receive LEED certification for this project so there was no official documentation available on the LEED measures. Nevertheless, the Kaiser project manager provided a LEED rating sheet that displayed the LEED measures and points that would have probably been earned. Figure 5 summarizes this information.

The most points were in the Indoor Environmental Quality category. An important feature of the building is interior open spaces that provide daylight access to offices in addition to those on the building's perimeter. The building has an underfloor air distribution system, providing good air distribution. Although there were operating problems with this system when we visited the site, they were corrected subsequently. The building includes waterless urinals that improve the water use efficiency.

Figure 5. Kaiser Permanente Building LEED Rating Checklist

LEED-NC Version 2.1 Project Checklist

Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

| Yes ? | | Points | Comments |
|-------|--|-----------|---|
| 4 | Sustainable Sites | 14 Points | |
| X | Prereq 1 Erosion & Sedimentation Control | Required | |
| | Credit 1 Site Selection | 1 | |
| | Credit 2 Development Density | 1 | |
| | Credit 3 Brownfield Redevelopment | 1 | |
| X | Credit 4.1 Alternative Transportation, Public Transportation Access | 1 | Trolley is located within 1/2 mile |
| X | Credit 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms | 1 | |
| | Credit 4.3 Alternative Transportation, Alternative Fuel Vehicles | 1 | |
| | Credit 4.4 Alternative Transportation, Parking Capacity and Carpooling | 1 | |
| | Credit 5.1 Reduced Site Disturbance, Protect or Restore Open Space | 1 | |
| | Credit 5.2 Reduced Site Disturbance, Development Footprint | 1 | |
| | Credit 6.1 Stormwater Management, Rate and Quantity | 1 | |
| | Credit 6.2 Stormwater Management, Treatment | 1 | |
| X | Credit 7.1 Landscape & Exterior Design to Reduce Heat Islands, Non-Roof | 1 | Light-colored concrete |
| | Credit 7.2 Landscape & Exterior Design to Reduce Heat Islands, Roof | 1 | |
| X | Credit 8 Light Pollution Reduction | 1 | |
| 1 | Water Efficiency | 5 Points | |
| | Credit 1.1 Water Efficient Landscaping, Reduce by 50% | 1 | |
| | Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation | 1 | |
| | Credit 2 Innovative Wastewater Technologies | 1 | |
| X | Credit 3.1 Water Use Reduction, 20% Reduction | 1 | Waterless urinals installed |
| | Credit 3.2 Water Use Reduction, 30% Reduction | 1 | |
| 3 | Energy & Atmosphere | 17 Points | |
| X | Prereq 1 Fundamental Building Systems Commissioning | Required | |
| X | Prereq 2 Minimum Energy Performance | Required | |
| X | Prereq 3 CFC Reduction in HVAC&R Equipment | Required | |
| X | Credit 1 Optimize Energy Performance | 10 | |
| | Credit 2.1 Renewable Energy, 5% | 1 | |
| | Credit 2.2 Renewable Energy, 10% | 1 | |
| | Credit 2.3 Renewable Energy, 20% | 1 | |
| | Credit 3 Additional Commissioning | 1 | |
| X | Credit 4 Ozone Depletion | 1 | |
| X | Credit 5 Measurement & Verification | 1 | Installed DDC system used but not all working |
| | Credit 6 Green Power | 1 | |

Yes ?

| | |
|---|---|
| 3 | 1 |
| X | |
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| X | |
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| X | |
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Yes ?

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|----|---|
| 13 | 1 |
| X | |
| X | |
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| X | |
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Yes ?

