EM&V Report for Rebuild a Greener San Diego Program (1500-04)

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Rebuild A Greener San Diego Program

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Executive Summary

The Rebuild a Greener San Diego Program was designed to provide three types of assistance to San Diego County residents who lost their homes in the October 2003 fires: (1) technical information and guidance; (2) financial incentives for the incorporation of energy-efficient measures or design principles that result in homes achieving energy savings greater than the minimum requirements of Title 24; and (3) financial incentives for the installation of photovoltaic self-generation systems. Financial incentives were provided on a first-come, first-served basis for two prescriptive packages of energy efficiency measures.

There are two over-riding conclusions presented in this report. First, there were significant implementation issues that severely limited program participation and the corresponding energy savings. With the exception of marketing/outreach efforts through existing networks, the process was deeply flawed and was never able to overcome significant barriers to participation (e.g., extremely stressed victims wary of proposals even those that are well-intentioned like very low cost energy efficiency, victims that placed very small importance on energy efficiency relative to almost anything else, and relatively immobile victims), which led to an overall lack of participation, excessive free-ridership, and minimal spillovers. Examples of the flawed process include the late program start, the excessive number of partners and their associated bureaucratic issues, the inflexible prescriptive program design, the insufficient incentive levels, etc.

In terms of participation, the program design neither took advantage of the participation drivers (e.g., income, education, family size), nor was able to overcome variables that reduce participation (e.g., awareness, relative importance of energy efficiency).

The program also suffered from excessive free-ridership. More than 70% of survey respondents demonstrated evidence of a weak form of free-ridership ("already planning to incorporate energy-efficiency measures/design principles in the re-build process"). In addition, approximately 30% of survey respondents showed a stronger form of free-ridership ("the program did not alter building plans"). As a counter-weight many respondents stated that the program increased overall awareness of energy efficiency and led them to complete an overall upgrade and to do more energy efficiency than anticipated. However, the net result still suggests an insufficient net-to-gross. Overall, our assessment of the net-to-gross is 0.723, which is below the *a priori* assumed value of 0.80.

Another offset to free-ridership are spillovers. In this case, we examined two types of spillovers: (1) impact on individuals outside the program through information sharing; and (2) impact on the knowledge and decisions of individuals "inside" the program without direct compensation. The data indicated that these spillovers existed but were relatively unimportant.

The second overarching conclusion is that there are significant program impacts, especially for electricity. We estimate the impact of the prescriptive energy efficiency measures in the Rebuild a Greener San Diego Program through the use of calibrated building simulations. The simulations are calibrated using post-fire billing data. We then calculate the difference in the post-fire energy use and peak demand with and without the prescriptive energy efficiency measures to determine the gross program impacts. The net program impacts are then calculate using a net to gross ratio developed from self reported data collected through a telephone survey of program participants. The net program impacts per participants are 722 kWh per year with a corresponding reduction in peak demand of 0.98 kW and 70 therms per year.

The building simulation analysis is vetted by comparing actual energy use for a sample of program participants and nonparticipants who built new homes following the October 2003 fires. This billing analysis results in a net estimate of program energy savings and is directly comparable to the estimate of net energy savings developed using the building simulations. The estimated net energy impact from the billing analysis is 2,650 kWh substantially more than the building simulations. However, the statistical significance of the billing analysis estimate is weak with a 90% confidence interval ranging from -146 kWh to 5,474 kWh per participant. Therefore the billing analysis estimates encompasses the building simulation estimate and provides additional statistical evidence of the program impact.

Finally, in terms of program impacts using the estimated impacts from the building analysis the estimated net annual program impact for electricity is 179,899 kWh with a peak demand reduction of 234 kW and for gas is 17,403 therms. These savings are expected to extend for 18 years based on the expected useful life of the measures installed. The program impacts are summarized in the energy reporting table below. Overall, the program met its planning goals in terms of energy saving but fell short of its coincident peak demand reduction goals.

	Electricity		Natural Gas
	Energy Savings (kWh)	**Demand Reduction (kW)**	**Energy Savings (therms)**
Program Goal	173,494	443	16,349
Verified Savings	179,899	234	17,403

Given the findings of our evaluation Zebedee & Associates provided a coherent program design going forward. The key elements are as follows.

- The program must be housed within a single agency that has the ability to aid in all aspects of the rebuilding process, from initial communication to the completion of the rebuilt home. This includes holding workshops and training, problem solving, conducting site visits, handling insurance and building contractor issues – everything.
- The communication requirement means that the program/agency must be aligned with existing communication systems (e.g., 2-1-1 system). This alignment with the existing communication system will also produce a greater number of spillovers than occurred previously. The sponsoring agency must be able to convey the message that energy efficiency is important; that is, to communicate to the various market actors (homeowners, contractors, architects, etc.) that energy efficiency is an investment and a potential lost opportunity.
- The agency must be operational immediately, which requires that the program be set up now, in advance of any pending disaster. Thus, the program must be a portion of the responsibilities of an existing organization. Our recommendation is that the program should be housed in the existing new construction program to take advantage of existing experience and to minimize administrative cost. This also ensures that program staff members, who hopefully are knowledgeable and stable in their jobs, will be able to provide design assistance and training (individual or in workshop form) and to minimize construction delays.
- The program must have pre-established participation goals to minimize lost opportunities. For example, 80% of rebuilt square footage should be doable.
- The program must be performance based rather than prescriptive.
- The evaluation of building plans should be central to the program.

- The program requires an application process that is fast, efficient, easily understood, and straightforward.
- The program should require rebuilt homes to significantly exceed existing standards in order to minimize free-ridership and to create free-drivership.

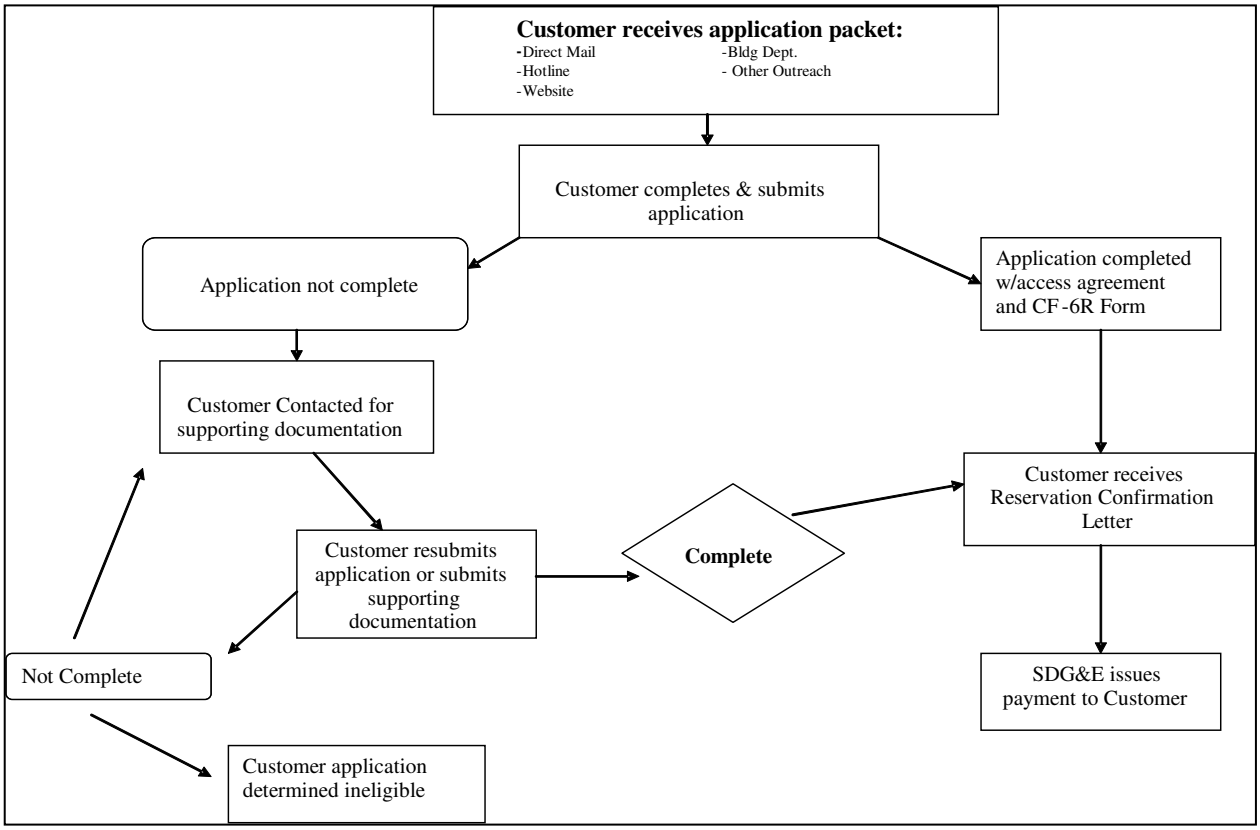
1. Program Overview

The new construction that succeeds a natural disaster (wildfire, hurricane, tornado, etc.) that destroys some of the existing housing stock represents an opportunity to transform how buildings are designed, built, and operated. The Rebuild a Greener San Diego Program was designed to take advantage of this opportunity by providing three types of assistance to San Diego County residents who lost their homes in the October 2003 fires: (1) technical information and guidance; (2) financial incentives for the incorporation of energy-efficient measures or design principles that result in homes achieving energy savings greater than the minimum requirements of Title 24; and (3) financial incentives for the installation of photovoltaic self-generation systems.

The specific program goals were to generate: (1) estimated net annual savings of 173,494 kWh and 16,349 therms; and (2) estimated net lifecycle savings of 3,122,899 kWh and 294,276 therms. The program was designed as a unique partnership between government agencies (San Diego City and San Diego County), the electric and natural gas utility (San Diego Gas and Electric or SDG&E), and a non-profit (California Center for Sustainable Energy or CCSE), with support from the business community and elected officials. Close coordination across jurisdictional boundaries, as well as with other programs being implemented by non-utilities throughout the greater San Diego Area, was to be ensured through direct day-to-day involvement of the City, the County, SDREO, and SDG&E.

Program eligibility was limited to SDG&E consumers whose homes were fully destroyed by the October 2003 fires. Financial incentives were provided on a first-come, first-served basis for two prescriptive packages of energy efficiency measures. The incentive for Package 1, which included an 80% AFUE or greater gas-fired (natural or propane) furnace, a 12.0 SEER or greater central air conditioner, low-e windows and glazed doors ($\leq$ 0.40 U-Factor & $\leq$ 0.40 SHGC), a 0.62 Energy Factor or greater gas (natural or propane) water heater, and a radiant barrier if HVAC ductwork was located in the attic, was $1,700. The incentive for Package 2 (included all Package 1 measures plus a thermsal expansion valve on the air conditioning unit, tight ducts, application of ACCA Manual D, and verification of the building measures by a Home Energy Rating System ("HERS") Rater) was $2,000. The customer participation process is summarized in Figure 1 below.

Figure 1
Customer Participation Process



The Program Implementation Plan (PIP) was submitted and approved in early 2004 and the program began in the spring of 2004 and was operational until December 1, 2006. At the conclusion of the program there were 308 total customers, with 249 receiving financial incentives exceeding $420,000.

2. Evaluation Background

This evaluation of the Rebuild a Greener San Diego Program includes the following tasks/objectives:

- A literature survey of similar programs (standard new construction programs, other emergency efforts in which energy efficiency played a role, etc.).
- An analysis of the short and long term energy impacts of the program through the use of billing analysis, and calibrated building analysis.
- A participant perspective assessment of the performance and success of the program including analysis of marketing/outreach efforts, education efforts, the rebate

payment process, and overall customer satisfaction. Important goals include determining the effectiveness of program information and incentives at motivating participants to take actions that they would not have taken on their own.

- A non-participant perspective assessment of the program, including marketing/outreach efforts, education efforts, the rebate payment process, and overall customer satisfaction. Non-participants include individuals from two specific groups: (1) those that qualified for the program (home significantly damaged in fires), applied for the program and chose not to participate and (2) and those that qualified for the program but did not apply for the program. A key component of this assessment will be determining why so few of the potential participants elected to take part in the program.
- An assessment of the effectiveness (overall cooperation, communication, etc.) of the partnership through in-depth interviews with important participants.
- Preparation of a template for creating and implementing similar programs to meet the energy efficiency requirements of events similar to the San Diego fires. The primary goal of this task is to determine program design or operations conditions that influenced the success of the program, and determining the program theory, program design, program development, program implementation, and program management changes that should be made in future programs. We expect to be able to define the structure of program outreach efforts in order to capture all the participants that would be expected to participate, the logistics (resources, operations, methods, processes, timelines, etc.) of the program to minimize participation barriers, the levels and types of services offered, and the program changes needed for future emergency assistance energy efficiency programs.

3. Literature Review

The objective of the literature review is to determine the existence and relevance of previous evaluations of programs similar to the Rebuild a Greener San Diego Program – a partnership between several public sector and quasi public sector entities whose purpose was to encourage energy efficiency after a natural disaster. The Rebuild a Greener San Diego Program was not the typical resource acquisition program. Rather, the program was developed as a response to the damage from urban fires near San Diego.

The intent of the program was to deliver assistance to customers so that homes would be rebuilt above existing energy efficiency codes, and would therefore be more energy efficient than the homes would have been built.

Zebedee & Associates conducted a review of the literature, primarily focusing on reports written for evaluations of California programs and on recent natural disasters (e.g., hurricane Katrina) and using the California Measurement Advisory Committee website (http://www.calmac.org/), the California Energy Commission website (http://www.energy.ca.gov/), assorted DOE websites (e.g., www.eere.energy.gov/buildings), and the Institute for Business and Home safety website (www.ibhs.org) to determine whether or not data exist for programs similar to the Rebuild a Greener San Diego Program.

We were not able to identify an evaluation of a program *identical* to Rebuild a Greener San Diego. However, we were able to find studies that yielded information on various aspects of the rebuild program. For example, the following types of studies provided useful information:

- Baseline studies of the building characteristics of homes (see "Residential New Construction Baseline Study of Building Characteristics Homes Built After 2001 Codes," Itron, Inc. 2004).
- Best practices studies (i.e., best practices overall, in preparation of natural disasters, and post-disaster rebuilding). For example, see "Building America Best Practices: Volume 2," Pacific Northwest National Laboratory and Oak Ridge National Laboratory, US Department of Energy, 2005.
- Descriptions of partnerships designed to aid in rebuilding or redevelopment efforts – most of these partnerships focused on non-energy efficiency aspects (e.g., access to mortgage lending, filing appropriate paperwork to receive benefits, etc.).
- New construction energy efficiency programs.

The most relevant studies were, in order of relevance:

- "Evaluation, Measurement, and Verification of the 2002 and 2003 California Statewide ENERGY STAR® New Homes Program, Phase II Report," (RLW Analytics, Inc. and Skumatz Economic Research and Associates, 2006).
- "2003 Building Efficiency Assessment Study: An Evaluation of the Savings by Design Program," (RLW Analytics, Inc., 2005).
- "Evaluation, Measurement, and Verification Report on the 2004 – 05 Sustainable Communities Program, 1316-04," (Quantec, LLC in association with Christine Hammer, 2006).
- "Energy Design Resources (EDR) 2003 Evaluation," (Opinion Dynamics Corporation, 2003).
- "EM&V Report for Green Building and Technical Assistance Program, CPUC 1299-04," (Zebedee and Associates, 2006).
- "Green Building Technical Support Services Program Evaluation," Quantec, LLC in association with Andrea Traber Architecture + Sustainability, 2006).
- "Evaluation of the 2004 – 2005 Designed for Comfort: Efficient Affordable Housing Program," (KEMA, Inc. 2006).

Below we briefly summarize each study and conclude with lessons learned from the literature review.

3.1. Evaluation, Measurement, and Verification of the 2002 and 2003 California Statewide ENERGY STAR® New Homes Program, Phase II Report

The ENERGY STAR® New Homes Program is similar to the Rebuild a Greener San Diego Program in that it targets single family production and provides financial incentives ($700 - $900), education, and marketing to builders who construct new residences that exceed the state's mandatory minimum energy efficiency standards. The evaluation of the ENERGY STAR® program primarily focused on the energy impacts and offered relatively little on process and did not include a detailed blueprint for improving the program to enhance participation. These latter two elements are central to our evaluation.

In terms of energy impacts, which were based on multiple methodologies, the ENERGY STAR® evaluation found significant programmatic energy savings and a net-to-gross ratio for electricity that exceeded one while the net-to-gross for gas was estimated to be approximately 0.50.[1] These results bode well for the Rebuild a Greener San Diego program. Other findings, such as "program participants account for roughly 10 percent of residential new construction" or "a more efficient home does not necessarily equate to less energy consumption" are also relevant to our study in that they help us place bounds on participation rates and energy savings estimates.[2] On the other hand, many of the conclusions of the ENERGY STAR® New Homes evaluation are only marginally relevant to our investigation. For example, conclusions such as: (1) "builders comply with ENERGY STAR® requirements through end-use trade-offs"; (2) "there is a lack of conformity in Title 24 modeling"; and (3) "enforcement of codes may not be as rigorous as generally perceived" are not important for our study because Rebuild a Greener San Diego uses prescriptive measures only.[3]

3.2. 2003 Building Efficiency Assessment Study: An Evaluation of the Savings by Design Program

The Savings by Design program is the statewide non-residential new construction energy efficiency program administered and implemented by the California investor-owned utilities (IOUs). The key objectives of the evaluation study of Savings by Design were to:[4]

- Develop energy and demand savings impact estimates for the gross whole building.
- Develop impact estimates for measure categories that have associated incentives and for measures that do not have associated incentives.
- Develop estimates of both free-ridership and spillover at the measure and end-use level.

[1] See "Evaluation, Measurement, and Verification of the 2002 and 2003 California Statewide ENERGY STAR New Homes Program, Phase II Report," RLW Analytics, Inc. and Skumatz Economic Research and Associates, 2006, page 26.

[2] Ibid, page 11.

[3] Ibid pages 11-12.

[4] See "2003 Building Efficiency Assessment Study: An Evaluation of the Savings by Design Program," RLW Analytics, Inc., 2005, page 1.

- Develop net savings results.
- Provide process findings of the Savings by Design program from the perspective of the program participants.

Thus, the objectives of this evaluation are quite similar to those for the evaluation of Rebuild a Greener San Diego, in that both impact and process components are included and free-ridership and spillovers are relevant. Of course, Savings by Design is a non-residential new construction program and implementation did not include a partnership of diverse entities. In addition, the process evaluation was limited to participants and did not address non-participants.

A sample of the key findings of the Savings by Design evaluation were the following.[5]

- Program related gross and net energy impacts were significant, with HVAC plus motors accounting for approximately 36% of the savings.
- Participant net-to-gross for commercial (76.1%) and industrial (59.0%) projects compared favorably with past results.
- The incentive played a central role in the participation decision and ultimately changing design practices.
- Design assistance and analysis is very important as they help sell the program, corroborate internal decisions, and introduce new measures and technologies.
- Lack of awareness of the program limited program participation.

3.3. Evaluation, Measurement, and Verification Report on the 2004 – 05 Sustainable Communities Program

The Sustainable Communities Program combines elements of the two new construction programs – Savings by Design and the ENERGY STAR® New Homes. The Sustainable Communities Program provides a range of services and incentives to participating projects. For example, multi-family residential projects are eligible for incentives of $165/unit, up to a maximum of $30,000. Projects are expected to include some combination of energy efficiency and demand reduction technologies, on-site generation, water use and waste reduction, and transportation efficiencies. The evaluation of the program included a process evaluation and a participant survey, but did not include an

[5] Ibid, pages 2-7.

impact component. Evaluation activities included interviews with the program manager, stakeholders, and program participants, verification of measure installation, and assessment of *ex ante* energy and demand savings.[6]

Important conclusions of the evaluation study were the following.[7]

- Marketing/recruiting was enhanced by the use of existing networks, although over-reliance on these networks could ultimately limit participation.
- Marketing/recruiting is enhanced through leveraging the collaborative relationships with other organizations.
- Preparation and distribution of case studies was an ineffective marketing/recruiting tool.
- Participants placed a high value on technical assistance.
- The existence and magnitude of incentives has a strong influence on participation and corresponding spillover effects.
- The application process must be efficient and straightforward.
- Oftentimes program requirements have a positive effect on participant awareness of building characteristics and increased the comfort of incorporating these features.
- *Typical* projects likely have the largest spillover effects on other projects.
- Continued expansion of energy-efficiency requires the availability of both consumer information (including examples of building projects) and financing.

3.4. Energy Design Resources (EDR) 2003 Evaluation

Energy Design Resources (EDR) offers a suite of tools (including publications, software tools, and training) to educate architects, engineers, lighting designers, developers, builders, and building operators about techniques and technologies that contribute to energy efficient new construction. Energy Design Resources is not a stand-alone

[6] See "2003 Building Efficiency Assessment Study: An Evaluation of the Savings by Design Program," RLW Analytics, Inc., 2005, page 5.

[7] Ibid, pages 51-57.

program; rather it is a statewide energy efficiency offering that is housed under the Savings by Design program.

The evaluation of Energy Design Resources primarily focused on interviews with program implementers, Savings by Design field staff, architects, engineers, and energy consultants. The primary findings of the evaluation were that Energy Design Resources' tools are underutilized by many segments of the energy industry (especially lighting designers, developers, building owners and facility managers) and that the lack of awareness severely limits the usefulness of the tools.[8] These results are consistent with those presented above in that marketing/outreach/recruiting are essential if participation is to be increased.

3.5. EM&V Report for Green Building and Technical Assistance Program

The Green Building and Technical Assistance Program was an informational program designed to provide training, design assistance, and technical support to both residential and non-residential new construction projects in the San Diego Gas & Electric Service Territory. As an informational program, the goal of the program was to promote long-term sustainable energy use and peak demand savings by promoting green building practices.

In their overall evaluation of the Green Building Education and Technical Assistance Program, Zebedee & Associates found the following.

