

Energy Upgrade California™ in San Diego County

Final Report

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ARRA EECBG contracts have not been granted confidentiality status for any contract deliverables; therefore, the Final Report is a public document and must be completed before the contract termination date of the contract. The contractor should use the outline below to complete the report. Each contractor should receive approval from their Commission Contract Manager to ensure the Final Report meets the needs of each individual contract.

Final meetings between the contractor and the Energy Commission will be at the discretion of each Commission Contract Manager.

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I. EXECUTIVE SUMMARY

Program Background

As the third largest metropolitan area in California, the San Diego region plays a crucial role in the state's efforts to achieve its goal of 40% average energy savings in existing residences by 2020. The California Comprehensive Residential Building Retrofit Program is the California Energy Commission's (Energy Commission) federal America Recovery and Reinvestment Act (ARRA)-funded initiative intended to create jobs, train a sustainable energy industry workforce, and stimulate the economy. The County of San Diego was the recipient of \$3 million of ARRA Energy Efficiency and Conservation Block Grant (EECBG) funds for regional implementation of a single and multi-family California Comprehensive Residential Building Retrofit Program, referred to as Energy Upgrade California in San Diego County (EUCSDC).

The emergence of the Energy Commission's HERS Whole-house program, and influx of ARRA funds flowing into California's energy upgrade market, presented an opportunity to evolve the infrastructure for retrofit programs.

The Energy Upgrade California™ in San Diego County (EUCSDC) program developed and piloted multi-family assessment and verification protocols, multi-family HERS Rater training curriculum, and assessment tools for the hard-to-serve multi-family market. The program also supported development of a web-based navigation tool for building owners and interested parties, named the Funding Finder.

Subcontractor Heschong Mahone Group (HMG) led the multi-family program team, and developed the long overlooked infrastructure (tools and expertise) to support a sustainable multi-family whole-building program. HMG developed and piloted the extension of the HERS Whole-house regulations to multi-family buildings. With this, a performance-based program was created to specifically target whole-building upgrades and encourage building owners to upgrade their older building stock to improve efficiency by a minimum of 10% over existing conditions.

The EUCSDC program influenced and leveraged other multi-family programs, both regionally and statewide. San Diego Gas and Electric (SDG&E), the City of Chula Vista, and the City of San Diego all adopted the assessment, energy modeling, and verification protocols developed through the EUCSDC program, and relied on EUCSDC marketing and outreach efforts to recruit program participants. In return, participants of the EUCSDC program were able to leverage rebates for energy efficiency upgrades from SDG&E, the City of Chula Vista, and the City of San Diego, depending on property characteristics and location.

The Energy Upgrade Multi-family HERS Rater training provided through the EUCSDC program qualified HERS Whole-house Raters to serve not only the multi-family components of the EUCSDC, SDG&E, City of Chula Vista, and City of San Diego programs, but also the Sacramento Municipal Utility District (SMUD) Home Performance Program – Multi-Family

(HPP-MF), and the Los Angeles County Multi-family Whole Building Pilot Program. This collaboration was made possible through the Multi-Family Subcommittee of the Home Energy Retrofit Coordinating Committee (MF-HERCC), which convened for the purpose of establishing 80% consistency in ARRA-funded multi-family whole-building programs statewide and facilitated the transmission of the protocols and training curriculum across programs. More information about the MF-HERCC and HERCC-published documents can be viewed at <http://www.multi-familygreen.org/resources/reports-guidelines/hercc>.

The California Center for Sustainable Energy (CCSE) provided professional administration consultant services for regional implementation of the single family component of EUCSDC.

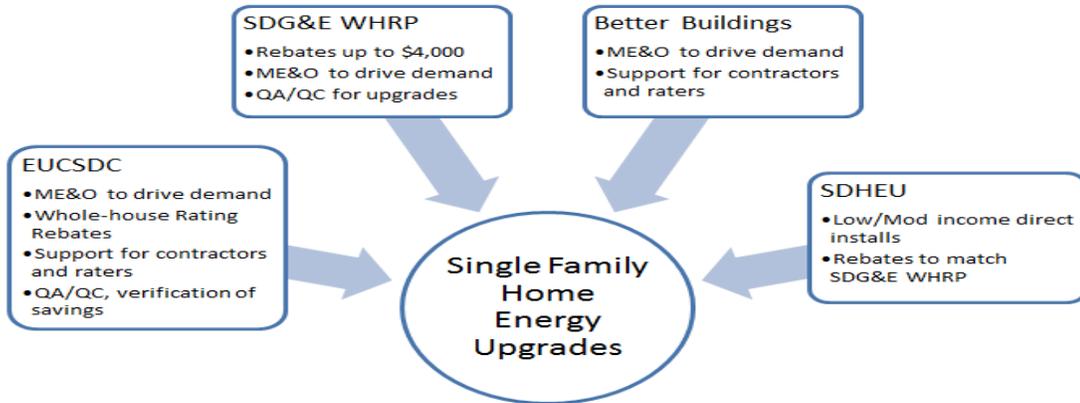
Throughout the contract period, EUCSDC both influenced and leveraged other home performance programs regionally and statewide. Regionally these programs include:

- San Diego Gas & Electric's (SDG&E) Whole House Retrofit Program (WHRP)
- U.S. Department of Energy's (U.S. DOE) Better Buildings program
- City of Chula Vista Home Upgrade/Carbon Downgrade program
- City of San Diego's Energy Efficiency & Conservation Block Grant (EECBG) funded San Diego Home Energy Upgrade (SDHEU) program, a direct-install energy upgrade program for low- and moderate-income residents of the City of San Diego.

These programs are working collectively towards the following common goals: (1) a reduction in regional energy consumption by improving the regions' existing building stock, and (2) the development of a sustainable home performance industry. As such, EUCSDC leveraged funds from all programs to achieve the goals of this contract.

Many of the homeowner marketing and outreach efforts pursued under this contract were supported to a large degree by Better Buildings funding, which allowed for more flexible spending. This leveraged approach enabled CCSE to create comprehensive and effective marketing campaigns. Participants in EUCSDC leveraged SDG&E WHRP rebates, City of Chula Vista rebates, and SDHEU rebates to secure energy upgrades at a reduced cost. Qualifying EUCSDC participants also secured SDHEU rebates in some cases to receive energy upgrades at no cost.

EUCSDC leveraged Better Buildings funds to support many of the education efforts pursued through this contract, including trainings for Heating, Ventilation & Air Conditioning (HVAC) contractors, whole-house energy raters and the real estate community. Additionally, EUCSDC leveraged SDG&E WHRP resources to recruit participating contractors and raters, and to collaboratively create streamlined quality assurance and quality control (QA/QC) guidelines for participating contractors as seen in the diagram below.



Project Organization

The County of San Diego was the EUCSDC administrator and was responsible for fiscal oversight, invoicing, reporting, contract management and overall program performance and deliverables to the Energy Commission. The program included two separate yet equally important target markets: multi-family and single family. The County contracted with the Hescong Mahone Group (HMG) and California Center for Sustainable Energy (CCSE) respectively as the lead for each of these target markets.

HMG was responsible for the multi-family scope of work, which was broken into 18 subtasks, each supporting a program goal of building owner engagement, training and support of HERS Raters, and development of tools and best practices. These goals are described in more detail in the Multi-Family GOALS section of this report.



Figure 1: Multi-Family Program Task List

CCSE was responsible for the single family scope of work, which was broken into 10 subtasks, each supporting a program goal of property owner engagement, training and support of HERS Raters, and development of tools and best practices. These goals are described in more detail in the Single Family GOALS section of this report.



Figure 2: Single Family Program Task List

Organizational Structure

As the prime contractor, the County of San Diego had oversight over four multi-family contractors and three single family contractors; Hescong Mahone Group (HMG), CalCERTS, EnergySoft, Strategic Energy Innovations (SEI), California Center for Sustainable Energy (CCSE), Manpower, and the California Building Performance Contractors Association (CBPCA).

HMG acted as the lead multi-family contractor, managing the other three contractors and reviewing deliverables. HMG led program design and implementation of the multi-family program, including audit and verification protocols, marketing, design assistance, and quality assurance. HMG subcontracted with DeMarco Designs for graphic design of program marketing materials. CalCERTS delivered multi-family HERS Rater training and conducted health and safety testing for properties leveraging SDG&E rebates. CalCERTS subcontracted with Association for Energy Affordability (AEA) for a portion of the first multi-family HERS Rater training, and combustion safety mentoring to newly trained CalCERTS staff. EnergySoft improved their certified whole-house energy modeling software CalRatePro to make it more applicable to multi-family buildings, and provided energy modeling training and support to participating HERS Raters. SEI developed tenant education materials.

CCSE acted as the lead single family contractor, managing the other two contractors and reviewing deliverables. CCSE led program design and implementation of the single family program by conducting outreach and education to recruit participants, develop quality assurance/quality control protocols, administer a rebate program for whole-house ratings,

and verify energy savings to track results. California Building Performance Contractor's Association (CBPCA) and Manpower, Inc. delivered workforce training both in the field and in the classroom to unemployed and under-employed individuals looking to serve the single family market segment for energy upgrades.

Figure 3 below illustrates the program organizational structure.

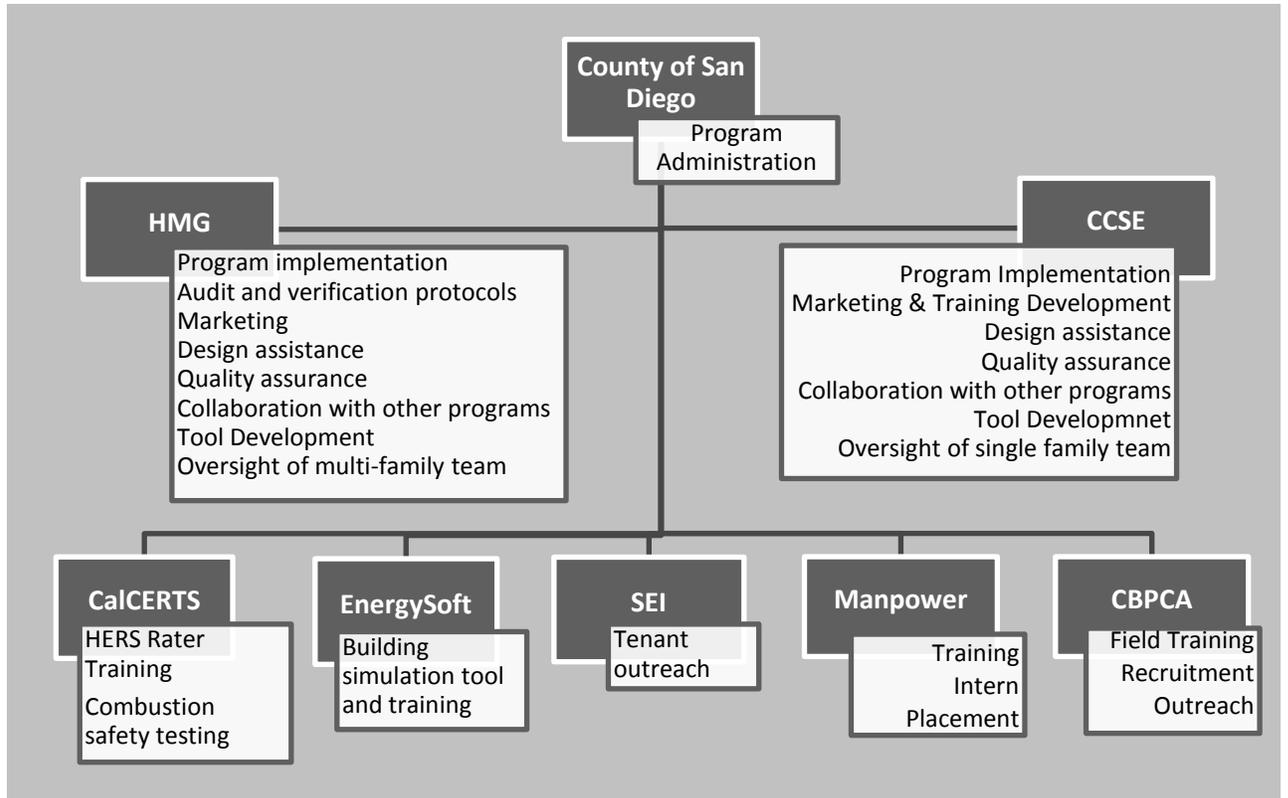


Figure 3: Program Organizational Structure

Heschong Mahone Group (HMG)

HMG is an established firm providing professional consulting services in the field of building energy efficiency and specializes in program design and implementation of comprehensive multi-family programs. HMG has over 10 years of experience designing and implementing multi-family new construction and energy efficiency upgrade programs in California. HMG is therefore intimately familiar with energy efficiency in multi-family buildings, state energy codes, program implementation, and the challenges of moving multi-family building owners to implement energy upgrades. HMG is also an active member of the MF-HERCC.

CalCERTS

In 2003 CalCERTS, Inc. was approved by the Energy Commission to become a Home Energy Rating System (HERS) Provider. The company's mission is to fill the growing need in the energy efficiency industry for a technically superior, yet customer-oriented HERS Provider. CalCERTS is a private organization that provides service, support, training and certification to HERS raters. CalCERTS has developed and owns its own software, which is utilized by the HERS Rater to enter rating data into a computer-based database (registry). CalCERTS, Inc.

maintains this registry as a repository of information that can be accessed by the HERS Rater, building departments, contractors and government agencies. CalCERTS is an active member of the MF-HERCC.

EnergySoft

As one of the leading energy analysis firms in the country, EnergySoft has been providing consulting services and software to clients worldwide since 1982. EnergySoft specializes in Building Energy Performance Modeling and has completed over 10,000 projects to date. EnergySoft is also a provider of the Energy Commission-approved energy code compliance software, and is the author of the HERS Whole-house rating tools.

Strategic Energy Innovations (SEI)

SEI is a nonprofit organization that helps empower organizations to reduce pollution and save money through clean energy and resource efficiency. SEI has substantial experience delivering in-depth training programs to tenants of multi-family buildings in California.

California Center for Sustainable Energy (CCSE)

The California Center for Sustainable Energy (CCSE) is an independent, non-profit 501 (c) (3) corporation that helps residents, businesses and public agencies save energy, reduce grid demand and generate their own power through a variety of rebate, technical assistance and education programs. CCSE also provides the community with objective information, research, analysis and long term planning on energy issues and technologies and has emerged over the last 10 years as a state leader in management of energy programs and promoting sustainable energy education and practices growing rapidly to meet the increased demand for services.

Manpower, Inc.

Manpower Inc. offers a range of services and solutions including on-the-job training, work readiness and entrepreneurial training that supports the growth of local green training program graduates. Manpower has been part of the San Diego business community for over 30 years and has strong relationships with local companies making them uniquely positioned to place Green Grads in internships with local businesses.

California Building Performance Contractors Association (CBPCA)

CBPCA is the only training provider approved to provide Home Performance with EnergyStar training for home performance contractors. They are also California's first and only Energy Commission approved HERS provider with a Third Party Quality Control Program and the only organization in the state delivering integrated training in energy efficiency, healthier indoor air and comfort, and a safer, more durable building.

Energy Upgrade California™ in San Diego County – Multi-family

II. MULTI-FAMILY PROGRAM: GOALS

The primary goals of the Energy Upgrade California™ in San Diego County Multi-family Program were to cultivate a sustainable market for energy efficiency upgrades; reduce regional energy consumption; and create jobs. The program aimed to:

- Actively engage both market-rate and affordable housing multi-family building owners in the region's efforts to reduce energy use and carbon emissions in support of AB 32 (Global Warming Solutions Act of 2006), California's Energy Action Plan and local Climate Action Plans
- Train and support HERS Whole-House Raters and generate and sustain jobs
- Develop tools and best practices that can be applied to future multi-family residential upgrade programs

This section of the report provides a high-level description of program achievements as compared to the original goals.

Engage Multi-family Building Owners

The EUCSDC Program aimed to engage multi-family building owners to participate in the program, and had a goal of upgrading 1,000 multi-family dwelling units by May 30, 2012, improving energy efficiency in each building by a minimum of 10% as compared to pre-upgrade existing building conditions. This was particularly challenging, given that the EUCSDC program was unable to offer financial incentives to building owners. The program instead relied on SDG&E's whole-house rebates offered through a multi-family pilot program, the City of San Diego's "San Diego Home Energy Upgrade" rebates available only to low- and moderate-income properties, and the City of Chula Vista's "Home Upgrade Energy Downgrade" rebate program.

SDG&E launched their multi-family pilot program ahead of schedule and in advance of the other Investor-Owned Utility Companies (IOUs), in order to leverage the EUCSDC outreach efforts. This allowed them to jump-start their program and also set an example for the other IOUs in California.

This collaboration of programs, unprecedented in the region, was highly successful in terms of influencing building owners to upgrade their properties with layered programs and rebates. However, each of the above-mentioned leveraged programs had different program policies, requirements, and deadlines, which made meeting the EUCSDC deadline for retrofit completion difficult. Additionally, cost effectiveness of program participation for many building owners was challenged due to limited incentives (outside the cities of Chula Vista and San Diego), health and safety requirements imposed by SDG&E, and a mild climate zone.