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| 25 | 2 |
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| | | Comments |
|---|---|--|
| Materials & Resources | | 13 Points |
| Prereq 1 | Storage & Collection of Recyclables | Required |
| Credit 1.1 | Building Reuse , Maintain 75% of Existing Shell | 1 |
| Credit 1.2 | Building Reuse , Maintain 100% of Shell | 1 |
| Credit 1.3 | Building Reuse , Maintain 100% Shell & 50% Non-Shell | 1 |
| Credit 2.1 | Construction Waste Management , Divert 50% | 1 Documentation available |
| Credit 2.2 | Construction Waste Management , Divert 75% | 1 |
| Credit 3.1 | Resource Reuse , Specify 5% | 1 |
| Credit 3.2 | Resource Reuse , Specify 10% | 1 |
| Credit 4.1 | Recycled Content , Specify 5% (post-consumer + ½ post-industrial) | 1 Carpet |
| Credit 4.2 | Recycled Content , Specify 10% (post-consumer + ½ post-industrial) | 1 |
| Credit 5.1 | Local/Regional Materials , 20% Manufactured Locally | 1 |
| Credit 5.2 | Local/Regional Materials , of 20% Above, 50% Harvested Locally | 1 |
| Credit 6 | Rapidly Renewable Materials | 1 |
| Credit 7 | Certified Wood | 1 |
| Indoor Environmental Quality | | 15 Points |
| Prereq 1 | Minimum IAQ Performance | Required |
| Prereq 2 | Environmental Tobacco Smoke (ETS) Control | Required |
| Credit 1 | Carbon Dioxide (CO₂) Monitoring | 1 |
| Credit 2 | Ventilation Effectiveness | 1 |
| Credit 3.1 | Construction IAQ Management Plan , During Construction | 1 |
| Credit 3.2 | Construction IAQ Management Plan , Before Occupancy | 1 |
| Credit 4.1 | Low-Emitting Materials , Adhesives & Sealants | 1 |
| Credit 4.2 | Low-Emitting Materials , Paints | 1 |
| Credit 4.3 | Low-Emitting Materials , Carpet | 1 |
| Credit 4.4 | Low-Emitting Materials , Composite Wood & Agrifiber | 1 |
| Credit 5 | Indoor Chemical & Pollutant Source Control | 1 Separate ventilation for print shop |
| Credit 6.1 | Controllability of Systems , Perimeter | 1 |
| Credit 6.2 | Controllability of Systems , Non-Perimeter | 1 Underfloor air distribution, but little occupant control |
| Credit 7.1 | Thermal Comfort , Comply with ASHRAE 55-1992 | 1 |
| Credit 7.2 | Thermal Comfort , Permanent Monitoring System | 1 |
| Credit 8.1 | Daylight & Views , Daylight 75% of Spaces | 1 |
| Credit 8.2 | Daylight & Views , Views for 90% of Spaces | 1 |
| Innovation & Design Process | | 5 Points |
| Credit 1.1 | Innovation in Design : Provide Specific Title | 1 |
| Credit 1.2 | Innovation in Design : Provide Specific Title | 1 |
| Credit 1.3 | Innovation in Design : Provide Specific Title | 1 |
| Credit 1.4 | Innovation in Design : Provide Specific Title | 1 |
| Credit 2 | LEED™ Accredited Professional | 1 |
| Project Totals (pre-certification estimates) | | 34 |

Other Projects

There were seven other projects signed up for the Program for which construction was not completed by the end of 2006. Because construction was incomplete, we conducted no site verification visits for these projects. Based on our experience with the three completed projects, we anticipate that the savings estimated for these projects will be equal to the value estimated by SDG&E.

The energy savings estimates for these remaining projects are presented in Table 6. The projects covered a wide spectrum of building types including multifamily residential, a library, offices, and a recreation center. Building size ranged from about 3,000 sq.ft. to over 100,000 sq.ft.

Table 6. Savings Estimates for Additional Projects, Gross

| Project | kWh/year | kW | Therms/year |
|--------------------------|----------|-------|-------------|
| Del Sur Ranchhouse | 17,228 | 6.5 | 21 |
| DMV San Ysidro | 54,263 | 28.7 | 1,527 |
| Marine Corps Air Station | 51,685 | 24.9 | 1,016 |
| Community Road Housing | 14,401 | 0 | 5,684 |
| Nobel Library | 111,046 | 39.8 | 1,136 |
| Nobel Recreation Center | 50,366 | 13.3 | 908 |
| West City Center | 243,715 | 109.4 | -204 |

6. Secondary Impacts

Although the SCP requires participants to achieve significant direct energy savings and other direct impacts result from the green building features incorporated, there are other impacts from the Program that are less readily calculated. A complete analysis of the effects of this Program would include quantification of these impacts; however, a thorough analysis was beyond the scope of this study.