- The program design was sound and well executed.
- The level of participation, as measured by number of workshops, the number of participants, the number of technical assistance packages, the general education and support (through brochures, mailings, website, education activities), and the coordination with existing programs, etc. generally met expectations.
- A high degree of customer satisfaction and a significant change in energy related knowledge, which was ultimately responsible for subsequent energy efficiency installations.
- Training/education program provided valuable insights, reduced market barriers, and affected behavior.

[8] See :Energy Design Resources (EDR) 2003 Evaluation," Opinion Dynamics Corporation, 2003, pages 4-8.

- Significant program spillover.
- A potentially high degree of free-ridership, since a high percentage of survey respondents learned about the program only through the established work-related networking channels and made energy related decisions frequently. These survey elements pointed to a group of participants that are already engaged in energy efficiency activities who should have knowledge of the benefits and costs of energy efficiency alternatives.

3.6. Green Building Technical Support Services Program Evaluation

This program focused on residential market-rate new construction and remodeling and affordable housing and included direct promotion of energy efficiency and resource-efficient building design and construction. The program was multi-faceted and included point-of-purchase displays, in-depth consultations, half-day workshops, community events, inspector training, support to the Green Affordable Housing Coalition and local governments, a green home tour, case studies and fact sheets, and ask-an-expert.

The evaluation obtained participant perspectives and assessments for each of the discrete program activities and services using evaluation sheets, telephone interviews, and web-based data collection to compile study data.

In general, the evaluation found the following.[9]

- Point-of purchase displays were relatively ineffective.
- The in-depth consultations, while well-received, were utilized by participants with significant knowledge of green buildings (i.e., free riders).
- The half-day workshops attracted primarily supply-side market actors who were already fairly familiar with green building practices.
- The typical participant at community events, which received high customer satisfaction ratings, was already somewhat familiar with green building.
- The inspector training was very useful to participants and the materials were well presented, well-targeted, and useful.

[9] See "Green Building Technical Support Services Program Evaluation," Quantec, LLC in association with Andrea Traber Architecture + Sustainability, 2006, pages 3-8.

- Support to the Green Affordable Housing Coalition and Local Governments significantly increased both the knowledge of the participants and the willingness to pursue green options.
- The green home tour appeared to be a very effective way to increase consumer awareness and knowledge of green buildings, although most participants indicated that their knowledge of green building was already better than average.
- The program case studies and fact sheets were effective and well targeted.
- The Ask-an-Expert consultation service provided in conjunction with the Program is a key resource that assists a wide range of users and seemed to be meeting users' needs as evidenced by the ratings it received.

3.7. Evaluation of the 2004 – 2005 Designed for Comfort: Efficient Affordable Housing Program

The Designed for Comfort Program worked within the affordable multifamily and single-family housing sectors to incorporate strategies that involve both long-term changes in market structure and shorter-term acquisition of energy savings. The evaluation of the program included both a process evaluation, to assess the overall level of performance of the program, gauged by the acceptance of the program features by the participating housing authorities and eligible property owner/developers, and an impact evaluation, which verified both energy (kWh and therms) and peak demand (kW) savings attributable to the program. The primary findings of the evaluation are summarized below.[10]

- Program achieved significant energy savings.
- The program total resource cost (TRC) ratios were lower than expected, significantly below one for each utility.
- The program met its goals in terms of the number of public housing authorities that participated.
- Several key barriers to increased participation were identified. These included inadequate information provision (quality and quantity), inadequate marketing,

[10] See "Evaluation of the 2004 – 2005 Designed for Comfort: Efficient Affordable Housing Program," KEMA, Inc. 2006, pages 2-9.

failure to utilize sector leaders, delays in obtaining incentive payments and the logistics of identifying qualifying equipment.

3.8. Lessons Learned

The literature review of California program evaluations produced the following conclusions:

- New construction programs have significant associated energy savings
- Spillovers can be increased with extensive outreach and making sure the participants are satisfied.
- The existence and magnitude of the incentive is very important for inducing participation.
- Marketing and outreach are essential since lack of awareness hampers participation.
- Marketing and outreach is enhanced by the use of existing networks and through leveraging the collaborative relationships with other organizations, although over-reliance on these networks/relationships could ultimately limit participation and increase free-ridership.
- Training in the form of design assistance and analysis of options heightens both satisfaction levels and corresponding spillover effects.
- The application process must be fast, efficient, and straightforward.
- Training, workshops, personal consultations, etc. can have a significant impact on knowledge levels and are generally well-received. However, participants are often relatively well-informed (free riders) or are highly motivated. Expanding these services to other potential participants is essential.
- Barriers to participation must be identified early in the process and eliminated through program re-design.

Our evaluation of the success of the Rebuild a Greener San Diego Program, which includes both impact and process components, incorporates these lessons.

4. Telephone Survey Results

Zebedee & Associates, with the assistance of our subcontractor Social Science Research Laboratory (SSRL) at San Diego State University, conducted a telephone survey of three specific groups: (1) program participants; (2) individuals who applied for but did not complete the program (partial participants); and (3) non-participants. The survey instrument (see Appendix A) focused on the specific program goals, as well as the following general issues:

- the decision to participate;
- group (participant, partial-participant, non-participant) and individual issues and needs;
- the success of program implementation;
- program success in raising awareness and affecting decisions of participants to implement the energy efficiency and demand reduction measures;
- the relative values of the various elements/components of the program;
- any perceived energy/comfort savings; and,
- any unanticipated outcomes/results.

The survey was conducted during the September/October 2007 time period.

4.1. Sampling Plan

The survey sample was developed from the list of approximately 2,650 fire victims obtained from the California Center for Sustainable Energy (CCSE). The list contained individual names, addresses, and contact information. The first step to develop a list sample was to remove duplication and problem address and telephone numbers (incomplete contact information), thereby leaving 1,270 unique individual households in three groups – 220 program participants, 55 partial-participants, and 995 non-participants. We used these values to represent the relevant populations.

In order to determine the appropriate sample size, we began with the following formula: $n = \frac{\{Z_{\alpha/2}\}^2 pq}{E^2}$, where n is the sample size, Z is the normal distribution Z-score, 1-α is the degree of confidence, p is the population proportion, q = 1-p, and E is the margin of error. Since the population was not infinite we corrected the formula above by the finite

correction factor. This produced the following equation: $n = \frac{Npq\{Z_{\alpha/2}\}^2}{pq\{Z_{\alpha/2}\}^2 + (N-1)E^2}$,

where N is the population size (220 for participants, 55 for partial-participants, and 995 for non-participants) and all other variables are defined above (see Triola, 2001). In addition, we used a 90 - 10 sample model, consistent with CALMAC procedures, implying Z = 1.60 and E = 0.10. Finally, since we did have *a priori* estimate of p, we used p = 0.5. Thus, our target sample sizes were 50, 30, and 60 individuals for participants, partial-participants, and non-participants. In fact, we over-sampled where possible and surveyed 100, 30, and 102 individual households in the respective groups.

4.2. Survey Implementation

Each individual on the final lists was telephoned to ascertain his/her willingness to participate in the survey. This initial inquiry resulted in one of the following outcomes:

(1) unknown eligibility (e.g., busy signal, answering machine, left message, unqualified refusal, etc.);
(2) ineligible (e.g., incorrect contact information);
(3) unwillingness to participate; or
(4) completed survey.

In Table 1, we present the complete attrition analysis, including both sampling and survey implementation. As illustrated in the table, 232 surveys were completed. This value converts to response rates of 18.3 percent of the original list sample of 1,270 households. Alternatively, one can calculate the following rates as (all values taken from Table 1)[11]:

- Response Rate_3 = Completes/(Completes + Partial Completes + Refusals + Non-Contacts + Adjusted Unknown Eligibility) = 232/(232 + 12 + 21 + 0 + .5*232) = 60.89%.
- Cooperation Rate_3 = Completes/(Completes + Partial Completes + Refusals) = 232/(232 + 12 + 21) = 87.55%.
- Refusal Rate_3 = Refusals/(Completes + Partial Completes + Refusals + Non-Contacts) = 21/(232 +12 + 21 +0) = 7.92%.

[11] These rates are calculated according to AAPOR's Outcome Rate Calculator, Version 2.1, May 2003. Note that the unknown eligible are adjusted by the expected eligibility rate, which is assumed to be 0.5.

As is evident, the survey implementation can be characterized as quite successful in that the response and cooperation rates are high and the refusal rate is small.

Table 1
Attrition Analysis

Sampling/Survey Step	Participants
Initial Survey List	2,648
Remove Problematic Records	1,378
Remove Unknown Eligibility	232
Remove Calls Not Attempted	512
Remove Ineligible Records	262
Remove Terminated Surveys	32
Completed Surveys	232

4.3. Respondent Characteristics

Overall, the survey respondents on average are older, more educated, have larger annual incomes, and are less ethnically diverse than the comparable values for the San Diego Gas and Electric (SDG&E) service territory.

A more relevant comparison may be to individuals/households in the San Diego census block groups that sustained fire damage. The data for the survey respondents and this comparison group for a set of individual/household characteristics are provided in Table 2. As is shown, the conclusions about survey respondents stated above are generally still valid. That is, survey respondents are older, more educated, and less ethnically diverse than the comparison group. In addition, survey respondents have smaller household sizes and have lived in their homes longer than the comparison group.

As is also shown in Table 2, participants in the Rebuild a Greener San Diego Program are more educated, have larger family sizes, and have larger incomes than non-participants. These differences are statistically significant. Partial participants lie in the middle of these two extremes for each variable. There was no statistically significant difference between groups for time in residence at current home, employment status, or the ethnic composition or age of respondent. Finally, program participants (92%) were

more likely to have completed rebuilding their home than non-participants (72.55%) – partial participants (83.33%) lie in the middle of the extremes. In fact, some non-participants (19.61%) never rebuilt their home.

Table 2

Summary Statistics of Survey Respondents

Characteristic	Units of Measure	Participants (n=100)	Partial-Participants (n=30)	Non-Participants (n=102)	Fire-Damaged Census Blocks
Age	Percent Greater than 45	80.61	76.77	88.24	64.19
Household Size	Mean	3.07**	2.62	2.56	4.48
Income	Percent Greater than $75,000	65.52**	49.26	45.98	51.66
Membership in Environmental Organization	Percent Yes	29.0*	26.67	19.61	N/A
Employment Status	Percent Working Full-Time	48.98	51.72	45.54	46.60
Ethnicity	Percent White, Not Hispanic	91.49	100.0	94.95	85.06
Education	Percent Bachelor's Degree or Greater	61.62**	63.33	37.62	38.50
Time in Current Residence	Mean Years	15.52	14.17	16.09	10.82
Completed Rebuilding Home	Percent Yes	92.0**	83.33	72.55	N/A

For a difference in means test between the participants and the non-participants: * represents significance at the 10% level; ** represents significance at the 5% level.

4.4. General Observations

The 2003 Firestorm wildfires did cause a small increase in household involvement in environmental organizations (13% – 21 % increase across groups). Other household characteristics showed little variation due to experience with wildfires. Thus, the wildfires seemed to have very little long-term impact on family structure and behavior.

Energy efficiency considerations were relatively un-important compared to issues related to insurance, obtaining building plan approval, temporary housing, and finding rebuilding help. For example, only 11% (13.3%, 9.8%) of participants (partial-participants, non-participants) indicated that, relative to insurance issues, energy efficiency was very important by selecting "9" or "10" on the importance scale. This conclusion also holds for energy efficient appliances.

Rebuilt homes were significantly larger in all dimensions (square footage, bedrooms, bathrooms, fireplaces, pools/spas) compared to pre-fire homes. For example, 84% of participant homes increased square footage. The comparable figures for non-participants and partial-participants were 67.1% and 83.3%, respectively. Homes increased in size by an average of 480.6 ft^2. Participant homes showed the largest average increase (593.4 ft^2) whereas the non-participant homes had the smallest average increase (348.6 ft^2).

Small percentages (13 – 21 percent) of each group were familiar with Title 24 building codes, especially as they pertain to energy efficiency.

Non-participants were generally unaware of the Rebuild a Greener San Diego Program. Almost 55% had never heard of the program. Participants and partial-participants were most likely to have heard about the program from relief organizations or contractors. Flyers, newspapers, and several aspects of the California Center for Sustainable Energy (website, facility, and personnel) were surprisingly ineffective in communicating the existence of the program. Only 9.8% of respondents pointed to these entities as the initial source of program information.

Among those individuals that indicated that they were aware of the Rebuild a Greener San Diego Program, the overwhelming majority were expressly aware of the financial aspects of the program. For example, 84.5% of these respondents were aware of the energy efficiency financial incentives and 87.3% were aware of the rebates for installation of a photovoltaic solar energy system. However, these individuals were

significantly less aware of other aspects of the program (workshops, website, site inspections, technical information and guidance. This pre-dominance of the program's financial aspects may be a signal of free-ridership.

The initial program participation decision was almost invariably made by the homeowner. Specifically, the homeowner made the initial decision to participate in over 93% of the cases. Thus, the most important touch-point is the homeowner community, not contractors, architects, etc.

Program participants generally played a passive role in installing the energy efficiency measures. Hence, they were generally unaware of measure cost, in terms of dollars or effort. In spite of this lack of knowledge, the majority of participants indicated they felt the energy efficiency measures were effective in reducing air conditioning use (63%), heater use (56%), overall energy use (61%), and the electricity bill (53%). In addition, respondents indicated that the energy savings were greater than or equal to their pre-installation expectations.

4.5. The Participation Decision

The information in Table 2 provides only anecdotal evidence of association or correlation between demographic variables and participation in the Rebuild a Greener San Diego Program. No evidence of causality is provided. The objective of this sub-section is to describe a predictive model of participation in the program. In effect, the predictive model allows the identification of the important drivers of program participation.

The survey variables used in the analysis of participation are listed and defined in Table 3. The dependent variable (Participation) is a dichotomous choice variable; hence the model is estimated using Logistic regression techniques. Also note that "partial participants" are treated as "non-participants" in the model.[12] The independent variable set include demographic variables (sex, age, income, education, employment, and family size), as well as attitudinal (participation in an environmental group, and perceptions of

[12] One of the decisions we had to make was how to treat the "partial participant" group. On the one hand, they could be considered non-participants since they never received final compensation from the program. On the other hand, they did begin the process with the intention of participating. We estimated the models under three different scenarios: (1) partial participants were coded as non-participants; (2) partial participants were coded as participants; and (3) partial participants were omitted from the model. The results are materially unaffected by the treatment of partial participants.

relative importance of energy efficiency), awareness (familiarity with building codes and the Rebuild a Greener San Diego program), and behavior variables (alter living area post-fire.

The estimated participation equation is presented in Table 4, Column 2. Several aspects of the estimated equation are worth noting. First, estimated functional form makes the equation quite amenable to interpretation since the coefficients are interpreted as "a one unit increase in the independent variable leads to a z percentage point change in the participation rates," where z is the estimated coefficient. As an example, consider the effect of an individual being familiar with building codes, especially as they pertain to energy efficiency. That individual was 18.6% more likely to participate in the Rebuild a Greener San Diego Program, when all other variables in the equation are set at their mean values.

Second, several of the variables in the equation represent groups. For example, there are dummy or zero-one variables for each income group. These coefficients are interpreted as deviations from the omitted group. In the case of income, the omitted group is "income $25,000 – $49,999". Thus, an individual with an income greater than $100,000 is 22.9% more likely to participate in the program than an individual in the omitted income group.

Table 3

Variables Used in Participation Model

Variable/Definition	Variable Categories
Full Participation in Program	Yes, No
Education Level	High School, Some college, Bachelors Degree, Some Graduate School
Sex	Male, Female
Employment Status	Full-time, Part-time Not working
Income Status	< $25000, $25000 – $49999, $50000 – $74999, $75000 – $99999, > $99999
Family Size	Number of Family Members
Age	18 – 24, 25 – 34, 35 – 44, 45 – 54, 55 – 64, > 64
Environmental Group Status	Yes, No
Aware of Rebuild a Greener San Diego	Yes, No

Importance of Energy Efficiency	Compared to Insurance Issues
Importance of Energy Efficiency	Compared to Plan Approval
Importance of Energy Efficiency	Compared to Temporary Housing
Importance of Energy Efficiency	Compared to Building Help
Increased Square Footage Post-Fire	Yes, No
Familiar with Building Codes	Yes, No

Third, robust standard errors are provided in parentheses. In addition, the significance of each coefficient is indicated by asterisks, with one asterisk representing significance at the 10% level and two asterisks indicative of significance at the 5% level.

Fourth, the estimated results indicate that income, education, family size, familiarity with building codes, and a positive decision to increase the size of one's residence post-fire all significantly increase the probability of program participation. These variables could be considered the important participation drivers. The corresponding implication is that individuals in other categories (lower income, less educated, etc.) were not drawn to the previous program and that they need to be an important part of any future marketing/outreach effort. On the contrary, many of the possible regressors (e.g., membership in an environmental organization, age, relative importance of energy efficiency) were not significant determinants of participation. Consequently, their role in future marketing/outreach should be downplayed.

We also utilized the survey data to consider two other aspects of participation: (1) program awareness; and (2) participation conditional on the individual being aware of the program. The dependent variables in these questions are also zero-one choices so our analytical method is logistic regression. The results are presented in Table 4, columns 3 and 4, respectively. The awareness regression offers little except that members of environmental organizations are more likely to be aware of the program. This suggests that coordinating marketing/outreach with established entities may produce more program awareness.

The conditional equation (column 4), which includes only those survey respondents that specified explicit awareness of the Rebuild a Greener San Diego program, is nearly identical to the unconditional participation equation and adds very little additional insight.

Table 4

Logisitic Regression Results

Variable	Participation	Awareness	Conditional Participation***
Income $50,000 – $74,999	0.081	0.031	0.080
	(1.12)	(0.079)	(0.123)
Income $74,000 – $100,000	-.0.033	-0.105	0.054
	(0.126)	(0.103)	(0.140)
Income $100,000 Plus	0.229**	-0.020	0.289**
	(1.111)	(0.082)	(0.113)
Some College	0.341*	0.108	0.265*
	(0.144)	(0.074)	(0.161)
College Degree	0.366**	0.124*	0.267*
	(0.146)	(0.065)	(0.156)
Some Graduate School	0.382**	0.120	0.306**
	(0.143)	(0.073)	(0.152)
Female	0.026	-.061	0.087
	(0.074)	(0.054)	(0.085)
Family Size	0.073**	-.002	0.082**
	(0.029)	(0.018)	(0.032)
In Environmental Group	0.051	0.125*	-0.021
	(0.083)	(0.051)	(0.092)
Age 55 – 64	0.089	0.039	0.088
	(0.094)	(0.063)	(0.101)
Age 65 Plus	0.134	-0.012	0.159
	(0.107)	(0.073)	(0.115)
Increased Square Footage	0.251**	0.309**	0.134
	(0.075)	(0.075)	(0.102)
Familiar w/ Building Codes	0.186*	0.055	0.188*
	(0.101)	(0.065)	(0.104)
Importance v. Insurance	0.037	0.085	-0.001
	(0.125)	(0.075)	(0.136)
Importance v. Plan Approval	0.045	-0.120	0.169
	(0.199)	(0.186)	(0.204)
Importance v. Housing	-0.011	0.003	-0.060
	(0.188)	(0.142)	(0.224)
Importance v. Building Help	0.082	0.132	-0.000
	(0.149)	(0.058)	(0.162)
Observations	227	227	178

* Represents significance at the 10% level. ** Represents significance at the 5% level.
*** Includes only survey respondents "aware" of the Rebuild a Greener San Diego program.

4.6. Participant Satisfaction

A relatively small percent of program participants (and partial-participants) attended a Rebuild a Greener San Diego workshop. Those that did offered high praise for the

workshop and indicated a very high degree of customer satisfaction for the individual elements of the workshop (see Table 5). On the other hand, some specific aspects of the workshop (technical level, usefulness of written materials, convenience of day, time, and location received significantly lower satisfaction scores.

The overall customer satisfaction with the Rebuild a Greener San Diego workshop and other interactions with CCSE personnel were graded quite high, in line with other CCSE programs that Zebedee & Associates have evaluated.

Table 5
Customer Satisfaction --- Program Workshop
(n=28)

Satisfaction Measure	"Very Satisfied" (%)
Presenter "On Time"	92.8
Demonstrated Knowledge	100.0
Communicated Clearly	92.8
Organized Presentation Effectively	89.3
Provided Sufficient Information	89.3
Answered Questions	92.8
Instilled Confidence	85.7
Cared about Participation	96.4
Made Workshop Positive Experience	92.8
Amount of Time Provided	59.1
Technical Level	59.1
Usefulness of Written Materials	50.0
Convenience of Time and Location	63.6
Overall Satisfaction	64.3

4.7. Network and Free-rider Effects

Network effects are a form of spillover in that the program impacts individuals and decisions beyond those that are directly compensated. Consider first the impact on individuals outside the program. These can be measured by referrals, additional program

participation, or energy efficiency awareness and adoption. These network effects associated with participants were fairly large in that 64% of participant respondents indicated that they had referred other individuals to the Rebuild a Greener San Diego Program. Each participant referred an average of 3.93 individuals to the program. Approximately one-third of those referrals were perceived to have generated additional program participation. This type of network effect was much smaller for partial-participants in that only 33.3% indicated they had referred the program to others. The average number of referrals was approximately the same as the participant group.

Information sharing about energy efficiency was also significant for the participant group as the average participant shared information about energy efficiency with more than eight individuals. Partial-participants did considerable less energy efficiency information sharing, with each partial-participant sharing with about 3.3 individuals.

A second type of spillover occurs when the program impacts knowledge and decisions of individuals "inside" the program without direct compensation. For example, program participation seemed to have had a positive impact on knowledge of ecological, energy, and/or environmental issues in that 82.3% of participants and partial participants stated that their knowledge had increased "somewhat" or "a great deal." Examples of decisions that are affected by the program include participants doing more energy efficiency than required for the program or partial participants adopting any unplanned energy efficiency. These are reported below in the discussion of free-riding.