Given that the EUCSDC program was dependent on the SDG&E, City of San Diego, and City of Chula Vista programs to meet the 1,000 dwelling unit goal, the multi-family team pushed to have as many dwelling units as possible assessed and enrolled in these programs before the contract end date. By the May

deadline, 1,698 dwelling units on 29 properties were audited. Of these, 1,151 dwelling units are in the SDG&E, City of San Diego, and City of Chula Vista pipelines, with planned upgrades in 2012. The majority of the remaining 547 dwelling units are still considering upgrades, but have not yet submitted program applications. Of the dwelling units enrolled in the SDG&E and city programs, 556 dwelling units actually completed upgrades before the contract deadline of May 30, 2012.

Train and Support HERS Whole-house Raters

The multi-family implementation team supported development of the HERS Whole-house Rater program through:

- Development of multi-family audit, energy modeling, and verification protocols
- Curriculum development and training delivery for multi-family HERS Raters
- Design assistance and HERS Rater support and mentorship

Audit, Assessment, and Verification Protocols

Using California's HERS Whole-house program as a basis, HMG developed multi-family-specific energy assessment, energy modeling, and verification protocols. These protocols were vetted through and adopted by the Home Energy Retrofit Coordinating Committee multi-family subcommittee (MF-HERCC) for the purpose of consistency statewide. The protocols draw from best practices from across the country, with consideration for California building and system types, climate zones, and the Title 24 Part 6 Building Energy Efficiency Standards.

Under the EUCSDC program, the protocols were piloted on more than 1,700 dwelling units (consisting of 120 buildings and 33 unique properties), assessed by HMG, CalCERTS, and participating HERS Raters. Based on this experience, as well as experience from other EUC multi-family pilots in Alameda, Los Angeles, and Sacramento, HMG composed a report of proposed changes to the HERS Regulations and HERS Technical Manual for Energy Commission consideration.

Energy Upgrade Multi-family Rater Training

CalCERTS, HMG, and EnergySoft collaboratively developed curriculum for a 5-day multi-family HERS Rater training course. The curriculum is based on the assessment, energy modeling, and verification protocols described above. Four trainings were offered to certified HERS Whole-house Raters. Most of the HERS Raters attending the training were inexperienced with multi-family buildings, and had less than a year of experience using building energy modeling software. This made the learning curve very steep, and resulted in a lot of mentorship as HERS Raters completed analyses on participating properties. The program ultimately had five (5) active HERS Raters who performed 72% of the property energy assessments reported in the Multi-Family Building Assessments and Upgrades section of this report.

Develop Tools and Best Practices

The multi-family team created, tested, and/or improved a number of tools and resources to facilitate the energy upgrade process, including the Funding Finder (Navigation Tool), CalRatePro energy modeling software, California Utility Allowance Calculator (CUAC), energy management guidelines, and a tenant newsletter.

The Funding Finder tool, referred to as the Navigation Tool in the contract Scope of Work, allows property owners to conduct a high-level assessment of their portfolio of properties. With some basic property information, the tool guides them to upgrade measure opportunities, upgrade approaches, and appropriate rebate programs and resources for improving each property. Through collaboration with StopWaste.Org, the tool was also integrated with the Portfolio Tracker tool, which allows multi-family building owners to track buildings or portfolios of buildings as they go through the upgrade process. HMG held four (4) workshops three (3) in-person trainings to introduce building owners and asset managers to these tools.

HMG and the MF-HERCC identified issues and recommended improvements to the existing residential building module of EnergyPro to better address building characteristics and possible energy efficiency upgrades in multi-family buildings. CalRatePro is the energy modeling software certified by the Energy Commission to be used for conducting whole-house ratings. Many of the perceived barriers to whole-building energy assessment of multi-family buildings lay within the energy modeling software. Issues that could be improved without amendment to the Title 24 Part 6 Alternative Compliance Manual (ACM) or the Title 20 HERS Technical Manual were addressed through changes to the software, while others were noted for future consideration.

HMG piloted the CUAC on individually metered affordable housing properties that completed upgrades under the EUCSDC Program. The list of eligible properties was quite small. Additionally, the low utility costs in the mild coastal climate in San Diego caused us to question whether project-specific utility allowance adjustments will be large enough to justify the cost of the assessment. This is discussed in more detail in the “California Utility Allowance Calculator” section.

To encourage energy savings beyond the one-time building upgrades completed under EUCSDC, energy management guidelines and a tenant newsletter will be distributed to each program participant in June 2012. The energy management guidelines offer tips on maintaining existing building systems for energy efficiency, identifying and correcting inefficiencies, and conserving energy on an ongoing basis. The tenant newsletter introduces the tenants at each participating property to the upgrades completed, and offers energy conservation tips for reducing lighting and plug loads and water use.

III. MULTI-FAMILY PROGRAM: ACCOMPLISHMENTS

Multi-family Assessment and Verification Standards

HMG developed audit, energy modeling, and verification protocols for the purpose of extending the HERS Whole-house program to multi-family buildings. These protocols were taught to participating Whole-house Raters through the Energy Upgrade Multi-family Rater training and piloted in the EUCSDC and the SMUD Home Performance Program – Multi-Family (HPP-MF). These protocols were tested and improved as the programs progressed through the assessments on more than 12,000 dwelling units, and as a result of the improvements to the modeling software, CalRatePro was able to model low-rise multi-family buildings with a higher level of consistency and credibility.

Assessment and Verification Protocols

Prior to contract execution, HMG developed a set of standards and protocols for HERS Whole-house multi-family assessment and verification. These protocols were vetted and recommended by the MF-HERCC for statewide use. The protocols were incorporated into the Energy Upgrade California™ Multi-family Rater Training curriculum.

Energy Modeling Protocols

Consistent with HERS Regulations, the EUCSDC Multi-family Program utilized the CalRatePro module of the EnergyPro software to qualify low-rise multi-family upgrade projects for program participation and estimate energy savings resulting from energy upgrades. For high-rise projects, the Nonresidential Title 24 Part 6 Performance module of EnergyPro was used. HMG worked with EnergySoft to identify interim workarounds and long-term changes to the EnergyPro Tool, specific to multi-family energy modeling, for both low-rise and high-rise multi-family buildings. HMG coordinated with other multi-family programs statewide through MF-HERCC HERS II Task Group meetings, identifying and addressing issues associated with the tool. EnergySoft adjusted the “Alterations” tab in EnergyPro to address many of the issues identified. Issues which could not be solved by simple adjustments to the software, and required adjustments to the ACM Manual, HERS Regulations, or HERS Technical Manual, were recorded and included in the report to the Energy Commission of HERS Whole-house program recommendations.

Additionally, HMG drafted an energy modeling guidelines document to assist HERS Raters in modeling multi-family buildings. The guidelines were reviewed by EnergySoft and will be distributed to all participating Raters for continued use in the SDG&E pilot program.

Participating HERS Raters were trained by EnergySoft, through the Energy Upgrade California™ Multi-family Rater training, on energy modeling, and received firsthand experience practicing energy modeling through the training.

Workforce Development

The multi-family team developed the HERS Rater workforce to serve the multi-family upgrade market through curriculum development and delivery of a 5-day Energy Upgrade Multi-family Rater training, as well as ongoing mentorship and support to Raters submitting upgrade projects to the EUCSDC program.

Energy Upgrade Multi-family Rater Training

HMG, CalCERTS, and EnergySoft collaborated to develop curriculum for equipping certified HERS Whole-house Raters with the knowledge and skills needed to audit, assess, offer recommendations, and verify proper installation post construction on multi-family upgrade projects. The curriculum built upon and proposes to expand the HERS Regulations and expanded the skills of existing HERS Whole-house Raters. Curriculum also included applicable portions of the Building Performance Institute (BPI) Building Analyst, Envelope, and Multi-family Analyst trainings. CalCERTS advertised the Energy Upgrade™ Multi-family Rater training through direct e-mail to all certified HERS Whole-house Raters. The training combined classroom learning, hands-on exercises, and field training approaches.

Four (4) five (5)-day Energy Upgrade Multi-family Rater trainings were completed, training a total of 49 people. The training agenda was as follows:

Day 1: Program overview and multi-family audit and assessment protocols

- Day 2: Multi-family building systems
- Day 3: Field practice audit
- Day 4: Energy modeling
- Day 5: Review and exam

Following each training the curriculum and exam were updated, based on exam results and trainee feedback. Trainees unable to pass the test the first time were invited to retest at HMG’s office. Of six (6) HERS Raters that failed the exam initially, three (3) requested to retake it and passed.

Training Dates	Number of Attendees	Number Qualified to Serve the EUCSDC Program
May 2-6, 2011	22	13
Sept. 12-16, 2011	9	5
Dec. 5-9, 2011	8	6
May 14-18, 2012	10	2
Total	49	26

Figure 4: Multi-family HERS Rater Trainings

The program had 49 trainees, although some attendees were part of the administrative, implementation, or quality assurance team, and others had not yet earned HERS Whole-house certification (a prerequisite), so were not eligible to serve the program. Additionally, because the fourth training was conducted so late in the program, HERS Raters that attended that training were not able to participate in the EUCSDC program, but will be eligible to serve the SDG&E and City of San Diego programs moving forward. Five (5) of the HERS Raters trained in the program secured work on multi-family projects as a direct result of the training, and submitted projects to the EUCSDC program. Two (2) of the five (5) active Raters moved on to full time positions in program implementation or quality assurance/quality control for San Diego energy efficiency programs. Many trainees that did not become active HERS Raters in the program served the EUCSDC program in other ways (with some overlap):

- Program administration and implementation (8)
- EUC multi-family trainers (6)
- Health and safety testing (2)
- SDG&E quality assurance/quality control (2)

Rater Mentorship

CalCERTS and HMG provided mentoring and ongoing technical support to HERS Whole-house Raters that graduated from the multi-family training program. This included accompanying the graduate on multi-family audits, upon request, to ensure that the graduate understands the protocols and can effectively and accurately implement the training. HMG also offered support through phone and e-mail correspondence to help raters through the assessment and verification processes. This mentorship was especially crucial for the majority of the professionals trained that had limited or no experience working with multi-family buildings, performing energy modeling, and developing energy upgrade recommendations. Overall, Raters found that this mentorship was one of the most valuable components of the program.

Project ID	No. of Dwelling Units	Site Visit	Energy Modeling Assistance	Assessment Review	Design Assistance	Health and Safety Testing
1014_11_010	198	X	X	X	X	X
1014_11_015	119		X	X	X	X
1014_11_001	60	X	X	X	X	X
1014_11_017	52		X	X	X	X
1014_11_044	13		X	X	X	X
1014_11_033	81	X	X	X	X	
1014_11_052	5		X	X	X	X
1014_11_049	64		X	X	X	
1014_11_004	76	X	X	X	X	X
1014_11_043	37		X		X	X
1014_11_006	60	X		X	X	
1014_11_005	108	X	X	X	X	
1014_11_016	100		X	X	X	
Total	973	6 Projects	12 Projects	12 Projects	13 Projects	9 Projects

Figure 5: Project Rater Assistance

Additionally, CalCERTS was able to use contract funding to provide no-cost health and safety testing, as was required on all participating projects leveraging SDG&E rebates. Only approximately 30% of the trained Raters hold the required BPI Multi-family Building Analyst certification. Many of the qualified Raters were not comfortable with the BPI health and safety scope, and building owners were concerned about the added cost of the testing. This presented an opportunity for CalCERTS to educate the HERS Whole-house Rater serving each project, while also making the SDG&E program more accessible and cost effective for the participants.

Project ID	DHW units tested	In-unit gas appliances tested	Central heating systems tested	Issues uncovered and actions taken
1014_11_001	8	N/A	N/A	Gas leaks found at newly installed DHW units. Fixed immediately by installer.
1014_11_004	3	76	N/A	Range top/stove gas leaks and high CO readings found. Recommendations made to fix gas leaks and clean stove and range top. Majority of issues resolved.
1014_11_010	2	N/A	1	Central heating system was serviced.
1014_11_015	3	N/A	N/A	One gas leak found at newly installed DHW unit. Fixed immediately by installer.
1014_11_017	2	N/A	N/A	One gas leak found at newly installed DHW unit. Fixed immediately by installer.
1014_11_043	NA	N/A	N/A	Gas leaks detected at test in. Property owner advised.
1014_11_044	1	13	N/A	Range top/stove gas leaks and high CO readings found. Recommendations made to fix gas leaks and clean stove and range top. Majority of issues resolved.
1014_11_052	4	4	N/A	High readings on range/stove units. Property owner replaced two range/stove units. Test out results

				indicated that two wall heaters required servicing. Recommended servicing.
Total	23	93	1	

Figure 6: Combustion Safety Testing

Job Creation on Multi-family Project Team

In addition to job training, jobs were created within the multi-family implementation team. Heschong Mahone Group and CalCERTS both hired permanent staff to assist in the implementation of the program. HMG acquired one additional employee to work full time on the EUCSDC program, and two others to work part time on the EUCSDC program. CalCERTS hired one additional employee for the purpose of completing combustion safety testing on participating properties. This testing kept the new CalCERTS employee occupied for approximately 30% of the time between February and May 2012.

Tool and Resources Development

The multi-family team created, tested, and/or improved a number of tools and resources to facilitate the energy upgrade process, including the Funding Finder, CalRatePro software extension, California Utility Allowance Calculator (CUAC), energy management guidelines, and a tenant newsletter.

Funding Finder (Navigation Tool)

Under EUCSDC, and funds leveraged from the Association of Bay Area Governments (ABAG) State Energy Program (SEP), HMG developed specifications for an online web tool to help building owners navigate multi-family energy efficiency upgrade opportunities and programs. The Funding Finder tool, hosted by the Multi-family Energy Upgrade website at multi-family.energyupgradeca.org, assists multi-family building owners in identifying energy upgrade opportunities, and determining which upgrade approaches and programs should be pursued for each property. The tool:

- Guides building owners to programs and resources to help them make the best decisions about energy efficiency investments
- Steers properties with deeper energy savings opportunities to multi-family whole-building programs such as EUCSDC, which require hiring a HERS Whole-house Rater to more deeply assess the building through audit and analysis, and provide recommendations to the building owner
- Encourages all properties to take some action, even if the whole-building approach is not appropriate
- Encourages ongoing energy management by educating building owners and promoting subsequent annual assessments through creation of a user account with log-in for return visits and project tracking
- Helps to minimize confusion about which program is best for their projects
- Cross-promotes and fosters coordination among programs that target the multi-family market
- Sharpens building managers' awareness of building characteristics and systems, and their replacement history through basic data collection of existing building components and vintages (year installed or last replaced)
- Provides information on collaborative programs in the region

HMG conducted four (4) workshops to demonstrate tool access and use (see Figure 7 for workshop details). These workshops were done in conjunction with StopWaste.Org, who presented the

supplementary Portfolio Tracker Tool. While the Funding Finder tool assists building owners in finding the appropriate upgrades and programs, the Portfolio Tracker tool is used for energy assessment and upgrade tracking once properties have enrolled in a whole-building program, such as Energy Upgrade California.

Event Name	Date	Location	Number of Attendees
Multi-family Asset Management Tools Workshop	5/3/2012	Oakland, CA	22
Multi-family Asset Management Tools Workshop	5/16/2012	San Diego, CA	5
National Association of Housing & Redevelopment Officials (NAHRO) Spring Conference	5/21/2012	Monterey, CA	6
Multi-family Asset Management Tools Workshop	5/22/2012	Webinar	21
Total	4 Workshops		54

Figure 7: Funding Finder Workshops

The webinar was recorded and posted on the HMG website at www.h-m-g.com/multi-family. The workshops were promoted by e-mail announcements through HMG’s database of approximately 5,000 multi-family professionals (including: building owners, asset managers, contractors, green/energy consultants, and HERS raters). The San Diego Housing Federation also posted an announcement in the events section of their website. StopWaste.Org promoted the event through their marketing channels, including the Green Affordable Housing Coalition. Attendance demographics are outlined in Figure 8.

Profession	% Total
Owners (development, asset management, property management)	43%
Consultants (energy consultant, green consultant, HERS Rater)	33%
Other (local government, program implementer, marketing)	24%

Figure 8: Workshop Attendee Demographics

The Funding Finder tool was well received by workshop attendees. In summary, attendees provided the following feedback:

- Tool is easy to use and provides useful high-level information on opportunities and financing programs
- Consultants see the tool as a useful first step to providing their clients with direction on prioritizing upgrades to their portfolio of properties (based on need and availability of rebates)
- Property owners see the tool as an aid in managing their portfolio and navigating applicable programs

The live demonstration of the Funding Finder tool at these workshops also provided an opportunity to identify areas for improvement, including:

- *The ability to change the user login information.* Currently the tool only allows a single user login. Therefore, if multiple users want to view or enter a portfolio, they need to share logins. This is especially important for consultants that enter multiple client projects. To ensure data security, each client’s portfolios need to be entered under a separate account to ensure that the appropriate information remains private. Also, there is not currently the ability to change the login information. Thus, if an individual leaves the company or the primary contact changes, the old login must be used.
- *The ability for utility or other program administrators to view user contact information for recruitment purposes.* Currently, the tool relies on the user inputting the property information to take action and call recommended program administrators. Both administrators and users indicated interest in adding

a contact release function which would allow program administrators to contact eligible properties. The utilities would also like to expand on this functionality to alert users of special promotions or new programs as they become available.

