

From Energy Efficiency to Sustainable Communities: Challenges and Achievements of a Program to Promote Building Design and Construction Based on Sustainability

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ABSTRACT

Recognition that benefits of energy-efficient buildings extend beyond direct energy cost savings has grown in recent years; e.g., energy efficiency provides environmental benefits and can improve interior space livability. These benefits are recognized by the growing green building and sustainable development movements, which look more broadly at resource efficiency and environmental impacts of buildings and communities. However, transitioning from programs with a narrow focus on energy efficiency and its direct economic benefits to ones that address general resource efficiency, broader costs and benefits, and communities is challenging. This paper examines one of the first utility programs that has started to make this transition: San Diego Gas & Electric's 2004-'06 Sustainable Communities Program (SCP).

The SCP combines elements of two successful California new construction programs—Savings by Design and Energy Star. SCP's goal was to produce sustainable energy savings by creating a network of energy-efficient demonstration projects incorporating clean on-site generation, water conservation, transportation efficiencies, and waste reduction strategies. Its longer-term goal was to help “mainstream” new technologies and sustainable design practices and pave the way for future code upgrades and implementation of a statewide SCP. SCP projects were required to be at least 30% more efficient than California's 2001 Title 24 required, strongly encouraged to pursue the U.S. Green Building Council's Leadership in Energy and Environmental Design certification, and willing to consider installing renewable energy systems.

This paper reports on the intent of the two-year program, its leveraging of energy efficiency as a foundation for sustainable building design, program challenges, accomplishments, and lessons learned.

Introduction

Green Buildings, Sustainable Communities, and Programs to Promote Them

For at least 15 years, the term “green building” has been used to define both the characteristics of certain buildings and the processes associated with them.¹ In general, the green building process involves applying integrated design, construction, and operating principles to buildings with the objective of minimizing their negative human health and environmental impacts. Typically, the impacts are addressed by categorizing them according to the mechanism through which buildings affect health or the environment such as:

¹ In some programs, the term “high performance” is used to denote similar concepts.

- Siting
- Energy use
- Water use
- Materials used for construction and products/equipment installed in the building
- Access to fresh air and daylight

In the past few years, the definition of green buildings and the process for producing and operating them have been formalized as organizations such as the U.S. Green Building Council (USGBC) developed green building tools and rating systems. Since the USGBC was established in 1993 it has produced multiple Leadership in Energy and Environmental Design (LEED) green building rating systems including ones for new commercial construction and major renovations, existing building operations, and commercial interiors. Local entities in the U.S., as well as organizations in other countries, have developed similar systems for specific applications.

Similarly, during the past 15 years the concept of “sustainable communities” has evolved. Local, national, and international organizations have been established to promote sustainable communities. For example, the Institute for Sustainable Communities in Vermont and has conducted projects in more than 17 countries. They define sustainable communities as “...as towns and cities that have taken steps to remain healthy over the long term...[and] value healthy ecosystems, use resources efficiently, and actively seek to retain and enhance a locally based economy” (ISC 2005). As of 2000, nearly 50 local communities and organizations in the U.S. alone had developed community sustainability projects (Sustainable Measures 2000a). To a large extent, sustainable communities embody the same type of principles as green buildings, but at the community level.

A cornerstone of both green buildings and sustainable communities is the efficient and environmentally sound use of energy. In LEED for new commercial buildings, for example, impacts associated with energy production, use, and efficiency offer the largest number of possible points. In sustainable community programs, many energy-related indicators have been employed to measure progress towards sustainability including average annual residential energy consumption, renewable energy use, and heat loss of buildings (Sustainable Measures 2000b).

The USGBC is in the process of expanding its green building programs to communities. In partnership with the Congress for the New Urbanism (CNU) and the Natural Resources Defense Council (NRDC), USGBC has brought together stakeholders to establish a consensus-based standard—LEED for Neighborhood Developments (LEED-ND)—to address the impacts of development projects. This rating system will integrate the principles of smart growth, urbanism, and green building into the first national standard for neighborhood design. The rating system is expected to be finalized by late 2007.

San Diego Gas & Electric’s (SDG&E’s) Sustainable Communities Program

Program description. SDG&E implemented the SCP during 2004 and 2005 with funding through the California Public Utilities Commission (CPUC). In the Program, SDG&E works in concert with the cities and counties in its area 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 two highly successful statewide new construction programs—Savings by Design (SbD) and the

California ENERGY STAR® New Homes Programs. The SCP provided a range of services and incentives to participating projects.