Free-ridership occurs when the program compensates participants for actions they were already planning to undertake. The information from the survey on free-ridership provides mixed evidence (see Table 6 below). On the one hand, 72% of participants and 86.7% of partial-participants indicated that they were "already planning to incorporate energy-efficiency measures/design principles in the re-build process." Thus, 98 respondents out of 130 participants and partial-participants suggested that they were free-riders. This is weak evidence that the program was not driving energy-efficiency. Rather, energy efficiency aware individuals seemed to taking advantage of the program's financial incentives.

In addition, 22% of the program participants and 46.7% of the program partial participants (or alternatively, 27.7% of the 130 participants and partial-participants) indicated they were "the program did not alter building plans". This provides strong

evidence that the program did not deliver the full energy saving originally estimated. Based on the self-reported responses from the telephone survey Zebedee & Associates concludes the level of free-ridership for this program is 27.7 percent of participants on a per-participant basis as well as on an energy saving basis. Therefore, we recommend a net-to-gross ratio of 0.723, which is below the *a priori* assumed value of 0.80.

Table 6

Free-Ridership

Free-Rider Behavior	Definition	Participants (n=100)	Partial-Participants (n=30)	Overall (n=130)
Weak Form	Already planning to incorporate some level of energy efficiency in rebuilding	72.0%	86.7%	**75.4%**
Strong Form	Already planning to incorporate energy efficiency in rebuilding and the program did not alter building plans	22%	46.7%	**27.7%**

It should also be noted, 52 (40%) of the participants and partial participants indicated that the program positively affected many of their energy related choices. Specifically, survey respondents were asked how program participation changed the rebuilding process. The addition of solar energy, radiant barriers, insulation, tight ducts, and more efficient appliances were the most common answers. In general, individuals stated that the program increased overall awareness of energy efficiency and led them to complete an overall upgrade and to do more energy efficiency than anticipated.

4.8. Overall Participant Satisfaction

Ninety-eight percent of participants and ninety percent of partial-participants indicated that they would choose to participate in the program again. However, the overall satisfaction with the program was below other CCSE programs that Zebedee & Associates have evaluated. For example, only 67% of participants (30% of partial-participants) awarded the program a "9' or a "10" on the overall satisfaction scale.

The survey respondents offered many suggestions for improving the program. Most of the recommendations focused on either program design or program operation. With regard to program design the comments were primarily directed at the financial incentives (should be bigger and better) and the prescriptive nature of the energy efficiency measures (more measures, such as tank-less water heaters, should allowed and there should be greater flexibility). With regard to the operation of the program the comments focused on time (time constraints should be relaxed, approvals and site-inspections should be accelerated, and the program should be extended), communication (more staff to handle inquiries, return phone messages, more information on solar energy), outreach (the program should be more extensively marketed), and size (there should be more solar contractors).

4.9. Non-participation

Non-participants did not participate in the program for a variety of reasons. The lack of awareness is especially relevant since almost 55% of non-participants had never heard of the program. Another important reason for non-participation was timing. Specifically, many non-participants had already started the rebuilding process before the program became operational. In addition, some non-respondents indicated that the rebuilding process was quite complex and that the important decisions were made by their contractors. For some, energy efficiency considerations were relatively low on the priority list. Other reasons included the lack of funding, the lack of networking about the program among neighbors, and the desire not to add complexity/time to the rebuilding process. Finally, some respondents cited communication/operational errors (e.g., they lost my file) as the reason for non-participation.

The reported reasons for non-participation imply that any future program must be up and running almost immediately after the occurrence of an event in order to maximize participation and to minimize any unnecessary cost of starting over. In addition, the sponsoring agency needs to convey the message that energy efficiency is important; that is, the profile of energy efficiency as an investment and a potential lost opportunity must be clearly communicated to the various market actors (homeowners, contractors, architects, etc.). Any future program must utilize all available avenues (e.g., homeowner forums, on-stop recovery centers, insurance agencies, other social agencies etc.) for communicating the existence and value of energy efficiency programs. Finally,

maintaining cost-effectiveness is, of course, important, but rebate levels and other financial considerations (e.g., on-bill financing) need to be sufficiently flexible in order to minimize lost opportunities. The Rebuild a Greener San Diego Program seemed to be entirely too prescriptive and did not allow the potential participant enough leeway in achieving energy efficiency or in meeting the financial obligations of an investment in energy efficiency.

5. Interview Results

In addition to the surveys of participants and non-participants detailed above, Zebedee & Associates, with the assistance of the Social Science Research Laboratory (SSRL) at San Diego State University, conducted lengthy in-person interviews with individuals in three distinct groups: (1) program managers from the partner agencies; (2) professionals in firms/agencies that offer emergency services; and (3) local building contractors. For the first two groups we utilized a free-format open-ended interview method. For the building contractors we used a detailed interview guide (see Appendix B below). The results of these interviews were critical in understanding the operational successes and failures of the Rebuild a Greener San Diego program and in helping to create the blueprint for an ideal program in response to a natural disaster.

5.1 Interviews with Program Managers from Partner Agencies

The program manager interview focused primarily on the following four subjects.

- Initial program design;
- Partnership dynamics;
- Program implementation; and,
- Recommendations for building an ideal response program.

Initial Program Design

The initial roles and responsibilities established such that the California Center for Sustainable Energy was to conduct workshops, provide information, coordinate the application process, and oversee the partnership. The San Diego County and City building departments were to be the marketing vehicle or link to the program applicants. They were also to conduct inspections, approve applications, and submit final paperwork

to SDG&E for payment. SDG&E was to process the payment requests. All interviewees indicated that the program had the best possible intentions.

The program offered prescriptive packages only. The packages were based on the "Whole House" package offered previously by San Diego city. Initial engineering calculations set the prescriptive packages at approximately 20% above (pre-2005) Title 24 guidelines. Performance-based energy efficiency options were considered in the initial design meetings but were rejected due to cost and complication considerations.

Partnership Dynamics

There was general consensus that the partnership seemed to work well in that there were many cordial meetings and that communication was open. However, all interviewees expressed the sentiment that the partnership was beset with a myriad of problems. These included, but were not limited to, the following:

- too many partners;
- excessive and cumbersome bureaucracy;
- a general difficulty to coordinate among disparate agencies;
- time wasted getting approval from multiple agencies;
- an agency that was unwilling to contribute dollars to support victims who rebuilt in another agency's jurisdiction;
- internal jealousies (e.g., one agency contributed administrative funds whereas another contributed only in-kind services; consequently, the the former was unwilling to have its dollars spent on the latter's victims);
- communication difficulties (e.g., one agency's email system routinely trashed messages because their email spam-blocker deleted any message with the phrase "toll-free" in it).
- responsible staff members at the various partner organizations that changed often, lead to a loss of program momentum and general instability;
- partner agencies that could/would not complete tasks as defined in the original partnership agreement (e.g., he building departments were unable to conduct the necessary the plan checks, inspections, etc), which required a shift from the

initial roles and responsibilities to an alternative approach, with the CCSE to taking on a larger role (process the applications, inspect the work done, and approve the applications)

- a revised set of roles and responsibilities that created duplication of roles and caused some partners to were no be longer active partners.

In general, all interviewees agreed that a smaller number of partners (i.e., one), with explicitly defined roles, was the preferred option.

Program Implementation

There were some implementation successes. For example, the marketing/outreach conducted through fire recovery groups and other community based organizations worked well. In addition, the marketing/outreach conducted through existing development companies was responsible for a large share of program activity. For example, Stonefield Development and Hallmark Development were important links to homeowners.

However, the list of implementation problems was lengthy. The list below is by no means complete.

- There was a disconnect between the individuals who negotiated the partnership agreement and the rank and file of the agencies. For example, the City and County leaders never communicated the extent of the staff workload to the staff members.
- The City and County had insufficient staff to implement the program. In addition, they did not have sufficient staff to use a performance-based approach.
- Timing was critical and it took too long to get the program operational resulting in opportunities missed. Of course, there is a fine line in that if the program had moved too quickly it is possible that administrative dollars could have been wasted if victims were not be responsive, either because they are overwhelmed or they have other priorities (settling with insurance companies, getting temporary housing, etc. However, all interviewees indicated that delays severely reduced the effectiveness of the program.

- The prescriptive approach was too inflexible and some of the measures were inappropriate for the clientele, especially the larger custom homes.
- Failures in using direct mail to contact victims (mailing to the appropriate address, failure to forward mail from burned homes, low response rate, etc.).
- A rebate that was too small for the cost and hassle of upgrading one's home with the energy efficiency package.
- Excessive administrative cost of the program, given the program accomplishments.
- Builders/contractors that had relationships with HVAC vendors. At the time of the rebuilding it was common knowledge that the Title standards were going to change. Consequently, 10-SEER air conditioners were being dumped on the market at discount prices. Builders/contractors that took advantage of these price reductions were interested in installing these units and not the more efficient 12-SEER units.

There were also a variety of market barriers that the program was not able to overcome. These included extremely stressed victims that wary of proposals, even those that are well-intentioned like very low cost energy efficiency, victims that placed very small importance to energy efficiency, relative to almost anything else, and relatively immobile victims that did not want to "go somewhere" to obtain information.

Recommendations for Creating the Ideal Program

Given the information above, the interviewees suggested that the ideal future program have the following elements (in no particular order):

- Be up and running almost immediately after the occurrence of an event in order to maximize participation and to minimize any unnecessary cost of starting the rebuilding over. If delays are inevitable then there must be some concessions for those that have already begun the rebuilding process (e.g., ability to expedite the permit process and waive re-submittal permit fees).
- Be performance-based, rather than use prescriptive packages. This allows flexibility in design and heightens cost-effectiveness.
- An application process that is efficient, easily understood, and straightforward.

- Incentives that encourage energy efficiency significantly beyond the standards. This limits free-ridership and serves to drive the market to greater energy efficiency in the long run.
- A minimum number of partner agencies in order to reduce coordination problems and provide potential participants an obvious entry point.
- Roles and responsibilities that are explicit and not redundant in order to minimize administrative costs (especially important if there are partner agencies).
- Program staff members that are knowledgeable and stable.
- A sponsoring agency that is able to convey the message that energy efficiency is important; that is, to communicate to the various market actors (homeowners, contractors, architects, etc.) that energy efficiency is an investment and a potential lost opportunity.
- A sponsoring agency that includes adequate staffing to provide design assistance and training (individual or in workshop form) and to minimize construction delays.
- A program that is ready when the victims are ready to consider energy efficiency. This requires constant communication so that opportunities are not missed.
- A program that goes to the victims, rather than requiring victims to go to the program.
- Marketing/outreach that utilizes all available avenues (e.g., homeowner forums, on-stop recovery centers, insurance agencies, other social agencies etc.) for communicating the existence and value of energy efficiency programs.
- An effort to reach *all* potential customers and not be limited to those individuals that are more motivated and well-informed.
- Rebate levels and other financial considerations (e.g., on-bill financing) that are sufficiently flexible in order to minimize lost opportunities.
- Program design that contains explicit provisions to minimize free-ridership and maximize network effects.

- Be linked explicitly to the rebuilding permit process to ensure that the homeowner addresses energy efficiency. For example, the building plan check process could include a requirement that the homeowner/builder meet or consult with the sponsoring agency about energy efficiency and either accept or reject the program in writing. If the building departments are unwilling to include this type of requirement then it might be possible to incent the building departments (direct cash or staffing funds) to undertake thus activity.

5.2 Interviews with Emergency Services Professionals

As with the program manager interviews we used a free format open-ended method for extracting information from emergency services professionals. We examined two distinct time periods: (1) during-disaster; and (2) post-disaster. In each situation the focus was on communication, services provided, and potential problem areas.

During-Disaster Emergency Services

The two most important aspects of a during-disaster system are communication and the actual provision of services. The emergency communication system during a disaster is a complex system that uses a hub/spoke design for overall coordination. At the center or hub is the Web Emergency Operations Center (EOC), which is the clearinghouse for information. All possible communications are cleared at the EOC before they are released. The consistent message is then sent out via the spokes to participating satellite agencies (cities, counties, universities, media outlets, etc.). These entities then use their contact systems (additional spokes) to contact their clientele (e.g., universities contact their students, faculty, staff, etc, using their own communications system).

Disaster victims are directed to emergency services, such as food, shelter, etc. using the communication system. Local or regional emergency facilities serve their corresponding local or regional populations. This minimizes distance displacement and reduces unnecessary relocation costs.

The overall during-disaster system has improved dramatically post-Katrina. One important aspect of the improvement has been the continued development of the 2-1-1 telephone system. For example, the 2-1-1 call centers from the six affected California counties in the 2007 Firestorm answered 130,000 calls in five days whereas the Monroe, Louisiana 2-1-1 answered 110,000 calls in two *months* following hurricane Katrina.

Information related to the fires, evacuation routes and locations, road closures, etc. were provided by the collaborative 2-1-1 system.

There has been a significant investment in infrastructure and services for the during-disaster period. Of course, there are continuing operational problems such as: (1) reliance on a largely volunteer workforce; (2) inadequate sustainable funding; (3) border failures[13]; (4) lack of two-way communication; and (5) significant peak-load or capacity constraints during the crisis. It will be necessary to plan for and solve these problems going forward.

Post-Disaster Emergency Services

In this context "post" refers to after the evacuation centers are closed and (at least) semi-permanent housing has been obtained by the majority of disaster victims. Unfortunately, relative to during-disaster services, there has not been the same type of coordinated, concerted effort to provide post-disaster services. Rather, historically the approach could be classified as piecemeal, disintegrated, or scatter gun. This is especially true if the focus is limited to home rebuilding. Essentially, the homeowner is left to navigate through insurance appraisers and adjusters, building code departments, building contractors, government and non-government programs, etc. without competent aid.

The primary conclusions from our interview on rebuilding were the following. First, there needs to be some attention paid to information communication for the rebuild effort. There should be something akin to the EOC during the recovery stage. This will help overcome the lack of knowledge problem and ensure that all parties are receiving a clear consistent message.

Second, the rebuilding effort needs a "hub" that needs to be able to:

- attend workshops (e.g., San Diego Rebuild);
- conduct site visits;
- conduct both problem and dispute resolutions;

[13] Disasters are inherently regional and it is critical to operate in an integrated manner. In effect, if you border a crisis you inherit the crisis, even if you are in the midst of your own crisis. Disasters require preparation and response in a regional manner. It should also be noted that the regions must also be interconnected since non-border areas are also affected by the need to communicate with friends and families.

- help to identify people and processes (zoning, building departments, environmental health issues, etc.) to make rebuilding go faster and with fewer problems; and
- review contracts and insurance policies.

Basically, the hub operation needs to be a one-stop shop for everything related to rebuilding. Energy efficiency needs to be included in the list of relevant issues. Of course, this type of process requires a team of individuals with broad-based knowledge in construction management, insurance, problem resolution (finding solutions to construction issues) dispute resolution, internal county political issues, etc., essentially the entire rebuilding effort.

Third, once the communication channels and the hub are established there needs to be programs available that are easy to use, provide the correct incentives, etc. The goals of the programs (e.g., demonstration facilities, a little past the standard, etc.) and the terms of participations (e.g., incentive level, EE measures, flexibility, etc.) must be in place prior to the event occurrence. Overall responsibility for the design and operation of the programs should also be assigned pre-event.

Essentially, there are two aspects to the problem: (1) getting information to victims about energy efficiency; and (2) having an easy to use program that is of interest to victims. The first task requires the type of hub/spoke system that is used in the during-disaster notification process. This second task requires a one stop operation, with knowledgeable and helpful individuals, that coordinates all activities. And the entire operation must be in place pre-disaster since once the victims have now entered into the planning stage it is too late.

5.3. Interviews with Building Contractors

We used a detailed interview guide for the local contractor interviews (see Appendix B). The focus was on the relative importance of energy efficiency, the effectiveness of the Rebuild a Greener San Diego Program, and recommendations for improving the program. The average contractor profile was male, with relatively high income (greater than $100,000), who had 25.4 years of experience in construction, had been in business 17.2 years, had nine employees, built single-family residential homes, and re-built 13.8 homes after the 2003 firestorm.

Relative Importance of Energy Efficiency

On a scale of one-to-ten, the contractors stated that energy efficiency was a "six" in terms of overall importance in building a single family residence. However, relative to insurance issues or building plan approval, energy efficiency rated an average in the range of 3.0 – 3.2 on the same one-to-ten scale. In addition, all contractors indicated that prior to the 2005 change in Title 24, they built to the minimum energy efficiency standards. Only one contractor indicated that he currently (post-2005) builds beyond the Title 24 energy efficiency standards, with greater attention to windows and infiltration rates. Thus, it seems that energy efficiency was, and continues to be, a relatively unimportant part of the building process.

The Rebuild a Greener San Diego Program

Only 60 percent of the contractors interviewed had previously heard of the Rebuild program. However, if an individual was aware of the program, there was also general awareness of all aspects of the program (workshops, financial incentives, website, etc.). Further, contractors that had clients who participated in the program almost universally rated each aspect of the program as "excellent." On the other hand, there seemed to be little spillover (few contractors spread the word about the program and the program caused very few contractors to change building practices) and excessive free-ridership (most contractors indicated that the prescriptive energy efficiency measures were already in the building plans prior to any interaction with the Rebuild a Greener San Diego Program.

Recommendations for Improving the Program

There were primarily three recommendations. First, almost every contractor indicated that the rebates were insufficient; hence, they all called for increasing the magnitude of the rebates. Interestingly, the contractors preferred to keep the prescriptive approach as means of qualifying for the rebate rather than use a performance based approach. Second, given the relative importance of building plan approval, several contractors suggested that program participants be allowed to bypass the City/County plan check process and utilize an alternative plan check procedure. This alternative would be conducted by program personnel, thus allowing participants to re-build in a shorter

period of time. Finally, the contractors recommended significant changes in marketing/outreach to increase overall awareness of the program.

6. Building Simulations

In this section, we describe our effort to determine the impact of the prescriptive energy efficiency measures in the Rebuild a Greener San Diego Program through the use of calibrated building simulations. The simulations are calibrated using post-fire billing data. We then calculate the difference in the post-fire energy use with and without the prescriptive energy efficiency measures to determine the gross programmatic impact using the 2003 Title 24 building standards as the baseline. In other words, we compute the electricity and gas savings through a comparison of the home that was built to what would have been built without the program.

6.1. Home Selected for Building Simulations

Three specific homes were selected as representative of the types of homes that were burned in the 2003 firestorm. Table 7 provides basic information about each home. As is evident, the three homes include a relatively small home, an average home, and a relatively large home, where size is determined pre-fire. Of course, all homes were rebuilt to significantly larger sizes post-fire. We also selected two suburban homes and one relatively rural home. All homes are in climate zone 10, although the rural home is very close to the border for climate zone 14. Other interesting aspects of the homes can be summarized as follows.

- Home #1 rebuilt to double pre-fire size, added more bedrooms and bathrooms, and a swimming pool.
- Home #2 had a relatively small increase in living area, with no additional bedrooms. The home stayed relatively true to the pre-fire footprint; basically the home was modernized by adding more open space in the interior of home (modernized). The home had no swimming pool before or after the fire.
- Home #3 added significant square footage without adding bedrooms and only one bathroom.

Table 7

Characteristics for Homes Simulated

Characteristic	Home #1	Home #2	Home #3
Living Area Pre, Post-Fire	**1825, 3990**	**2250, 2700**	**2500, 3700**
Bedrooms Pre, Post-Fire	**3, 5**	**4, 4**	**4, 4**
Bathrooms Pre, Post-Fire	**2, 5**	**3, 4**	**3, 4**
Fireplaces Pre, Post-Fire	**1, 1**	**1, 1**	**1, 1**
Pool Pre, Post-Fire	**No, Yes**	**No, No**	**Yes, Yes**
Stories	**2**	**1**	**4**
Orientation	**East**	**North**	**Southeast**
Aspect Ratio	**40X40**	**40X50**	**45X65**
Garage	**Two-Car**	**Two-Car**	**Two-Car**
Roof Type	**Concrete Tile**	**Concrete Tile**	**Concrete Tile**

6.2. Building Simulation Model Description

The tool used to model the homes was *EnergyGauge USA*, an hourly building simulation software based on the DOE 2.1-E engine. It was developed at the University of Central Florida specifically for use in residential applications, and is accredited for HERS (Home Energy Rating System) Rating analysis.

The goal of the simulation activity was to estimate the energy impact of implementing the prescribed energy efficiency package. To make this estimate, we developed a baseline model for each home, with the energy conservation measures installed, and calibrated to twelve months of post-fire utility bills. The simulated energy use results of the baseline models were then compared to results using identical simulation inputs, with the exception that the energy conservation measures were rolled back to pre-2005 Title 24 standards.

The baseline models were developed using a minimum set of descriptive data for each home collect from the program participant telephone surveys. These data included floor space, number of floors, aspect ratio (length of home v. width), home orientation, type of

roof, size of garage, heating fuel, and whether or not there was a pool pump. The assumed energy conservation measures were 80% AFUE gas furnace; 12.0 SEER split system air conditioning; 0.4 U-factor and 0.4 SGHC windows; 0.62 energy factor gas water heaters; and radiant barriers in attic areas.

Since detailed data regarding construction and lighting types, occupancy patterns, appliance use, and other aspects of each home were not available, certain gross assumptions were made as a first step in developing the baselines. Internal loads, thermsostat settings, hot water usage, and other parameters were then adjusted in an iterative process until the monthly results from the simulation closely approximated the utility bills.

Once the baselines were established, the model were modified as follows: 78% AFUE gas furnace, 10 SEER split system air conditioning, 0.87 U-Factor and 0.7 SGHC windows, 0.58 energy factor water heating and no radiation barriers in attic spaces. Note that "Home #3" had propane heat and water heat, so no gas results were obtained for this home.