- *The ability for program administrators to add or edit their program descriptions.* Currently the tool is maintained by StopWaste.Org (and will continue to be maintained through the end of 2012). Utilities expressed interest in having the ability to edit and add programs to the tool as they are updated or released.
- *Improve language of some questions in the tool.* There is confusion regarding the intent of the 'planned upgrades' section as well as the definition of 'income qualified' and 'common area.' The attendees suggested providing clarification of these terms on the tool website.
- *Review default assumptions in the drop down lists.* A few of the drop down default values assume higher efficiency existing conditions than are common (such as assuming that bathroom fans installed in dwelling units are ENERGY STAR). The attendees suggested reviewing these default assumptions.
- *Align more fields between Funding Finder and Portfolio Tracker.* Currently the tool imports some basic information from Funding Finder into Portfolio Tracker. There is an opportunity to align more of these fields to be imported, such as building system information (i.e. water heating, heating, cooling, etc).

In order to ensure longevity of the Funding Finder post ARRA funding, HMG also engaged the California Public Utilities Commission (CPUC) and IOUs through webinar demonstrations, with the goal that the IOUs will fund tool maintenance and development of additional functionality. The CPUC and the IOUs are interested in the tool and further discussion will follow.

HMG, with StopWaste.org and Renewable Funding, also explored possible integration with the CPUC's Engage 360. However, the CPUC abandonment of Engage 360 halted this investigation.

CalRatePro Software Development

As described above, HMG lead the HERS Whole-house task group of the MF-HERCC to guide the development of, and improvements to, an energy modeling tool in-line with HERS Whole-house regulations. The group identified barriers, gaps and limitations in the existing CalRatePro tool while using the tool for multi-family building energy modeling, including:

- Multi-family energy efficiency measures not already available in the tool as alternatives, including some types of central systems and controls
- Interface issues that do not allow for proper entry of building data for multi-family buildings, including the use of dwelling unit multipliers to apply average lighting and appliance conditions to all modeled dwelling units
- Assumptions based on single-family homes that are unsuitable for calculating multi-family building use, such as building air sealing levels, presence of dishwashers, and laundry energy loads per occupant

The issues identified were sorted into three groups:

1. Immediate changes for the tool to be useable for multi-family buildings
2. Short-term changes to be incorporated over the course of this program
3. Long-term changes that require revisions to the Residential and Nonresidential ACMs published with the 2008 Title 24 Part 6 Building Energy Efficiency Standards, HERS Regulations, and HERS Technical Manual.

EnergySoft made improvements to the CalRatePro module of the EnergyPro software to address immediate needs and wish list items, where possible. Long-term recommended changes are included in the “California HERS Multi-family Whole-Building Regulations Proposal” also being developed under this contract. The table below summarizes the key changes proposed.

Change	Status
Additional features added to “Alternatives” tab to avoid 2-model approach	Complete. There may be future changes.
Creation of an ECON-2 report to show Site and TDV savings side-by-side, per measure and cumulatively	Complete. Possible next step to integrate rebate calculation.
Include operational analysis to account for unregulated loads and better calibrate models to actual usage (lighting wattage, elevators, laundry rooms, etc.)	Requires changes to HERS Technical Manual
Revise appliance assumptions and defaults to better represent existing multi-family buildings, including: <ul style="list-style-type: none"> • Refrigerator efficiency • Presence or absence of a dishwasher • Laundry loads (when located elsewhere on the property) • Pipe insulation, when none is present • Water heater insulation wrap, when less than default values 	Requires changes to HERS Technical Manual and/or ACM Manual
Revise credits for demand controls on recirculation pumps.	Requires changes to the ACM
Revise standby loss input to be a btu/hr value.	Could still be consistent with ACM Manual, but calculation within EnergyPro, to avoid user error. May require Energy Commission approval.
Develop whole-building ratings.	Requires changes to HERS Technical Manual and HERS Regulations.

Figure 9: Summary of Suggested Changes to the EnergyPro Software Modules

California Utility Allowance Calculator (CUAC) Pilot

Federal housing regulations cap affordable housing costs or “housing burden” (rent and utilities) at 30% of the household’s adjusted monthly income. The amount a household is expected to pay for utilities is called the “utility allowance.” To estimate utility costs, each local public housing agency (PHA) is tasked with determining a utility allowance. Because the housing burden includes both rent and utilities, the rent that property owners receive is determined by the difference between the total housing burden and the estimated utility costs.

$$\text{Housing Burden (30\% of adjusted income)} - \text{Utilities} = \text{Rent.}$$

If a utility allowance can be reduced to reflect installed energy efficiency measures, a building owner may be able to lower tenant utility bills and increase rents without increasing the tenant’s total housing burden. The utility allowance applies to individually metered units.

Typically, utility allowances are set by the local public housing authority and are an average allowance based on information about energy usage for the region’s housing stock. One average utility allowance is applied to all properties ranging in vintage and efficiency. An alternative is a project-specific utility allowance, which is intended to reflect the efficiency/energy use of a specific property.

The California Utility Allowance Calculator (CUAC) tool is designed to calculate project-specific utility allowances for low income (affordable) housing projects. CUAC is currently only available to new construction and gut rehabilitation projects. To test the tool, HMG piloted the CUAC on each eligible project completing upgrades under the EUCSDC program. The purpose of the exercise was to demonstrate the applicability of the CUAC as a means for building owners to recover costs associated with energy upgrade projects, by allowing rents to be increased. Because projects must be affordable housing and individually metered to have a utility allowance, the number of projects we were able to run the analysis on was limited. Results are reported in the table below.

Project ID (1014_11_)	Unit Type	Savings from Existing Conditions (All Fuel)	Climate Zone	Existing Monthly Utility Allowance (Electric)	Proposed Monthly Utility Allowance (Electric)	Existing Monthly Utility Allowance (Gas)	Proposed Monthly Utility Allowance (Gas)	Expected Total Monthly Savings
015	1-Bdrm	12.45%	CZ 07	\$29	\$23.17	\$9	\$8.57	\$6.26
015	2-Bdrm			\$38	\$24.09	\$12	\$9.72	\$16.19
015	3-Bdrm			\$46	\$53.19	\$15	\$12.90	-\$5.09
017	1-Bdrm	18.87%	CZ 10	\$29	\$20.84	\$9	\$10.46	\$6.70
017	2-Bdrm			\$38	\$27.42	\$12	\$12.67	\$9.91
017	3-Bdrm			\$46	\$36.54	\$15	\$15.42	\$9.04
049	1-Bdrm	20.75%	CZ 07	\$13	\$5.95	\$14	\$20.88	\$0.17
049	2-Bdrm			\$17	\$5.15	\$18	\$14.78	\$15.07
049	3-Bdrm			\$21	\$5.30	\$22	\$14.60	\$23.10

Figure 10: CUAC Pilot Results

Energy Management Guidelines

HMG developed energy management guidelines for building owners and managers to encourage post-upgrade and ongoing energy management through proper operations and maintenance of their buildings. The guidelines include current best practices to implement energy management, and are designed to inform building owners whether energy upgrades are planned, underway, or not yet being considered. The document includes the following:

- Benefits of energy management
- Building science basics, including envelope, mechanical system and water topics
- Data management, including utility data collection, usage logs, maintenance/service logs, and evaluating building performance
- Maintenance and capital improvements, with subheadings for a list of multi-family building systems
- Health and safety with combustion safety focus
- Checklists for Building owner / manager maintenance tracking

The guidelines will be distributed to all participating property owners, and also posted on HMG's website at: http://www.h-m-g.com/multifamily/experience/ACI-CA_Multifamily_Health&Safety_06082012.pdf.

Tenant Newsletter

Strategic Energy Innovations (SEI) developed a resident energy education strategy to motivate residents to become active stewards of their energy and water use. The strategy provided two levels of service under the EUCSDC program, resulting in:

- A tenant education newsletter for each participating property owner or manager to distribute to tenants
- An Interactive Energy Display (IED) for deployment on five (5) properties participating in the multi-family program. The display is portable and can be taken to the select sites at an optimal time or special event to engage residents. The display features technology and behavior strategies to reduce lighting, plug load and water use

Tenant newsletter was distributed at one property, and will be distributed at five (5) additional properties in June, 2012 representing 556 dwelling units in all. The first newsletter was distributed in conjunction with the IED set-up and provoked conversations about a number of energy conservation topics not specifically addressed by the IED. No further feedback has yet been received.

Though each participating property owner was offered the option to have the IED onsite, only one expressed interest and hosted the display. The one property that hosted the display was the first to complete upgrade construction in the program. The display drew interest from the senior community and many brought their own light bulbs and appliances to compare brightness and energy use with the IED. Some feedback received from the participating tenants and property management suggested that a larger event (workshop or presentation) with food would draw a larger crowd. The display alone attracted approximately 20 people over the course of an hour.

The other five (5) properties that completed construction by the May 30, 2012 deadline were all still under construction in the month of May, and were not interested in hosting any kind of event until the project was complete, so not to get in the way of construction.

Marketing

HMG's marketing efforts focused on building owner meetings; presentations at industry meetings, conferences, and workshops; and direct e-mail. Contacts were culled from HMG's existing database. The San Diego Housing Federation (SDHF) and San Diego County Apartment Association (SDCAA) marketing channels were also utilized to market the program. The program collaboration with SDG&E, the City of San Diego, and the City of Chula Vista allowed for cross-promotion as well. HMG's modest marketing budget favored electronic marketing, and mass publications (magazines and program ads), where a single ad could reach many people with little or no cost for materials or printing.

The success of HMG's marketing strategy was due to the leveraging of existing relationships within the affordable housing industry. In particular, the SDHF channel allowed HMG to touch nearly every affordable housing owner in San Diego County. Funds leveraged from the City of San Diego program paid SDHF to assist in marketing and event coordination. HMG also had many affordable housing contacts through implementation of the "Designed for Comfort" rate payer funded program. While HMG made substantial effort through SDCAA to reach market rate owners, the participation of market rate properties was much lower.

Marketing Materials ("Collateral")

HMG, with graphic design assistance from DeMarco Designs, developed a variety of marketing materials, both in print and electronic formats. The marketing collateral developed under EUCSDC is summarized in

the table below. Of the listed marketing collateral, e-mail blasts and magazine ads attracted the majority of participants, and were also the lowest cost per person reached.

Description	No. Created	Estimated Distribution
Pull-up banner	2	10 events, approximately 500 people
Table cloth	1	2 events, approximately 100 people
Brochure/Circle Card	2	500 (at marketing events)
E-mail Blasts	8	5,000 total (SDHF members, HMG database, SDAA members) ¹
Tenant door hangers	1	76 tenants
Conference program/magazine ads	3	8 publications, total of 13,000 people

Figure 11: Marketing Collateral

Additional statewide multi-family marketing materials for EUC were created by MIG. These included a multi-page brochure, program fact sheet, tri-fold brochure, tablecloth, case study, and a set of three (3) pull-up banners. HMG participated in conference calls with MIG and the other multi-family program implementers in California to offer guidance and feedback on the materials. Because the materials weren't completed until March 2012, they were used very little in the EUCSDC program but will be used in the continuation of the SDG&E and City of San Diego programs (through the end of 2012).

Events

HMG participated in various events to market the EUCSDC program and recruit participants. These are listed in the table below.

Event	Location	Date	Type
Affordable Comfort Institute (ACI) Conference	San Francisco, CA	3/30-31/2011	Session presentation
Housing California Conference	Sacramento, CA	4/27-28/2011	Exhibit, presentation
San Diego County Apartment Association (SDCAA) Expo	San Diego, CA	6/8/2011	Exhibit
SDCAA Workshop	San Diego, CA	7/12/2011	Presentation
SDCAA Luncheon	San Diego, CA	7/14/2011	Presentation
SDCAA Workshop	San Diego, CA	7/21/2011	Presentation
SDCAA Workshop	San Diego, CA	7/26/2011	Presentation
Chula Vista Property Manager's Meeting	Chula Vista, CA	7/27/2011	Presentation
Building Performance Institute (BPI) Multi-family Analyst Training	San Diego, CA	8/1/2011	Presentation
Multi-family Buildings Conference	Chicago, IL	8/8-10/2011	Session presentation
Affordability through Sustainability	San Diego, CA	9/16/2011	Exhibit, presentation
SDCAA Golf Classic	Coronado, CA	9/22/2011	Exhibit
SDCAA Workshop	San Diego, CA	10/12/2011	Presentation
San Diego Housing Federation (SDHF) Annual Conference	San Diego, CA	10/13/2011	Exhibit, session presentation
California Association of Building Energy	San Diego, CA	10/20/2011	Exhibit, session presentation

¹ This number has already been rounded down to the nearest 1,000 in order to account for overlap in the distribution lists, but is still an estimate. The number of overlapping subscribers is unknown.

Consultants Conference			
SDCAA Workshop	San Diego, CA	10/25/2011	Presentation
SDHF Holiday Party	San Diego, CA	12/1/2011	Networking
SDHF Roundtable	San Diego, CA	1/2/2012	Presentation
Grand Reopening Sorrento Tower	San Diego, CA	3/22/2012	Press event
Housing California Conference	Sacramento, CA	4/12/2011	Session presentation
ACI Conference	Sacramento, CA	6/5-6/2012	Session presentation

Figure 12: Marketing Events

Multi-Family Building Assessments and Upgrades

This section explains the program process and achievements at each process step, broken down as follows:

- Prequalification
- Energy Assessment
- Upgrade Construction
- Verification and Quality Assurance/Quality Control

Prequalification

Through the prequalification form, building owners interested in the program submitted basic property information including:

- Property vintage and upgrade history
- Building characteristics
- Mechanical system types and vintages
- Upgrade plans and budget

HMG used this information to assess whether upgrade opportunities and available budget for a property are enough to feasibly reach at least a 10% improvement threshold. This screening process controlled the volume of program dropouts due to a lack of cost effective upgrade or financing options. Properties that were not a good fit for the EUCSDC whole-building approach were directed to more applicable programs, such as the Multi-family Energy Efficiency Rebate (prescriptive or one measure) programs.

HMG received prequalification forms for 3,248 dwelling units (66 properties).

Energy Assessment

Once prequalified for the program, HMG instructed the building owner to form an agreement with a HERS Whole-House Rater from the list of Energy Upgrade California™ qualified HERS Raters.

The Rater completed an energy assessment of the building or buildings, per program assessment and energy modeling protocols, developed by HMG and taught in the Energy Upgrade Multi-family Rater Training. During the assessment stage, HMG served as liaison for interaction between the building owner and HERS Rater as necessary to clarify program requirements and encourage forward progress. The CalRatePro software includes cost analysis features that rank measures by cost effectiveness and report estimated annual cost savings, based on the energy savings estimates, upgrade costs, and utility rates. These outputs were included in the assessment the HERS Rater delivered to the program participant. Once the upgrade scope had been finalized with the property owner, the HERS Rater submitted their assessment forms, property photos and building energy models for HMG review.

Building assessments were submitted for 1,715 dwelling units (30 properties). For many upgrade projects, completion by the May 30th EUCSDC deadline was not possible. A typical upgrade project, from the time program interest is expressed through construction completion, takes nine (9) months to a year, so the program timeline was too tight. These property owners completed assessments with the intent of enrolling in SDG&E's Whole-Building pilot program or the City of San Diego Home Energy Upgrade Program, as both offer rebates to help offset some of the costs of energy upgrades. Of all of the properties assessed, only two (77 dwelling units total) decided not to proceed with upgrades.

Ten (10) of the properties (315 dwelling units) assessed are under County ownership or oversight. These properties were unable to complete upgrades through the EUCSDC, SDG&E, or City programs in 2012, but were assessed by CalCERTS to jump-start planning for upgrades in 2013 or beyond.

Six (6) properties (400 dwelling units) qualified for assessment rebates through the EUCSDC program. The property owners were interested in enrolling in the SDG&E and/or City of San Diego programs, but were unable to complete construction before May 30, 2012.

The table below shows the 1,141 dwelling units that completed assessment through the EUCSDC program, but could not reach retrofit completion by the program deadline.

Project ID	No. of Dwelling Units	Project Status	HERS Rater Rebates	Notes
1014_11_052	5	Notice to Proceed		Assessed before 5/14/2012
1014_11_044	13	Notice to Proceed		Assessed before 5/14/2012
1014_11_004	76	Assessment Review		Assessed before 5/14/2012
1014_11_043	37	Assessment Review		Assessed before 5/14/2012
1014_11_016	100	Assessment		Assessed before 5/14/2012
1014_11_006	60	Assessment		Assessed via Multi-family Rater Training
1014_11_005	108	Assessment		Assessed via Multi-family Rater Training
1014_11_002	17	Assessment		Assessed via Multi-family Rater Training
1014_12_056	24	Assessment		Property assessed by CalCERTS
1014_12_057	59	Assessment		Property assessed by CalCERTS
1014_12_058	16	Assessment		Property assessed by CalCERTS
1014_12_059	38	Assessment		Property assessed by CalCERTS
1014_12_060	12	Assessment		Property assessed by CalCERTS
1014_12_061	92	Assessment		Property assessed by CalCERTS
1014_12_062	5	Assessment		Property assessed by CalCERTS
1014_12_063	25	Assessment		Property assessed by CalCERTS
1014_12_064	24	Assessment		Property assessed by CalCERTS
1014_12_065	20	Assessment		Property assessed by CalCERTS
1014_11_011	67	Assessment	\$ 10,050	
1014_11_012	68	Assessment	\$ 10,200	
1014_12_067	19	Assessment	\$ 2,850	
1014_12_066	7	Assessment	\$ 1,050	
1014_11_046	77	Assessment	\$ 10,350	Rebates for 69 of 77 units

1014_12_055	172	Assessment	\$ 25,500	Rebates for 70 of the 172 units
Total	1,141		\$ 60,000	

Figure 13: Properties Assessed but Not Upgraded before Program Deadline

HMG conducted a comprehensive review of each assessment prepared by Raters, prior to enrollment, for each upgrade project as follows:

- Reviewed existing conditions and energy calculation files from the HERS Rater
 - Existing conditions have been modeled correctly and accurately per the data collected by the HERS Rater during energy assessment.
 - Proposed upgraded conditions have been modeled correctly
 - Energy savings are at least 10% of existing baseline conditions.
 - Evaluate energy savings (kW, kWh, and Therms)
- Offered design assistance to suggest measures that would enhance energy savings or assist in meeting program criteria in case project details have been mischaracterized or insufficient energy savings are modeled.
- Notified the HERS Rater once the energy models were approved.

