EVERGREEN ECONOMICS

Needs Assessment for the Energy Savings Assistance and the California Alternate Rates for Energy Programs

Volume 1: Summary Report

Final Report

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Executive Summary

Background

This study was conducted for the joint California investor-owned utilities (IOUs): Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas and Electric Company and Southern California Gas Company, and the Energy Division of the California Public Utilities Commission. The findings and recommendations are intended to provide the study sponsors with information that may be used to plan and implement the next cycle of low-income energy efficiency programs, the Energy Savings Assistance (ESA) and the California Alternate Rates for Energy (CARE) programs.

The CARE program is offered by all four investor-owned utilities and provides a monthly discount on energy bills for income-qualified households and housing facilities. The ESA program is offered by all four investor-owned utilities and provides no-cost weatherization services to low-income households who meet the income and program guidelines. Services provided include attic insulation, energy efficient refrigerators, evaporative coolers, air conditioners, weatherstripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs. The program also provides energy efficiency education and referrals to other income-qualified programs. The program's objective is to help income-qualified customers reduce their energy consumption and energy bills while increasing their health, comfort and safety in the home.

Overview of Study Objectives and Approach

The overall study objective is to provide updated information to support important program and regulatory decisions related to better addressing the needs of the low-income customers who are eligible for the ESA and CARE programs.

The specific study objectives are to:

1. Report the most recently available estimates of eligible households;
2. Explore the accessibility of the programs to eligible low-income customers;
3. Obtain participating customers' perceptions of the programs;
4. Assess eligible non-participating low-income customers' willingness and barriers to participate;
5. Assess the energy-related needs of low-income customers, which includes an examination of customers' needs for specific energy efficiency measures;
6. Provide data that can be used to support updates of estimates of the energy savings potential remaining among eligible low-income customers' homes;
7. Collect data on energy burden and insecurity from eligible low-income customers; and
8. Assess the non-energy benefits that participants receive from participating in the ESA program.

We used numerous data and information sources for this study including primary and secondary research:

- Literature Review and Program Staff and Contractor In-Depth Interviews;
- Secondary Data Analyses;
- Customer Telephone Survey;
- Multivariate Analyses;
- In-Home Visits; and
- Low-Income Program Review.

Summary of Key Findings and Recommendations

This subsection summarizes the conclusions and recommendations that are presented in more detail in Section 3. In Section 3, we also provide cross-references to the relevant detailed report findings in Volume 2 that supported the development of the conclusions and recommendations.

Below we present the high level results and recommendations as they relate to the key study research questions, which are enumerated below.

1. *What is the current program penetration rate? How many eligible customers have not yet been served?*

Based on 2012 Athens Research data, 32 percent of California IOU households are technically and income-eligible for CARE and ESA. 95 percent of eligible IOU households were enrolled in CARE as of the end of 2012[1], leaving 5 percent or 207,000 California IOU households not enrolled.

59 percent of 2012 eligible California IOU households have been treated by ESA during the period of 2002-2012,[2] leaving 41 percent or 1.7 million untreated California IOU households.[3]

2. *How do most customers get reached by the programs? What methods are the most effective? How does that differ by customer segment?*

Most ESA participants learn about the program from either friends/family/colleagues or from IOU outreach methods, based on our telephone survey. Non-participants who recently became income-eligible for the programs due to a life event were most likely to learn about the

[1] Note that as the IOUs increase post-enrollment verification, the penetration rate is going down as more households are removed from the program.
[2] This estimate includes about 20,000 customers that SCE reported as treated in 2012 that were only enrolled and not treated (since they failed the 3 measure minimum rule). They reported that 68,859 were enrolled and 49,026 were treated.
[3] Note that the 2020 goal for ESA removes homes that have been treated by the Department for Community Services and Development and estimated unwilling homes (which was 5% based on the prior KEMA LINA study.)

program from a social worker or other professional who referred them to support programs, based on our qualitative in-home results. Low-income households learn about the CARE program based on the same methods as ESA, but with IOU bill inserts being more common than learning about the program from friends/family/colleagues. Based on our telephone survey, low-income households overwhelmingly prefer to be reached by mail (this finding does not differ significantly by low-income household segment).