All non-residential SCP projects were required to exceed California's 2001 Title 24 non-residential energy-efficiency requirements by at least 30% (as compared to the SbD Program, which required 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%, or twice the efficiency improvement required by ENERGY STAR®.

Upon commissioning their project, participants were required to provide documentation, including selected construction documents, Title 24 documentation, integrated design analysis reports, and other documents, 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 \$120,000 per project). Non-residential projects were also eligible for design team incentives based on energy savings, up to \$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).

Goals and objectives. The SCP sought to address several market barriers impeding the adoption of green building principles and development of sustainable communities. These included:

- Concerns of developers and building owners about the possible first-cost increases and delays resulting from green building design and construction practices
- Lack of financing for energy-efficiency improvements
- Lack of information about green building products and designs
- Lack of local green building projects
- Split incentives (between owners/landlords/tenants) and difficulty involving hard-to-reach sectors

The two-year goal of this Program was to produce 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 program.

As noted earlier, projects selected for this Program had to exceed Title 24 energy-efficiency requirements by a minimum of 30% and were strongly encouraged to pursue LEED

certification. Although it was not a requirement, SDG&E also actively encouraged and supported incorporation of clean on-site generation.

The measurable objectives of the 2004-'05 Program (SDG&E 2004), were to:

- Create a network of sustainable community projects throughout SDG&E's service area that achieve total estimated annual net savings of 1,684,774 kWh, 390 kW, and 31,774 therms.
- Select and fund a mix of eight to ten residential and non-residential projects that demonstrate the application of sustainable design practices to different building types.
- Prepare and distribute two-page informational flyers for all SCP projects.
- Prepare detailed case studies for five to six projects to document and quantify the benefits of sustainable design practices and the viability of exceeding the 2001 Title 24 energy efficiency requirements by a minimum of 30%.
- Publicize individual project results in cooperation with participating cities, local building departments and government organizations, San Diego Regional Energy Office (SDREO), and trade associations 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 (IOUs).
- 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 California's Energy Action Plan goals of increasing the proliferation of renewable energy systems and promoting customer- and utility-owned distributed generation.

Program opportunities and challenges. This Program is very unique because of the leadership role played by SDG&E. Although several other U.S. utility-sponsored programs promote various components of the SCP, none take the integrated, comprehensive approach of this Program. Many utilities have programs to promote energy efficiency in new buildings, both residential and non-residential. Numerous utility programs provide incentives and technical assistance for the incorporation of renewable energy in buildings. Promotion of green buildings, however, is quite unusual in utility-sponsored programs, particularly among IOUs.² Most green building programs are implemented by government, private, and non-profit organizations. Similarly, sustainable community programs are virtually all implemented by government and non-profit organizations.

The SCP provides the opportunity to extend the traditional direct energy focus of utility programs to the broader impacts of buildings and communities on the built environment. Utility energy-efficiency programs are usually justified based on the fact their economic benefits, in terms of avoided future energy costs, exceed the sum of all utility and participant program costs. Since some costs associated with developing green buildings or sustainable communities are linked to non-energy and indirect energy benefits rather than the direct benefit of avoided energy

² One outstanding exception has been the programs offered by Portland General Electric including Earth Smart, Earth Advantage, and Green Building Services. Since its creation, Earth Advantage has transformed from a utility program to a non-profit program and Green Building Services has become an employee-owned consulting firm.

costs, this raises the fundamental question of how to rationalize having other energy utility customers and investors cover the utility costs associated with these programs. We believe one reason few IOUs have implemented green building, let alone sustainable community, programs is the hurdle of selling other utility customers, investors, and regulators on the idea that other customers or investors should pay for such programs.

Study Approach

Quantec was contracted to conduct an evaluation, measurement, and verification (EM&V) study of the SCP. The EM&V approach relied on the applicable CPUC Energy Efficiency Policy Manual and established methods to evaluate the SCP's achievements. The measurable and quantifiable achievements were primarily the levels of energy and peak demand savings from the Program. A process evaluation and participant survey were used to assess the Program's implementation and satisfaction levels.

Evaluation activities were carried out 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 included confirmation of measure installation and tabulation of the *ex ante* energy and demand savings. For this study, the following activities were conducted:

- Develop a program theory
- Interview Program Manager
- Interview key stakeholders
- Interview Program participants
- Verify project measure installation
- Assess *ex ante* energy and demand savings and cost effectiveness

The EM&V plan called for selecting a sample of completed projects to include in the verification, energy/demand savings assessment, and participant interviews. However, when we conducted our study only three projects had gone through the entire Program so these activities were carried out for a census of the projects.