HMG confirmed the upgrade project’s eligibility, finalized review of required documentation, and enrolled the customer. Once enrolled, HMG sent the upgrade project installation team a Notice to Proceed (with upgrade construction) letter with a project-specific list of upgrade measures and specifications approved for program participation.

Nine (9) properties (668 units) made it through the assessment review process prior to the May 30th deadline.

Upgrade

Program participants selected their own installation contractors, and agreed to third-party verification and testing HMG included within the building owner application, terms and conditions which established post-upgrade data collection and documentation to ensure that the following ARRA flow-down requirements were met:

- Waste Management Plan requirements
- Buy America requirements, if applicable
- Historic Preservation Act, if applicable
- Conformance with California Law

Because the EUCSDC program did not offer rebates or fund the energy upgrades in any way, the program participants were not subject to Davis-Bacon or Prevailing Wage requirements.

HMG remained in close contact during upgrade installation, through weekly team meetings, to verify that the upgrade project was moving forward. HMG maintained a project tracking database to track project status, contacts, upgrade measures, and energy savings.

Verification and Quality Assurance (QA)

Upon construction completion, the EUC Multi-family Rater for the project returned to the site to verify that the upgrades listed on the ‘Notice to Proceed’ letter were installed to the appropriate specifications. Energy modeling adjustments were made as necessary to match the final energy model to the upgraded

conditions. HMG reviewed the final energy models and compared them against submitted photos of the upgrade conditions to verify energy savings. As per program requirements, on 10% of projects HMG also conducted a quality control (QC) site visit to verify that the existing conditions matched that reported by the Rater. HMG conducted a QC visit at project 1014_11_10 and did not find any discrepancy between what the EUC Multi-Family Rater reported and what was verified in the field. Due to the timeline with which the QC was to be completed, this 198-unit project was the only opportunity to perform the appropriate verifications and also fulfill the 10% of project verification requirement.

SDG&E’s third-party provider also conducted quality control inspections at all properties participating in SDG&E’s pilot program, as they completed construction. To-date projects 1014_11_010 and 1014_11_15 have been verified, without discrepancy.

Project ID	Number of Dwelling Units	Climate Zone	Est. TDV Savings (%)	Est. Annual kWh Savings	Est. Annual kW Savings	Est. Annual Therm Savings
1014_11_010	198	7	17.7	109,878	33.00	4,723
1014_11_015	119	7	15.8	42,458	5.49	2,266
1014_11_001	60	10	22.1	91,079	29.40	1,390
1014_11_017	34	10	33.8	77,776	19.71	(125)
1014_11_033	81	7	21.4	168,345	16.26	2,132
1014_11_049	64	7	11.7	-	-	4,594
Total	556			489,536	103.86	15,105

Figure 14: Multi-family Projects Completed and Verified

Once energy savings was verified by HMG, CalCERTS uploaded the .xml files to the HERS Registry. The average energy savings per project was 21.4%, just above our aim of a 20% average across projects.

Leveraged programs and rebates

The multi-family team leveraged multiple funding sources for the implementation of the EUCSDC program including marketing collaboration and cost sharing, tool development cost sharing, and leveraging of rebates for the execution of energy upgrades. Figure 15 describes the leveraged funds, excluding incentives; HMG subsidized through other similar efforts and are not included in the overall leveraged funds reported per EUCSDC program requirements.

Description of Leveraged Funds (Excluding Rebates)	Applicable Tasks	Amount Leveraged
ABAG SEP – Funding Finder Development	2.13M Navigation Tool	\$ 15,813
City of San Diego EECBG	All	\$ 258,073
SMUD HPP (SEP funding)	All	\$ 128,819
Total		\$ 402,705

Figure 15: Leveraged Program Funds

Sacramento Municipal Utility District (SMUD) Home Performance Program

Also implemented by HMG, SMUD-HPP offered whole-building performance-based rebates for 20% or greater improvement in building energy efficiency, over existing conditions. This ARRA SEP-funded program was a couple of months ahead of the EUCSDC program, therefore the EUCSDC program was able to leverage program design and ramp-up efforts. SMUD-HPP and EUCSDC shared multiple e-mail blasts,

and were able to cost-share marketing efforts including travel and attendance at conferences, a pull-up banner, and participation in statewide multi-family marketing collaboration with MIG.

Association of Bay Area Governments (ABAG) State Energy Program (SEP)

With the ABAG ARRA SEP-funded contract, EUCSDC shared the cost of development of the Funding Finder tool. Much of HMG's labor developing the tool logic, as well as participation in stakeholder meetings was covered by the ABAG contract. Additionally, the ABAG funding covered the cost of Renewable Funding's effort in programming the tool and integrating it with the Multi-family Energy Upgrade website.

SDG&E Whole-Building Program

SDG&E's Whole-Building multi-family pilot program, also operating under the statewide Energy Upgrade California brand, offers \$550 to \$1,500 per dwelling unit for 10 to 40% improvement in building energy efficiency. The program began ramp-up in May 2011 and will continue through December 2012.

HMG worked closely with SDG&E and SDG&E's QA contractor Richard Heath & Associates (RHA) to create a streamlined participation process through which building owners could participate in the EUCSDC program and receive rebates from SDG&E's Whole-Building Program. This included reviewing, approving, and sharing program materials, and involved a considerable amount of upfront effort to agree upon terms and program details including but not limited to, application, rater, contractor, and property qualifications, required documentation, health and safety testing requirements, and QA procedures. HMG collected all required program documentation and supplied it to SDG&E at enrollment (to reserve rebates) and completion (to pay rebates), which provided the building owner a single point of contact for both programs. HMG and SDG&E also worked to integrate the QA processes and limit "touches" (visits) to participating properties, especially dwelling units. HMG and SDG&E had ongoing communication with each other as each upgrade project passed through the program, meeting weekly to check in on the program pipeline and outstanding issues. Four EUCSDC upgrade projects (411 dwelling units) leveraged the SDG&E whole-building rebates. An additional seven properties (257 dwelling units) were recruited into the SDG&E whole-building program through EUCSDC outreach efforts but were not able to reach completion by May 30, 2012.

San Diego Home Energy Upgrade (SDHEU)

The City of San Diego aligned their ARRA EECBG-funded San Diego Home Energy Upgrade Program with the EUCSDC program and SDG&E Whole-Building programs for streamlined participation and cost sharing. The City of San Diego coordinated all marketing materials and outreach with the EUCSDC efforts. Rebates were available to participating building owners and HERS Raters. Building owner rebates ranged from \$500 per dwelling unit for 10% improvement, up to \$2,000 per unit for 40% improvement in building energy use. HERS Rater rebates began at \$50 per dwelling unit at 10% improvement and escalated to \$200 per unit for 40% improvement. The only HERS Rater rebates for multi-family properties in the San Diego region were offered by the SDHEU program, though EUCSDC did offer an assessment rebate towards the end of the program to encourage property owners to get started through the energy upgrade process.

3 EUCSDC properties (343 dwelling units) took advantage of the City of San Diego rebates, and another 8 properties (477 dwelling units) were added to the City pipeline as a result of the EUCSDC outreach efforts but did not reach completion before May 2012.

City of Chula Vista

The City of Chula Vista's ARRA Energy Efficiency and Conservation Block Grant (EECBG)-funded Home Upgrade Energy Downgrade program offered rebates to match SDG&E's Whole-House rebates for both single family and multi-family properties located within the City of Chula Vista. HMG worked with the City of Chula Vista to produce a joint marketing brochure that included information about all regionally available whole-building rebates for multi-family. One 119-unit project in the EUCSDC program leveraged the Home Upgrade Energy Downgrade rebates. HMG facilitated this participation through project status update meetings with the City of Chula Vista, as the upgrade project made its way through the program process. The property owner received \$65,450 from the City of Chula Vista for reducing their building energy use by 10%.

California Solar Initiative (CSI) Solar Thermal

The CSI-Solar Thermal program offers rebates based on the expected energy savings of new solar water heating systems installed. Currently, the program incentives are \$12.82/therm displaced and \$0.37/kWh displaced. Incentive amounts depend upon current water heating fuel source (natural gas, electricity, or propane). Multi-family buildings that heat their water with natural gas may receive a maximum incentive of \$500,000, while multi-family buildings that heat their water with electricity or propane may receive a maximum incentive of \$250,000. Increased incentives are available to low-income properties.

HMG collaborated with the CSI-Solar Thermal program to send out a joint e-mail (e-blast), and recruited several properties for upgrades under the City of San Diego program. The extended construction schedules on these properties prevented them from completing upgrades before the EUCSDC program deadline of May 30, 2012. 243 dwelling units are planned to participate in the CSI and City programs jointly as a result of EUCSDC outreach, and another 136 dwelling units are participating in both the CSI program and the SDG&E whole-building pilot program.

Energy Savings Assistance Program (ESAP)

ESAP offers no-cost energy efficiency measure and appliance repair and replacements to income-qualified residential customers. Individual tenants are eligible with approval of the property owner or manager. HMG collected Building Owner Waivers for ESAP participation on low-income program participants, encouraging building owners to go after no cost measures before beginning the Energy Upgrade participation process.

The participation process for the ESAP and whole-building programs cannot easily be streamlined for several reasons. The EUCSDC program targets property owners, while the ESAP program targets low-income residents. The programs use different outreach and qualification channels. Both programs require an audit of some type, but qualifications and procedures for performing the audit are different. Therefore, a unit will receive multiple touches by different program implementers, which can be disruptive and confusing for participants. Lastly, ESAP does not consider whole-building upgrades. The ESAP upgrades are not well integrated with the larger plans for a property, and in some cases can be installed through ESAP and then uninstalled when a property later does whole-building upgrades or rehabilitation.

To date, the program has not successfully served EUCSDC participants. None of the dwelling units met ESAP program eligibility requirements, whether due to income, prior participation, or too few opportunities for cost effective improvements (by ESAP criteria). Moving forward, the SDG&E multi-family

whole-building pilot program will continue efforts to layer the two programs, setting baseline energy use (test-in conditions) post ESAP participation for qualified projects.

Project ID	No. of Dwelling Units	Gross Cost of EE Upgrades	Est. SDG&E Rebates Leveraged	Est. City of SD Rebates Leveraged	Est. City of CV Rebates Leveraged	Est. Total Rebates Leveraged	Net cost of EE Upgrades (- Leveraged)
1014_11_010	198	\$ 1,644,048	\$ 108,900	\$ 166,320	-	\$ 275,220	\$ 1,368,828
1014_11_015	119	\$ 210,100	\$ 65,450	-	\$ 65,450	\$ 130,900	\$ 79,200
1014_11_001	60	\$ 714,389	\$ 37,500	-	-	\$ 37,500	\$ 676,889
1014_11_017	34	\$ 449,763	\$ 24,050	-	-	\$ 24,050	\$ 425, 713
1014_11_033	81		-	\$ 89,100	-	\$ 89,100	
1014_11_049	64	\$ 135,660	-	\$ 35,200	-	\$ 35,200	\$ 100,460
Total	574	\$ 3,153,960	\$ 235,900	\$ 290,620	\$ 65,450	\$ 591,970	\$ 2,651,090

Figure 16: Leveraged Funds for Energy Upgrades

On average, the net cost to the building owner for participation in the EUCSDC program was \$5,377 per dwelling unit, with gross costs ranging from \$1,765 to \$13,225 per dwelling unit. Rebates covered an average of 18% of the gross cost, with a broad range of leveraged program incentives covering between five (5) and 35% of the gross costs.

IV. MULTI-FAMILY PROGRAM: CONCLUSIONS AND LESSONS LEARNED

This report provides a summary of the goals and accomplishments of the Energy Upgrade California™ in San Diego County (EUCSDC) program. Because the program timeframe was almost cut in half and the program will continue under SDG&E’s portfolio, consider the following findings preliminary. The findings, conclusions, best practices, and lessons learned described below are based on HMG’s experience in implementing whole-building multi-family upgrade programs, and our widespread collaboration with similar programs throughout the state. The conclusions and lessons learned fall into several categories:

- Coordination and leveraging of programs and resources
- Program timeframe
- Developing a multi-family building upgrade infrastructure
- Calculated energy savings

Coordination and Leveraging Local, State, and Federal Programs and Resources

Program collaboration resulted in the greatest successes, and also the greatest challenges in the EUCSDC program. While combined marketing efforts allowed us to reach a larger audience, and leveraged made multi-family upgrades possible under the EUCSDC program, they also each added their own sets of qualifications, requirements, and timelines. The greatest challenges were related to program ramp-up time and the layering of program qualifications and requirements.

Lengthened Ramp-up Time

When the EUCSDC program kicked off there weren’t any financial incentives available for multi-family whole-building upgrades in the San Diego area. Through coordination with the City of San Diego, SDG&E, and the City of Chula Vista, HMG was able to influence their programs for inclusion of multi-family

rebates. The City of San Diego designed their program around the EUCSDC program and aligned their rebates with the EUCSDC program protocols and procedures. HMG persuaded SDG&E to roll out their multi-family pilot program ahead of schedule so that SDG&E could leverage the EUCSDC outreach efforts and EUCSDC could leverage SDG&E's rebates. The addition of multi-family rebates to SDG&E's Whole-House program allowed the City of Chula Vista to match multi-family rebates for properties in the City of Chula Vista, as they were already doing for single family properties.

In an effort to streamline the programs, limit touches (inspections) to properties and dwelling units, and provide a united front under the Energy Upgrade California™ brand, the EUCSDC, SDG&E, and the Cities of Chula Vista and San Diego worked very closely to integrate their processes. Joint marketing materials also had to be reviewed and approved by each program. The coordination took much longer than it might have taken for a stand-alone program and further constricted the already narrow window for upgrade construction under the EUCSDC program.

Layered Program Qualifications and Requirements

This section summarizes the challenges of layering program requirements, including program enrollment, eligible measures, health and safety, and quality assurance.

Program Enrollment Criteria

Due to difference in funding sources and the interests of each program administrator, requirements for program enrollment differed across the four (EUCSDC, SDG&E, City of San Diego, and City of Chula Vista) programs. The EUCSDC program was the most flexible to the various property types and locations but each of the three programs offering rebates to fund upgrades had their own limitations.

SDG&E's program was limited to residential customers, which eliminated those with commercial utility rates such as Single Room Occupancy (SRO-a multi-tenant building offering a more affordable living option with shared amenities such as kitchens or bathrooms.) and many types of supportive housing (offering permanent, affordable housing with on-site tenant services) from the list of eligible multi-family property types. Additionally, SDG&E required that all eligible low-income properties go through the Energy Savings Assistance (direct install) Program prior to enrolling in the multi-family pilot program.

Because the City of Chula Vista chose to simply match SDG&E rebates, projects ineligible for SDG&E's program were automatically in eligible for those offered by the City of Chula Vista. The rebates offered by the City of Chula Vista were limited to projects within their jurisdiction. Though the City of San Diego did not exclude the SRO building type, their program was limited to low- and moderate-income properties within the City of San Diego. For property owners with a portfolio of properties across the County, it was difficult to keep the requirements straight. It was beneficial that HMG was the entry point to each of the four (4) programs in the region and could guide participants to the appropriate programs and explain the intricacies of each.

Eligible Measures and Competing Programs

In addition to varying qualifications for enrollment, the list of eligible upgrade measures under the various programs in the San Diego region also differed, which made layering them difficult in some cases. Similar to the enrollment qualifications, the EUCSDC and City of San Diego programs had the most flexible and extensive list of eligibility measures, which allowed for significant upgrades; if it could be modeled in the CalRatePro software (except screw-in lighting fixtures and photovoltaic systems) it could be included.

SDG&E shortened the list to exclude HERS verification measures (e.g. refrigerant charge) and solar thermal (solar water heating) systems. Again, because the City of Chula Vista program relied on the SDG&E program to qualify, process, and verify projects, their list of eligible measures mirrored SDG&E's. Though the exclusion of HERS verification measures did impact at least one project, the exclusion of solar thermal systems had a much greater impact. Many of the coastal properties struggled to reach 10% improvement without this measure, so opted to instead participate in the CSI solar thermal program and disregarded the other energy efficiency opportunities in the buildings. Those participating in the City of San Diego program and SDG&E programs had to submit two energy models, one with the solar thermal system included (City of San Diego) and one without (SDG&E).