3. *What are the characteristics of eligible customers that have not been reached by CARE and ESA? How do those differ from those who have? Are there concentrations of certain geodemographic characteristics of underserved customers?*
4. *What fraction of ESA non-participants is willing to participate in ESA?*
5. *What are the main barriers preventing ESA non-participants from participating? What were the main drawbacks for ESA participants?*

Based on our modeling effort, the CARE program has been successful in reaching low-income households in areas with higher rates of single-parent households, Spanish-speaking households, households with seniors, larger households, non-English/non-Spanish-speaking households, African-American households and higher population density. The CARE program has been less successful in reaching low-income households in areas with higher rates of renters, households at or below 100 percent of the federal poverty level and higher energy usage[4].

The ESA modeling results indicated that the ESA program, like CARE, has been successful reaching some segments of customers that might have greater needs and/or barriers: seniors, single-parents, the very poor, non-English speakers (Spanish more than other languages) and African-American households. Also like the CARE model, with the exception of PG&E, rural households are less likely to participate than urban households. (Note that only 2 percent of low-income households are in rural areas within the other IOUs' service territories.) Likewise, older homes, households participating in other low-income programs, households on medical baseline and those with longer tenure on CARE and in their present home are also more likely to participate in ESA.

CARE participants who have recertified are more likely to participate in ESA, which may reflect that such customers are more likely to be truly income-eligible. Single-family homes,[5] households located in climate zones where cooling loads are greatest, inland households, households with both electricity and gas service from the IOU(s) and households with electric IOU service (if a SoCalGas or PG&E customers) are more likely to participate in ESA. These results may reflect targeting by the program where the need and/or energy-savings opportunity is perceived to be greater.

[4] Note we looked at CARE customer usage.
[5] Note that this variable was only available for SCE.

Based on our ESA modeling results, the most important drivers of and barriers to ESA participation are:

- (Barrier) Trusting a contractor;
- (Barrier) Getting the landlord's approval;
- (Barrier) Being home for appointments; and
- (Driver/Barrier) Needing something the program offers.

Note that we could not test whether the driver of saving energy was important in the ESA model, because almost every household said that was important. However, other findings presented in this study suggest that saving energy is a primary driver of participation.

Based on multiple methods, we estimate that the willingness to participate in ESA among non-participants is 52 percent. This estimate is adjusted to attempt to correct for the non-response bias inherent in the telephone survey. (The original telephone survey self-report estimate is 72 percent.) Note that if these estimates are used to update ESA program treatment goals, the reasons for not being willing to participate should be factored in. For example, there are customers who are not willing because they do not want to ask their landlord for permission (23% of the 29% of unwilling customers, or about 7% of ESA non-participants), which the program could try to address, along with other barriers identified in this report.

6. *Are the programs designed effectively to reach and enroll non-participants based on their characteristics?*

The ESA and CARE programs are reaching many segments of the low-income population that might be considered hard-to-reach, as described above. The CARE program is not reaching as many renters and rural areas, all else constant, suggesting the CARE program could improve its outreach to these customers. The CARE program may not be reaching as many households that are very low-income, and there may also be customers enrolled in CARE that are not income-eligible, as some of our research may suggest. The ESA program is not reaching households with single-fuel IOU service and households that have been in their homes a shorter period time, all else constant, suggesting the ESA program could improve its coordination across IOUs and its outreach to these customers.

7. *Are the programs designed effectively to reach and enroll non-participants based on their preferences and information channels?*
8. *Are the programs using the appropriate channels to reach all segments of eligible Customers?*

The programs use many methods to reach eligible low-income households, which are consistent with what low-income households say are their preferences for being reached based on our telephone survey. Low-income households overwhelmingly prefer receiving information by mail and prefer to pay their energy bills by mail.