To address these impacts, we drew upon a study prepared for SDG&E by CTG Energetics.⁸ This study examined all the LEED categories and possible credits, and indicated what likely indirect energy impacts were associated with the credits and were not reflected in Title 24 and, the mechanism that would produce the impacts. Table 7 summarizes this information for those measures identified as having probable indirect energy effects.

Only one of the items shown in the table is associated with an increase in energy use; the others are expected to reduce energy consumption in transportation, production, or water treatment, or to offset the need for nonrenewable energy resources. Although it was not possible to calculate the likely energy impacts for each project, we could draw some general conclusions.

All three projects met the public transportation credit requirement and, if building occupants took advantage of this option, the energy savings were likely to be relatively large. All projects also provided at least a 20% reduction in water use, thus reducing water pumping and treatment and water heating energy use. The TKG project was likely to have the largest energy savings associated with water treatment and pumping measures because of its use of reclaimed water.

Finally, the TKG and Sun Harbor projects had significant effects, in addition to those due to energy efficiency, on the amount of conventional energy they used. PVs at the TKG site were estimated to provide more than one-fourth of the building's electricity needs and the on-site fuel cell was estimated to offset another 12% of the electricity use presumably with less environmental impacts than conventional generation. Sun Harbor's purchase of wind-generated electricity displaced 100% of the project's consumption of a mix of conventionally generated electricity.

⁸ This information was provided in a memorandum dated May 20, 2005, to Alex Kim at SDG&E.

Table 7. Potential Energy Impacts from LEED Measures

| LEED Prerequisite or Credit | Potential Indirect Energy Impacts |
|--|--|
| Alternative Transportation: Public Transportation Access, Bicycle Friendly, Alternative Fuel Refueling Stations*, Parking Capacity | Fuel for transportation |
| Stormwater Management: Rate and Quantity, Treatment | Pumping and treatment process energy |
| Heat Island Effect: Roof/Non-Roof | Theoretically, heat island effect influences cooling loads for nearby buildings |
| Water Efficient Landscaping: Reduce by 50%, No Potable Use or No Irrigation | Pumping and treatment process energy |
| Innovative Wastewater Technologies | Pumping and treatment process energy |
| Water Use Reduction: 20-30% Reduction | Pumping and treatment process energy. Reduced domestic water heating for reductions in hot water use (e.g. low flow fixtures, faucet aerators) |
| Renewable Energy: 5%, 10%, 20% | Renewable energy offsets grid electrical demand and consumption. |
| Green Power | Depending on generation mix |
| Building Reuse: Maintain 75% or 100% of Existing Shell, Maintain 100% of Existing Shell and of 50% Non-Shell | Reduced transportation, manufacturing, and construction energy use |
| Construction Waste Management: Divert 50% or 75% from Landfill | Potential energy savings due to recycling materials instead of manufacturing virgin materials |
| Resource Reuse: 5%-10% | Potential energy savings due to recycling materials instead of manufacturing virgin materials |
| Regional Materials: 20%-50% Manufactured Regionally | Reduced transportation energy use. |
| Construction IAQ Management Plan: During Construction or Before Occupancy | Potential for increased energy use due to ventilation of building during construction |

* Assuming alternative means is more efficient than standard internal combustion engine

For programs like this one that have potentially significant indirect energy benefits, it would be useful to identify and quantify these benefits as accurately as possible and include them in the program’s cost effectiveness analysis. This can be a challenging exercise, however, because of the diversity of impacts and mechanisms through which they occur, but it is appropriate to include these impacts in a comprehensive analysis.

7. Findings and Recommendations

Findings

Measurable Objectives

The accomplishments of the SCP relative to the measurable objectives listed in SDG&E's Program plan are summarized below.