Health and Safety

SDG&E's health and safety (H&S) requirements were an especially difficult barrier to overcome. Because combustion and ventilation testing requirements were added by SDG&E after many projects were already underway, program budget was repurposed for CalCERTS to complete health and safety testing at no cost to the building owner and avoided issues for HERS Raters not holding BPI Multi-family Analyst certifications (an SDG&E requirement for completing the H&S testing scope). Moving forward, without the EUCSDC program offering no-cost H&S testing, SDG&E expects the EUC Multi-Family Raters to take responsibility for the H&S inspections. This will push the cost (in HERS Rater labor) of H&S testing onto the building owner and will require that HERS Raters either acquire BPI Multi-family Analyst certification or partner with a BPI Multi-family Analyst.

Another challenge presented with the H&S testing is that it leans on BPI standards. This is problematic for two reasons; the BPI standards around health and safety (combustion and ventilation testing) 1- rely on BPI Building Analyst and ASHRAE 62.2 standards written around single family buildings, and 2- intentionally leave space for professional judgment.

One issue in particular with applying BPI and ASHRAE standards to multi-family building is the absence of a protocol for conducting blower door testing in multi-family buildings, which highlights an outstanding question surrounding testing for adequate ventilation in naturally ventilated buildings. This issue is described in more detail in HMG's *Study of Multi-Family Air Leakage Testing Strategies* deliverable. With regard to leaving space for professional judgment, there were many instances in which the professional judgment of HMG, CalCERTS, or a participating Rater differed from that of SDG&E's third party QA/QC provider, who was responsible for reviewing the H&S reports. CalCERTS and HERS Raters were required to revisit multi-family properties, revise reports, and suggest mediation beyond what was included in their original submission. This cost the HERS Raters additional time and made property owners (participants) uneasy. Had written protocols been provided defining the BPI Building Analyst Standards and Multi-family Analyst Standards, those conducting H&S testing and inspections would have better success and confidence that the work completed for H&S tasks was sufficient the first time.

Quality Assurance and Quality Control (QA/QC)

Rigorous (and duplicative) review of the energy modeling by SDG&E's third party QA/QC provider often slowed the participation process down and increased the number of inspections or touches to a property or dwelling unit. Participating Raters also received multiple sets of comments on their energy models from the different programs (EUCSDC / City of San Diego, and SDG&E / City of Chula Vista).

All (100%) of SDG&E participants were reviewed and field-verified. HMG reviewed all energy models but only field verified post-upgrade on 10% of properties. HMG, when possible, coordinated the QC inspections with assessment, health and safety, or verification inspections so that multiple parties touched the property on the same day. Had it been known that SDG&E was going to have such a rigorous QA/QC process in advance, EUCSDC might have leveraged funding, instead of duplicating the effort.

Future Programs

As described above, many challenges were encountered in leveraging multiple programs. HMG recommends the following as the program continues:

- Continue single-point-of contact entry to all regional programs (perhaps expand to include all multi-family energy efficiency and renewable programs)
- Integrate the CSI solar thermal and multi-family Whole-building programs
- Develop written health and safety protocols for multi-family properties
- Contract with a single QA/QC provider across all regional EUC programs

Program Timeframe

Program dwelling unit and savings goals were based on a two-year program timeframe. Due to delayed contract execution, the program was shortened to 14 months, including ramp-up and project recruitment (marketing). Because multi-family project upgrades take an average of nine (9) months, project completions were compromised simply due to limited time for completion within the EUCSDC program timeframe. Deeper upgrades and rehabilitation projects often take longer. The projects were confident that rebate funds would be available beyond the EUCSDC program deadline and are continuing through the SDG&E and City of San Diego programs.

In order for a program such as this to gain momentum, it needs several years to mature. Because of the level of property owner investment, a longer lead time is necessary to plan for major investments, secure funds (especially through a lengthy public funding process)² or incorporate into capital improvement budgets and schedules.

Fortunately, this program is being sustained by SDG&E and the City of San Diego, and projects are continuing to undergo whole-building energy upgrades. Also, despite reaching only 56% of the 1,000 dwelling unit goal, we made substantive headway in developing the infrastructure for a whole-building multi-family energy upgrade program and met our target of at least a 20% average energy savings across participating upgrade projects.

For future multi-family whole-building upgrade programs, we recommend a minimum three-year timeframe. If three years is not possible, high financial incentives can motivate a market to complete upgrades quickly but must be attached to the program (not leveraged).

² A Tax Credit Allocation Committee (TCAC) funding can take a year or more.

Developing a Multi-Family Whole-Building Upgrade Infrastructure

One of the primary challenges the EUCSDC program faced was the need to simultaneously implement an upgrade program while developing the program infrastructure, which posed many delays and changes to the program rules throughout the process. Despite this challenge, the American Reinvestment and Recovery Act (ARRA) funds enabled the program to make substantial progress in developing this infrastructure, which hasn't been available previously. Multi-family whole-building programs have been in existence in California for 10 years and have been shoe-horned into new construction infrastructure until now.

The EUCSDC program, with help from the MF-HERCC, provided multi-family-specific protocols (audit, energy modeling, and verification) and program design guidance, has created a platform for developing this infrastructure. EUCSDC piloted these protocols and began the process for Energy Commission adoption of changes to the HERS Whole-house program to address multi-family buildings. First steps were also taken to revise the energy modeling software for use in multi-family building ratings and energy upgrade programs. With revisions to the HERS Regulations, HERS Technical Manual, and ACM Manual, more can be done to improve the energy modeling tools. These efforts must continue beyond the EUCSDC program term to ensure the success of the multi-family upgrade market.

The development of the EUC Multi-family Rater training through the EUCSDC program not only equipped HERS Raters for service in the multi-family energy upgrade market, but also expanded CalCERTS' multi-family building knowledge and its capacity to offer multi-family training into the future, provided the Energy Commission amends the HERS Regulations and Technical Manual to address multi-family buildings. The jobs created under the EUCSDC Multi-family program, for both HERS Raters and program implementers, will be sustained by the City of San Diego and SDG&E's pilot and follow-on programs.

The most prominent weaknesses within the HERS Rater industry as they relate to the multi-family whole-building programs are energy modeling and business practices; continuing education in these areas would be valuable to practitioners. In addition, integrating Title 24, Part 6 energy consultants (i.e. Certified Energy Plans Examiners, CEPE's) with energy modeling experience and thorough knowledge of Title 24, Part 6 requirements, into multi-family whole-building programs may also be beneficial. HMG sees an opportunity for HERS Analysts, without field certifications, to conduct the energy modeling under the supervision of a HERS Whole-house Rater. Though this role is called out in the HERS Regulations, it has not (to-date) been implemented, and may work very well in multi-family building programs where the energy modeling can be quite complex. Understanding of Title 24, Part 6 requirements and familiarity with the ACM Manual also helps energy modelers better understand the EnergyPro software, originally designed for Title 24 Part 6 compliance.

Calculated Energy Savings

San Diego's mild climate (climate zones 7, 10, 14, and 16) makes deep energy savings difficult; in many cases utility bills are already lower when compared to other climate zones in the state. A substantial retrofit scope of work, as would be included in a larger rehabilitation, is necessary to reach the program's 10% improvement threshold. In other regions such as Sacramento, a 20% reduction could be achieved through the simple replacement of HVAC equipment.

Domestic hot water (DHW) measures generally had the largest impact on energy savings, especially in climate zone 7 where heating and cooling loads are very small. The list of upgrade possibilities to DHW systems was limited due to energy modeling constraints and rebate program limitations. Projects with poorly insulated domestic hot water pipes and tanks were not able to claim full savings for increasing insulation on their system because the energy modeling software contains default minimum values above zero for pipe and tank insulation. The software also underestimates savings from demand controls, treating them equally with time and temperature recirculation controls. These cost-effective measures were overlooked because sufficient savings could not be counted towards the 10% reduction threshold.

Solar thermal installation was not an eligible upgrade measure in SDG&E's pilot program and some projects could not reasonably (cost-effectively) reach a modeled 10% improvement without it. Properties wanting to install solar thermal systems gravitated toward the CSI solar thermal program and did not consider additional upgrades.

Based on our experience we recommend the following for future multi-family whole-building upgrade programs in San Diego and elsewhere in the State:

- Maintain a 10% threshold for participation in the San Diego region, but escalate rebates steeply to encourage deeper energy savings. A 20% threshold, however, is more reasonable for much of the rest of the state. In areas where utility bills are historically low (like those in coastal, more temperate climates) there is less room for reductions, especially with all of the available leveraged rebates
- Integrate the CSI solar thermal program with the whole-building program to encourage packaged upgrades and avoid lost opportunities from projects choosing one program or the other. This recommendation is applicable both regionally and statewide.
- Improve energy modeling capabilities to allow for more accurate energy savings for the following domestic hot water measures listed below. Hot water generation is the biggest energy consumer in the San Diego region and would therefore, have the biggest impact if the capability to model such measures.
 - ❖ Hot water pipe insulation
 - ❖ Tank insulation
 - ❖ Recirculation controls with demand pumps

V. MULTI-FAMILY PROGRAM: TECHNOLOGY

Though the program's focus was not on technology development, marketing collateral, websites, web tools, and networks were all results of the program.

Website

Two websites were created to host information about the EUCSDC program. The first is HMG-created, specifically for the San Diego program and can be viewed at www.h-m-g.com/multi-family/sandiego. This simple site contains basic information about the program, available rebates, and contact information.

The second website is the statewide multi-family Energy Upgrade website at multi-family.energyupgradeca.org. HMG provided input and feedback during the creation of the site. In addition to the general information, a San Diego fact sheet and case study are also posted on this site. More case studies will be added as energy upgrade projects are completed and the fact sheet will also be updated to reflect available rebates from June through December 2012. The Funding Finder tool also rests on this site.

Networks and Collaborations Fostered

HMG's collaborative efforts were primarily with the Home Energy Retrofit Coordinating Committee (statewide) and Residential Advisory Council (San Diego region). HMG also collaborated through the Association of Energy Services Professionals and national conferences such as the Affordable Comfort Institute (ACI) Annual Conference, and Multi-family Buildings Conference.

Home Energy Retrofit Coordinating Committee (HERCC)

The HERCC is a collaborative of utilities, government agencies, building experts and others convened by the U.S. EPA's Region 9 in an effort to coordinate the various ARRA funds coming into California for energy upgrade and weatherization programs. In January 2010, a multi-family subcommittee (MF-HERCC) was formed to address the application of residential energy and green building programs to the unique needs of the multi-family and affordable housing sectors, and to develop consistent recommendations and standards for statewide whole-building upgrade programs. The MF-HERCC aims to minimize barriers to participation in multi-family upgrade programs through coordinating development of standards, professional qualifications, verification procedures, website and IT support, and energy savings quantification and tracking tools.

Residential Advisory Council

The Residential Advisory Council brings together San Diego program implementers, contractors, and community based organizations around the topic of residential energy programs. The council focus has primarily been on Energy Upgrade California™, with a wide variety of discussion topics including but not limited to: marketing, financing, workforce development, behavior, program processes, and energy savings.

Other products

Additional products created under the EUCSDC program include the Multi-family Rater training curriculum and a moveable Interactive Energy Display.

Multi-family Rater Training Curriculum

HMG, CalCERTS, and EnergySoft collaborated to develop curriculum for equipping HERS Whole-house Raters with the knowledge and skills needed to audit, assess and offer recommendations on multi-family upgrade projects, and verify proper installation post construction. The curriculum built upon the HERS Whole-house regulations and the skills of existing HERS Whole-house Raters. Curriculum also included applicable portions of the BPI Building Analyst, Envelope, and Multi-family Analyst curriculum. CalCERTS advertised the Energy Upgrade California™ Multi-family rater training through e-mail to all HERS Whole-house Raters.

The training agenda is as follows:

- Day 1: Program overview and multi-family assessment protocols
- Day 2: Multi-family building systems
- Day 3: In-Field practice assessment
- Day 4: Building energy modeling
- Day 5: Review and exam

Each trainee received a 3-ring binder containing slides of the training content.

Interactive Energy Display

SEI developed the Interactive Energy Display (IED) for tenant education at participating multi-family properties. The IED focused on education around plug loads and screw-in light bulbs. 4 bulbs with wattmeters allow for comparison of incandescent, compact fluorescent (CFL), and LED screw-in lighting options. The display also includes an electrical outlet with wattmeter. Tenants can plug in any appliance or gadget to test watt draw. For easy setup and transport, the display folds into a sturdy plastic storage box with assembly instructions attached. Because multi-family property management staff was not willing to take responsibility for the display, HMG staffed the IED.

VI. MULTI-FAMILY PROGRAM: DELIVERABLES

The table below shows a summary of multi-family program deliverables from the EUCSDC contract.

Deliverable	Due Date in Agreement	Date Delivered to Energy Commission
Program Implementation Plan	4/15/2011	4/13/2011
Marketing Plan	4/15/2011	4/13/2011
Coordination Plan	4/15/2011	4/13/2011
Workforce Development Plan	4/15/2011	4/13/2011
Building Energy Modeling Approach	4/15/2011	4/13/2011
Risk Assessment and Contingency Plans	4/15/2011	4/13/2011
Monthly Deployment Schedule	4/15/2011	4/13/2011
Monthly reporting on data tracked	6/14/2012	Ongoing
Program Application	4/15/2011	3/30/2012
Program Brochure	4/15/2011	4/25/2011
Website Design	4/15/2011	4/25/2011
Other Marketing Materials	6/14/2012	Ongoing
HERS assessment and verification protocols	4/28/2011	4/13/2011
Infiltration study final report	6/14/2012	Expected June 2012
QA inspection of 10% of upgrade projects	6/14/2012	6/14/2012
Combustion safety testing for participating projects	6/14/2012	6/14/2012
HERS MF Rater training curriculum and materials	6/14/2012	4/25/2011
HERS MF Rater trainings	6/14/2012	5/18/2012
Energy modeling Tool	6/14/2012	6/14/2012
Energy modeling curriculum and materials	6/14/2012	4/25/2011
Energy modeling training sessions	6/14/2012	5/17/2012
XML output file format	6/14/2012	6/14/2012

Plan Checking Protocols	6/14/2012	4/13/2011
ECON-2 Form for each participating project	6/14/2012	Expected June 2012
Assessment review worksheet for each project	6/14/2012	Expected June 2012
Quality Assurance Procedures	6/14/2012	4/13/2011
Quality Assurance Summary	6/14/2012	6/14/2012
Quality Installation Clauses/Language	6/14/2012	6/14/2012
Participant Survey Results	6/14/2012	Expected June 2012
Energy measures summary template	6/14/2012	Expected June 2012
Reports of statewide collaboration (monthly)	6/14/2012	Ongoing
Report of Rater support activities (monthly)	6/14/2012	Ongoing
Tool logic diagrams	6/14/2012	6/15/2011
Link to Beta Version of Navigational Tool	6/14/2012	1/23/2012
Link to Final Version of Navigational Tool	6/14/2012	3/1/2012
Workshop presentation(s)	6/14/2012	5/22/2011
Energy Management Guidelines	6/14/2012	Expected June 2012
Newsletter for each property participating in the program	6/14/2012	Expected June 2012
Interactive Energy Display to deployed to at 5 properties	6/14/2012	Expected June 2012
List of leveraged programs	6/14/2012	6/14/2012
Report leveraged funds (monthly)	6/14/2012	Ongoing
Monthly reports of program energy savings	6/14/2012	Ongoing

Figure 17: Multi-family Program Deliverables

VII. MULTI-FAMILY PROGRAM: BUDGET

The following table shows the approved budget and amount expended under each of the multi-family program subtasks identified within the Scope of Work. The budget was adjusted with a Justification Memo in May 2012 to ensure appropriate budget remained in each subtask. Consequently, the program came out on budget in each task with very little deviation.