9. *Is the ESA program designed effectively to overcome non-participant barriers? And take advantage of what might drive future participation? And to improve the experience for participants?*
10. *Are enrollment and eligibility requirements preventing participation?*

The ESA program is all else constant, reaching fewer renters, especially multi-family renters, and renters that are concerned about seeking permission from their landlord (particularly those in buildings with 11 or more units). As mentioned below, multi-family have fewer energy needs and lower energy burden due to having less energy-using equipment, smaller homes and lower energy bills. As such, they may be less interested in participating.

Households that only have IOU service for a single fuel[6] are less likely to be treated by the ESA program, though our research did not assess the extent to which other programs such as the Low Income Home Energy Assistance Program (LIHEAP) are able to fill that gap. Some contractors that provide service in overlap areas may contract with both IOUs, but not all do. Additional barriers that impact ESA participation are households having trouble being home for multiple appointments and trusting contractors to be in the home. Our research did not conclusively determine whether having access to and/or being willing to show income documents and trusting the IOU are barriers.

11. *What sources could the programs leverage or leverage more to increase participation?*
12. *What improvements could be made to reduce barriers and increase and improve ESA participation?*
13. *What are the pros and cons of modifying ESA program requirements that might be impeding participation?*

We offer the following recommendations:

- The programs should continue past successful approaches that have lead to higher penetration rates among many hard-to-reach segments.
- The programs should consider ways to overcome barriers to participate for renters, particularly sing-family renters (which have greater energy burden, as explained below) and rural areas, which have unique issues.
- The ESA program should continue the combination campaigns that do outbound calls/direct mail and then door-to-door canvassing.
- To ensure that the newly low-income households are aware of the program, the IOUs could explore how to expand efforts that promote the CARE program through social workers, hospitals, low-income law centers and other agencies that interact with individuals who are going through life changes that might be associated with reductions in household income.

[6] About 74 percent of SCE and 63 percent of SoCalGas's CARE-eligible customers are served by the other single-fuel IOU. Roughly 650,000 CARE-eligible SoCalGas customers do not have IOU electric service.

- The CARE program should explore how to increase the penetration rate in very high poverty areas.
- The ESA program should be able to skip over treating households that do not want to participate in the program because they do not need it or want anything that is offered, such as for multi-family homes that have relatively lower energy burden. The treatment goal for ESA should be updated to make use of the new data provided by this study.
- The ESA program could try to target households that re-enroll in CARE after moving to ensure that the highly transient population (such as renters) participate in the program in greater numbers.
- The ESA program could continue refining its outreach strategies to try to overcome the barrier of households who do not want a "hand out".
- The ESA program could continue refining its implementation strategies to reduce the number of visits so that households that have trouble being home for multiple visits participate in greater numbers.
- The ESA program should continue coordinating with community organizations and contracting with them to conduct outreach to overcome barriers related to lack of trust in contractors.
- The IOUs should continue to coordinate with each other and improve the experience of households that have service with two different IOUs, and coordinate with LIHEAP to improve treatment of homes that use a non-IOU heating fuel source.
- The IOUs should continue to promote the ESA program based on saving energy and improving comfort.
- The program should consider establishing a clearer identity and brand for ESA, by which customers consistently hear about the program and are able to refer to it when discussing with their friends, family and neighbors.
- The IOUs should continue the use of data and targeted post-enrollment verification for the CARE program to reduce incidences of households being on the rate who are not income-qualifying, while not removing customers who truly qualify.
- The IOUs and CPUC should consider focusing resources for a future low-income Needs Assessment study on non-English/non-Spanish speaking low-income households that were excluded from this study's survey research (we estimate to be around 16 percent of the low-income population.) Note that the secondary research is based on population data that includes this segment.