- ***Create a network of sustainable community projects that achieve total estimated annual net savings of 1,684,774 kWh/year, 390 kW, and 31,774 therms/year.*** The participating SCP projects (both those completed and in progress as of the end of 2005) achieved estimated gross savings of 881,204 kWh/year, 354 kW, and 24,600 therms/year. Applying the net-to-gross value of 0.8 from the Energy Efficiency Policy Manual Version 2, the net values are 704,963 kWh/year, 283 kW, and 19,680 therms/year. Based on these results, the Program met 42% of its 2004–'05 kWh savings objective, 73% of its kW objective, and 62% of its therms objective. The estimated net life cycle savings using a 15-year overall measure life for non-residential buildings and 18 years for residential buildings were 10,610,000 kWh and 308,841 therms. Appendix A presents the savings goals relative to the achieved savings over the measure lifetimes.
- ***Select and fund 8 to 10 projects that demonstrate the application of sustainable design practices to different building types.*** The SCP identified nearly 80 prospective participants, but only three went through the entire SCP process by the Program deadline. An additional seven projects were signed up and are expected to be completed and receive Program incentives. The three completed projects successfully demonstrated the application of sustainable design practices to different building types.

Two of the projects that were constructed were office buildings and the third was a combined retail/office building. The projects differed substantially in size and type of occupancy. One project was a major renovation of an existing building and the other two were new construction.

The number of projects that could be completed during the two years the Program was funded was limited by the amount of time required for the design and construction of new buildings. For the SCP to affect a project the Program had to be introduced to designers early in the design phase; however, few major building projects could go from design through construction in less than the approximately two-year window available in the 2004-'05 Program.

- ***Prepare and distribute two-page informational flyers for all SCP projects.*** No informational flyers were prepared for individual projects and distributed. However, two flyers about the Program were developed and disseminated.
- ***Prepare case studies for five to six projects.*** One case study was prepared and distributed. As of early 2006, a second one was in preparation.

- **Publicize individual project results** in cooperation with various organizations to increase community awareness and promote widespread local adoption of sustainable design practices. SDG&E did conduct several activities to disseminate information about the Program and individual projects, including working with the City of San Diego and conducting informational meetings and making presentations on the projects. With just three projects completed, however, the Program has had only a limited effect as a stimulus for the creation of sustainable communities.
- **Set the stage for future code upgrades and “mainstreaming” sustainable development practices**, potentially leading to a statewide program offered by all four California IOUs. SDG&E did communicate with the other utilities and each IOU has designed a similar program for its service area.
- **Actively target “hard-to-reach” markets such as multifamily apartments, affordable housing projects, or leased properties.** Neither multifamily nor affordable housing projects were completed during 2004-’05. Four multifamily projects were identified as prospects, and one was signed up and in process as of early 2006. Participation of residential projects was limited by the challenge of meeting the energy-efficiency requirements, concerns about added costs of green features, and the lack of a residential green rating system during this period.
- **Select and showcase** at least one hard-to-reach project. This objective was not met.
- **Support the State of California Energy Action Plan goals** of increasing the proliferation of renewable energy systems, and promoting customer and utility owned distributed generation. One of the three projects incorporated both utility-owned PVs and a fuel cell on site. The building owner was pleased with the systems. The cost of on-site renewable energy systems was an impediment to customer-owned generation in this Program.

Cost Effectiveness

We assessed the Program from both the total resource cost (TRC) and participant cost test (PCT) perspectives. Key inputs to these analyses are shown in Table 8. All costs are those tracked for the Program by SDG&E except the customer cost. Since customers were not required to track and report these costs, SDG&E estimates these costs using a multiplier linked to electricity and natural gas savings based on data from the Sbd Program, adjusted by a factor to take into the higher energy savings required by the SCP.

Table 8. Cost Effectiveness Inputs

| Input | Value |
|---|------------|
| Gross Annual Energy Savings, kWh | 881,204 |
| Gross Demand Savings, kW | 354 |
| Gross Annual Energy Savings, Therms | 24,600 |
| Net-to-Gross Ratio | 0.8 |
| Total Program Costs (including commitments) | \$ 622,969 |
| Customer Cost | \$179,551 |
| Incentives | \$281,647 |

Using the methodology prescribed by the CPUC, we calculated the net benefits and benefit-cost ratios shown in Table 9. The Program was cost effective from both perspectives with a TRC of 1.19 and a PCT of over 11.