Budget Category or Deliverable	Brief Description	Budgeted	Actual Expenditure
Task 2.1M Program Implementation Plan (PIP)	PIP details each program component, including: marketing, coordination, and workforce development plans; energy modeling approach; risk assessment and contingency plans; and monthly deployment schedule.	\$19,137.48	\$ 19,137.48
Task 2.2M Tracking System	Customized system for tracking program participants and multi-family upgrade projects. Tracked data included in monthly reports.	\$26,200.45	\$ 26,200.45
Task 2.3M Marketing Materials	Program marketing materials including: application, brochure, exhibit panel, e-mail blasts, PowerPoint presentation, conference program ads, and website.	\$36,130.58	\$ 36,060.66

Task 2.4M Participant Recruitment	Ongoing project recruitment through: conference presentations, exhibitions, and ads; publishing articles in industry newsletters; direct e-mail marketing; coordination and cross promotion of programs; coordination with housing associations and public agencies; and targeting publicly available multi-family housing project lists.	\$99,115.07	\$ 99,092.40
Task 2.5M Audit and Verification Protocols	HERS assessment and verification protocols for multi-family buildings, based on HERCC standards, to propose to the Energy Commission for approval. Quality assurance inspection of a minimum of 10% of participating multi-family upgrade projects. Combustion safety and other testing (as applicable) on projects participating in SDG&E whole-building upgrade rebate program. Infiltration scoping study and report.	\$287,282.98	\$279,112.22
Task 2.6M HERS Rater Training	HERS Multi-family Rater training curriculum and materials HERS Multi-family Rater trainings	\$138,633.84	\$138,601.97
Task 2.7M HERS Whole- House Software Development	Develop a multi-family energy modeling tool that will build upon the existing CalRatePro platform and HERS tools and protocols. Train HERS Multi-family Raters to use the tool.	\$55,119.01	\$ 55,119.01
Task 2.8M Plan Check and Design Assistance	Review baselines and proposed energy calculation files from the HERS Rater, provide design assistance (as necessary), and pilot the CUAC tool (as appropriate) for each participating upgrade project.	\$56,208.70	\$ 56,208.70
Task 2.9M Quality Assurance	Provide training and checklists to certified HERS Raters who are providing energy assessments/ratings of existing multi-family buildings. Conduct a quality control check of 10% of participating properties to verify installation of approved energy efficiency measures. Program satisfaction survey of participating property owners and HERS Raters	\$29,260.49	\$ 29,260.46
Task 2.10M Conformance with CA Law	Insures that: applicable permits are pulled, energy improvements are installed in conformance with California law, selected contractor(s) are in good standing with the CSLB, and the work is within the scope of their licensure, ensure that Title 24 Part 6 measures and field verification requirements for alterations are met.	\$10,180.12	\$ 10,180.11
Task 2.11M Collaboration with Programs	Collaborate with State and National Programs for consistency and leveraging.	\$37,832.82	\$ 37,773.31

Task 2.12M Workforce Development	Ongoing support to HERS Raters, including: on-site assistance with conducting assessments of multi-family properties participating in the multi-family program, combustion safety testing mentoring, phone communication question and answer sessions with individuals or groups of Raters.	\$4,729.68	\$ 4,729.68
Task 2.13M Navigational Tool	Develop a navigation tool that will help building owners to match their properties with upgrade opportunities, approaches (tune-up, single measures, or whole-building), and applicable programs and resources.	\$25,821.79	\$ 25,802.25
Task 2.14M Energy Management Guidelines	Develop energy management guidelines that serve as a roadmap for building owners to achieve persistent energy savings through energy management best practices.	\$18,255.57	\$ 18,263.06
Task 2.15M Tenant Energy Conservation	Energy conservation newsletter, tailored for each property participating in the program. Interactive Energy Display to be deployed to at participating properties.	\$1,868.49	\$ 1,864.52
Task 2.16M Building Owner Rebates	Collaborate with regional, state-wide and national programs through which participants can leverage rebates for energy efficiency improvements. Report monthly.	\$23,729.79	\$ 23,729.77
Task 2.17M HERS Rater Incentives	Collaborate with regional, state-wide and national programs through which participants can leverage rebates for energy assessments. Report monthly.	\$69,446.27	\$ 69,446.27
Task 2.18M Verification of Energy Savings	Track and report energy savings estimated through building energy modeling, for each participating property.	\$8,637.21	\$ 8,637.19
	TOTAL	\$947,590.34	\$939,266.13

Figure 18: Budget Expenditure

Energy Upgrade California™ in San Diego County – Single Family

II. SINGLE FAMILY PROGRAM: GOALS

The principal goals of EUCSDC were:

- 1) Reduce regional energy consumption,
- 2) Create short term and permanent jobs, and
- 3) Develop and support a sustainable market for residential energy efficiency upgrades.

The following narrative outlines specific goals and objectives as described in the single family portion of the EUCSDC program Scope of Work, with a comparison to actual accomplishments and an explanation of any discrepancies.

Focus on both market-rate and affordable housing

EUCSDC achieved the goals set forth in the comprehensive building retrofit program scope of work by addressing the energy efficiency, health, safety and comfort benefits of building upgrades across all income levels; focusing on the inclusion and awareness of available resources for the community in both market-rate and affordable housing. All marketing, outreach and education was aimed at both demographics with no favor to either. EUCSDC provided rebates to homeowners who received a whole-house rating, and several ratings were performed on low-income homes at a fully subsidized rate (i.e. no cost). EUCSDC's Green Grad Education & Training Upgrade Program (GETUP) focused on getting unemployed or under-employed workers trained and into the home performance industry. Many of the homes upgraded through GETUP were owned by low-income residents or organizations working directly to serve the low-income community.

The California Center for Sustainable Energy (CCSE), the single family implementation team for EUCSDC, leveraged San Diego Gas and Electric's (SDG&E) Whole House Retrofit Program (WHRP) rebates to receive energy upgrades at a reduced cost for program participants.

CCSE also leveraged the City of San Diego's Home Energy Upgrade (SDHEU) program to provide a substantial focus on moderate- and low-income housing. SDHEU provided matching rebates to participants in SDG&E's WHRP rebate program that lived in the City of San Diego and also met low- and moderate-income qualifications. For example, if a low- or moderate income homeowner living within the City of San Diego received \$2,500 in Energy Upgrade California rebates from SDG&E's WHRP, SDHEU provided the homeowner an additional \$2,500, further lessening the out of pocket expense of the energy upgrade.

Additionally, SDHEU provided direct installation of energy upgrade measures in low- and moderate-income homes in the City of San Diego. EUCSDC recruited participants into the SDHEU program (as applicable by income level and location) to receive fully subsidized energy upgrades via SDG&E's Energy Savings Assistance (ESA) and Middle Income Direct Install (MIDI) programs and SDHEU. EUCSDC also provided whole-house ratings to a select

group of direct install recipients. A more thorough description of this leveraging activity is included in the whole-house rating discussion below.

Actively engage single family homeowners in the region's efforts to reduce energy use, carbon emissions and water use in support of the Global Warming Solutions Act of 2006

Through a comprehensive marketing campaign, CCSE reached over one million residents with messaging about home performance and Energy Upgrade California resources. Over 6,000 residents attended education and outreach events. While these residents were 'engaged' to some degree and are considered EUCSDC participants, the goal of this contract was to achieve 1,000 single family energy upgrades. Energy upgrades are currently tracked by their corresponding rebates. As of May 30, 2012, 234 participants received SDG&E WHRP rebates in association with whole-house energy upgrades, 27 of which also received SDHEU matching rebates. An additional 164 low- and moderate-income participants received City of San Diego SDHEU rebates in association with direct installation of energy upgrade measures. Together, these efforts resulted in a total of 398 single family energy upgrades completed by the term of this contract. Another 136 homes have been enrolled in SDG&E'S WHRP program, and another 681 low- and moderate-income homes are enrolled in the City of San Diego's SDHEU program, bringing the total upgrades scheduled in the region by the end of 2012 to 1,177.

Provide active training and support of CA Whole-house Raters and building performance contractors

CCSE secured and trained 14 participating Whole-house Raters to provide rebates under the Whole-house Rebate Program. Additionally, by leveraging SDG&E WHRP funding, CCSE successfully trained 71 contractors in BPI standards to facilitate entry into the EUC program. By leveraging funds from the U.S. Department of Energy's Better Buildings pilot program and from local governments, CCSE provided continuing education to over 600 raters and contractors on topics including building science, data collection and energy modeling, sales and marketing, quality assurance and quality control, SDG&E WHRP rebate application processes, and more.

Additionally, a high level of support was provided to all participating Whole-house Raters and contractors. Rebates greatly stimulated the marketplace for whole-house ratings and created a new source of income for participating raters. Cooperative marketing funds (described below) were made available to all participating contractors and raters, allowing for a more comprehensive outreach and messaging effort that significantly increased awareness of EUC among local residents. A total of 15 contractors and 1 rater participated in the cooperative marketing program.

CCSE leveraged U.S. Department of Energy (U.S. DOE) funds to create contractor and rater 'tools' such as the Residential Energy Roadshow, which provides a platform for

homeowner education and to secure program participation at community events. CCSE also created a referral system that sends interested homeowners directly to qualified contractors and raters to receive more information about EUC and to schedule an assessment. An assessment voucher program, allowing contractors and realtors to offer free assessments to homeowners, was also established.

Create workforce development opportunities to train and place training graduates

EUCSDC's GETUP provided on-the-job home performance training and soft employment skills to 58 under- or un-employed students over four training sessions. 80% of qualified GETUP graduates were placed in internships with local home performance contractors or were hired permanently with Energy Upgrade California existing contractors or home performance industry partners.

Develop tools and best practices that can be applied to future residential upgrade programs

Many tools and best practices were created as part of EUCSDC and in collaboration with leveraged programs including:

- Establishment of partnerships and collaborations to inform and promote holistic growth of the home performance industry
- Established practices for connecting interested homeowners to participating Whole-house Raters and contractors at every opportunity
- Creation of Whole-house Rater and contractor tools that assist in generating leads and closing sales – Roadshow, vouchers, cooperative marketing, and demonstration homes
- Outreach and education to engage the real estate community

A thorough discussion is found in Section IV.B. *Best Practices*.

III. SINGLE FAMILY PROGRAM: ACCOMPLISHMENTS

Developed strategies and Program Implementation Plan (PIP)

On August 11, 2011 CCSE submitted a PIP that included strategies for Marketing, Workforce Development, and Quality Assurance. Each section included objectives, goals, a plan to accomplish said goals, what metrics should be used to evaluate success, and a proposed schedule for the goals and accomplishments. The document was intended to provide a roadmap for program administrators working towards program implementation.

Critical Project Reviews were held on September 30, 2011 and April 10, 2012 to assess progress toward meeting program and contract goals and to define changes in program implementation based on progress.

Developed appropriate tracking tools and databases

Tracking tools and databases were used for nearly all deliverables under this contract. CCSE relied heavily upon our existing database and customer relationship management tool, CiviCRM, to track several deliverables including:

- Homeowner workshop registrants and attendees
- Contractor and rater workshop registrants and attendees
- Real estate professional workshop registrants and attendees
- Whole-house rating rebate applications and processing, including energy savings associated with assessments and upgrades that received rebates
- Cooperative marketing pilot program campaign requests (described below)

CCSE created and maintained excel databases to track other deliverables including

- Cooperative marketing pilot program spending
- “Program Dashboard” to track overall progress toward contract goals, both qualitative and quantitative

Designed and developed stakeholder-specific education and marketing materials

Through the course of the contract CCSE created and disseminated a large volume of stakeholder-specific education and marketing materials, including:

Educational presentations for homeowners

In May 2011, CCSE designed a homeowner workshop presentation that was subsequently revised numerous times to improve the customer experience at workshops. By May 2012, CCSE had settled upon two primary presentations, which will be offered while funding is available:

- Home Performance 101, which provides an in-depth look into building science principles while addressing the major benefits of a whole-house upgrade;
- Home Performance 102, which provides less coverage of building science and focuses more on the Energy Upgrade California rebate structure and associated resources like financing, matching rebate opportunities, and case studies of real home performance projects in the San Diego region

Marketing Materials (“Collateral”)

CCSE created marketing materials to increase awareness of Energy Upgrade California and to engage homeowners and other stakeholders in the program. Early in the program, CCSE worked with SDG&E, the County of San Diego, and complementary contract managers to create co-branded contractor marketing materials including brochures, half- and full-page ads, door hangers and direct mailers that can be customized by participating contractors via the cooperative marketing program. CCSE also created many advertisements supporting various events and promotions including fliers to promote homeowner workshops, full-page newspaper ads, television commercials and radio ads in support of

limited-time promotions and appearances at local home shows. CCSE also created two unique brochures to promote Energy Upgrade California – one addressing the steps to participate, and the other addressing whole-house ratings. Most of these materials were distributed to contractors and raters for dissemination at their discretion, and handed out at events and homeowner workshops. Feedback from contractors and raters indicated that the co-branded materials and general marketing materials were helpful in generating home performance business for their companies.

Cooperative Marketing Pilot Program

CCSE launched a cooperative (co-op) marketing pilot program for contractors and whole-house raters in May 2011. To encourage and facilitate marketing efforts among home performance professionals in San Diego County, CCSE offered cooperative marketing cost-share on approved marketing campaigns. Participating Contractors and Whole-house Raters were invited to participate in the co-op by either incorporating the Energy Upgrade California Participating Contractor/Rater logo into their own designs, or incorporating their own logo into pre-approved Energy Upgrade California design templates. Co-op funds were available to help cover the costs of marketing efforts in the San Diego region. Participating contractors and whole-house raters were eligible for funding of up to 50% of the total project cost, with a maximum of \$2,500 cost-share per campaign. A total of \$40,000 in funds was available on a first-come, first-served basis. Examples of appropriate co-op campaigns include brochures, fliers, door-hangers, advertisements in publications, and radio and online advertising. Contract terms prohibited the use of co-op funds to support marketing efforts associated with direct labor (i.e. door-to-door campaigns) or web development. 14 contractors and 1 whole-house rater participated in the cooperative marketing program, creating 27 separate campaigns that provided messaging about Energy Upgrade California to over 750,000 people.

Case studies

CCSE created case studies of energy upgrade projects and homeowner experiences in various forms including PowerPoint slides (for inclusion in workshop presentations), fliers (for dissemination at events and distribution to contractors), and web tools, available at www.energyupgradeca.org. CCSE also created www.sdhero.org, a website dedicated to a leveraged Better Buildings pilot that focuses on engaging the military community in home performance.

Residential Energy Roadshow

In collaboration with the U.S. DOE-funded Better Buildings program (implemented by CCSE in the San Diego region), CCSE created the Residential Energy Roadshow, a traveling 42' trailer showcasing Energy Upgrade California and residential energy and water efficiency and home improvements. The mobile program is designed to educate and inspire Southern Californians to learn about and implement energy-saving practices in their homes. The Roadshow travels throughout San Diego County to community events and home shows. Event attendees are invited to walk through the trailer to view and learn about technologies, materials and systems that address efficient and renewable energy at home. Educational materials and trained 'event leads' (CCSE staff) accompany the Roadshow to

provide more information and to address questions. As attendees leave the trailer, they are asked to complete a 'response card' that collects contact information and allows them to sign up for a contractor referral. Over the contract period, the Roadshow was featured at 44 events, and 3,270 residents completed response cards.

The Roadshow also offered participating contractors, raters and financial institutions offering energy efficiency loans, an opportunity to present their services to interested residents. The ability to directly connect the program demand generators and workforce industry provides uniquely tailored services and makes for successful stimulation of the market.

Hold trainings and host/facilitate events for homeowners, contractors, raters and other program partners

Homeowners

CCSE held homeowner workshops at least twice per month for the duration of the contract (See Section III.C above). Additional homeowner-focused presentations were provided at corporate 'lunch and learns' where employees of the corporation were invited to learn about home performance and Energy Upgrade California through seminars at community events (i.e. home shows).

Contractors and raters

CCSE held workshops geared toward home performance professionals on various topics including general program updates, cooperative marketing, quality assurance guidelines, the home energy rating rebate program, sales and marketing skills, and more. CCSE also hosted 'meet and greet' events that brought contractors and Whole-house Raters together to form partnerships and create new business models and opportunities.

Real Estate Professionals

CCSE hosted numerous events for realtors, lenders, inspectors and appraisers in order to introduce and engage all players in the home transaction process to the energy upgrade industry and the benefits of energy efficient homes. Through a partnership with local REALTOR® Associations, CCSE was able to hold workshops at association headquarters. We hosted workshops introducing Energy Upgrade California, whole-house ratings, greening the Multiple Listing Service (MLS), and also hosted a Build it Green Certified Green Real Estate Professional training in January 2012, attended by over 60 local professionals. We also hosted 'meet and greets' designed to introduce realtors to local home performance professionals to facilitate the creation of 'green teams' and opportunities to share clients and generate business.

Local Government Staff

While the Cities of San Diego and Chula Vista implemented complimentary Energy Upgrade programs, other smaller jurisdictions within San Diego County lacked resources necessary to fully participate in the EUCSDC program awareness and training campaign. CCSE created an email campaign that provided general information about the program and offered

actionable ‘next steps’ for local governments including presentations by CCSE for building department staff, an appearance at City Council or committee meetings, and writing articles for constituent newsletters. CCSE was able to initiate relationships with representatives from a handful of jurisdictions, while maintaining a strong relationship with those participating in the Local Government Partnership (LGP), which includes the Cities of San Diego, Chula Vista, the San Diego Association of Governments (SANDAG), and SDG&E. CCSE also provided a four-part building science training to the City of Chula Vista Environmental Services Department staff.

Coordinated stakeholders to steer and participate in the growth of the local energy upgrade industry

CCSE, along with industry leaders, stakeholders, and local governments in the San Diego region, established the Retrofit Advisory Council (RAC) in early 2010. The group consists of local implementers, SDG&E, local governments, community and non-government organizations, realtors, financing institutions, contractors and Whole-house Raters. The RAC provides frequent guidance and feedback allowing the region to “adaptively manage” local utility sponsored EUC implementation. The RAC’s vision is a sustainable market for energy efficiency upgrades in San Diego. The mission is to foster communication and facilitate objective and collaborative information sharing that improves implementation of regional energy upgrade programs and efforts. The RAC has four primary objectives:

- Identify market barriers
- Determine market needs to overcome barriers
- Evaluate capacity to address barriers
- Provide solutions or advice to address barriers

Barriers and solutions are typically addressed in the four RAC Committees:

- Marketing
- Real Estate & Finance
- Research & Policy
- Workforce Development

Committees meet bi-monthly, while the full RAC meets quarterly. The effort is ongoing and will continue through 2012 via SDG&E partnership funding.