Quantec's team conducted visits to each of the project sites. During these visits, the team verified that the energy-efficiency and green building measures and equipment were installed and operating as expected. The project manager or other knowledgeable person at each site provided supporting materials and information. As necessary, additional information, such as LEED checklists, were obtained after the site visits. In addition, a structured interview was conducted with the primary representative for each project to get his or her feedback on the Program, interactions with SDG&E, and the green features of their building.

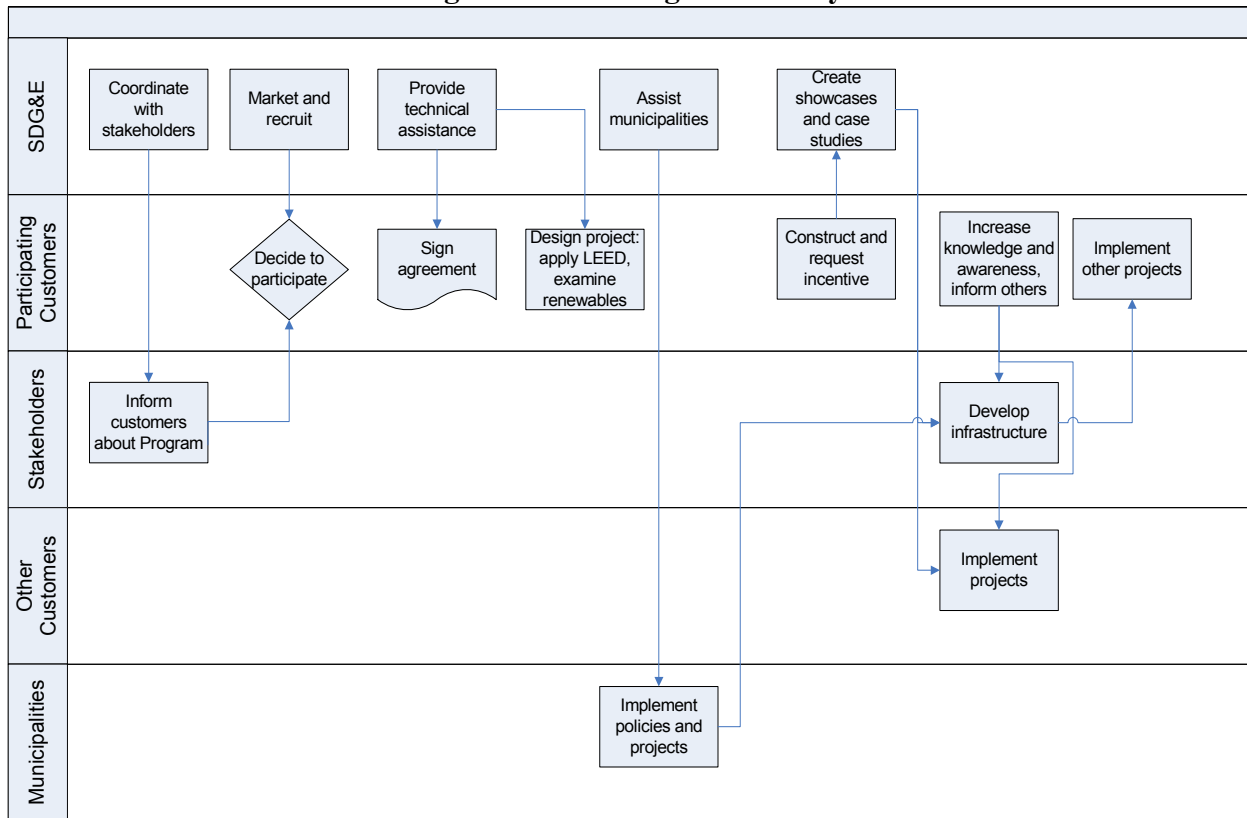
Quantec's team also met with SDG&E's engineers who had conducted the energy analysis for each project. The EnergyPro building energy simulation models, inputs, and outputs were obtained for the projects and Quantec conducted a thorough review of each. Based on this information, SDG&E's Program worksheets were reviewed and Quantec completed the cost-effectiveness analysis.

Process Findings

The program theory (illustrated using a “swimming lane” format) developed for the SCP is summarized in Figure 1. This theory of how the Program would operate was used to guide process evaluation data collection and assessment of the Program’s success.