6.3. Building Simulation Model Results

The three significant results from the building simulations are presented in Table 8. First, the simulations for either electricity or natural gas are very close approximations to actual usage. In other words, our simulations appear to do a good job of capturing the characteristics of each sample home.

Second, there are significant programmatic effect for both electricity and natural gas. As is evident in Table 8, the impact of the program on electricity use ranges from approximately six to nine percent of the "old standards" energy use. The average energy reduction across all three homes on a per square footage basis is 0.36 kWh per square foot. Based on the average program participant house size of 2,762 square feet this translates into an annual gross energy savings attributable to the Rebuild a Greener San Diego Program of 999 kWh. The corresponding reduction in natural gas usage is approximately 29% or 97 therms per year.

Finally, the program also has a significant effect on peak electricity demand. The gross effect is approximately 1.35 kW per program participant, where the demand values are measured as one-hour averages.

Table 8
Building Simulation Results

	Home #1	Home #2	Home #3	Overall
Billed Electric Use (kWh)	17,776	8,855	20,820	
Simulated Electric Use – As Built (kWh)	17,612	8,857	20,735	
Simulated Electric Intensity – As Built (kWh/ft^2)	4.41	3.28	5.60	
Simulated Electric Use – Old Standards (kWh)	19,273	9,677	22,087	
Simulated Electric Intensity – Old Standards (kWh/ft^2)	4.83	3.58	5.97	
kWh % Saved	**8.62%**	**8.47%**	**6.12%**	**7.74%**
Peak Day Demand – As Built (kW)	6.74	4.30	7.78	
Peak Day Demand – Old Standards (kW)	5.26	3.18	6.32	
Peak Day Demand Reduction (kW)	**1.48**	**1.12**	**1.46**	**1.35**
Billed Gas Use (Therms)	699	166	N/A	
Simulated Gas Use – As Built (Therms)	649	176	N/A	
Simulated Gas Intensity – As Built (Therms/ft^2)	0.16	0.07	N/A	
Simulated Gas Use – Old Standards (Therms)	773	304	N/A	
Simulated Gas Intensity – Old Standards (Therms/ft^2)	0.19	0.11	N/A	
Therms % Saved	**16.04%**	**42.14%**	**N/A**	**29.09%**

To estimate net program impacts based on the engineering simulation analysis the gross estimates developed above are multiplied by the net to gross ratio developed in Section

4. For the Rebuild a Greener San Diego Program, we estimate a net to gross ration of 0.723. Therefore, the annual net program impacts per participant are 722 kWh with 0.98 kW in peak day demand and 70 therms.

7. Billing Analysis

In this section, we describe our effort to determine the impact of the prescriptive energy efficiency measures in the Rebuild a Greener San Diego Program through the use of billing data. The purpose of the billing analysis is to vet the building simulation analysis presented above by providing a scientifically sound methodology independent of the building simulations. We compare pre-fire and post-fire energy usage rates, using summary statistics and regression analysis, for five specific groups. In this context, "pre-fire" refers to the twelve months preceding the 2003 firestorm and post-fire is the twelve-month period July 2005 – June 2006. Group membership is determined by program participation, fire damage, and survey participation (see section 4 above). The five specific groups are:

- fire victims, program participants, who were surveyed;
- fire victims, program participants, who were not surveyed;
- fire victims, program non-participants, who were surveyed;
- fire victims, program non-participants, who were not surveyed; and
- program non-participants, who were not surveyed among households that did not suffer fire damage.

7.1. Building the Billing Analysis Data Set

Obtaining the billing data was somewhat more difficult than expected. We originally requested the data in June 2007. Our initial contacts were quite responsive. For example, we were able to obtain the participant and applicant data within two working days. Once we had the project level data, we requested the premise identifications for the applicants/participants and requested the billing data for these locations for the period November 2002 – June 2007. We requested and obtained the following data: (1) monthly energy usage in kWh and therms; (2) monthly billing days for electricity and natural gas; (3) the relevant rate schedule for electricity and natural gas; and (4) the monthly meter status code with code definitions (e.g., service off, service restarted, etc.).

The next step was to obtain similar data for non-participants for comparison purposes. We started by identifying the census blocks that had suffered fire damage through available maps. Given these census blocks we created a file of all the premise identifications in each census block using data from a project previously completed for SDG&E. We then requested the billing data for each of these premise identifications, over 100,000 locations. This is when the process slowed down. In August, we were asked to complete a confidentially agreement, which we did immediately. In mid-October the request was moved to SDG&E's customer information group. After a few iterations, the raw data was provided in November. The meter status codes were not provided but we decided to work without that data.

The delays in obtaining the billing data had an important consequence. In order to complete the overall evaluation study on time, it was necessary to proceed with the survey effort without the billing data. This created an inconsistency once the billing data arrived. The relatively small number of surveyed non-participants with corresponding billing data (see analysis below) directly resulted from this inconsistency.

Once the data was reviewed, we determined that there was an odd situation where there was no data for the time period where the home was being demolished, planned, and rebuilt. Since the time period was different from home to home, we had to create a blank billing history template and merge the actual data with the template to identify/determine the missing data.

The billing data was classified into the groups specified above. Since some homes were rebuilt and completed at various times it was decided that the post construction period would be the most current 12 month period (i.e., July 2006 - June 2007). The final billing data set was merged with the survey data to form a complete profile for these individuals. For non-surveyed customers we used data from First American Real Estate Solutions (e.g., living area, etc.) and merged by premise identification or APN (Assessor Parcel number).

Once the complete data set was constructed, a set of summary statistics were computed and regressions equations were estimated.

7.2. Billing Analysis Results – Summary Statistics

Summary statistics for both electricity and natural gas for each of the five groups is provided in Table 9, which is divided into quadrants dependent on energy type and use rate (per day, per square foot and per day). The following conclusions are relevant for electricity (per day, per square foot) *over time*.[14]

- Program participants (surveyed) use less electricity after the fire and the difference is marginally significant. In other words, the new houses are less energy intensive when compared to the pre-fire houses. This can be for a variety of reasons including but not limited to improved energy efficiency.
- Burned homes of program nonparticipants (surveyed) also use less electricity after the fire; however, the differences are generally not significant.

The summary statistics for electricity (per day) yield the following conclusions.

- Program participants that were surveyed show a significant increase in electricity use (i.e., they use more) when comparing pre-fire to post-fire. This statement does not imply that the program failed to create energy savings. As we see below, the rebuilding of larger homes is the likely culprit for increasing electricity use on a per day basis post-fire.
- For burned homes of program non-participants, surveyed and not surveyed, electricity use change is insignificant when comparing pre-fire to post-fire.
- Homes that were not burned demonstrate a significant increase in electricity use when comparing pre-fire to post-fire.

These individual conclusions can be summarized into three over-riding statements. First, homes that were burned and rebuilt are more energy efficient in that use/day/square foot declines. Second, rebuilt homes are significantly larger than pre-fire homes and hence overall energy use increases over time. Third, homes that were not fire-damaged use significantly more energy when comparing pre-fire to post-fire time periods. Thus, preliminary statistical evidence suggests the program has caused a reduction in electricity use. The magnitude and statistical significance of this reduction is explored in more detail below.

With regard to natural gas, the differences across time are not significant for any group, whether one examines the "per day, per square foot" or the "per day" data.

We next turn to differences between groups. The following conclusions are relevant for electricity (per day, per square foot).

- Pre-fire there is no significant difference between surveyed participants and surveyed non-participants (t = -1.05). Thus, pre-fire these two groups are comparable.
- Post-fire there is a marginally significant difference between surveyed participants and surveyed non-participants (t = -1.44). Thus, there seems to a program effect. The magnitude of the effect is 0.0026 kWh/day/ft^2, which implies annual electricity savings of approximately 2,600 kWh.
- All other comparisons between groups must be made on a use/day basis because we do not have square footage data for non-surveyed households for both pre-fire and post-fire periods.

We can draw the following conclusions with regard to electricity (per day).

- There are no significant differences between any of the groups (burned or not burned, surveyed or not surveyed, program participant or non-participant) pre-fire.
- Surveyed program participants use more electricity post-fire than two other groups (fire victims, program non-participants, not surveyed and fire victims, program participants, not surveyed). This may imply that program participants rebuilt with relatively more additional square footage than these other groups.

Finally, consider the results for natural gas (per day per square foot):

- Pre-fire there is no significant difference between surveyed participants and surveyed non-participants (t = 0.0725). Thus, pre-fire these two groups are comparable.

[14] Note that these summary statistics are not weather adjusted. This deficiency is relatively unimportant in our analysis since we are only concerned with comparisons across groups.

- Post-fire there is no significant difference between surveyed participants and surveyed non-participants (t = 0.969). Thus, there does not seem to be a program effect for natural gas.

Table 9
Billing Analysis Summary Statistics

Electricity Use – kWh	Group	Pre-Fire	Post-Fire
Mean Annual Electricity (Per Day, Per Square Foot)	Program Participants (Surveyed)	0.0111	0.0097
	Program Non-Participants (Surveyed)	0.0141	0.0123
Mean Annual Electricity (Per Day)	Program Participants (Surveyed)	23.175	27.846
	Program Participants (Not Surveyed)	22.772	22.381
	Program Non-Participants (Surveyed)	23.731	25.041
	Program Non-Participants (Not Surveyed, Burned)	24.176	24.447
	Program Non-Participants (Not Surveyed, Not Burned)	23.602	25.867

Gas Use – Therms	Group	Pre-Fire	Post-Fire
Mean Annual Gas (Per Day, Per Square Foot)	Program Participants (Surveyed)	0.00047	0.00042
	Program Non-Participants (Surveyed)	0.00050	0.00048
Mean Annual Gas (Per Day)	Program Participants (Surveyed)	1.186	1.429
	Program Participants (Not Surveyed)	1.256	1.252
	Program Non-Participants (Surveyed)	1.169	1.191
	Program Non-Participants (Not Surveyed, Burned)	1.226	1.295
	Program Non-Participants (Not Surveyed, Not Burned)	1.211	1.215

7.2. Billing Analysis Results – Regression Analysis

The presentation of the regression analysis is limited to electricity (per day, per square foot).[15] In addition, we utilize the billing data only the for the individuals (participants and non-participants) that were also survey respondents since we do not have accurate pre-fire and post-fire square footage data for the other groups. The survey variables used in the model estimation are defined in Table 10.

The objective of the regression analysis is to determine whether or not program participation has a significant effect on electricity use per day, per square foot. The dependent variable in the analysis is the post-fire or post-rebuild electricity use.

Two distinct models are estimated. In the model of post-fire electricity use, without pre-fire electricity usage as a regressor (Model 1 below), program participation is a marginally significant (t = 1.62) determinant. In addition, the coefficient (-.00263) implies annual net electricity savings of approximately 2,650 kWh for the average participant home of 2,762 square feet. Note that average annual electricity use for the average home is approximately 10,464 kWh. These savings are equivalent to eliminating a swimming pool.[16] This regression is relatively weak ($R^2 = 0.21$) in that most of the other regressors are insignificant (exceptions being number of pools and employment status (full-time implies more electricity usage)).[17]

In the alternative model of post-fire electricity use, with pre-fire electricity usage as a regressor (Model 2 below), program participation is not a significant (t = 0.80) determinant. The coefficient implies annual energy savings of 1,038 kWh. This regression is relatively strong ($R^2 = 0.53$) in that most of the other regressors are significant determinants. In fact, this regression contains some interesting results. For

[15] Regression results for natural gas use are available upon request from the authors. These results are consistent with the summary statistics presented above that do not point to a programmatic impact.

[16] The coefficient on Pool in Model 1 is 0.00263. Thus, eliminating a pool creates savings of 2,650 kWh for the average home. For corroboration of this number consider the *Home Energy Comparison Tool* used in the SDG&E service territory. In that model the elimination of a pool creates annual electricity savings of approximately 2,920 kWh/year.

[17] We also ran regressions wherein income, age, and education were represented by categorical dummy variables. The results were qualitatively similar to those presented in Table 11.

example, if a home was rebuilt with additional square footage then electricity use/day/ft^2 significantly decreased. Also, the variables income, age, and education affect energy use in predictable ways.

Table 10

Variables Used in Billing Analysis

Variable/Definition	Variable Categories
Full Participation in Program	Yes, No
Education Level	High School, Some college, Bachelors Degree, Some Graduate School
Employment Status	Full-time, Part-time, Not working
Income Status	< $25000, $25000 – $49999, $50000 – $74999, $75000 – $99999, > $99999
Family Size	Number of Family Members
Age	18 – 24, 25 – 34, 35 – 44, 45 – 54, 55 – 64, > 64
Environmental Group Status	Yes, No
Pools in Rebuilt Home	Number
Base Electricity Usage	Annual kWh in the Pre-Fire Period
Post Electricity Usage	Annual kWh in Latest Post-Fire Period
Increased Square Footage Post-Fire	Yes, No

Table 11

Billing Analysis Regression Results

Variable	Model 1	Model 2
Income	-0.000746	0.000860*
	(0.000757)	(0.000641)
Education	0.000262	-0.00130*
	(0.000930)	(0.000764)
Family Size	-0.000100	-0.000119
	(0.000673)	(0.000524)
In Environmental Group	-0.00127	-0.000430
	(0.00161)	(0.00126)
Age	-0.000894	-0.000976*
	(0.000826)	(0.000643)
Employment Status	-0.00157*	-0.012
	(0.000828)	(0.073)
Pools	0.00263**	0.00182*
	(0.00128)	(0.00100)
Increased Square Footage	-0.00131	-0.00347**
	(0.00175)	(0.00141)
Participation in Program	**-.0.00263***	**-0.00103**
	(0.00162)	**(0.00419)**
Base Electricity Usage		0.50081**
		(0.07852)
Observations	71	71
R-Square	0.21	0.53

7.4. Lessons Learned from Billing Analysis

The analysis billing of pre-fire and post-fire billing data seems to indicate the presence of a programmatic impact of Rebuild a Greener San Diego in that program participants seem to use less electricity on a "per day, per square foot" basis than non-participants. In addition, the magnitude of the effect is relatively large, given that the average participant home is 2,762 square feet the estimated net electric energy savings is approximately 2,650 kWh. However the relative precision of this estimate is weak – at a 90% confidence interval we can conclude the true net energy savings of the program is between -146 kWh and 5,474 kWh. This interval encompasses the estimated net energy savings developed using the building simulations and therefore provides independent verification of the program electric energy impacts. Unfortunately there does not seem to be a

comparable effect for natural gas. However this again is related to the lack of precision from the billing analysis and should not be taken as evidence of no program natural gas impacts.

Table 11

Billing Analysis Regression Results

Variable	Model 1	Model 2
Income	-0.000746	0.000860*
	(0.000757)	(0.000641)
Education	0.000262	-0.00130*
	(0.000930)	(0.000764)
Family Size	-0.000100	-0.000119
	(0.000673)	(0.000524)
In Environmental Group	-0.00127	-0.000430
	(0.00161)	(0.00126)
Age	-0.000894	-0.000976*
	(0.000826)	(0.000643)
Employment Status	-0.00157*	-0.012
	(0.000828)	(0.073)
Pools	0.00263**	0.00182*
	(0.00128)	(0.00100)
Increased Square Footage	-0.00131	-0.00347**
	(0.00175)	(0.00141)
Participation in Program	**-.0.00263***	**-0.00103**
	(0.00162)	**(0.00419)**
Base Electricity Usage		0.50081**
		(0.07852)
Observations	71	71
R-Square	0.21	0.53

8. Overall Program Energy and Demand Impacts

While the annual energy impacts do vary between the building simulations (722 kWh per participant) and billing analysis (2,650 kWh per participant and year), the overall conclusion the program results in a reduction in energy use is consistent. The billing analysis was designed to support the building simulations to help avoid make a type Ior type II error or in other words reaching the wrong conclusion about the program's energy impact. Since the results are consistent in this regard we are confident of the program's ability to generate energy savings. Zebedee & Associates recommends the building

simulation estimate of 722 kWh per participant and year be used as the actual verified electricity energy savings in addition to the corresponding reduction in peak demand of 0.98 kW and 70 therms per year per participant.

Table 12 compares the annual energy and demand savings goals of the Rebuild a Greener San Diego Program with the actual verified savings. These savings are expected to extend for 18 years based on the expected useful life of the measures installed. The energy impact reporting table is presented in Appendix D.

Table 12

Annual Program Goal Savings and Verified Savings

	Electricity		Natural Gas
	Energy Savings (kWh)	**Demand Reduction (kW)**	**Energy Savings (therms)**
Program Goal	173,494	443	16,349
Verified Savings	179,899	234	17,403

9. Blueprint for Creating the Ideal Disaster Response Program

Throughout the previous sections we have reported a variety of recommendations for building an improved disaster response program (see especially, section 5). In this sub-section we summarize these thoughts into a coherent program design.

The program must be housed within a single agency that has the ability to aid in all aspects of the rebuilding process, from initial communication to the completion of the rebuilt home. This includes holding workshops and training, problem solving, conducting site visits, handling insurance and building contractor issues – everything. The implications for program design are as follows.

First, the communication requirement means that the program/agency must be aligned with existing communication systems (e.g., 2-1-1 system). This alignment with the existing communication system will also produce a greater number of spillovers than occurred previously. The sponsoring agency must be able to convey the message that energy efficiency is important; that is, to communicate to the various market actors

(homeowners, contractors, architects, etc.) that energy efficiency is an investment and a potential lost opportunity.

Second, the agency must be operational immediately, which requires that the program be set up now, in advance of any pending disaster. Thus, the program must be a portion of the responsibilities of an existing organization. Our recommendation is that the program should be housed in the existing new construction program to take advantage of existing experience and to minimize administrative cost. This also ensures that program staff members, who hopefully are knowledgeable and stable in their jobs, will be able to provide design assistance and training (individual or in workshop form) and to minimize construction delays.

Third, the program must have pre-established participation goals to minimize lost opportunities. For example, 80% of rebuilt square footage should be doable.

Fourth, the program must be performance based rather than prescriptive.

Fifth, the evaluation of building plans should be central to the program.

Sixth, the program requires an application process that is efficient, easily understood, and straightforward.

Finally, the program should require rebuilt homes to significantly exceed existing standards in order to minimize free-ridership and to create free-drivership.

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Appendix A – Final Survey Instrument

SURVEY INSTRUMENT

INT. Hello, my name is _____. [IF NAME SUPPLIED:] I'm calling from San Diego State University's Social Science Research Laboratory. We're conducting a study with people whose homes were damaged in the October 2003 San Diego fires. Would that include your household? [IF HOME NOT DAMAGED IN FIRES, THANK AND CODE AS NQR-DMG]

VER. [VERSION OF INTERVIEW:] 1 - VERSION A 2 - VERSION B*
* = RESPONSE OPTIONS REVERSED ON VERSION B FOR ALL QUESTIONS INDICATED

INT2. This study is sponsored by the Rebuild a Greener San Diego Partnership, which includes San Diego City, San Diego County, SDG&E, and the San Diego Regional Energy Office. We'd like to speak both with people who participated in the Rebuild a Greener San Diego Program and those who did not. Do you have a few minutes to answer some questions? [IF NO, CHECK NAME AND SCHEDULE A CALL BACK]

[CONFIRM IF NEEDED:] And are you 18 or older? [IF YES, "C" TO CONTINUE; IF NO, THANK AND CODE AS NQR-AGE]

PROG. PARTICIPATION IN PROGRAM [FROM SAMPLE]

1 - COMPLETED PROGRAM
2 - APPLIED, BUT DID NOT COMPLETE PROGRAM
3 - NON-PARTICIPANT

PART. What was your level of participation in the Rebuild a Greener San Diego Program if any? Did you complete the program, in other words, you went through the application process, had your application approved, installed the recommended items, and received the rebate check; did you have some participation, but did not complete the program, meaning you completed some of the program processes, but not all; or did you not participate in the program or begin the application process at all?

1 - COMPLETED PROGRAM
2 - SOME PARTICIPATION, BUT DIDN'T COMPLETE
3 - NO PARTICIPATION AT ALL
9 - DON'T KNOW/REFUSE ——> **NQR - PART**

SEX. [RECORD RESPONDENT GENDER:] 1 - MALE 2 - FEMALE

---------- QUALIFIED RESPONDENT: QUOTAS CHECKED; DATA SAVED ----------

IC. Thank you for your participation in this survey. The survey should only take about about {[INSERT IF NO PARTICIPATION:] 10 minutes [INSERT IF SOME PARTICIPATION:] 15 minutes [INSERT IF COMPLETED PROGRAM:] 20 minutes} to complete.

Let me assure you that only aggregate responses will be reported, no names or telephone numbers will be tied to your responses, and your participation is completely voluntary. To ensure that my work is done honestly and correctly, this call may be monitored by my supervisor. [ONLY IF ASKED ABOUT MONITORING:] My supervisor randomly listens to interviews to make sure we're reading the questions exactly as written and not influencing answers in any way.

REBUILDING SECTION

[ASK EVERYONE:]

Q1. After the 2003 fires, did you rebuild your home or the damaged portions of the home, did you start the rebuild process but not complete it, or did you not attempt to rebuild your home or damaged portions of the home at all?

1 - REBUILT HOME/DAMAGED PORTIONS
2 - STARTED REBUILD, BUT DID NOT COMPLETE
3 - DID NOT REBUILD HOME/DAMAGED PORTIONS ——> **GO TO (Q6)**
9 - DON'T KNOW/REFUSE ——> **GO TO (Q6)**

Q2. We'd like to find out how important applying energy-efficient specifications was relative to other concerns you had in the rebuilding process. Examples of rebuilding specifications would be applying California's building code Title 24 recommendations and application of ACCA Manual D.

How important would you say applying energy-efficient rebuild specifications was relative to... {INSERT ITEM}?

Please use a scale from 1 to 10, with 1 being specifications were not at all as important and 10 being specifications were much more important than... {INSERT ITEM}.