Table 9. Cost Effectiveness Results

| Total Resource Cost | |
|---------------------|-------------|
| Benefits | \$576,190 |
| Costs | \$484,963 |
| Net Benefits | \$91,227 |
| Benefit-Cost Ratio | 1.19 |
| Participant Cost | |
| Benefits | \$1,997,459 |
| Costs | \$179,551 |
| Net Benefits | \$1,817,907 |
| Benefit-Cost Ratio | 11.1 |

It is important to note that the benefits included in this analysis are only those produced as a result of electricity and natural gas savings. Other direct savings, such as reductions in water utility bills, and indirect energy savings and other savings types discussed in Chapter 6 are not included in this analysis. In addition, the method used to estimate customer project costs did not take into account the non-energy-efficiency measures implemented to meet the green building requirements of the Program.

Process Findings

Process findings for the SCP are based on our interviews and reviews of relevant materials. Findings are presented in the context of the program theory shown in Figure 2 and the discussion highlights the effectiveness and efficiency of the Program activities, expected effects and outcomes, and differences between Program design and implementation.

To a large extent, this Program, as SDG&E described it in the Program procurement document, was a demonstration program, and its accomplishments have to be assessed accordingly. In addition, participants had up to four years to complete their project and submit final documentation after receiving the incentive agreement from SDG&E. Consequently, the two years of the Program we have analyzed set the stage for possible future activities so the final effects of the Program cannot be known at this time. On balance, in two years the Program did not achieve all of the quantitative objectives established at the beginning, but it did demonstrate that receptive customers would take advantage of the financial incentives and other assistance provided by the Program to integrate sustainable building practices into their projects. The ultimate effects of the Program on the broader market will have to be assessed in the future, but it appears that the Program has made important contributions to the growth of sustainable buildings and communities in the SDG&E area.

Program Activities and Outputs

Marketing/Recruiting: The SCP's use of Account Executives has been very effective at reaching a large audience of designers, particularly through the Savings by Design and ENERGY STAR[®] networks. Direct contact by SDG&E representatives was very important in enlisting the first three SCP participants. We identified two problems, however, with relying on this approach:

- In the short term, participants did not make a very clear distinction between SCP and SbD.
- In the long term, reliance on direct contacts requires considerable labor resources and could limit the reach of the Program.

The other marketing and recruiting mechanisms planned for the Program either did not progress as far as expected (e.g., preparation and distribution of case studies) or were not very influential in the projects that were completed. To an extent, it was not possible for the Program to develop enough momentum in two years to leverage successful projects in recruiting additional participants. Participants were either not aware of written Program materials or considered them much less influential than the direct contacts from SDG&E personnel.

Showcases/Case Studies: Because of the small number of projects completed, the effectiveness of showcases and case studies has been fairly limited. SDG&E has done a good job leveraging the success of the TKG project, but this project is the only one that has been used very extensively as of early 2006 to inform customers about the Program.

Technical Assistance: SDG&E provided limited technical assistance through the SCP, but participants did give high marks to the assistance they received. Customers recognized that they either needed in-house expertise or had to rely on consultants for detailed technical expertise. They did get assistance from SDG&E on selecting strategies to meet performance requirements and finalize their energy analyses. Customers typically understood that they could work with the SDREO to obtain necessary technical assistance.

Coordination with Other Organizations: Coordination of the SCP activities with the efforts of other regional stakeholders appeared to be well done. There was little or no confusion about the role of the SCP relative to activities of other organizations. It appeared, however, that the Program could have benefited by taking more advantage of the relationships between the SCP and other organizations. In particular, we believe that marketing and recruiting could have been enhanced through leveraging the assistance of other organizations by employing the kind of collaborative relationships described in SDG&E's Program plan.

Incentives: Although the participants welcomed the Program incentives, the dollar value of the incentives beyond the SbD level was not a major factor in the decision to participate. The existence of the incentives and their total magnitude, however, did have some influence on participation and the ability of project proponents to get their team's commitment.

Given that these projects were conducted by "early adopters," it is likely that the incentives could be more important to a broader cross-section of potential participants in the future.