To a large extent, the SCP was a demonstration program, and its accomplishments must be assessed accordingly. In addition, participants had up to four years to complete their project after receiving the incentive agreement from SDG&E. Consequently, some participating projects were not constructed by 2006 so the final effects of the Program cannot be known at this time. Findings from the process evaluation are presented below in terms of the Program activities and outputs, initial and intermediate outcomes, longer term outcomes, and effects on barriers limiting green building and sustainable communities.

Figure 1. SCP Program Theory



Program Activities and Outputs

Marketing/recruiting. The SCP relied to a large extent on Account Executives to reach hundreds of designers and this was very effective, particularly through the SbD and ENERGY STAR networks. Direct contact by SDG&E representatives was very important in enlisting the SCP participants. There were 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 would require considerable labor resources and could limit the reach of the Program.

It seems reasonable that the SCP relied on existing relationships to recruit initial participants. As projects are completed and momentum builds, it should be possible to address the short-term problem by making customers more aware of the unique features of SCP. In the longer-term, the need for direct recruitment should lessen as visibility of the Program and participants' projects increases and the SCP sells itself.

Showcases/case studies. Because of the small number of projects constructed by 2006, the effectiveness of showcases and case studies was somewhat limited. However, SDG&E did a good job leveraging the success of the first completed project and it was used very extensively to inform customers about the Program. After the project was completed, this participant conducted one or two tours per week allowing others to get firsthand knowledge of a green building project.

Technical assistance. SDG&E provided technical assistance on energy efficiency to SCP participants and helped design teams go through the green building process. Participants also were aware they were able to obtain green building design assistance through the SDREO technical assistance program and did take advantage of this opportunity. Participants gave high marks to the assistance they received in conjunction with the SCP. Customers recognized that for detailed technical issues they needed to rely either on in-house expertise or on consultants.

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, the study found that marketing and recruiting could have been enhanced through leveraging the assistance of other organizations more by using 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 the initial projects were conducted by "early adopters," it seemed likely that the incentives could be more important to a broader cross-section of potential participants in the future.

Assistance to municipalities. SDG&E concentrated its efforts with local governments somewhat more than anticipated in the original Program plan and found this was a very effective strategy. The SCP assisted several municipalities in developing showcase projects they could use to demonstrate green building design practices and provided assistance in developing green building policies and educating government staff and the public.

Initial and Intermediate Outcomes

Application process. The participants generally viewed the application process positively and considered it to be efficient and straightforward. Participants were uniformly pleased with their interactions with SDG&E during the application process and throughout their participation.

Project designs. All three constructed projects were able to meet the energy-efficiency design requirements of the Program. The requirements were challenging, but these participants felt they were not out of reach. In a few cases, potential participants did incorporate green building features but were unable to meet the energy-efficiency requirements and were unable to qualify as SCP participants.

Sustainability features. All three constructed projects successfully incorporated a diverse set of green building features. We reviewed the green features in each of these projects based on the LEED rating system and estimated the LEED rating. One building had gone through the certification process and received an official Gold rating. Based on our review, the other two would probably qualify for a Silver rating.

On-site renewable generation. The Program was successful at getting participants to consider the installation of renewables as part of their projects. It was not economical, however, for any of the participants to pay to install renewable generation, but one took advantage of an SDG&E program and leased their space to the utility to install utility-owned systems. The other two participant who constructed their projects before 2006 said they would have installed photovoltaics (PVs) if SDG&E had pursued this same approach with them.

Project construction. No participants indicated that there were any specific construction problems attributable to the sustainability features of their building. The only such 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 how important a well integrated design/construction process is for green buildings.

Awareness and realization of sustainable building benefits. In two of the three projects, achievement of the energy performance goals was uncertain because of post-construction problems with building systems. In the third project though, comprehensive monitoring conducted by the owner showed that all systems were performing as expected and he was confident that the expected energy savings were achieved. Project representatives were convinced 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 these effects, their comments suggested the impacts were positive and ranged from marginal to significant. 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.

Longer Term Outcomes

Influence on other customers. Even though it was primarily a demonstration program, the SCP showed how sustainable design practices could be promulgated and, based on study findings, was beginning to have an effect beyond the initial participants. The engineering firm whose building underwent a major renovation as the first SCP project was able to draw upon its experience to inform clients about green building practices and expand its reputation as a green building firm and, presumably, increase integration of green building practices in its projects. Furthermore, their showcase tours helped groups and individuals learn about green building practices. This project also included a touch-screen display in the lobby for visitors to access real-time information showing how the building is performing. Another 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 dedicated a publicly accessible room to display information about the project and green buildings.