		NOT AT ALL AS IMPORTANT									MUCH MORE IMPORTANT	UNSURE/ NOT APP/ REFUSE
1.	Dealing with insurance issues?	1	2	3	4	5	6	7	8	9	10	99
2.	Obtaining building plan approval?	1	2	3	4	5	6	7	8	9	10	99
3.	Needs associated with temporary housing?	1	2	3	4	5	6	7	8	9	10	99
4.	Obtaining help to rebuild your house?	1	2	3	4	5	6	7	8	9	10	99

Q3. And now we'd like to find out how important decisions associated with <u>installing energy-efficient appliances</u> were relative to other concerns you had in the rebuilding process.

[IF NEEDED:] Appliances would refer to items like refrigerators, interior lights, etc.,

How important would you say <u>installing energy-efficient appliances</u> was relative to... {INSERT ITEM}?

Please use a scale from 1 to 10, with 1 being installing the appliances was <u>not at all as important</u> and 10 being installing the appliances was <u>much more important</u> than... {INSERT ITEM}.

		NOT AT ALL AS IMPORTANT									MUCH MORE IMPORTANT	UNSURE/ NOT APP/ REFUSE
1.	Dealing with insurance issues?	1	2	3	4	5	6	7	8	9	10	99
2.	Obtaining building plan approval?	1	2	3	4	5	6	7	8	9	10	99
3.	Needs associated with temporary housing?	1	2	3	4	5	6	7	8	9	10	99
4.	Obtaining help to rebuild your house?	1	2	3	4	5	6	7	8	9	10	99

Q4. The next questions refer to differences between the damaged home and the rebuilt home.

1-5. Was there a change in... {INSERT ITEM} between the damaged home and the rebuilt home? [IF NO CHANGE/DK/REF, GO TO CURRENT #]

A. [IF YES, CHANGE OCCURRED:] What was the... {INSERT ITEM} in the <u>damaged home</u>?

B. What is the current... {INSERT ITEM} in the <u>rebuilt home</u>?

		Q4_1-Q4_5. CHANGE TO HOME			Q4_1A-Q4_5A. # IN DAMAGED HOME			Q4_1B-Q4_5B. CURRENT # IN REBUILT HOME		
		YES	NO	DON'T KNOW/ REFUSE	#	NOT ASKED	DON'T KNOW/ REFUSE	#	NOT ASKED	DON'T KNOW/ REFUSE
1.	overall square footage	1	2	9	____	999998	999999	____	999998	999999
2.	# of bedrooms	1	2	9	____	98	99	____	98	99
3.	# of bathrooms	1	2	9	____	98	99	____	98	99
4.	# of fireplaces	1	2	9	____	98	99	____	98	99
5.	# of pools or spas	1	2	9	____	98	99	____	98	99

Q4_6. Were any major landscaping changes made as part of the rebuilding process? [IF YES:] What were they?

_____

99 - NO/DON'T KNOW/REFUSE

Q4_7. Were any <u>other</u> major changes made to your home as a part of the rebuilding process? [IF YES:] What were they?

_____

99 - NO/DON'T KNOW/REFUSE

ENERGY USE/KNOWLEDGE SECTION

IF # OF POOLS/SPAS <1/DK/REF (Q4_5B) GO TO Q6

Q5. On a typical day, about how many hours per day do you have a filtering device running in your pool or spa? [ROUND UP TO THE NEAREST HALF HOUR; IF MORE THAN ONE POOL/SPA, COMBINE TO RECORD TOTAL HOURS]

___.__ HOURS/DAY

99.9 - DON'T KNOW/REFUSE

[ASK EVERYONE:]

Q6. We're interested in levels of energy use among households on a typical day while the house is <u>unoccupied</u>. During times that your house is unoccupied, do you typically leave <u>most</u> of your energy-requiring devices on, do you leave them on but adjust the usage, or do you turn them off? This would include lighting, air conditioning, heating, or other devices that can be adjusted, but does not include any refrigerators or other devices that run on a continual basis.

1 - LEAVE DEVICES ON
2 - LEAVE ON, BUT ADJUST USAGE
3 - TURN DEVICES OFF
9 - IT DEPENDS/DON'T KNOW/UNSURE

Q7. And using a 24-hour timeframe, about how many hours would you say your house is unoccupied on a typical <u>weekday</u>? [ROUND UP TO THE NEAREST HALF HOUR]

___.__ HOURS/DAY
99.9 - DON'T KNOW/REFUSE

Q8. And again using a 24-hour timeframe, about how many hours is your house unoccupied on a typical <u>weekend</u> day? [ROUND UP TO THE NEAREST HALF HOUR]

___.__ HOURS/DAY
99.9 - DON'T KNOW/REFUSE

Q9. How familiar are you with the Title 24 building codes, especially as they pertain to energy efficiency? This would include heating, ventilation, and air conditioning standards, otherwise known as HVAC standards, limits on infiltration, window quantity and construction, lighting, etc. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with these codes?

1 - VERY FAMILIAR
2 - SOMEWHAT FAMILIAR
3 - NOT VERY FAMILIAR
4 - NOT AT ALL FAMILIAR
9 - DON'T KNOW/REFUSE

PROGRAM PARTICIPATION SECTION

[ASK EVERYONE:]

Q10. Now I'd like to ask you a little about the Rebuild a Greener San Diego Program. Where did you hear about the Rebuild a Greener San Diego Program or have you not heard of it? [DO NOT READ, RECORD ONLY ONE]

0 - NEVER HEARD OF PROGRAM ——> GO TO CONSERVATION BELIEFS SECTION (Q35)
1 - FLYERS POSTED IN NEIGHBORHOOD (POST OFFICES, LIBRARIES)
2 - NEWSPAPERS
3 - SDREO'S WEBSITE
4 - SDREO'S FACILITY (FLYERS)
5 - DIRECT CALL FROM SDREO PERSONNEL
6 - NEIGHBORHOOD/CITY ORGANIZATION (NEWSLETTERS/FLYERS)
7 - WORD OF MOUTH
8 - FIRE RELIEF ORGANIZATIONS/CENTERS (MEETINGS/FLYERS/EMAILS)
9 - CONTRACTOR/ARCHITECT
10 - OTHER, SPECIFY: _____
99 - DON'T RECALL WHERE/REFUSE, BUT HEARD OF PROGRAM

Q11. [IF HEARD OF PROGRAM:] I'd like to read you a list of the main elements of the Rebuild a Greener San Diego Program. For each please tell me if you are aware of it or not aware of it. Are you aware that the program offers...

		YES, AWARE	NO, UNAWARE	DON'T KNOW/ REFUSE
1.	Technical information and guidance on energy efficiency?	1	2	9
2.	Financial incentives for the incorporation of energy-efficient measures or design measures resulting in energy savings greater than the minimum requirements of California's building code (Title 24)?	1	2	9
3.	Rebates for installing a solar energy or Photo Voltaic system?	1	2	9
4.	Workshops to explain the Rebuild a Greener San Diego program?	1	2	9
5.	Site inspections to determine qualification for rebuilding incentives?	1	2	9
6.	Website links to other energy efficient construction or retrofit resources?	1	2	9

IF NO PROGRAM PARTICIPATION GO TO Q13

Q12. [IF COMPLETED PROGRAM/SOME PARTICIPATION:] Who made the initial decision to participate in the Rebuild a Greener San Diego Program? Was it the homeowner, a contractor, an architect, or someone else?

1 - HOMEOWNER
2 - CONTRACTOR
3 - ARCHITECT
4 - OTHER PERSON, SPECIFY: _____
9 - DON'T KNOW/REFUSE

IF COMPLETED PROGRAM GO TO Q14

Q13. [IF SOME/NO PARTICIPATION IN PROGRAM:] What was the main reason you did not {complete/participate in} the Rebuild a Greener San Diego Program? [PROBE AND RECORD ONE MAIN REASON; THEN ASK:] Were there any other reasons? [CLARIFY AND RECORD UP TO THREE ADDITIONAL REASONS]

1. _____
99 - DON'T KNOW/REFUSE ——> **GO TO Q14**

2. _____
99 - NO MORE/DON'T KNOW/REFUSE ——> **GO TO Q14**

3. _____
99 - NO MORE/DON'T KNOW/REFUSE

WORKSHOP SECTION

IF NO PROGRAM PARTICIPATION GO TO CONSERVATION BELIEFS SECTION (Q35)

[IF COMPLETED PROGRAM/SOME PARTICIPATION:]

Q14. Did you attend a workshop explaining the Rebuild a Greener San Diego Program?

1 - YES
2 - NO ——> **GO TO PERSONNEL SECTION (Q20)**
9 - DON'T KNOW/REFUSE ——> **GO TO PERSONNEL SECTION (Q20)**

Q15. [IF YES:] Thinking now about the workshop you attended, please let me know how you would evaluate the following aspects of the workshop. Did the workshop presenter...**

		YES	NO	DON'T KNOW/ REFUSE
1.	Show up at the appointed time?	1	2	9
2.	Demonstrate knowledge of the subject?	1	2	9
3.	Communicate information clearly?	1	2	9
4.	Organize the presentation effectively?	1	2	9
5.	Give you sufficient information to successfully participate in the program?	1	2	9
6.	Answer any questions you had to your satisfaction?	1	2	9
7.	Make you feel confident about installation of the recommended energy efficiency package?	1	2	9
8.	Make you feel confident about operation (e.g. energy savings) of the recommended energy efficiency package?	1	2	9
9.	Make you feel that he/she cared about your participation in the program?	1	2	9
10.	Make the workshop a positive experience?	1	2	9

** = ITEMS ON LIST RANDOMLY ROTATED FOR ALL QUESTIONS INDICATED

Q16. How would you rate the workshop in terms of each of the following...** Would you say excellent, good, fair or poor?

		EXCELLENT	GOOD	FAIR	POOR	DON'T KNOW/ REFUSE
1.	The amount of time provided for the workshop?	1	2	3	4	9
2.	The technical level of the information provided?	1	2	3	4	9
3.	The usefulness of the written materials provided (if any)?	1	2	3	4	9
4.	The convenience of the location?	1	2	3	4	9
5.	The convenience of the day and time it was scheduled?	1	2	3	4	9

Q17. What one aspect of the workshop was most valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

99 - DON'T KNOW/REFUSE

Q18. What one aspect of the workshop was least valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

99 - DON'T KNOW/REFUSE

Q19. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied were you with the explanatory workshop?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

PERSONNEL SECTION

[IF COMPLETED PROGRAM/SOME PARTICIPATION:]

Q20. Outside of the explanatory workshop, did you have any interaction with the San Diego Regional Energy Office personnel or other Partnership personnel while participating in the Rebuild a Greener San Diego Program?

1 - YES
2 - NO ——> GO TO INSTALLATION SECTION (Q23)
9 - DON'T KNOW/REFUSE ——> GO TO INSTALLATION SECTION (Q23)

Q21. [IF YES:] How would you evaluate the San Diego Regional Energy Office or other Partnership personnel in terms of their attitude and behavior? Did the personnel...**

		YES	NO	DON'T KNOW/ REFUSE
1.	Demonstrate knowledge of the subject?	1	2	9
2.	Communicate information clearly?	1	2	9
3.	Answer all questions you had to your satisfaction?	1	2	9
4.	Make you feel that they cared about your participation in the program?	1	2	9
5.	Make the interaction(s) a positive experience?	1	2	9

Q22. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall, how satisfied were you with your interaction(s) with the San Diego Regional Energy Office or other Partnership personnel?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

INSTALLATION SECTION

IF RESPONDENT DID NOT COMPLETE PROGRAM, GO TO NETWORK SECTION (Q28)

[IF COMPLETED PROGRAM ONLY:]

Q23. In terms of packages required for the incentives, which package of energy efficiency measures did you choose to install: package 1, which included a $1,700 incentive and required an 80% AFUE or greater gas-fired furnace, a 12.0 SEER or greater central air conditioner, low-e windows and doors, a .62 Energy Factor or greater gas water heater, and a radiant barrier if HVAC ductwork was located in the attic; or package 2, which included a $2,000 incentive and required completion of all package 1 measures plus a thermsal expansion valve on the air conditioning unit, tight ducts, application of ACCA Manual D, and verification of the building measures by a Home Energy Rating System rater?

[AS NEEDED:] AFUE stands for annual fuel utilization efficiency; SEER stands for seasonal energy efficiency ratio; HVAC stands for heating, ventilation, air conditioning; and ACCA stands for Air Conditioning Contractors of America.

1 - PACKAGE 1
2 - PACKAGE 2
9 - DON'T KNOW/REFUSE **——> GO TO OPERATION SECTION (Q26)**

Q24. Who was responsible for installation of the majority of the required program elements? Was it the homeowner, a contractor, or someone else?

1 - HOMEOWNER
2 - CONTRACTOR
3 - OTHER PERSON, SPECIFY: _____
9 - DON'T KNOW/REFUSE

Q25. For the next questions, I'll be asking about the ease of installation and cost of each of the required elements in the package you installed in your home.

A. Was... {INSERT ITEM} very easy, somewhat easy, somewhat difficult, very difficult, or are you unsure? [REPEAT SCALE FOR ALL ITEMS]

B. And do you know how much <u>more</u> it cost you to have this {installed/done} relative to what you would have paid if you had not participated in the program? [IF YES:] What was the cost difference? [REPEAT FOR EACH ITEM; FOR EACH AMOUNT PLEASE ROUND UP TO THE NEAREST $5 AMOUNT]

		Q25_1A TO Q25_9A. EASE OF INSTALLATION					Q25_1B TO Q25_9B. COST DIFFERENCE	
		VERY EASY	SMWT EASY	SMWT DIFF	VERY DIFF	UNSURE/ REF	COST DIFFERENCE	NO/DK/REF
1.	installation of the 80% AFUE or greater gas-fired furnace	1	2	3	4	9	$_____	99999
2.	installation of a 12.0 SEER or greater central air conditioner	1	2	3	4	9	$_____	99999
3.	installation of low-e windows and doors	1	2	3	4	9	$_____	99999
4.	installation of a .62 Energy Factor or greater gas water heater	1	2	3	4	9	$_____	99999
		VERY EASY	SMWT EASY	SMWT DIFF	VERY DIFF	UNSURE/ NOT APP/ REF	COST DIFFERENCE	NO/DK/REF/ NOT APP
5.	installation of a radiant barrier (if HVAC ductwork was located in the attic)	1	2	3	4	9	$_____	99999
IF PACKAGE 1, GO TO OPERATION SECTION (Q26)								
		VERY EASY	SMWT EASY	SMWT DIFF	VERY DIFF	UNSURE/ REF	COST DIFFERENCE	NO/DK/REF
6.	installation of a thermsal expansion valve on the air conditioning unit	1	2	3	4	9	$_____	999999
7.	installation of tight ducts	1	2	3	4	9	$_____	999999
8.	application of ACCA Manual D	1	2	3	4	9	$_____	999999
9.	verification of the building measures by a Home Energy Rating System rater	1	2	3	4	9	$_____	999999

OPERATION SECTION

[IF COMPLETED PROGRAM ONLY:]

Q26. Relative to pre-fire levels, have you noticed any reduction of... {INSERT ITEM} that you believe is due to installation of the program elements?

		YES	NO	DON'T KNOW/ REFUSE/NOT APPLICABLE
1.	your household's use of air conditioning or fans to cool your home	1	2	9
2.	your household's use of a heater to heat your home	1	2	9
3.	your household's overall energy usage	1	2	9
4.	your natural gas bill	1	2	9
5.	your electricity bill	1	2	9

Q27. Overall, how closely do your actual energy savings after the installations match your expected energy savings prior to installation of the energy-efficiency package? Would you say your energy savings were greater than expected, about the same as expected, or less than expected?*

1 - GREATER THAN EXPECTED
2 - ABOUT THE SAME AS EXPECTED
3 - LESS THAN EXPECTED
9 - NO PREVIOUS EXPECTATIONS/DON'T KNOW/REFUSE

NETWORK SECTION

[IF COMPLETED PROGRAM/SOME PARTICIPATION:]

Q28. Did you or other members of your household refer any other people to the Rebuild a Greener San Diego Program? [IF YES:] Approximately how many people did you refer?

_____ PEOPLE
0 - NO/NONE ——> **GO TO Q29**
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE ——> **GO TO Q29**

Q28A. [IF ONE OR MORE:] Did any of the people you referred to the program actually participate in the program? [IF YES:] Approximately how many people participated?

_____ PEOPLE
0 - NO/NONE
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE

Q29. Did you or other members of your household share any information about energy-efficiency measures learned in the Rebuild a Greener San Diego Program with other people? [IF YES:] Approximately how many people did you share the information with?

_____ PEOPLE
0 - NO/NONE ——> **GO TO Q30**
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE ——> **GO TO Q30**

Q29A. [IF ONE OR MORE:] Did any of the people you shared this information with actually implement any energy-efficiency measures? [IF YES:] Approximately how many people implemented energy-efficiency measures?

_____ PEOPLE
0 - NO/NONE
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE

FREE-RIDER EFFECTS SECTION

[IF COMPLETED PROGRAM/SOME PARTICIPATION:]

Q30. Do you think that your participation in this program has increased your knowledge of ecological, energy, and/or environmental issues a great deal, somewhat, or not at all?

1 - A GREAT DEAL
2 - SOMEWHAT
3 - NOT AT ALL
9 - DON'T KNOW/REFUSE

Q31. Thinking back to before you heard about this program, were you already planning to incorporate energy-efficiency measures or design principles in the re-build process before hearing about this program, or did you decide to incorporate energy-efficiency measures or design principles as a result of hearing about this program?

1 - ALREADY PLANNING MEASURES
2 - INCORPORATED AS A RESULT OF PROGRAM ——> **GO TO Q32**
9 - DON'T KNOW/REFUSE ——> **GO TO Q32**

Q31A. [IF ALREADY PLANNING TO INCORPORATE MEASURES:] Did your participation in the program change how you rebuilt, or what you would have implemented in your rebuild process? [IF YES, PROBE FOR EXPLANATION:]

_____
96 - NO, DID NOT CHANGE
97 - N/A, NO SPECIFIC PRIOR PLAN
99 - DON'T KNOW/REFUSE

OVERALL SATISFACTION SECTION

[IF COMPLETED PROGRAM/SOME PARTICIPATION:]

Q32. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied or dissatisfied are you with the Rebuild a Greener San Diego Program?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

Q33. If you had it to do over again, would you choose to participate in this program?

1 - YES
2 - NO
9 - DON'T KNOW/REFUSE

Q34. What <u>one</u> suggestion would you offer to improve this program?
[PROBE AND RECORD ONE MAIN RESPONSE]

_____

99 - DON'T KNOW/REFUSE

CONSERVATION BELIEFS SECTION

[ASK EVERYONE:]

Q35. On a scale from 1 to 10, with 1 being not at all a serious issue, and 10 being a very serious issue, how would you rate the seriousness of greenhouse gas emissions and global warming issues?

NOT AT ALL A SERIOUS ISSUE									VERY SERIOUS ISSUE	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

Q36. Should the State of California be doing more to reduce energy consumption in the state, is it doing about the right amount, or should it be doing less to reduce energy consumption in California?

1 - SHOULD DO MORE
2 - ABOUT RIGHT
3 - SHOULD DO LESS
9 - DON'T KNOW/REFUSE

DEMOGRAPHICS SECTION

[ASK EVERYONE:]

RES. In closing, the following questions are for comparison purposes only. How long have you lived at your current residence? [RECORD CUMULATIVE YEARS IF GAP IN RESIDENCE]

_____ YEARS
0 - LESS THAN 6 MONTHS
99 - DON'T KNOW/REFUSE

ENV. Are you a member of, or do you donate to, any environmental organizations? [IF YES:] Which one(s)? [DO NOT READ; RECORD ALL MENTIONED]

		NOT MENTIONED	MENTIONED
1.	AUDUBON SOCIETY	0	1
2.	GREENPEACE	0	1
3.	NATURE CONSERVANCY	0	1
4.	SIERRA CLUB	0	1
5.	WORLD WILDLIFE FEDERATION	0	1
6.	OTHER, SPECIFY: _____	0	1
7.	NONE	0	1
8.	DON'T KNOW/REFUSE	0	1

EDU. What is the highest grade or year of school that you have completed and received credit for: high school or less; at least one year of college, trade or vocational school; graduated college with a bachelor's degree; or at least one year of graduate work?

1 - HIGH SCHOOL OR LESS
2 - 1 YEAR COLLEGE/TRADE/VOCATIONAL SCHOOL
3 - GRADUATED COLLEGE/BACHELOR'S DEGREE
4 - AT LEAST 1 YEAR GRADUATE WORK
9 - DON'T KNOW/REFUSE

ADT. How many adults age 18 or older, including yourself, live in your household?

_____ ADULTS
99 - DON'T KNOW/REFUSE

KID. How many children under the age 18 live in your household?

_____ CHILDREN
0 - NO CHILDREN IN HOUSEHOLD
99 - DON'T KNOW/REFUSE

EMP. What is your employment status? Are you working full-time (at least 35 hours per week), working part-time, or not working? [CLARIFY AND RECORD ANY COMBINATIONS THAT INCLUDE WORKING AS '1' or '2', SUCH AS "*STUDENT AND WORKING PT*"]

1 - WORKING FULL-TIME
2 - WORKING PART-TIME
3 - NOT WORKING
9 - DON'T KNOW/REFUSE

AGE. Please tell me when I mention the category that contains your age...

1 - 18 to 24,
2 - 25 to 34,
3 - 35 to 44,
4 - 45 to 54,
5 - 55 to 64, or
6 - 65 or over?
9 - DON'T KNOW/REFUSE

ETH. Which of the following best describes your ethnic or racial background: white, not of Hispanic origin; black, not of Hispanic origin; Hispanic or Latino; Asian or Pacific Islander; Native American; or another ethnic group?