Future Program Features: In 2005, SDG&E examined possible Program changes to increase participation and effectiveness if the Program were continued. These included the possibility of relaxing the energy-efficiency requirements for residential projects; increasing the incentive for non-residential projects while making LEED certification mandatory; expanding the opportunities to site utility-owned renewable generation at Program projects; and modifying the requirements to reflect the latest version of the state residential building standard, Title 24. For the Program beginning in 2006, SDG&E modified the Program to reflect the Title 24 changes and decided to require LEED where applicable, but allow flexibility for projects to use different pathways in cases where LEED was not applicable. The Program was also modified to permit projects to receive incentives equivalent to the Sbd if they were unable to meet the SCP energy-efficiency levels due to factors beyond their control. SDG&E will make more use of the option where the utility locates renewable generation equipment at project sites and will work with participants to modify their designs to facilitate future installation of renewables.

Program Initial and Intermediate Outcomes

Application Process: The application process was efficient and straightforward, and participants viewed it positively. Participants were uniformly pleased with their interactions with SDG&E during the application process and throughout their participation.

Project Designs: All three completed projects were able to meet the energy-efficiency design requirements of the Program. The requirements were challenging, but none of the participants felt they were out of reach.

Sustainability Features: All three completed projects successfully incorporated a diverse set of green building features. Using the LEED rating system, one building received an official Gold rating and the other two would probably receive a Silver rating based on our analysis.

On-Site Renewable Generation: The Program was successful at getting the participants to consider the installation of renewables as part of their projects. It was not economical for any of the first three participants to install renewables generation, but one leased their space to SDG&E to install utility-owned systems. The other two participant completing projects would have installed PVs if SDG&E had pursued this same approach with them.

Project Construction: None of the participants interviewed indicated that there were any specific construction problems attributable to the sustainability features of their building. The only construction problems that arose were due to poor performance by the general contractor for one project and, though these problems could have arisen in a conventional project, the situation was cautionary because of the importance of a well integrated approach for green buildings.

Awareness and Realization of Sustainable Building Benefits: In two of the three constructed projects, realization of the energy performance goals was uncertain because of post-construction problems with building systems. Comprehensive monitoring was being conducted in one project in which all systems were performing as expected and the owner was confident that the expected energy savings were being achieved. Project representatives were confident that they were achieving water savings, but the magnitudes were uncertain. Interestingly, project interviewees provided considerable feedback on the less measurable benefits of occupant productivity,

comfort, and satisfaction. Although none were able to quantify the effects, their comments suggested the buildings provided marginal to very significant positive impacts. Overall, the requirement to pursue LEED certification had a positive effect on participant awareness of green building characteristics and increased their comfort with incorporating green features.

Program Longer-Term Outcomes

Influence on Other Customers: Despite the small number of projects completed by 2006, the SCP demonstrated how sustainable design practices could be promulgated and, in our view, had a significant effect on non-participants. TKG has been able to draw upon its experience to inform clients about green building practices and expand its reputation as a green building engineering firm and presumably increase integration of green building practices in its projects. Furthermore, many groups and individuals have toured the TKG building to learn about green building. This project also included a touch-screen display in the lobby that allows visitors to access information from the Energy Management System showing how the building is performing. The Sun Harbor project provided evidence and an example for the Port of San Diego to draw upon in developing and approving its LEED certification policy for future projects. In addition, this project has a room dedicated to information about the project and green buildings that is available to the public.

Influence on Participants' Other Projects: Because none of the participants were typical developers, it was unlikely they would develop other projects. TKG, however, indicated that they were able to take what they learned from their project to other developers.

Development of Sustainable Communities Infrastructure: All these projects had some effect on the development of an infrastructure to support sustainable buildings and communities, but it was not possible to assess the long-term effects. The design and construction teams involved in each project took away from their projects an enhanced knowledge of green building practices and LEED. The Sun Harbor and TKG teams, in particular, were very open to green building practices and were likely to look for opportunities to inform others about them and apply them. These projects provided a seed for green building in the San Diego area that was likely to grow when the Program continued and similar program efforts were implemented.