Influence on participants' other projects. Although none of three projects constructed by the end of 2005 were implemented by developers, other projects in the Program were. Some of these developers expressed an interest in applying sustainable building practices to additional projects.

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 in our study 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. Two of the teams with completed projects, 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 as the Program continues beyond 2005.

SCP Effects on Green Building and Sustainable Community Barriers

Costs, schedule, and financing. SDG&E was able to build upon its successful SbD 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 expanding beyond energy-efficiency improvements to incorporate green building features. The participants interviewed indicated that their projects cost more because of the sustainable design practices incorporated (including the energy efficiency), but none were able to provide very accurate estimates of added costs. The typical estimate was around 5% of the construction cost, which is in line with other studies. 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 process delaying their project schedules. Also, no one indicated that financing was more difficult as a result of incorporating green building practices.

Lack of information. The participants all agreed that lack of knowledge and education was a barrier to increased use of sustainable building practices. The three participants interviewed who

had completed projects felt that participating in the Program was an informative process and that it helped increase their knowledge and understanding of sustainable building practices.

The Program educated and informed customers beyond those who participated in the SCP about green building practices, primarily through the case study information, other SDG&E efforts, and information dissemination by the participants. It was not possible to assess the extent of this effect; the ultimate impact 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 demonstrated to only a limited extent that it could overcome the barriers facing hard-to-reach customers or projects with split incentives. SDG&E had anticipated numerous multifamily and affordable housing projects would participate. Though several potential participants were identified, only one signed up and construction was not completed before 2006. The Program Manager felt that the lack of a green rating system and added costs were the main factors that limited multifamily and affordable housing project participants.

When the LEED residential rating system is finalized, it could help overcome the first barrier. The cost barrier is not unique to this Program: it has limited the success of prior energy-efficiency programs in hard-to-reach sectors. It is worth noting that many government and non-profit groups have initiated green building programs for lower income households to address this need because they recognize the disproportionate burden that healthcare and utility costs associated with poor quality housing place on these households.

Achievement of Measurable Objectives

The Program achieved 42% of its net annual electricity savings goal of 1, 684,774 kWh, 73% of its net demand savings goal of 390 kW, and 62% of its annual net natural gas savings goal of 31,774 therms. Based on these results, the Program did not meet its 2004-'05 energy savings objective. The estimated life cycle savings were 10.6 GWh and 308,841 therms.

SCP partially achieved its objective of supporting California's goals of increasing the proliferation of renewable energy systems, and promoting customer and utility owned distributed generation. The cost of on-site renewable energy systems was an impediment to customer-owned generation in this Program. Through SDG&E's innovative leasing arrangement one of the three constructed projects incorporated on-site generation—utility-owned PVs and a fuel cell—and the building owner was pleased with the systems. Owners of the other two completed projects were interested in a similar arrangement, but SDG&E did not institute this arrangement with them.

The SCP signed up nine (9) participants so it met its objective of supporting 8 to 10 sustainable design projects. As noted earlier, only 3 of the projects were able to be constructed by the end of 2005. Nevertheless, the completed projects brought diversity to the Program. Two were office buildings and the third was a combined retail/office building. The projects differed substantially in size and type of occupancy. One was a major renovation of an existing building and the other two were new construction. Four multifamily projects were identified as prospects and one multifamily project signed up to participate, but it was not constructed by the end of 2005. 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 green rating system. Due to the limited number of projects completed, some of the lesser Program objectives were not met.

The Program did have some success meeting its objective of publicizing project results in cooperation with various organizations to increase community awareness and promote widespread local adoption of sustainable design practices. SDG&E conducted several activities to disseminate information about the Program and projects, including working with the City of San Diego and conducting informational meetings and making presentations on the projects.

Achievement of Major Goals and Recommendations

Although it clearly takes more than three constructed green buildings to constitute a sustainable community, the SCP made measurable progress toward its goal of “setting the stage for future code upgrades and ‘mainstreaming’ sustainable development practices, potentially leading to a statewide program.” The Program educated designers, engineers, owners, and developers about green building and the LEED rating system. SCP sponsored and helped create “Build Green San Diego,” an annual local green building conference. As noted, interest in the Program grew over the two years as nearly 80 prospective participants were identified, 9 projects signed up as participants, and hundreds of designers were informed about the Program.