1 - WHITE, NOT HISPANIC
2 - BLACK, NOT HISPANIC
3 - HISPANIC/LATINO
4 - ASIAN/PACIFIC ISLANDER
5 - NATIVE AMERICAN
6 - ANOTHER ETHNIC GROUP, SPECIFY: _____
9 - DON'T KNOW/REFUSE

INC. We don't want to know your exact income, but roughly, is your annual household income before taxes under $25,000, $25,000 to but not including $50,000, $50,000 to (but not including) $75,000, $75,000 to (but not including) $100,000, or $100,000 or more?

1 - UNDER $25,000
2 - $25,000 TO $49,999
3 - $50,000 TO $74,999
4 - $75,000 TO $99,999
5 - $100,000 OR MORE
9 - DON'T KNOW/REFUSE

CHG. Please tell me whether or not any of your household's activities or demographics have changed <u>as a result of</u> your involvement with the 2003 San Diego wildfires.

Has... {INSERT ITEM} increased, decreased or has there been no change due to your involvement with the wildfires? [INCLUDES RELATED EFFECTS FROM OTHER SOURCES, BUT ULTIMATELY DUE TO THEIR INVOLVEMENT IN THE WILDFIRES, I.E. INVOLVEMENT IN RGSD PROGRAM LED TO CHANGES]

		INCREASED	DECREASED	NO CHANGE DUE TO WILDFIRES	DON'T KNOW/ REFUSE
1.	your household's involvement in environmental organizations	1	2	3	9
2.	the number of adults living in your household	1	2	3	9
3.	the number of children (under age 18) living in your household	1	2	3	9
4.	your annual household income	1	2	3	9

CHG_5. And finally, has your household's employment status become more stable, become less stable, or has there been no change due to your involvement with the wildfires?

1 - MORE STABLE
2 - LESS STABLE
3 - NO CHANGE DUE TO WILDFIRES
9 - DON'T KNOW/REFUSE

CLOSING SECTION

PHN. Those are all the questions I have.
[ONLY IF NOT ON CATI:] I'd like to confirm that I reached you at...

Thank you for your time and have a nice {day/evening}.

[VERIFY AND INSERT TELEPHONE NUMBER:] _____

TIN. [INTERVIEWER NUMBER]

LEN. [LENGTH OF INTERVIEW IN MINUTES]

DAT. [DATE OF INTERVIEW]

REC. [CATI RECORD NUMBER]

LEGEND	
Mixed Case	Text read to respondent by interviewer
ALL CAPS	Text NOT on screen; coded in data processing
ALL CAPS; BOLD TEXT	Skip patterns
[ALL CAPS; HARD BRACKETS]	Instructions for programming; Instructions to interviewers
Bold; Mixed case; Salmon highlight	New section heading
Bold; Mixed case; Grey highlight	Special skip instructions

Appendix B – Contractor Interview Instrument

SURVEY INSTRUMENT

INT. Hello, my name is _____. I'm calling from San Diego State University's Social Science Research Laboratory. [IF NAME SUPPLIED:] May I speak to _____? We're conducting a study with contractors and builders who helped to rebuild single-family residential homes that were damaged in the October 2003 San Diego fires. The study is sponsored by the Rebuild a Greener San Diego Partnership, which includes San Diego City, San Diego County, SDG&E, and the San Diego Regional Energy Office. They would like to learn more about the rebuilding process from the perspective of contractors and builders who were involved in the aftermath of the fires. Do you have a few minutes to answer some questions? [IF NO, CHECK NAME AND SCHEDULE A CALL BACK]

[RECORD ID #:] _____

DMG. Are you a general contractor or specific trade contractor that helped to rebuild at least one single-family home damaged in the October 2003 wildfires?

1 - YES
2 - NO ——> NQR-DMG
9 - DON'T KNOW/REFUSE ——> NQR-DMG

CONT. Are you a "General Contractor" or a "Specific Trade Contractor"?

1 - GENERAL CONTRACTOR
2 - SPECIFIC TRADE CONTRACTOR
3 - BOTH GENERAL CONTRACTOR AND SPECIFIC TRADE CONTRACTOR
9 - OTHER/DON'T' KNOW/REFUSE ——> NQR-CONT

HRD. Have you ever heard about the Rebuild a Greener San Diego Program?

1 - YES
2 - NO ——> GO TO SEX [QUALIFIED NON-PARTICIPANT]
9 - DON'T KNOW/REFUSE ——> GO TO SEX [QUALIFIED NON-PARTICIPANT]

PART. [IF HEARD OF PROGRAM:] Have you ever contracted on a project where your client was a participant in the Rebuild a Greener San Diego Program and you were involved with implementing the requirements?

1 - YES [QUALIFIED PARTICIPANT]
2 - NO [QUALIFIED NON-PARTICIPANT]
9 - DON'T KNOW/REFUSE [QUALIFIED NON-PARTICIPANT]

SEX. [RECORD RESPONDENT GENDER:] 1 - MALE 2 - FEMALE

---------- QUALIFIED RESPONDENT: CHECK QUOTA BOARD ----------

1C. Thank you for your participation in this survey. The survey should only take about 15 minutes to complete.

Let me assure you that only aggregate responses will be reported, no names or telephone numbers will be tied to your responses, and your participation is completely voluntary. To ensure that my work is done honestly and correctly, this call may be monitored by my supervisor. [ONLY IF ASKED ABOUT MONITORING:] My supervisor randomly listens to interviews to make sure we're reading the questions exactly as written and not influencing answers in any way.

REBUILDING SECTION

[ASK EVERYONE:]

We are interested in your involvement with the rebuilding process in your work as a contractor or builder, rather than any private, non-work related involvement you may have had in recovering from the 2003 fires. This may include the rebuilding of single-family homes, garages, storage structures, greenhouses, etc. Also, please refer only to your work for the 2003 wildfires, rather than any subsequent wildfire work. [DOES NOT INCLUDE APARTMENTS]

Q1. After the 2003 fires, how many homes did you help to rebuild?

_____ # OF HOMES REBUILT
1 - REBUILT 1 HOME
96 - 96 OR MORE HOMES
97 - DID NOT REBUILD ANY HOMES/REFUSE ——> NQR-DMG
99 - UNSURE, BUT REBUILT AT LEAST 1 HOME

Q2. What types of structures did you help to rebuild?

_____
_____
99 - DON'T KNOW/REFUSE

Q3. {Was the home/Were the majority of the homes} you helped to rebuild completely destroyed in the fire, or {was it/were they} partially damaged, but not completely destroyed?

1 - HOME(S) COMPLETELY DESTROYED
2 - HOME(S) PARTIALLY DAMAGED
3 - REBUILT BOTH EQUALLY
9 - DON'T KNOW/REFUSE

Q4. {Was the home/Were the majority of the homes} you worked on {a custom home/custom homes}, {a manufactured home/manufactured homes}, or part of {a planned community/planned communities}? [PROBE IF NEEDED; EXAMPLE: IF WORKED ON A GARAGE ONLY, ASK WHAT TYPE OF HOME IT WAS ATTACHED TO]

1 - CUSTOM HOME(S)
2 - MANUFACTURED HOME(S)
3 - PLANNED COMMUNITY
4 - OTHER, SPECIFY: _____
9 - DON'T KNOW/REFUSE

Q5. In your role as a {General/Specific Trade} Contractor what were the main tasks you performed?

_____
_____
_____
99 - DON'T KNOW/REFUSE

Q6. Who were you hired by {the majority of the time}? [READ IF NEEDED]

1 - HOMEOWNER
2 - GROUP OF HOMEOWNERS
3 - ARCHITECT
4 - ANOTHER CONTRACTOR
5 - OTHER PERSON/GROUP, SPECIFY: _____
9 - DON'T KNOW/REFUSE

Q7. We'd like to find out how important applying energy-efficiency standards and specification was relative to other concerns you had in the rebuilding process. Examples would be applying California's building code Title 24 recommendations and application of the Air Conditioning Contractors Association (ACCA) Manual D.

How important would you say applying energy-efficiency specifications was relative to other concerns you had?

Please use a scale from 1 to 10, with 1 meaning energy-efficiency specifications were much less important and 10 meaning specifications were much more important than your other concerns.

MUCH LESS IMPORTANT									MUCH MORE IMPORTANT	NOT APPLICABLE	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	97	99 → **GO TO Q8**

Q7A. [IF RATED:] [IF NEEDED, PROBE:] And why did you rate the application of energy-efficiency specifications relative to other concerns you had as {a (1-10)/not applicable}? [REPEAT SCALE # GIVEN IN Q7]

_____
_____
_____
99 - DON'T KNOW/REFUSE

Q8. Did your work involve dealing with insurance issues at all?

1 - YES
2 - NO ——> GO TO Q9
9 - DON'T KNOW/REFUSE ——> GO TO Q9

Q8A. [IF YES:] How important would you say applying energy-efficiency specifications was relative to dealing with insurance issues?

Please use a scale from 1 to 10, with 1 meaning energy-efficiency specifications were much less important and 10 meaning specifications were much more important than dealing with insurance issues.

MUCH LESS IMPORTANT									MUCH MORE IMPORTANT	NOT APPLICABLE	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	97	99 → GO TO Q9

Q8B. [IF RATED:] [IF NEEDED, PROBE:] And why did you rate the application of energy-efficiency specifications relative to dealing with insurance issues as {a (1-10)/not applicable}? [REPEAT SCALE # GIVEN IN Q8A]

_____
_____
_____
99 - DON'T KNOW/REFUSE

Q9. Did you work with an architect to draw up any building plans?

1 - YES
2 - NO
9 - DON'T KNOW/REFUSE

Q10. How important would you say applying energy-efficiency specifications was relative to obtaining building plan approval?

Please use a scale from 1 to 10, with 1 meaning energy-efficiency specifications were much less important and 10 meaning specifications were much more important than obtaining building plan approval?

MUCH LESS IMPORTANT									MUCH MORE IMPORTANT	NOT APPLICABLE	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	97	99 → GO TO Q11

Q10A. [IF RATED:] [IF NEEDED, PROBE:] And why did you rate the application of energy-efficiency specifications relative to obtaining building plan approval as {a (1-10)/not applicable}? [REPEAT SCALE # GIVEN IN Q10]

_____
_____
99 - DON'T KNOW/REFUSE

ENERGY USE/KNOWLEDGE SECTION

[ASK EVERYONE:]

Q11. In general, how familiar are you with California's Title 24 building codes, especially as they pertain to energy efficiency? Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with these codes?

1 - VERY FAMILIAR
2 - SOMEWHAT FAMILIAR
3 - NOT VERY FAMILIAR
4 - NOT AT ALL FAMILIAR ——> GO TO Q12
9 - DON'T KNOW/REFUSE ——> GO TO Q12

Q11A. We'd like to find out how familiar you are with individual components of the Title 24 building codes. The {first/next} one is... [INSERT ITEM]. Would you say you are very familiar, somewhat familiar, not very familiar, or not at all familiar with this component of the Title 24 codes?

		VERY FAMILIAR	SOMEWHAT FAMILIAR	NOT VERY FAMILIAR	NOT AT ALL FAMILIAR	DON'T KNOW/ REFUSE
1.	Heating, ventilation, and air conditioning standards, otherwise known as HVAC standards	1	2	3	4	9
2.	Limits on infiltration	1	2	3	4	9
3.	Specifications on window quantity and construction	1	2	3	4	9
4.	Lighting specifications	1	2	3	4	9

Q12. In October 2005, California's Title 24 building standards enforced revised energy-efficiency requirements. Thinking about work you did previous to October 2005 and the standards enforced previous to October 2005, did you usually try to implement only what the Title 24 standards required, or did you usually try to go beyond what the Title 24 standards required?

[IF NOT AT ALL FAMILIAR OR UNSURE ABOUT STANDARDS, READ:] Please answer just to the extent of your familiarity with the Title 24 standards.

[IF NEEDED:] This refers to your work in general as a contractor, rather than specifically relating to your work rebuilding after the fires

1 - DO ONLY WHAT WAS REQUIRED ——> GO TO Q13
2 - GO BEYOND REQUIREMENTS
3 - ACTIONS DEPENDANT UPON SITUATION (VOLUNTEERED)
9 - DON'T KNOW/REFUSE ——> GO TO Q13

Q12A. [IF GO BEYOND/DEPENDANT:] Can you explain some of the ways in which you exceeded Title 24 building standards prior to October 2005?

_____
_____
_____
99 - DON'T KNOW/REFUSE

Q13. Since the October 2005 Title 24 revisions, do you usually implement only what the current Title 24 standards require, or do you usually try to go beyond what the Title 24 standards require?

[IF NOT AT ALL FAMILIAR OR UNSURE ABOUT STANDARDS, READ:] Again, please answer just to the extent of your familiarity with the Title 24 standards.

[IF NEEDED:] This refers to your work in general as a contractor, rather than specifically relating to your work rebuilding after the fires

1 - DO ONLY WHAT IS REQUIRED ——> **GO TO Q14**
2 - GO BEYOND REQUIREMENTS
3 - ACTIONS DEPENDANT UPON SITUATION (VOLUNTEERED)
9 - DON'T KNOW/REFUSE ——> **GO TO Q14**

Q13A. [IF GO BEYOND/DEPENDANT:] Can you explain some of the ways in which you have exceeded Title 24 building standards since October 2005?

_____
_____
_____
99 - DON'T KNOW/REFUSE

IF HAVE NOT HEARD OF PROGRAM GO TO IMPROVEMENT SECTION (Q49)

PROGRAM PARTICIPATION SECTION

[IF HEARD OF PROGRAM:]

Q14. [IF HEARD OF RGSD PROGRAM:] Now I'd like to ask you a little about the Rebuild a Greener San Diego Program. Where did you hear about the Rebuild a Greener San Diego Program? [DO NOT READ, RECORD ONLY ONE]

1 - FLYERS POSTED IN NEIGHBORHOOD (POST OFFICES, LIBRARIES)
2 - NEWSPAPERS
3 - SDREO'S WEBSITE
4 - SDREO'S FACILITY (FLYERS)
5 - DIRECT CALL FROM SDREO PERSONNEL
6 - NEIGHBORHOOD/CITY ORGANIZATION (NEWSLETTERS)
7 - WORD OF MOUTH
8 - OTHER, SPECIFY: _____
_____
99 - DON'T RECALL WHERE/REFUSE, BUT HEARD OF PROGRAM

Q15. I'd like to read you a list of the main elements of the Rebuild a Greener San Diego Program. For each please tell me if you are aware of it or not aware of it. Are you aware that the program offers...

		YES, AWARE	NO, UNAWARE	DON'T KNOW/ REFUSE
1.	Technical information and guidance on energy efficiency?	1	2	9
2.	Financial incentives to homeowners for the incorporation of energy-efficient measures or design measures resulting in energy savings greater than the minimum requirements of California's building code (Title 24)?	1	2	9
3.	Rebates to homeowners for installing a solar energy or Photo Voltaic system?	1	2	9
4.	Workshops for homeowners and contractors to explain the Rebuild a Greener San Diego program?	1	2	9
5.	Site inspections to determine qualification for rebuilding incentives?	1	2	9
6.	Website links to other energy efficient construction or retrofit resources?	1	2	9

IF PARTICIPATED IN PROGRAM GO TO Q17 (WEBSITE SECTION)
IF DK/REF PARTICIPATION IN PROGRAM GO TO IMPROVEMENT SECTION (Q49)

[IF DID NOT PARTICIPATE IN PROGRAM:]

Q16. [IF NO PARTICIPATION IN PROGRAM:] What was the main reason you did not participate in the Rebuild a Greener San Diego Program? [PROBE AND RECORD ONE MAIN REASON:]

_____
_____
_____

99 - DON'T KNOW/REFUSE

GO TO IMPROVEMENT SECTION (Q49)

WEBSITE SECTION

[IF PARTICIPATED IN PROGRAM:]

Q17. Have you ever visited the Rebuild a Greener San Diego website?

1 - YES
2 - NO ——> **GO TO WORKSHOP SECTION (Q22)**
9 - DON'T KNOW/REFUSE ——> **GO TO WORKSHOP SECTION (Q22)**

Q18. How would you rate the website in terms of each of the following... Would you say excellent, good, fair or poor?

		EXCELLENT	GOOD	FAIR	POOR	DON'T KNOW/ REFUSE
1.	Website links to other energy efficient construction or retrofit resources?	1	2	3	4	9
2.	The technical level of the information provided?	1	2	3	4	9

Q19. What one aspect of the website was most valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q20. What one aspect of the website was least valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q21. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied or dissatisfied were you with the Rebuild a Greener San Diego website?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

WORKSHOP SECTION

[IF PARTICIPATED IN PROGRAM:]

Q22. Did you participate in a Rebuild a Greener San Diego Program workshop?

1 - YES
2 - NO ——> **GO TO SITE INSPECTION SECTION (Q28)**
9 - DON'T KNOW/REFUSE ——> **GO TO SITE INSPECTION SECTION (Q28)**

Q23. [IF YES:] Please let me know how you would evaluate the following aspects of the workshop. Did the workshop presenter...

		YES	NO	DON'T KNOW/ REFUSE
1.	Show up at the appointed time?	1	2	9
2.	Demonstrate knowledge of the subject?	1	2	9
3.	Communicate information clearly?	1	2	9
4.	Organize the presentation effectively?	1	2	9
5.	Give you sufficient information to successfully participate in the program?	1	2	9
6.	Answer any questions you had to your satisfaction?	1	2	9
7.	Make you feel confident about the installation of the recommended energy efficiency package?	1	2	9
8.	Make you feel confident about operation (e.g. energy savings) of the recommended energy efficiency package?	1	2	9
9.	Make you feel that he/she cared about your participation in the program?	1	2	9
10.	Make the workshop a positive experience?	1	2	9

Q24. How would you rate the workshop in terms of each of the following... Would you say excellent, good, fair or poor?

		EXCELLENT	GOOD	FAIR	POOR	DON'T KNOW/ REFUSE
1.	The amount of time provided for the workshop?	1	2	3	4	9
2.	The technical level of the information provided?	1	2	3	4	9
3.	The usefulness of the written materials provided (if any)?	1	2	3	4	9
4.	The convenience of the location?	1	2	3	4	9
5.	The convenience of the day and time it was scheduled?	1	2	3	4	9

Q25. What <u>one</u> aspect of the workshop was <u>most</u> valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q26. What <u>one</u> aspect of the workshop was <u>least</u> valuable for you?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q27. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied or dissatisfied were you with the workshop?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

SITE INSPECTION SECTION

[IF PARTICIPATED IN PROGRAM:]

Q28. Did you participate in any site inspections to determine if your client(s) qualified for the rebuilding incentives?

1 - YES
2 - NO ——> **GO TO REBATE SECTION (Q35)**
9 - DON'T KNOW/REFUSE ——> **GO TO REBATE SECTION (Q35)**

Q29. How many?

_____ NUMBER OF VISITS
99 - DON'T KNOW/REFUSE

Q30. [IF YES:] Please let me know how you would evaluate the following aspects of the site inspection(s). Did the site inspector...

		YES	NO	DON'T KNOW/ REFUSE
1.	Show up at the appointed time?	1	2	9
2.	Communicate information clearly?	1	2	9
3.	Give you sufficient information to successfully participate in the program?	1	2	9
4.	Answer any questions you had to your satisfaction?	1	2	9
5.	Make you feel confident about the installation of the recommended energy efficiency package?	1	2	9
6.	Make you feel that he/she cared about your participation in the program?	1	2	9
7.	Make the site visit a positive experience?	1	2	9

Q31. How would you rate the site inspection(s) in terms of each of the following... Would you say excellent, good, fair or poor?

		EXCELLENT	GOOD	FAIR	POOR	DON'T KNOW/ REFUSE
1.	The amount of time provided for the site inspection?	1	2	3	4	9
2.	The clarity of the information provided?	1	2	3	4	9
3.	The usefulness of the written materials provided (if any)?	1	2	3	4	9
4.	The convenience of the day and time it was scheduled?	1	2	3	4	9

Q32. What one aspect of the site visit(s) were you most satisfied with?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q33. What one aspect of the site visit(s) were you least satisfied with?
[PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q34. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied or dissatisfied were you with the site visit(s)?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

REBATE SECTION

[IF PARTICIPATED IN PROGRAM:]

Q35. Did {your client/any of your clients} receive any rebates as a result of participation in the Rebuild a Greener San Diego Program?

1 - YES
2 - NO
9 - DON'T KNOW/REFUSE

Q36. How familiar are you with the rebate process?

1 - VERY FAMILIAR
2 - SOMEWHAT FAMILIAR
3 - NOT VERY FAMILIAR
4 - NOT AT ALL FAMILIAR ——> GO TO PERSONNEL SECTION (Q41)
9 - DON'T KNOW/REFUSE ——> GO TO PERSONNEL SECTION (Q41)

Q37. How would you rate the rebate process in terms of each of the following... [INSERT ITEM]? Would you say excellent, good, fair or poor?

		EXCELLENT	GOOD	FAIR	POOR	DON'T KNOW/ REFUSE
1.	The amount of time provided to complete the rebate requirements	1	2	3	4	9
2.	The availability of information to meet the rebate requirements	1	2	3	4	9
3.	The usefulness of written information to meet the rebate requirements	1	2	3	4	9
4.	The ease of getting any questions you had about the rebate process answered	1	2	3	4	9
5.	The amount of time it took to receive the rebate(s)	1	2	3	4	9

Q38. What one aspect of the rebate process were you most satisfied with? [PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q39. What one aspect of the rebate process were you least satisfied with? [PROBE AND RECORD ONE MAIN ISSUE]

_____

_____

99 - DON'T KNOW/REFUSE

Q40. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall how satisfied or dissatisfied were you with the rebate process?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

PERSONNEL SECTION

[IF PARTICIPATED IN PROGRAM:]

Q41. Apart from the workshop, did you have any interaction with San Diego Regional Energy Office personnel or other Rebuild a Greener San Diego Partnership personnel?

1 - YES
2 - NO ——> GO TO NETWORK SECTION (Q44)
9 - DON'T KNOW/REFUSE ——> GO TO NETWORK SECTION (Q44)

Q42. [IF YES:] How would you evaluate the San Diego Regional Energy Office or other Partnership personnel in terms of their attitude and behavior? Did the personnel...