Developed workforce development, internship and placement program

CCSE developed the Green Grad Education and Training Upgrade Program (GETUP), which is comprised of three intertwined workforce education pieces that form a comprehensive pathway to employment in the home performance industry. Since GETUP’s inception in July of 2011, CCSE has administered four GETUP trainings with 58 participants. 34 students graduated from the program after successful completion of all three components of the training – on the job home performance training, soft skills classroom training, and an

internship with a local home performance professional. 27 students participated in the internship program or were placed in permanent positions with local firms.

A separate four page report providing a thorough review of GETUP implementation is attached to this document as Appendix A.

Developed effective program Quality Assurance / Quality Control (QA/QC) protocol

EUCSDC played an integral role in the development, implementation and continual improvement of the QA/QC standards and documentation for the SDG&E WHRP. As a part of a collaborative effort with SDG&E and the program QA/QC vendor, Richard Heath & Associates (RHA), CCSE provided direct consultation, technical guidance and peer review in the development of guidance documents which serve as the framework for the QA/QC protocols for contractors participating in the SDG&E service area.

Quality Assurance & Quality Control Plan

The policies outlined in this document include processes and procedures for both quality assurance (desktop review) and quality control (field verification). The QA/QC processes and procedures consist of third party reviews and verifications at defined milestones through each individual home energy upgrade. This independent review and verification process ensures the customer is receiving a quality energy upgrade in compliance with the EUC program goals, and evaluates the performance of contractors as they complete the required administrative tasks, perform quality installations, and adhere to health and safety requirements.

Installation Specifications

Although not an EUCSDC deliverable in the contract Scope of Work, CCSE, RHA, and SDG&E developed EUC installation specifications for the utility-sponsored Energy Upgrade California program to serve the primary purpose of providing consistent documentation regarding minimum material requirements, installation practices, best practices and additional considerations in the implementation of high quality energy upgrades. The installation specifications are a tool for contractors, program managers, trainers, and quality assurance inspectors and are intended to build consistency and predictability into the EUC program. These specifications are a companion document to the EUC QA/QC plan.

Contractor Inspection Handbook

RHA, CCSE & SDG&E developed this document to provide a working (living) set of instructions that outlines the minimum inspection criteria and instructions for specific measures that are assessed and installed within the utility-sponsored Energy Upgrade California program. This document is neither comprehensive nor definitive, and also was not required in the EUCSDC program Scope of Work. It is designed to act as a minimum set of guidelines for contractors to follow in conducting whole house assessments.

Following the development of the QA/QC policies and standards, CCSE effectively facilitated implementation of the formalized protocols through education and training events and live technical support for contractors participating in the SDG&E utility program (Energy Upgrade California). CCSE continues to host the following monthly events to ensure that transparency, communication, and feedback is provided for the program QA/QC policies and standards for all participating contractors and raters:

- Job Submittal and QA/QC Process Workshop
- CalRatePro Energy Modeling Software Training
- Home Performance Contractor Training
- BPI Building Analyst + Envelope Professional Training
- QA/QC Roundtable

Implemented innovative promotions to spur program uptake

Sweepstakes

EUCSDC leveraged U.S. DOE-funded Better Buildings funds to create a free energy assessment sweepstakes to drive interest and participation in the utility-sponsored Energy Upgrade California program. EUCSDC ran three marketing campaigns to support this sweepstakes that included full page ads in the local Union Tribune newspaper, online and radio ads, and raffles at local home shows and homeowner events, and was able to spur interest among 724 homeowners who entered the sweepstakes. A total of 50 winners were chosen and connected directly to participating contractors to redeem their free assessments. CCSE utilized U.S. DOE-funded Better Buildings funds to offset the costs of the assessments for the contractors. While not all winners redeemed their prizes, a total of 17 assessments were performed via the sweepstakes, and those that were not selected received a voucher worth \$300 toward a Whole-house Rating, redeemable in the form of a rebate from a participating rater.

Reduce then Produce

In collaboration with the City of San Diego Mayor's office, CCSE implemented the "Reduce then Produce" Group Solar Purchase Program (RtP), designed to provide a pathway for homeowners throughout the San Diego region to increase energy efficiency via the utility-sponsored Energy Upgrade California rebate program, and participate in a group purchase for photovoltaic and solar thermal retrofits via for the California Solar Initiative rebate program. RtP resulted in the following:

- 5,191 Unique website visitors August 1-Nov. 1, 2011
- 168 Total sign-ups
- 30 Assessments completed
- 4 Whole-house ratings completed
- 13 Households that completed Energy Upgrades
- 7 Households that moved to solar

Developed rebate programs to increase program uptake and participation

Whole-house rating rebates

On August 1, 2011 CCSE launched a program to incentivize whole-house home energy ratings (whole-house ratings) by offering rebates for pre- (test-in) and post- upgrade (test-out) whole-house ratings. CCSE created program forms, a tracking database, a participation agreement with testing scope of work, and an online submittal process for participating Whole-house Raters. Over the course of the program, CCSE secured 14 participating Whole-house Raters who were both BPI and CalCERTS certified, who conducted a total of 236 whole-house ratings (199 test-ins and 37 test-outs). The program initially provided \$300 rebate upon “test-out” of the home, provided the home underwent a home performance upgrade. In December 2011, CCSE requested and in March, 2012, through the formal contract amendment process, received approval to decouple the rebate from upgrade completion and began offering rebates for ratings at both test-in and test-out. In other words, after this requested change, CCSE was able to offer rebates to homeowners who received a rating, regardless of whether they decided to pursue an actual energy upgrade in their home thereby increasing participation in the rebate program and providing information and recommendations to a wider homeowner audience on the benefits of energy upgrades. This change resulted in approximately 149 additional whole-house ratings.

CCSE also leveraged partnerships with low-income programs to provide subsidized whole-house ratings on low-income homes. Leveraging the San Diego Home Energy Upgrade (SDHEU) program, which provides direct installation of energy efficiency upgrades to low income homeowners, CCSE connected Whole-house Raters to participating homeowners and provided \$400 rebates for ratings on 20 SDHEU homes after the direct installation was complete. CCSE also collaborated with HMG to secure ratings on low-income housing owned by the San Diego Housing Commission (SDHC). CCSE provided \$300 and SDG&E provided an additional \$100 for each whole-house rating, offsetting the total cost of the service and eliminating out-of-pocket costs on behalf of SDHC. This pathway resulted in 46 whole-house ratings. Last, CCSE partnered with San Diego County Department of Housing and Community Development (SDHCD) to secure ratings on 21 low-income homes at a fully subsidized rate of \$400 each, eliminating out of pocket costs for the County. The last two efforts will enable SDHC and SDHCD to pursue informed energy upgrades on low-income homes as funds become available.

Total estimated energy savings associated with test-in recommendations include:

- 218,418 kWh
- 2,094 kW
- 25,122 therms

Total energy savings verified upon test-out (post-upgrade) include:

- 148,842 kWh
- 56.13 kW
- 9,765 therms

SDHEU matching rebates and direct installation of energy upgrades

The City of San Diego's EECBG-funded San Diego Home Energy Upgrade (SDHEU) program provides low- and moderate-income participants the opportunity to receive a comprehensive energy upgrade in their homes with little to no up-front cost. SDHEU's goal is to provide rebates for 2,000 residential energy efficiency upgrades that will produce average verifiable home energy savings of 15-20%, while providing significant workforce development opportunities. Low- and moderate-income families are eligible for direct installation of energy efficiency measures at no cost, or a dollar for dollar match of SDG&E WHRP rebates. EUCSDC leveraged SDHEU rebates to increase program participation.

Updated statewide web portal with local resources and information

Throughout the contract period, CCSE updated the County of San Diego's landing page within the statewide web portal (www.energyupgradeca.org) with information regarding local resources and happenings. CCSE submitted articles and information regarding the schedule of events for homeowner and stakeholder workshops, information about financing products, and more. CCSE also provided information and resources directly to Renewable Funding to inform other sites within the portal. Last, CCSE connected with the implementers of the California Public Utility Commission's (CPUC) Engage360.org to ensure that whole-house rating rebates were listed appropriately on the Engage360.org website.

Updated CCSE customer and contractor websites

CCSE maintains its own website (energycenter.org) with up-to-date information about Energy Upgrade California as it pertains to various stakeholders. Internal sites of note include our contractor and whole-house rater portal (www.energycenter.org/upgrade) which houses all resources necessary for participation in Energy Upgrade California. Contractors and Whole-house Raters initially use this portal to become qualified to participate in both the utility-sponsored and County of San Diego rebate programs. After they are approved they receive a login and password, and use the site to download marketing resources, request cooperative marketing funds, and submit whole-house rating rebate applications. CCSE also maintains a calendar of events (energycenter.org/calendar) where workshops for all types of stakeholders are listed and available for registration. Additional sites include:

- www.energycenter.org/roadshow – describes the Residential Energy Roadshow and lists upcoming events, allows interested parties to request the roadshow for events
- www.energycenter.org/upgradereferral – allows interested homeowners to be linked directly to a participating contractor (typically used by CCSE staff after events to input information from interested homeowners)
- www.energycenter.org/hers2 – describes whole-house ratings and previously described rebate program
- www.energycenter.org/save – provides information and ability to request follow-up regarding SDHEU

Promoted energy efficiency financing programs to support uptake of energy upgrades

CCSE worked extensively with the County of San Diego, the City of San Diego, Joint Power Authorities and financial institutions to bring energy efficiency financing programs to the region. The following loan products were partially a result of the work supported by this contract.

CRHMFA Homebuyers Fund (CHF) Energy Efficiency Loans

Through statewide coordination CCSE identified this loan product as a market-driver and facilitated the process that led to the County passing a resolution to join CHF. This allowed direct loan access to County of San Diego residents.

San Diego Metropolitan Credit Union (SDMCU) Energy Efficiency and Solar Loans

CCSE established a strong relationship with SDMCU and held five workshops to help SDMCU promote its private loan program to contractors.

San Diego Home Energy Upgrade Loan

CCSE pitched the idea of a Loan Loss Reserve to the City of San Diego following the Federal Housing Finance Agency (FHFA) shutdown of Property Assessed Clean Energy (PACE) loans. CCSE helped the City connect with U.S. DOE experts, provided consultation services during the request for proposal (RFP) process, helped secure a financial institution partner and held workshops to promote the loan to the region's contractors.

Reported on all activities as required via monthly narrative and data reporting

CCSE submitted monthly reports, as required by the contract, addressing both qualitative and quantitative progress toward goals, as well as barriers.

Key program outcomes

- 36 homeowner workshops with 522 total attendees
- 44 homeowner events featuring the Residential Energy Roadshow with 3,270 total interested attendees completing response cards
- 37 workforce trainings with 664 total attendees
- 7 local government outreach efforts with 489 total participants
- 14 real estate outreach efforts with 937 total participants
- 71 active participating contractors
- 14 participating Whole-house Raters (county rebate program)
 - 7 participating Whole-house Raters (new SDG&E WHP participation pathway)
- 34 GETUP graduates out of 58 accepted students over 4 training sessions
- \$74,300 in whole-house rating rebates allocated over 234 separate rebates
 - 198 pre-upgrade ratings (test-ins)

- Average pre-upgrade HERS II score: 172
- 36 post-upgrade ratings (test-outs)
 - Average post-upgrade HERS II score: 135
 - Total kWh saved: 148,842 (4,023 kWh average per home)
 - Total kW saved: 56.13 (1.5 kW average per home)
 - Total therms saved: 9,765 (264 therms average per home)
- \$40,000 in co-op marketing funds allocated over 27 separate campaigns created by 14 contractors and 1 whole-house rater, reaching over 750,000 residents with messaging about EUCSDC
- 9,093,935 residents received messaging about EUC from CCSE marketing efforts

Provide significant quantitative results, including but not limited to:

- 1,177 upgrades enrolled/reserved
 - 370 SDG&E WHRP program
 - 807 SDHEU program
- 398 upgrades completed
 - 234 SDG&E WHRP
 - 164 SDHEU
- Average upgrade project cost to the property owner: \$12,445 (SDG&E WHRP)
- Average energy savings: 24%
- Number of jobs created (separate full-time, part-time and internship): 27

IV. SINGLE FAMILY PROGRAM: CONCLUSIONS AND LESSONS LEARNED

Major findings and conclusions

EUCSDC played a critical role in the home performance market transformation within San Diego County. Over the course of this fifteen-month contract the California Center for Sustainable Energy, with its partners (County of San Diego, HMG and others), coordinated a broad array of regional stakeholders into upgrade action. Providing additional support through a host of developmental priorities such as workforce development, demand generation, technical review and analysis, and quality assurance and control, EUCSDC laid an undeniable foundation for continued industry growth, awareness and scalability. Without EUCSDC, SDG&E’s Energy Upgrade California would have had substantially less of an impact on market stimulation, providing fewer resources to industry stakeholders and communities alike.

Although this report and additional supplemental information will show that the single family portion of EUCSDC has met its goals, there continues to be a need for further IOU Energy Upgrade California program development and streamlining. The scale by which we are looking to upgrade the state’s existing single family building stock to reach the California Long Term Energy Efficiency Strategic Plan goals identified by the CPUC will continue to be a challenge without further program streamlining and an increase in

contractor participation. The current administrative burden required for contractors to participate in the IOU Energy Upgrade California program involves modeling the savings potential in homes and the necessary data collection to accurately make those projections. Associated with this approach is a newly created quality assurance and control protocol, which contains additional steps in the job submittal process that will remain an obstacle for those contractors who are new to the industry and those who currently lack the sufficient administrative staff to complete such tasks. Quality work is essential to program success and it is critical that we retain both a high standard of performance and a streamlined approach to project submittals to lessen the administrative burden on our workforce. A balance in this regard can only assist in reaching a sustainable and scaling a building performance industry capable of reaching the California Long Term Energy Efficiency Strategic Plan goals as well as those outlined in AB 758.

State of the market at program launch

Energy Upgrade California in San Diego County began implementation during the official launch of SDG&E's Energy Upgrade California Whole House program. Prior to the launch of these closely coordinated programs, the San Diego region maintained a relatively modest home performance industry. San Diego's approach in the development and implementation of EUCSDC focused simultaneously on marketing, education and outreach to generate demand for the services of the industry, and the development of the appropriate workforce to meet those increasing customer needs in this early period of market transformation. At the time of program launch, both consumer and contractor stakeholder groups lacked awareness of the value of home performance. Over the course of the fifteen month program cycle, considerable gains in both awareness and technical understanding of the importance and varied benefits to the comprehensive building retrofit approach have become clear and industry support is continuing to build.

Initial program phase and focus on quality assurance/quality control (QA/QC)

During program launch there was a clear need and interest to coordinate and leverage utility program resources. This coordination, however, produced a list of programmatic challenges as the fundamental utility program infrastructure was still in development for six months following SDG&E's official launch of Energy Upgrade California. EUCSDC provided technical assistance and guidance on QA and QC procedures during program development, with a strong focus on clarifying and streamlining QA/QC procedures prior to the full launch of demand generation activities. There was little need early on to promote a program that had not yet finalized its project processing procedures and fully communicated that process to participating and interested contractors. Program coordination presented a challenge for CCSE and EUCSDC partners during the first phase of implementation.

Securing project level data

Securing project level data has remained a challenge through the life of the program. SDG&E's ability to share project specific data, either at all, or in a timely manner has limited consistent evaluation of success. Coordination and integration with utility

programming remains a challenge, as their attempts to balance customer privacy and facilitate their program and associated development of the industry can be at odds. This contradiction does not allow for transparency nor dictate a clear and open approach to program partners.

Second program phase and building momentum

Currently, during the final month of program implementation, there are over 70 active participating Energy Upgrade contractors in the San Diego region; an increase from “several” during program launch. There are now seven (7) active Whole-house Raters participating in a new pathway for service professionals that can be directly tied to EUCSDC efforts. EUCSDC was also closely coordinated with low- and moderate-income upgrade programming in the City of San Diego with a goal to address a number of market based priorities. First, the health, safety and energy efficiency potential is greatest in low- and moderate- income housing as these homes and systems are typically maintained on an inconsistent basis. Second, contractors working through the Federal Weatherization Assistance program (WAP) and the utility Energy Savings Assistance (ESA) programs are capable of high volume upgrade productivity and have adequate understanding of the whole-house approach. EUCSDC leveraged all available resources and upgrade program activity across all income levels to bring an initial level of awareness and market based economic development opportunities to both the existing and developing workforce. Clearly this approach to coordinate all upgrade programming is required to meet the goals found in the CPUC’s Long Term Energy Efficiency Strategic Plan. Continued industry development should include fundamental coordination in training and technical standards to increase the ability among contractors to move between programs. This approach will offer communities and residents opportunities to reach the full energy upgrade potential in all of California’s building stock.

Best Practices

The list below includes activities and efforts that achieved or will help achieve the greatest return on investment in terms of reaching the state’s existing building upgrade goals. Section III. ‘Accomplishments’ includes a more detailed narrative of each activity; the narrative below provides high-level takeaways.

Retrofit Advisory Council

The Retrofit Advisory Council (RAC) provides frequent guidance and feedback allowing the region to “adaptively manage” local EUC implementation. The RAC is a stakeholder-working group comprised of local governments, community organizations, realtors, financing institutions, contractors and whole-house raters.