Green Building Barriers

The intent of the SCP was to address barriers that have impeded green building and sustainable community development in the San Diego area. Specific barriers that SDG&E identified in its Program plan included:

- Concerns, primarily in private sector developments, about the perceived difficulty of convincing developers and building owners to upgrade energy-efficiency features given the potential for sustainable design practices to increase first costs and fear that such practices could delay their projects
- Lack of financing for energy-efficiency improvements
- Lack of consumer information about energy-efficiency benefits

- Lack of information about green building design and products
- Lack of local green building projects to serve as examples
- Hard-to-reach sectors and split incentives (between owners/landlords/tenants)

Costs, Schedule, and Financing: SDG&E was able to build upon its successful Savings-by-Design program and the experience of its participants to partially address the cost barrier. SbD had succeeded in delivering a large number of projects incorporating increased energy efficiency; SCP, however, required going beyond energy-efficiency improvements and incorporating green building features. All the participants indicated that their projects cost more because of the sustainable design practices included, but none were able to provide very accurate estimates of added costs. The typical estimate was around 5% of the construction cost, including the cost of the energy-efficiency improvements. To these participants, the cost increase was not a significant barrier and the SCP incentives helped defray part of the added costs.

The participants did not express significant concerns about the sustainable design practices affecting their project schedules. No one indicated that financing was more difficult as a result of incorporating these practices.

Lack of Information: The participants all agreed that lack of knowledge and education was a barrier to increased use of sustainable building practices. All felt that participating in the Program was an informative process and that it helped alleviate some of their concerns about inadequate information and knowledge.

The Program has definitely had some effect educating and informing customers beyond those who participated in the SCP about green building practices, primarily through the case study information, other SDG&E efforts, and outreach by the participants. The Program resulted in three completed projects by the end of 2005 and several others to be constructed that will provide green building examples for builders, developers, and owners.

It was not possible within this study to quantify the effect the Program had on increasing overall knowledge and awareness about green buildings and sustainable communities. However, the number of marketing brochures distributed, the number of projects signed up, and the diversity of the participants suggested that the Program made significant progress in raising awareness levels and educating and informing targeted audiences in the local area. The ultimate effect will depend on the future efforts of the utility and other partners in educating other potential participants.

Hard-to-Reach Customers and Split Incentives: The Program was not able to demonstrate that it could overcome the barriers in this market sector. SDG&E had anticipated several multifamily and affordable housing projects would participate, but, although several potential participants were identified, only one multifamily project signed up, and it was not constructed by early 2006. The Program Manager attributed the lack of multifamily and affordable housing participants primarily to the added costs and unavailability of a green residential rating system.

When the LEED residential rating system is finalized, it could help overcome one of these barriers. However, it is not known how much the cost barrier would continue to limit

participation. SDG&E will continue exploring ways to increase the participation of multifamily and other hard-to-reach projects.

Recommendations

Based on our assessment of the SCP, we believe there is considerable value in continuing the Program and expanding it to other parts of California. It provides a unique opportunity to enhance a traditional building energy-efficiency program to promote green building practices and the development of sustainable communities. From the utility perspective, the most relevant benefits are the direct energy savings. To the owner and occupant, the benefits include the resulting electric and gas utility bill savings, but also water savings, increased resale value, improved indoor environmental quality, increased comfort and productivity, and a range of other difficult to quantify benefits. From a societal perspective, the benefits include less environmental impacts from reduced building energy consumption, reduced infrastructure costs, reduced environmental impacts from transportation and production, and other indirect benefits.

To expand the positive impacts of the Program and improve cost effectiveness, we offer the following recommendations:

- ***Quantify and Incorporate Additional Benefits in Cost Effectiveness Assessment:*** The cost effectiveness of the Program from the Total Resource and Societal Cost perspectives will be more accurate and complete if other benefits such as the value of water savings, stormwater treatment cost reductions, and air quality improvements are included. At a minimum, the indirect energy benefits of these other impacts should be quantified and included. In addition, past studies have shown that small improvements in worker productivity and absenteeism can overwhelm the economic value of all other benefits and, to the extent possible, these benefits should be included.
- ***Expand Education and Information Dissemination:*** A key activity in the Program plan was an educational and informational component. There is a growing body of information about green buildings and sustainable communities that could be mined, along with information from SCP projects, to develop more extensive educational materials that could be disseminated to potential participants. Dissemination should be expanded to include engineers, building owners and developers, and tenants as well to increase both the supply and demand for sustainable building practices.
- ***Increase Leveraging of Other Organizations and Resources:*** The Program has utilized the services and venues provided by other organizations; use of this tactic should be increased to reach a wider audience, provide additional expertise and services to prospective participants, and expand resources available. One area that would be important to address is the provision of additional technical services to participants throughout the process. A related service would be development of a resource center or “hotline” that potential participants could use to acquire green building and sustainable communities information as needed.
- ***Expand Incorporation of Renewables in Projects:*** These projects provide an ideal opportunity to demonstrate on-site renewable generation. The Program should expand its use of creative ways to site renewables in conjunction with participating projects, without

burdening participants with the full system costs, and should address the special needs of smaller projects as necessary.

- ***Enhance Strategies to Incorporate Multifamily and Affordable Housing Projects:*** SDG&E investigated the possibility of relaxing the energy-efficiency requirements for residential projects to increase participation. We believe that option should be examined, but should take into account the effects on the utility bills of occupants (the issue of split incentives). We also recommend that the Program expand its ability to attract affordable housing projects by working more with organizations such as Global Green USA, state and local housing agencies, and non-profits with existing missions to promote affordable housing.
- ***Develop Clear Relationship between Green Building Requirements, LEED, and Incentives:*** SCP provided an incentive to cover part of the cost of LEED registration and certification filings, while projects were required to consider, but not necessarily receive, LEED certification. SDG&E considered mandating certification and raising the overall incentive available. We believe that the option of not achieving LEED certification should remain, but that the incentive for LEED-certified projects should be substantially higher than for those not certified. To clarify what the SCP would consider to be a “green building” we recommend that each participant be required to submit a preliminary LEED rating for the planned building that attains at least a minimum number of points. SDG&E adopted steps similar to these in its 2006-'08 Program.
- ***Clarify and Emphasize the Sustainable Communities Dimension of Program:*** With construction completed on only three projects through December 2005, the SCP made more progress as a sustainable *building* than as a sustainable *community* program. However, since the intent is to lay the foundation for sustainable communities, we recommend that future efforts explicitly take a more community-oriented focus by seeking to involve groups of buildings and integrating a more comprehensive community planning perspective.

Appendix A: Energy Impacts Reporting Table

| Program ID*: | | 1316-04 | | | | | |
|----------------------|------------------|--|--|---|--|---------------------------------|--|
| Program Name: | | Local Nonresidential Sustainable Communities | | | | | |
| Year | Calendar Year | Gross Program-Projected MWh Savings | Net Evaluation Confirmed Program MWh Savings | Gross Program-Projected Peak MW Savings | Evaluation Projected Peak MW Savings** | Program-Projected Therm Savings | Net Evaluation Confirmed Program Therm Savings |
| 1 | 2004 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 2 | 2005 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 3 | 2006 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 4 | 2007 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 5 | 2008 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 6 | 2009 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 7 | 2010 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 8 | 2011 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 9 | 2012 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 10 | 2013 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 11 | 2014 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 12 | 2015 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 13 | 2016 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 14 | 2017 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 15 | 2018 | 2106.0 | 705 | 0.487 | 0.283 | 39717 | 19680 |
| 16 | 2019 | 56.0 | 11.5 | 0.077 | 0 | 4539 | 4547 |
| 17 | 2020 | 56.0 | 11.5 | 0.077 | 0 | 4539 | 4547 |
| 18 | 2021 | 56.0 | 11.5 | 0.077 | 0 | 4539 | 4547 |
| 19 | 2022 | | | | | | |
| 20 | 2023 | | | | | | |
| TOTAL | 2004-2023 | 31757.4 | 10609.5 | 7.536 | 4.245 | 609372 | 308841 |

Definition of Peak MW as used in this evaluation:

Demand savings are from EnergyPro simulation model based on the sum of monthly coincident peak savings across all projects.