		YES	NO	DON'T KNOW/ REFUSE
1.	Demonstrate knowledge of the subject?	1	2	9
2.	Communicate information clearly?	1	2	9
3.	Answer any questions you had to your satisfaction?	1	2	9
4.	Make you feel that they cared about your participation in the program?	1	2	9
5.	Make the interaction(s) a positive experience?	1	2	9

Q43. On a scale from 1 to 10, with 1 being very dissatisfied, and 10 being very satisfied, overall, how satisfied or dissatisfied were you with your interaction(s) with the San Diego Regional Energy Office or other Partnership personnel?

VERY DISSATISFIED									VERY SATISFIED	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

NETWORK SECTION

[IF PARTICIPATED IN PROGRAM:]

Q44. Did you refer any other people to the Rebuild a Greener San Diego Program? [IF YES:] Approximately how many people did you refer?

_____ PEOPLE
0 - NO/NONE ——> **GO TO Q45**
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE ——> **GO TO Q45**

Q44A. [IF ONE OR MORE:] Did any of the people you referred to the program actually participate in the program? [IF YES:] Approximately how many people participated?

_____ PEOPLE
0 - NO/NONE
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE

Q45. Did you share any <u>information</u> about energy-efficiency measures learned in the Rebuild a Greener San Diego Program with other people? [IF YES:] Approximately how many people did you share the information with?

_____ PEOPLE
0 - NO/NONE ——> **GO TO FREE-RIDER EFFECTS SECTION (Q46)**
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE ——> **GO TO FREE-RIDER EFFECTS SECTION (Q46)**

Q45A. [IF ONE OR MORE:] Did any of the people you shared this information with actually implement any of those energy-efficiency measures? [IF YES:] Approximately how many people implemented energy-efficiency measures?

_____ PEOPLE
0 - NO/NONE
97 - 97 OR MORE
99 - DON'T KNOW/REFUSE

FREE-RIDER EFFECTS SECTION

[IF PARTICIPATED IN PROGRAM:]

Q46. Do you think that your involvement in this program has increased your knowledge of ecological, energy, and/or environmental issues a great deal, somewhat, or not at all?

1 - A GREAT DEAL
2 - SOMEWHAT
3 - NOT AT ALL
9 - DON'T KNOW/REFUSE

Q47. Were you already planning to incorporate energy-efficiency measures or design principles in the re-build process before hearing about this program, or did you decide to incorporate energy-efficiency measures or design principles as a result of hearing about this program?

1 - ALREADY PLANNING MEASURES
2 - INCORPORATED AS A RESULT OF PROGRAM
9 - DON'T KNOW/REFUSE

Q48. Did involvement in the program change how you rebuilt, or what you would have implemented in the rebuild process? [PROBE FOR EXPLANATION:]

_____
_____
_____

96 - NO, DID NOT CHANGE
97 - N/A, NO SPECIFIC PRIOR PLAN
99 - DON'T KNOW/REFUSE

IMPROVEMENT SECTION

[ASK EVERYONE:]

Q49. What suggestions would you offer to increase participation in this program? [PROBE AND RECORD ONE MAIN RESPONSE]

_____

_____

_____

99 - DON'T KNOW/REFUSE

Q50. What other suggestions would you offer to improve this program?

_____

_____

_____

99 - DON'T KNOW/REFUSE

Q51. The Rebuild a Greener San Diego Program required specific energy-efficiency measures or design principles to be met in order to receive rebates or incentives. Would you prefer that the program maintain its prescriptive approach toward requirements, or would you prefer that the program adopt a more flexible approach toward requirements?

1 - PREFER PRESCRIPTIVE APPROACH
2 - PREFER FLEXIBLE APPROACH
9 - DON'T KNOW/REFUSE

CONSERVATION BELIEFS SECTION

[ASK EVERYONE:]

Q52. On a scale from 1 to 10, with 1 meaning not at all a serious issue, and 10 meaning a very serious issue, how would you rate the seriousness of greenhouse gas emissions and global warming issues?

NOT AT ALL A SERIOUS ISSUE									VERY SERIOUS ISSUE	DON'T KNOW/ REFUSE
1	2	3	4	5	6	7	8	9	10	99

Q53. Should the State of California be doing more to reduce energy consumption in the state, is it doing about the right amount, or should it be doing less to reduce energy consumption in California?

1 - SHOULD DO MORE
2 - ABOUT RIGHT
3 - SHOULD DO LESS
9 - DON'T KNOW/REFUSE

DEMOGRAPHICS SECTION

[ASK EVERYONE:]

The final questions are for comparison purposes only.

STA. Did your employment status become more stable due to the 2003 wildfires, did it become less stable, or was there no change as a result of the 2003 wildfires?

1 - MORE STABLE
2 - LESS STABLE
3 - NO CHANGE AS A RESULT OF WILDFIRES
9 - DON'T KNOW/REFUSE

CHG. Did your annual income increase due to the 2003 wildfires, did it decrease, or was there no change as a result of the 2003 wildfires?

1 - INCREASED
2 - DECREASED
3 - NO CHANGE AS A RESULT OF WILDFIRES
9 - DON'T KNOW/REFUSE

OCC. What is your occupational title?

_____
99 - DON'T KNOW/REFUSE

EXP. How many years have you been in the building/contracting business? [IF .5 OR GREATER, ROUND UP TO NEXT YEAR]

_____ YEARS
0 - LESS THAN 6 MONTHS
99 - DON'T KNOW/REFUSE

FRM. Do you work for a contracting firm or do you own your own firm?

1 - WORK FOR FIRM
2 - OWNER
9 - REFUSE

EMP. How many people are employed in the firm?

_____ NUMBER OF EMPLOYEES
0 - OWNER ONLY
99 - DON'T KNOW/REFUSE

YRS. How many years has the firm been in business?

_____ YEARS
0 - LESS THAN 6 MONTHS
99 - DON'T KNOW/REFUSE

WRK. What is your current employment status? Are you working full-time (at least 35 hours per week), working part-time, or not working? [CLARIFY AND RECORD ANY COMBINATIONS THAT INCLUDE WORKING AS '1' or '2', SUCH AS "*STUDENT AND WORKING PT*"]

1 - WORKING FULL-TIME
2 - WORKING PART-TIME
3 - NOT WORKING
9 - DON'T KNOW/REFUSE

EDU. What is the highest grade or year of school that you have completed and received credit for: high school or less; at least one year of college, trade or vocational school; graduated college with a bachelor's degree; or at least one year of graduate work?

1 - HIGH SCHOOL OR LESS
2 - 1 YEAR COLLEGE/TRADE/VOCATIONAL SCHOOL
3 - GRADUATED COLLEGE/BACHELOR'S DEGREE
4 - AT LEAST 1 YEAR GRADUATE WORK
9 - DON'T KNOW/REFUSE

INC. We don't want to know your exact income, but roughly, is your current annual household income before taxes under $25,000, $25,000 to but not including $50,000, $50,000 to (but not including) $75,000, $75,000 to (but not including) $100,000, or $100,000 or more?

1 - UNDER $25,000
2 - $25,000 TO $49,999
3 - $50,000 TO $74,999
4 - $75,000 TO $99,999
5 - $100,000 OR MORE
9 - DON'T KNOW/REFUSE

CLOSING SECTION

PHN. Those are all the questions I have. I'd like to confirm that I reached you at...

[VERIFY & INSERT TELEPHONE NUMBER:] [NOT INCLUDED IN CLIENT DATA FILE]

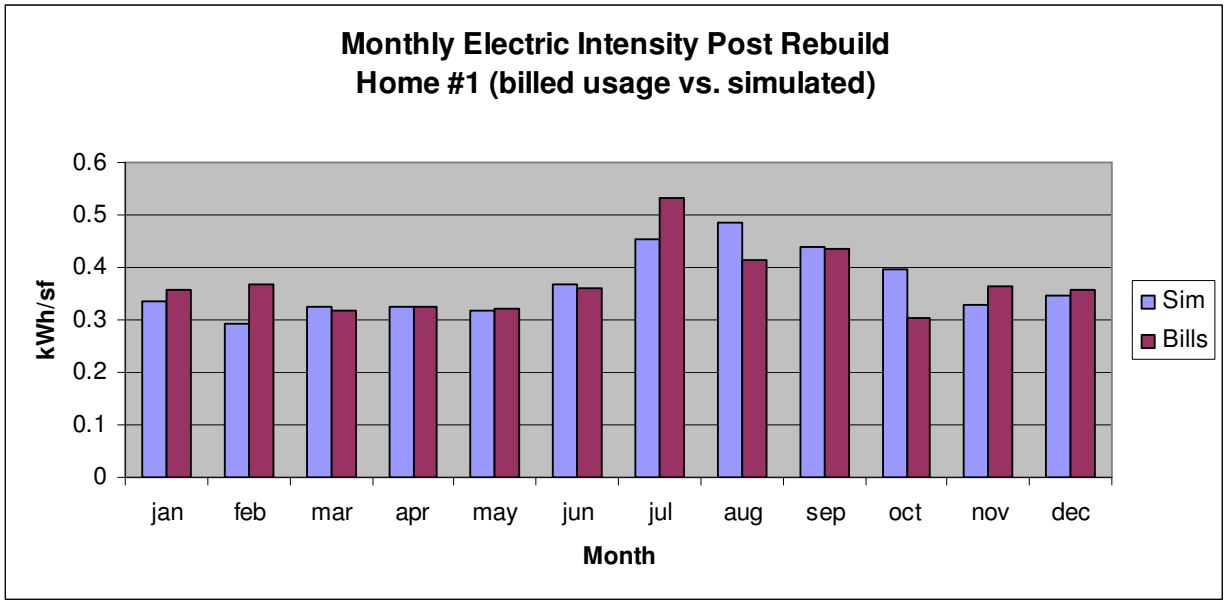
Thank you for your time and have a nice {day/evening}.

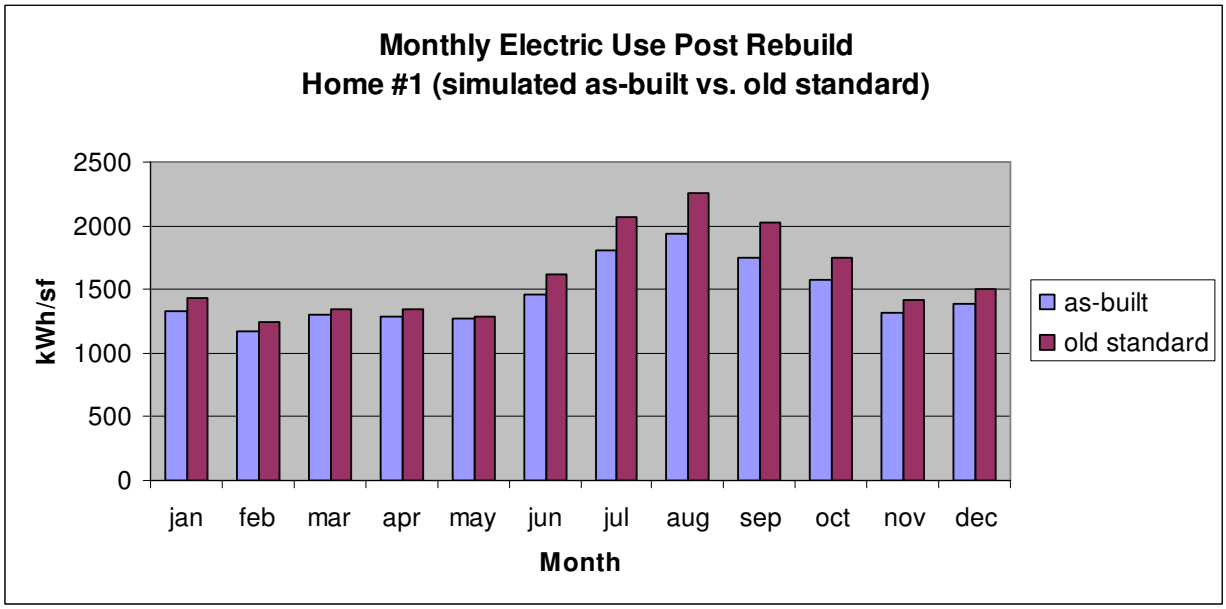
LEN. [LENGTH OF INTERVIEW IN MINUTES] : _____

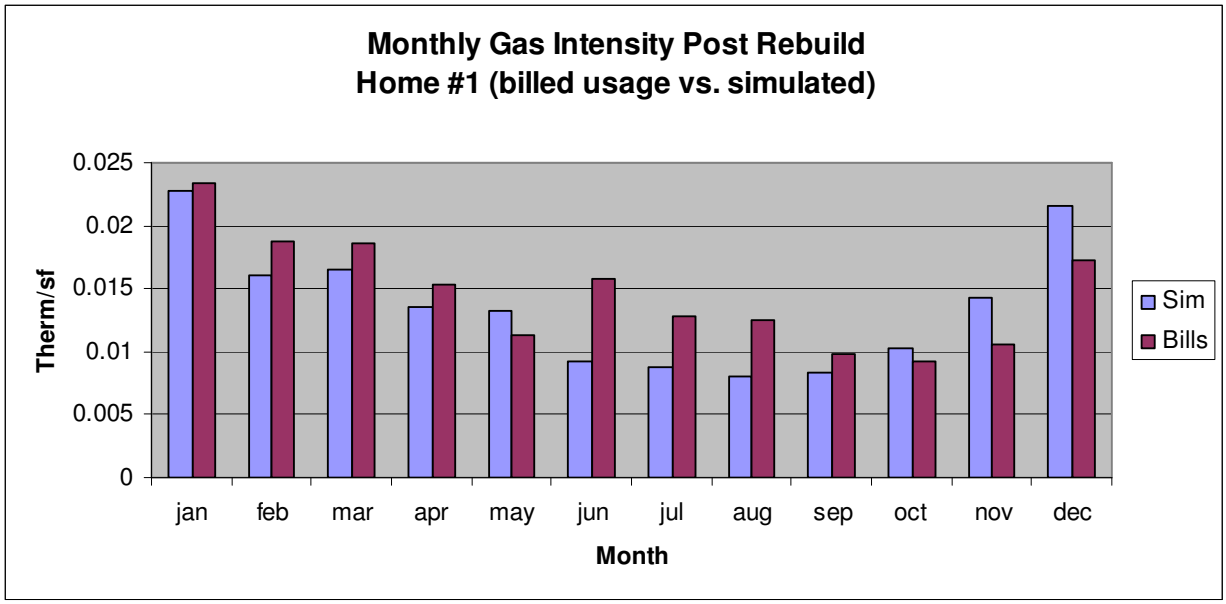
TIN. [INTERVIEWER NUMBER]: _____

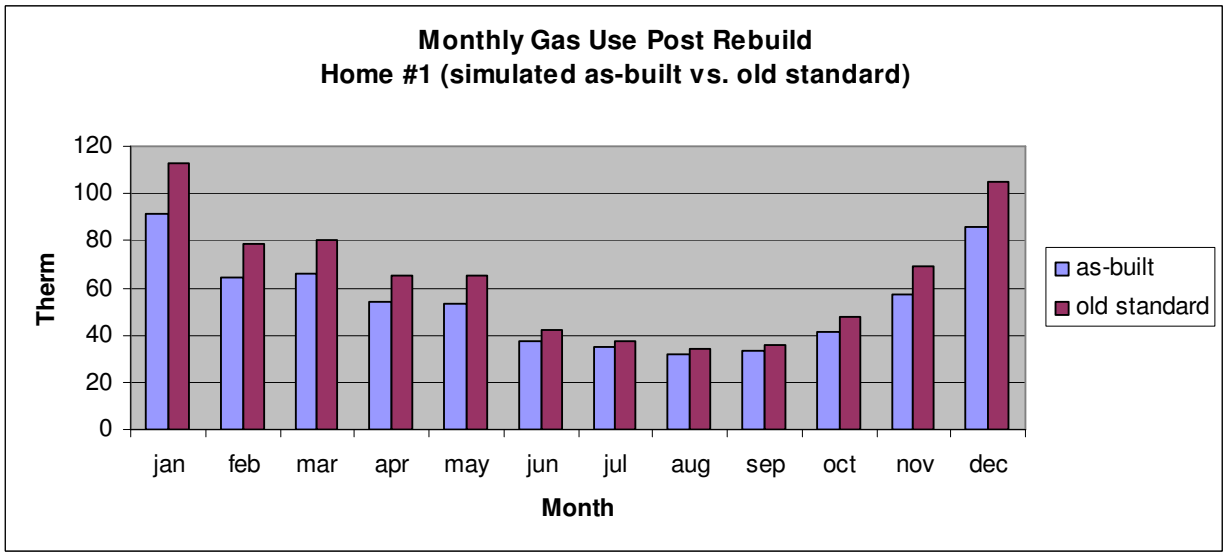
DAT. [DATE OF INTERVIEW] : _____

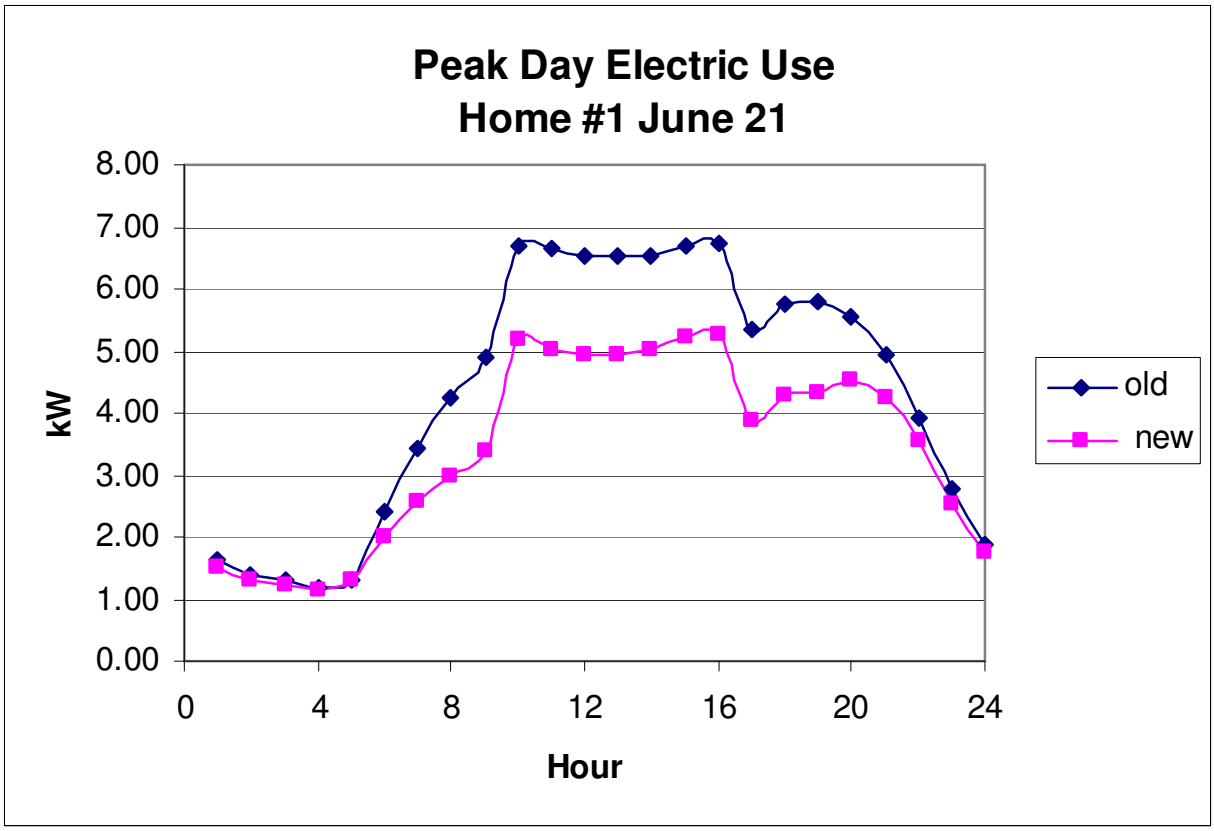
LEGEND	
Mixed Case	Text read to respondent by interviewer
ALL CAPS	Text NOT on screen; coded in data processing
ALL CAPS; BOLD TEXT	Skip patterns
[ALL CAPS; HARD BRACKETS]	Instructions for programming; Instructions to interviewers
Bold; Mixed case; Salmon highlight	New section heading
Bold; Mixed case; Grey highlight	Special skip instructions

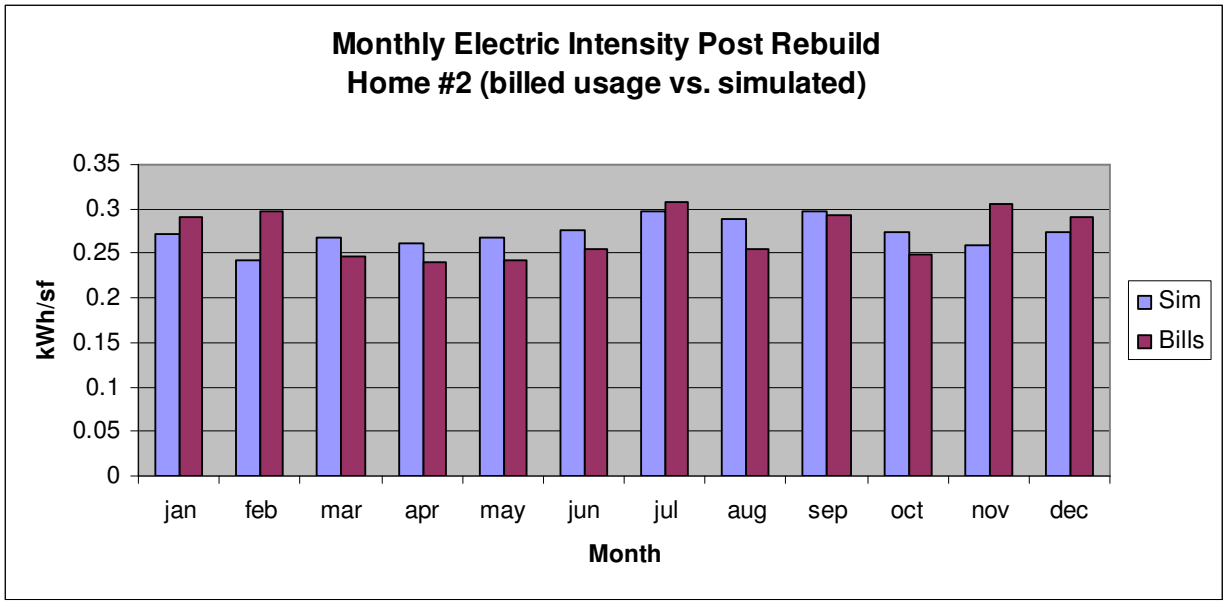

Monthly Electric Intensity Post Rebuild
Home #1 (billed usage vs. simulated)
kWh/sf
0.6
0.5
0.4
0.3
0.2
0.1
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
Bills