Real Estate Community Engagement

Active engagement of the real estate community revealed itself as another best practice. Real estate professionals including agents, appraisers, inspectors and lenders, have access to homeowners during the home transaction period, which can be an ideal time to implement energy upgrades. Outreach, education, and coordination activities for the local

real estate and lending community enable these key market actors to become strong advocates for energy efficiency.

Customer - contractor matching approach

Another best practice established under this contract was CCSE's customer-to-contractor matching approach, where emphasis was placed on evaluating the readiness of customers in the upgrade process, and either forwarding them to a qualified rater or contractor, or educating them further until they were comfortable moving forward.

Our goal was to eliminate as many barriers as possible on the path to energy upgrades. Because the industry is in development stages and most homeowners are new to the concept of the 'whole-house approach', the lag time between first introduction to Energy Upgrade California and signing a contract for an energy upgrade can be quite long. Additionally, after learning about the Energy Upgrade California program, the next step for homeowners can be confusing and the list of participating contractors can be long and daunting. By putting informed and interested homeowners directly in touch with participating contractors and whole-house raters, we can reduce the lag time and increase the number of upgrades.

Several practices, tools and systems were put in place to support the 'e-harmony' approach; however the foundation of the 'e-harmony' approach was simple: ensure that a whole-house rater or participating contractor was present as homeowners get their introduction to home performance. CCSE invited participating contractors to all homeowner events. After CCSE provided a baseline understanding of Energy Upgrade California, we invited the rater and/ or contractor to answer questions and sign homeowners up for assessments. Ideally, the Residential Energy Roadshow or a Demonstration Home was available as a tool for the contractor to assist in educating the homeowner and closing the assessment (See Section IV.C.1 for recommendations specific to raters).

Home Performance Demonstration Homes

Through a partnership with the City of Chula Vista, the Community Savings Initiative (U.S. DOE Better Buildings-funded program) developed a marketing and education best practice known as Home Performance Demonstration Homes. These homes, which received home performance upgrades through Energy Upgrade California, also acted as tools for the contractors and provided 'show and tell' opportunity with strong returns on investment. By visiting upgraded homes, homeowners could see installed upgrades firsthand, talk directly with satisfied homeowners about the benefits of the upgrades, and be guided on a home tour by energy efficiency contractors. Informational signage was set up throughout the homes to provide "did you know" facts for homeowners on various energy efficiency technologies and the results obtained. Visiting homeowners also learned directly about the available rebates, got their questions answered, and signed up for a whole-house rating or an energy assessment of their home all in one stop in a high credibility environment.

Home Energy Week events

In collaboration with SDG&E, CCSE promoted and hosted “Home Energy Week” events at locations around San Diego. Referencing utility consumption and demographic data compiled by the utility, SDG&E identified prime neighborhoods for community events and sent out direct mailers and door hangers to alert homeowners. CCSE arranged the venues, secured ‘featured contractors’ and brought the Roadshow mobile display to create a family-oriented, fun atmosphere where homeowners could learn about home performance and talk with a qualified professional. The goal was to connect interested homeowners directly to qualified contractors and whole-house raters to facilitate assessments and upgrades (See Section IV.C.1 for recommendations specific to raters).

Contractor Referrals

Recognizing the need for a system that connected interested homeowners directly to qualified participating contractors outside of events, CCSE created a contractor referral system. Working with SDG&E, CCSE first established contractor qualifications – at least five successful energy upgrade jobs completed, and both desktop and field mentoring on at least two of those jobs. After qualified contractors signed a participation agreement that outlined the customer follow-up and reporting expectations, they were included in an automated computer system that was available to the public and CCSE staff. While at community events, CCSE staff solicited interest from homeowners and asked specifically if they wished to be connected to a participating contractor. If they answered ‘yes’, their contact information was sent directly to the next contractor for follow up within 48 hours. Similarly, the homeowner received an email indicating which contractor would be reaching out to them to provide more information.

Contractor mentoring and continuing education

In an effort to better prepare the contractor workforce with the skills and knowledge necessary to complete home performance energy assessments and develop strong work scope recommendations under the Energy Upgrade California program, CCSE developed the San Diego Mentoring Program. The Mentoring Program was designed to provide participating contractors and raters with a full understanding of the SDG&E WHRP requirements and data collection process, ensure effective implementation of the whole-house approach, and monitor that contractors are following BPI national standards in each of the Energy Upgrade jobs. A contractor mentoring session consists of one-on-one consultation with a qualified CCSE mentor in one or more of the following areas:

- Field Mentoring on Energy Assessment and Work Scope Development
- Desktop Mentoring on Energy Upgrade Job Reporting and CalRatePro Model Development
- Quality Control Inspection Mentoring

Additionally, CCSE realized the need for continuing education and assistance in the area of marketing and sales techniques. To respond to that need, CCSE provides ongoing in-person and web-based training and education opportunities for contractors and whole-house raters on how to communicate the value, benefits and business case of home performance.

Lessons Learned

A place for whole-house raters in Energy Upgrade California

Some homeowners wish to receive an energy assessment from an independent auditor rather than a contractor that stands to gain from the suggested upgrades. Recognizing this, CCSE made several attempts at creating pathways for Whole-house Rater-contractor partnerships that allowed whole-house raters to perform the test-in and test-out, and for homeowners to choose a contractor for the upgrades only.

Unfortunately, this approach created additional work on all parties. The homeowner typically had to coordinate data sharing between the rater and the contractor, and confusion was often the result. Because contractors were required to submit jobs to the utility, the QA/QC implications associated with using data collected by another party were too much for many contractors.

Fortunately, leveraging partnerships with local implementers, CCSE was able to work with SDG&E to implement a Participating Rater pathway, in which Whole-house Raters can submit jobs directly to the utility and maintain accountability from job submittal to rebate disbursement. After performing the test-in whole-house rating, the rater becomes an advocate for the homeowner as they decide on a contractor and their energy upgrade measures. Contractors are able to focus on the installation of the measures and avoid energy modeling and the administrative requirements associated with job submittal.

The Participating Rater pathway was established based on the guidelines and success of the whole-house rating rebate program funded by this contract. Whole-house raters participating in the rebate program were already quite familiar with Energy Upgrade California and were able to easily transition into the utility program. Homeowners now have the option to make choices about assessments separate from the upgrade process.

V. SINGLE FAMILY PROGRAM: TECHNOLOGY

Website or other internet sites that show results of this project

www.energycenter.org (various sites within)

www.energycenter.org/upgrade (login and password required)

Networks or collaborations fostered

Retrofit Advisory Council (RAC) (see sections III.E and IV.B.1)

Collaboration between and leveraging of funds from SDG&E's Whole House Retrofit Program, U.S. DOE Better Buildings Program, and the City of San Diego's Home Energy Upgrade program.

Other products

- Online contractor referral system
- HERS whole-house rating rebate database
- Co-op marketing database
- Promotional sweepstakes Video
- Radio Ad
- Commercial promoting Energy Upgrade California
- PowerPoint presentations promoting Energy Upgrade California to homeowners, real estate professionals, contractors, raters, etc.
- Brochures & marketing materials
- Permit requirement database
- Contractor e-blasts
- Workshop attendee & evaluation databases

VI. SINGLE FAMILY PROGRAM: DELIVERABLES

Deliverable	Brief Description	Agreement Due Date	Delivery Date (CEC)
2.1S Program Implementation Plan	<ul style="list-style-type: none"> • Submittal of final PIP document to County 	2/15/11	8/11/11**
2.2S Tracking System	<ul style="list-style-type: none"> • Establish internal tracking database for cooperative marketing program participation. • Maintain data-sharing relationship with RHA and program partners to track upgrades. • Establish online tracking portal for Whole-house rebate program participation. 	8/1/11	7/1/2011 7/1/2011 8/1/2011
2.3S Marketing Education & Outreach	<ul style="list-style-type: none"> • Develop general market presentations and schedule bi-monthly workshops for homeowners. • Develop brochures with participation process; upgrade package info, frequently asked questions (FAQ). • Reduce them Produce: Implement limited time promotion to spur upgrades in conjunction with discounted solar PV pricing. • Build 'Residential Energy Roadshow' traveling trailer to promote upgrades and clean energy at various community events County-wide. • Develop portfolio of case studies for use by contractors and homeowners. 	2/15/11	5/1/2011** 7/26/11 10/20/11 10/1/11 var., ongoing var., ongoing var.,

	<ul style="list-style-type: none"> Implement limited time promotions to spur uptake of energy assessments and upgrades. 		ongoing
2.4S Quality Assurance	<ul style="list-style-type: none"> Establish and maintain list of participating contractors. Coordinate with RHA on creation, review and finalization of QA document. Create interested homeowner evaluation survey Provide Building Science Mentorship for Energy Savings Assistance Contractors moving into Energy Upgrade California as Home Performance Contractors 	2/15/11	5/1/2011** 8/1/2011 1/27/2012 8/1/2011
2.5S Conformance w/CA Law	<ul style="list-style-type: none"> Create Scope of Work template for HERS Whole-house/BPI assessments. Hold Contractor/Rater QA training 	2/15/11	8/1/2011**
2.6S Collab. with State & National Programs	Collaborate with state and national programs	2/15/11	Ongoing**
2.7S Workforce Development	<ul style="list-style-type: none"> Coordinate field trainings Coordinate classroom trainings Coordinate internship program Launch multiple sessions of GETUP students 	7/11/11	5/1/12** 5/1/12 5/1/12 4/23/12
2.8S Navigational Tool	<ul style="list-style-type: none"> Update statewide web portal Leverage Contractor/ Customer referral program through partner contracts 	5/19/11 Ongoing	Ongoing** Ongoing
2.9S Building Owner Incentives	NA	NA	NA
2.10S Financing Programs	NA	NA	NA
2.11S HERS Whole-house rating Incentives	<ul style="list-style-type: none"> Design and implement HERS Whole-house rating Rebate program Promote HERS whole-house rating rebates Process rebate requests for Home Energy Ratings 	8/1/11	8/1/11
2.12S Verification of Energy Savings	Provide monthly reports of program energy savings, audit and M&V activities	8/1/11	Ongoing**

Figure 19: Single Family Program Deliverables

***Contract deliverables have changed significantly since establishment of original due dates. New dew dates associated with new/changed deliverables were never set.*

VI. SINGLE FAMILY PROGRAM: BUDGET

The following table shows the approved budget and amount expended under each of the single family program subtasks identified within the Scope of Work. The budget was adjusted with a Justification Memo in May 2012 to ensure a more appropriate budget remained in each subtask.

Budget Category or Deliverable	Brief Description	Budgeted	Actual Expenditure
2.1S	Program Implementation Plan	\$65,539.86	\$52,007.83
2.2S	Tracking, Quality Assurance & Verification of Savings	\$78,269.94	\$74,556.82
2.3S	Marketing, Education and Outreach: Participant Recruitment	\$682,308.06	\$645,402.85
2.4S	Quality Assurance	\$49,940.00	\$46,952.53
2.5S	Conformance with California Law	\$39,421.28	\$36,419.71
2.5S	Collaboration with National and State Programs	\$47,945.03	\$39,647.82
2.7S	Workforce Development	\$570,226.86	\$534,077.61
2.8S	Navigational Tool	\$48,836.51	\$48,836.51
2.9S	Building Owner Incentives	\$0.00	\$0.00
2.10S	Financing Programs	\$0.00	\$0.00
2.11S	HERS Whole-house Rater and Home Performance Contractor Incentives	\$75,000.00	\$73,535.00
2.12S	Verification of Energy Savings	\$25,000.00	\$21,607.90
	TOTAL	\$1,548,160.91	\$1,494,453.31

Figure 20: Single Family Program Budget Expenditures

APPENDIX A

Green Grad Education and Training (GETUP) Program 2011-2012

Overview

The Green Grad Education and Training Upgrade Program or GETUP as it is commonly known comprises three intertwined workforce education pieces that form a comprehensive pathway to employment in the home performance industry. Since GETUP's inception in July of 2011, CCSE has administered four GETUP trainings with a total of 54 participants.

Participants begin the GETUP program with an online application and phone interview with a CCSE staff member who queries the applicant on his/her interest in the home performance industry as well as his/her background and training that meets the program's requirements. Those applicants who are accepted move on to the three-part program with up to 14 other participants.

Part One

In the first part of GETUP, participants have the opportunity to practice home upgrades skills in a real-world setting where they can ask questions, use appropriate equipment and tools and get a solid understanding of how home performance can make homes safer, more comfortable, more efficient and healthier. Program participants work hand-in-hand full-time with three well-established home performance contractors to assess the property, build a scope of work and execute it. The hands-on approach has been the key to success for GETUP, which has provided internships or jobs for 80 percent of the participants who successfully completed the program and were available for industry-related positions.

Part Two

After the hands-on training, participants attend an eight-day "soft skills" classroom training where they learn (or refresh) resume-building, financial literacy, sales, administration and other critical career skills. (This portion of the program is optional since many GETUP participants are already employed and choose to participate in Part One only).

Part Three

Successful participants of GETUP parts one and two move on to the paid internship portion of GETUP. Energy Upgrade California participating contractors provide job-related experience to GETUP participants/graduates who are actively seeking employment in the home performance field. Jobs can be hands-on installations, assessments, administrative, sales or other-related.

Results

The GETUP program ran four sessions; results from each session are listed in the following table:

Session Start Month	No. of participants accepted	# of graduates (eligible for internships)	# of internships or jobs secured	Percentage of internships based on # of eligible grads
July 2011	13	5	4	80
October 2011	13	10	7	70
February 2012	11	7	7	100
April 2012	18	0*	0	NA
Totals	55	22	18	83

*not offered in 4th session

Figure 21: Single Family Appendix A GETUP Summary

In the first GETUP session, of the 13 students who were accepted into the program, 5 completed the hands-on and classroom job-skills training, making them eligible for the internship. Of the 5 eligible students, four received internships or job offers from local home performance contractors. Candidates who did not complete the training were either not satisfied with the classroom training portion of the program and did not wish to continue, were not qualified for the types of internships offered (limited construction experience), had vacation conflicts, or had recurring physical ailments.

The second session began with 13 participants and ended with 10 completing both parts one and two of the training. Of that group, seven participants secured internships. One participant who did not complete internships was not approved by any instructors to perform internships based on poor performance in parts one and two. Others were not matched with eligible contractors concurrent with both parties' needs.

In February's session, of the 11 who began the program, seven were able to complete parts one and two and all seven eligible participants received jobs or internships within one month of the program. The reason two participants did not complete the program was because they were already employed and only wanted to complete the hands-on portion of the program. The other two participants who did not secure internships lacked adequate pre-existing experience in professions considered related to or ready for careers in the home performance industry.

April's session graduated 13 of 18 participants in part one; part two was optional for this group and comprehensive attendance rosters were not taken by the subcontractor. Internships were not offered as part of April's session because if the impending contract end in June.

Lessons Learned

1. Providing ample lead times for all functions of the program is critical; each session requires the following items to be addressed, at minimum:
 - a. securing a home for upgrade, assess the home to develop a SOW
 - b. securing trainer availability
 - c. funding for equipment
 - d. purchase of equipment to be installed at home
 - e. purchase of tools, safety supplies for each participant
 - f. pulling required permits

- g. planning/conducting potential participant orientations
- h. interviewing potential participants/notifying participants of approval
- i. Creating/amending orientation documents/schedules/timetables

It is a delicate balance to determine how much advance notice is needed to adequately prepare all the aforementioned items, keeping in mind that a shorter lead time is beneficial for job-seeking participants whose employment prospects could change on a dime; however, a one-month minimum should be required for program preparation/scheduling.

2. Equipment/supplies must be included in asking price for program. Otherwise, homeowner should be asked to cover the costs of supplies. Federal law (Davis-Bacon) prevented contract funding from covering costs of equipment unless GETUP participants were paid prevailing wages; this was not possible with the funding provided in the contract, so funding for equipment had to be found elsewhere.
3. Charge a registration fee. Even if it's refundable upon successful completion of the course, participants tend to more faithfully attend class and engage in active learning when they have a financial investment in the program.
4. Mixing participant types (unemployed, unskilled with working contractors) within one session is not ideal. Trainings should be flexible and adapt to the needs of participants. From the outset, the combination class mix was sought after to allow networking and daily interaction between the participant types. However, when it came to the hands-on training portion of the program, catering to multiple skill and interest levels became cumbersome for instructors and the program manager at CCSE.
5. Ensure there is a sales component in classroom training portion to meet the needs of participants. During the classroom portion, it became clear with the first session that job skills training was not something that was needed for those GETUP participants who were currently employed or had recent employment history. The classroom training syllabus was tweaked throughout the program to meet the needs of a varied group of participants. Ultimately, however, for future iterations of the program, a one or one-and-a-half week job skills training should be supplanted with sales/outreach/customer service training.
6. Link training (as a requirement) to Energy Upgrade California or some other popular and current program. The Energy Upgrade California program is the state's home performance rebate program, as approved by the California Energy Commission and the California Public Utilities Commission. By using the GETUP program as a step for Energy Upgrade California candidates (contractors, whole-house raters), participants can better understand the value of both programs. Through GETUP, participants learn hands-on approaches to home performance; they can also learn sales and outreach skills for home performance (a skill sought after by every contractor CCSE interviewed from the Energy Upgrade California participating contractor pool). By co-promoting these programs, contractors can better understand the value of the GETUP program, which will make them more likely to hire GETUP graduates.