A significant hurdle for the Program to deliver completed projects within its two-year timeframe was how long it takes for new construction and major renovations to be completed. Only one-third of the participants’ projects were constructed by 2006. Another notable Program design barrier was the requirement to achieve 30% energy savings beyond code. Some prospective participants implemented green design projects, but did not meet the energy savings threshold and, therefore, were not recognized as SCP participants.

Another factor limiting the Program was the lack of readily available information on the non-energy, indirect energy, and other benefits of green buildings. A goal that emerged during the Program was to quantify the indirect energy savings generated by green buildings and to lay the groundwork for the CPUC to incorporate these savings in cost-effectiveness analysis of similar programs. SDG&E conducted a preliminary study to identify such potential benefits, but further research is required to accurately quantify them. In addition, existing information on the diverse and significant benefits from developing communities based on sustainability practices is very limited. Such benefits include reduced habitat destruction, improved traffic flow, reduced local pollution, better access to services, increased availability of local products and services, and many others. Demonstrating and quantifying these benefits are untapped opportunities to pursue in future programs.

Despite the effects of these factors limiting the SCP, we believe this Program made notable progress as a demonstration of green building and sustainable communities. Two SCP completed projects were honored with “Earth Awards” from a local environmental organization.

One of the most significant accomplishments of the SCP was that it took a bold step to broaden traditional utility energy-efficiency programs to encompass and promote sustainability principles. SDG&E accomplished this through several tactics. First, the Program recognized the fact that LEED provides a significant number of points for energy efficiency and other measures associated with energy and set a high energy-efficiency qualification requirement so that SCP projects would achieve substantial points in LEED, even before incorporating other green features. Second, the incentive payments and utility costs were at a level that the Program was cost effective when just the direct energy savings were counted as benefits. From the Total Resource Cost (TRC) perspective, the Program provided net benefits of \$91,227 and a benefit-cost ratio of 1.19. The net benefits to participants were \$1.8M and their benefit-cost ratio was

over 11. Third, SDG&E raised the issue of broadening the TRC to encompass the indirect energy benefits of green buildings (e.g., reduced water treatment energy use) and the utility and others are studying this. Fourth, the Program provided a two-pronged approach to assist participants developing green buildings—financial incentives to help defray incremental costs and education and technical assistance to help overcome information barriers. Finally, the Program provided assistance that helped several local governments and stakeholders to begin developing the infrastructure needed to expand green building and sustainable communities.

We believe the fact that the CPUC has approved sustainable community programs for all four IOUs for the period 2006-'08 is one of the best indicators of the success of the SCP. These efforts will build on the solid foundation established by the Program and develop a platform for expansion to include neighborhood developments and community master plans.

To ensure the success and effectiveness of future programs building on the SCP we recommend the following:

- *Quantify and include additional sustainability benefits in cost-effectiveness assessments and disseminate information:* The indirect and non-energy benefits need to be quantified and they should be included when program cost-effectiveness is calculated. They also should be communicated clearly to potential participants and stakeholders. Quantified benefits should include the value of water savings, stormwater treatment savings, air quality improvements, and worker productivity improvements.
- *Expand education and information dissemination:* The growing body of information about green buildings and sustainable communities should be mined to develop more extensive educational materials that could be disseminated to potential participants. Dissemination should be expanded to encompass engineers, building owners, developers, and tenants to increase both the supply and demand for sustainable building practices.
- *Increase leveraging of other organizations and resources:* Leveraging could be used to reach a wider audience and provide additional expertise and services. One critical area is the provision of technical services to participants throughout the process. A related service would be development of a resource center or “hotline” to provide potential participants green building and sustainable communities information.
- *Expand incorporation of renewables in projects:* The use of renewable energy is totally consistent with green building and sustainable community principles. Creative ways should be identified to site renewables in conjunction with participating projects.
- *Incorporate multifamily and affordable housing projects:* To take advantage of existing efforts, networks, expertise, and funding, future projects should work with organizations such as Global Green USA, state and local housing agencies, and non-profits with existing missions to promote affordable housing.
- *Develop a clear relationship between project requirements, LEED, and incentives:* It may be appropriate to permit some projects to use systems other than LEED to document their sustainability, as long as the equivalency of the system has been shown. Incentives should be designed to encourage formal green building certification or verification.
- *Emphasize the concept of sustainable communities:* Future efforts should have a clear community focus and integrate into planning and development activities.
- *Work with municipalities to adopt green building policies:* Local governments can both set the example and establish policies and requirements that promote green buildings and sustainable communities.

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