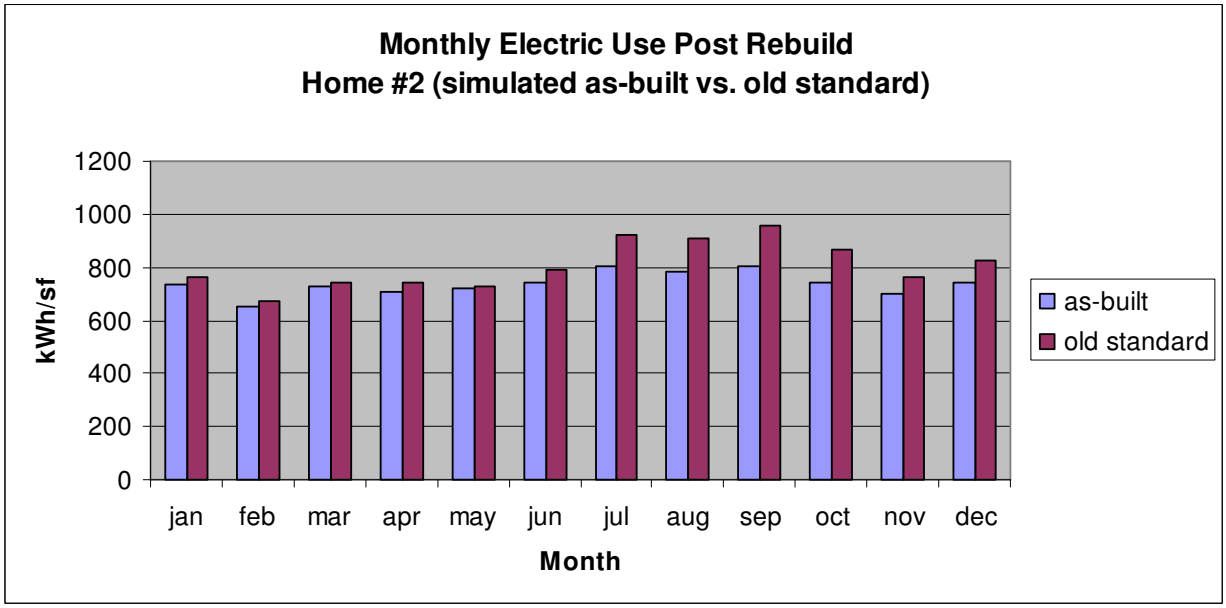

Monthly Electric Use Post Rebuild
Home #1 (simulated as-built vs. old standard)
kWh/sf
2500
2000
1500
1000
500
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
as-built
old standard

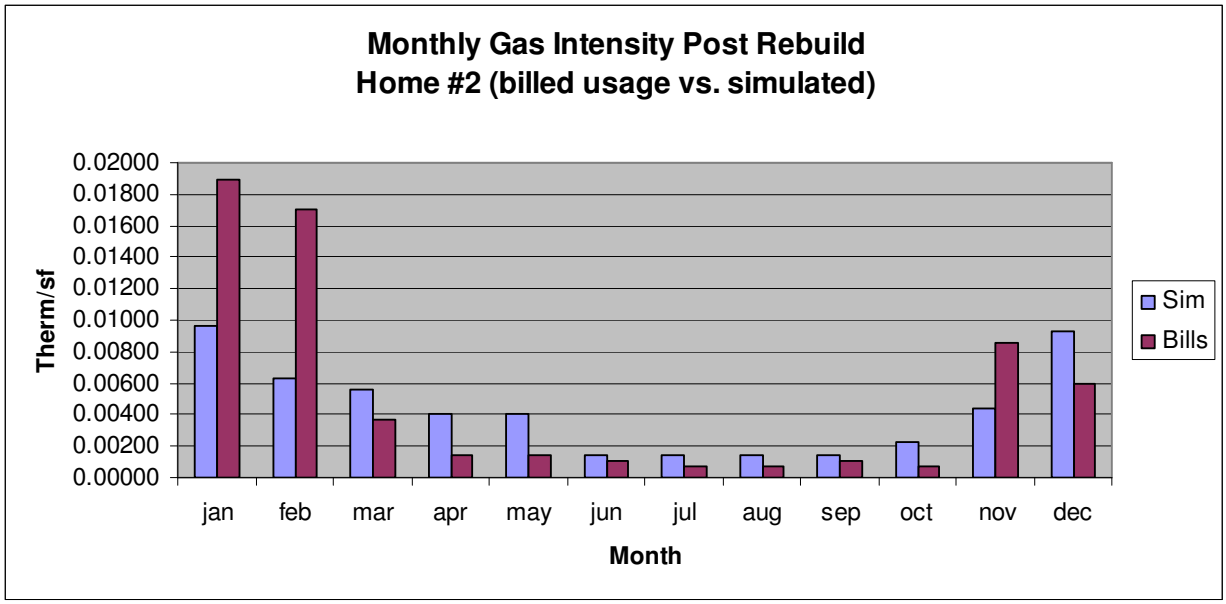

Monthly Gas Intensity Post Rebuild
Home #1 (billed usage vs. simulated)
Therm/sf
0.025
0.02
0.015
0.01
0.005
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
Bills

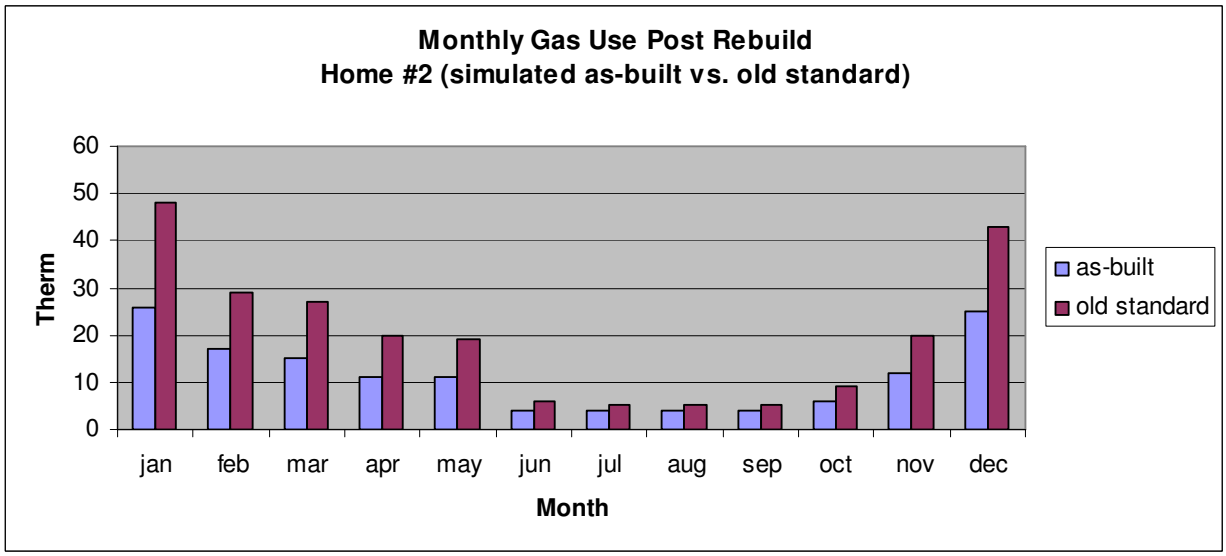

Monthly Gas Use Post Rebuild
Home #1 (simulated as-built vs. old standard)
Therm
120
100
80
60
40
20
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
as-built
old standard

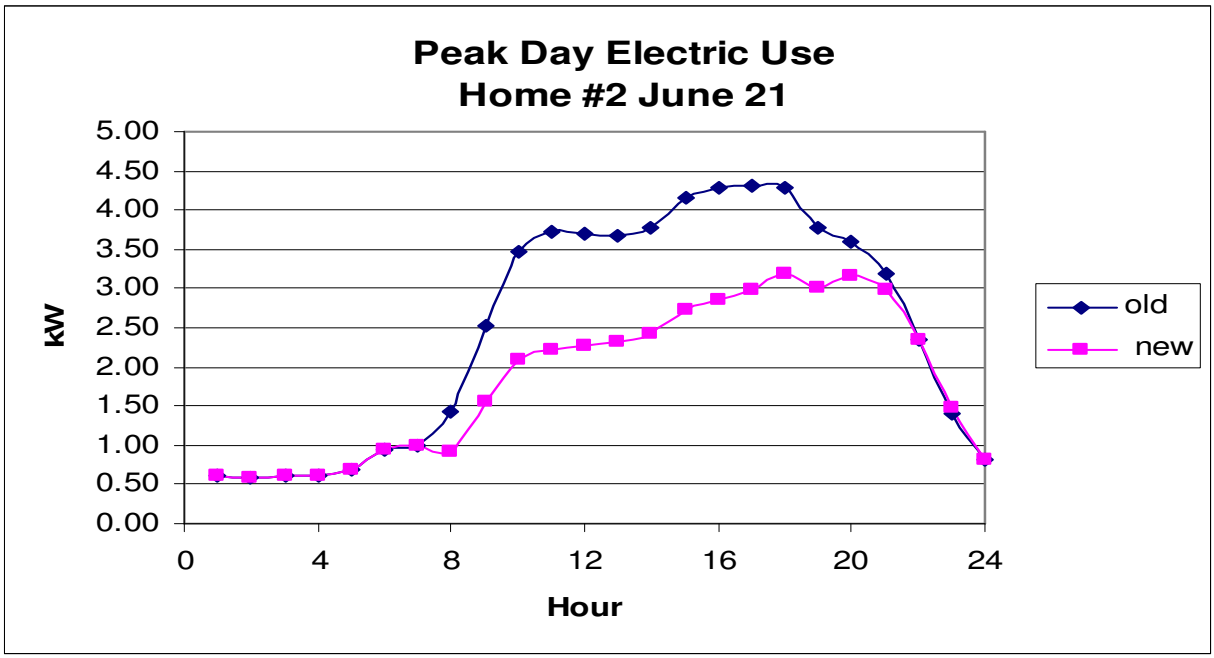

Peak Day Electric Use
Home #1 June 21
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
kW
0
4
8
12
16
20
24
Hour
old
new

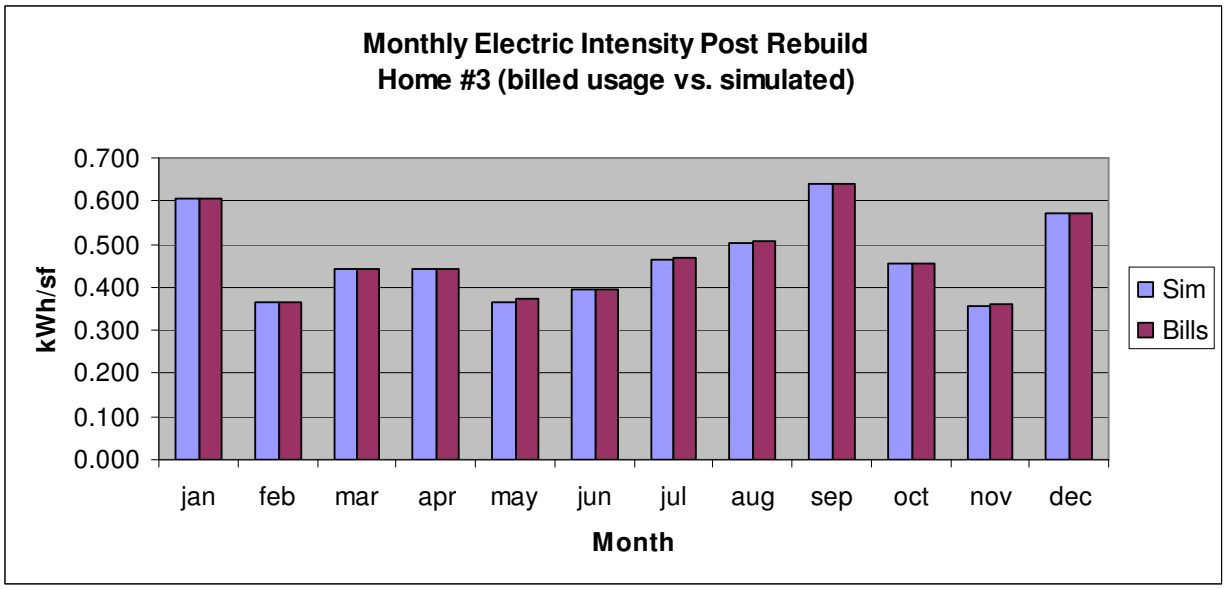

Monthly Electric Intensity Post Rebuild
Home #2 (billed usage vs. simulated)
kWh/sf
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
Bills

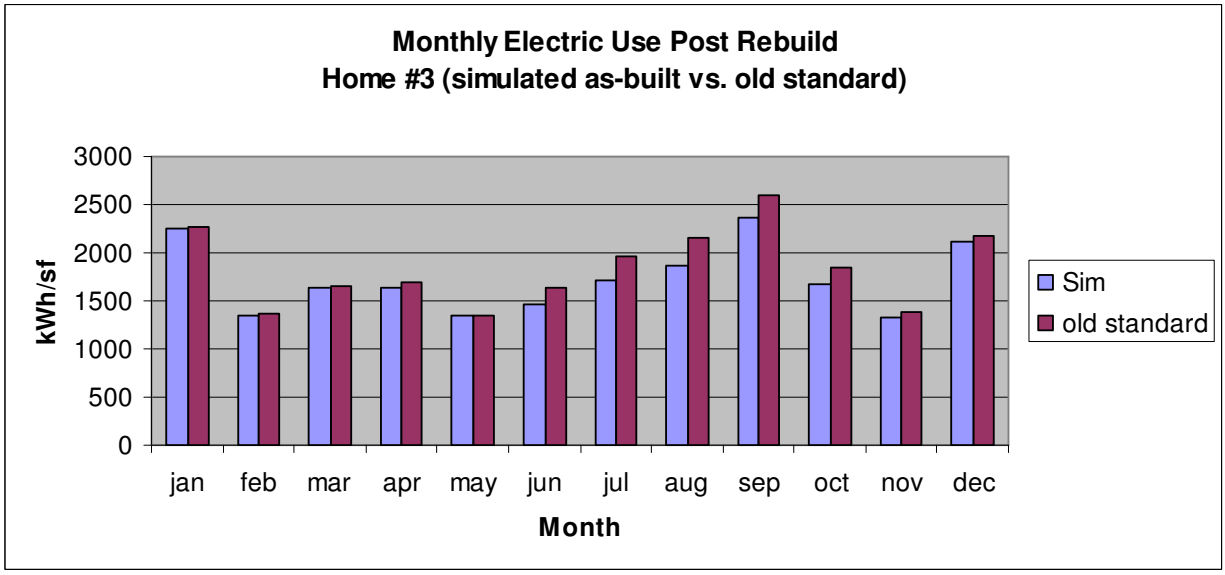

Monthly Electric Use Post Rebuild
Home #2 (simulated as-built vs. old standard)
kWh/sf
1200
1000
800
600
400
200
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
as-built
old standard

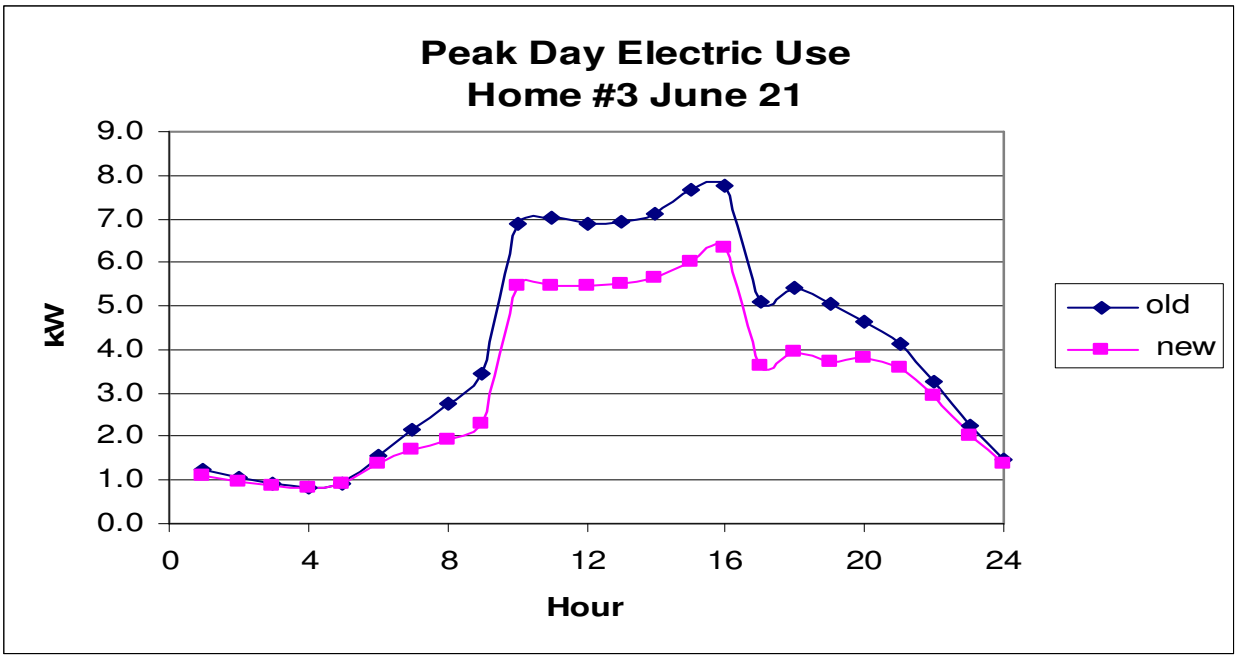

Monthly Gas Intensity Post Rebuild
Home #2 (billed usage vs. simulated)
Therm/sf
0.02000
0.01800
0.01600
0.01400
0.01200
0.01000
0.00800
0.00600
0.00400
0.00200
0.00000
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
Bills


Monthly Gas Use Post Rebuild
Home #2 (simulated as-built vs. old standard)
Therm
60
50
40
30
20
10
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
as-built
old standard


Peak Day Electric Use
Home #2 June 21
kW
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
0
4
8
12
16
20
24
Hour
old
new


Monthly Electric Intensity Post Rebuild
Home #3 (billed usage vs. simulated)
kWh/sf
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
Bills


Monthly Electric Use Post Rebuild
Home #3 (simulated as-built vs. old standard)
kWh/sf
3000
2500
2000
1500
1000
500
0
jan
feb
mar
apr
may
jun
jul
aug
sep
oct
nov
dec
Month
Sim
old standard


Peak Day Electric Use
Home #3 June 21
kW
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
0
4
8
12
16
20
24
Hour
old
new

Appendix D – Energy Impact Reporting Table

SDG&E Program Energy Impact Reporting for 2004-2005 Programs

Program ID*:	1500-04							
Program Name:	Rebuild a Greener San Diego							
	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**	Gross Program-Projected Therm Savings	Net Evaluation Confirmed Program Therm Savings
	1	2004						
	2	2005						
	3	2006	248.824	179.899	0.336	0.234	24070.83	17403
	4	2007	248.824	179.899	0.336	0.234	24070.83	17403
	5	2008	248.824	179.899	0.336	0.234	24070.83	17403
	6	2009	248.824	179.899	0.336	0.234	24070.83	17403
	7	2010	248.824	179.899	0.336	0.234	24070.83	17403
	8	2011	248.824	179.899	0.336	0.234	24070.83	17403
	9	2012	248.824	179.899	0.336	0.234	24070.83	17403
	10	2013	248.824	179.899	0.336	0.234	24070.83	17403
	11	2014	248.824	179.899	0.336	0.234	24070.83	17403
	12	2015	248.824	179.899	0.336	0.234	24070.83	17403
	13	2016	248.824	179.899	0.336	0.234	24070.83	17403
	14	2017	248.824	179.899	0.336	0.234	24070.83	17403
	15	2018	248.824	179.899	0.336	0.234	24070.83	17403
	16	2019	248.824	179.899	0.336	0.234	24070.83	17403
	17	2020	248.824	179.899	0.336	0.234	24070.83	17403
	18	2021	248.824	179.899	0.336	0.234	24070.83	17403
	19	2022	248.824	179.899	0.336	0.234	24070.83	17403
	20	2023	248.824	179.899	0.336	0.234	24070.83	17403
	TOTAL	**2004-2023**						

*Please complete this form for the SDG&E program ID included in the evaluation.
**Please include the definition of Peak MW used in the evaluation.
Definition of Peak MW as used in this evaluation:
Peak MW savings are determined using the day and hour on which the peak usage occurred for each each simulation. For each of the simulations the peak annual usage occurred on June 21. The peak savings was the difference in kW at that time between the baseline usage and the modified usage.
Note, change the Program ID Number on the worksheet tabs (below), so that it matches the Progam ID Number of the program being evaluated.