14. *What is the extent of the energy burden among eligible customers? How has that changed since the last LINA study? What segments have the most burden and experience the most insecurity? How do ESA participants v. non-participants differ in terms of their burden?*

The mean energy burden, which is the ratio of energy cost (based on IOU billing data) to reported income (from the telephone survey) for the low-income population is estimated at 8.0 percent.[7] This is likely a higher bound estimate since, relative to the general population,

[7] Based on taking the mean of customer-level ratios of energy burden.

the low-income population tends to have a greater proportion of their essential expenses addressed by subsidies such as government assistance for housing, health care, child care and/or food and earned income credit. The mean energy burden for the low-income population is statistically unchanged from 2007, based on the prior LINA study. The low-income mean energy burden is estimated at 1.8 times the general population's mean energy burden.

Regions with higher mean energy burden among low-income households are:

- The Central Valley (climate zones 11 – 13)
- PG&E's service territory, which has the climate zones and regions with the relatively higher burdens
- The North Coast (climate zones 1-5)
- Households that said that climate or weather was a barrier to saving energy in their home.

Demographic characteristics associated with higher mean energy burden among low-income households are:

- The very poor (by definition, since burden is based on income) – income less than $15,000
- African-American
- Single-family renters
- Speaks a non-English/non-Spanish language[8].

Household characteristics associated with higher mean energy burden among low-income households:

- Reports being sick often due to home conditions
- Income has changed recently due to loss of job or fewer hours
- Presence of a disability.

The mean burden for ESA participants is 9.1 percent, compared to 6.7 percent for ESA (income-eligible) non-participants, due to higher non-participant income. (Non-participant income is on average 30% higher than participants, and non-participant energy usage is 2.5% higher than participants'.)

15. Which ESA measures contribute to the most benefit?

[8] We remind the reader that this is a biased sample of non-English/non-Spanish speakers, since to respond to our survey someone in the household must have spoken English or Spanish. Our survey does not include households that only speak a non-English/non-Spanish language.

A majority of ESA participants said they noticed changes (either "a lot" or "somewhat") in their safety and comfort and reduced bills as a result of ESA participation. We found that HVAC and weatherization measures are most likely to generate improvements in health, comfort and safety. We also found that HVAC and weatherization measures were the most common measures that generated self-reported energy savings and health, comfort and safety benefits among participants and prospective non-participants. The next most beneficial measure was a refrigerator.

16. *What support and services (including energy efficiency measures) do customers need to address their energy-related needs? What is needed most? Do the needs differ by customer segment/characteristics? Which needs are the highest priorities?*

The bulk of the study results related to this research question are too detailed to provide in this synthesis. We refer the reader to Section 3.4.3.1 below and Sections 4.3, 5.5.3 and 5.5.4 in Volume 2 of this report.

Based on telephone survey results, there are few major health, comfort and safety needs among the low-income population[9], though the ESA program makes a notable difference in health, comfort and safety needs among participants.

17. *How are the programs helping low-income customers address their energy burden and insecurity issues?*

The average CARE customer saves $29/month (33% savings) on their electric bill and $6/month (18% savings) on their gas bill. The ESA program results in 81 percent of participants noticing a reduction in their energy bills[10], with 64 percent noticing improvements in safety and 65 percent in comfort, and 44 percent noticing improvements in the health of household members. The energy savings results are consistent with actual changes in bills.

18. *How well aligned are the needs and the measures that are installed by ESA among eligible customer segments?*
19. *Is the ESA program designed effectively to address the needs? Is the ESA program designed effectively to address the needs of the customer segments that have the greatest need?*

ESA currently offers a range of measures that tend to align with what customers need and what they find helpful, with a major focus on weatherization measures, which lead to the greatest benefits. Renters are unable to receive all ESA measures unless they get their landlord's cooperation – the ESA program does not allocate ratepayer funds to subsidize

[9] Households that have major non-response barriers that are largely excluded from the telephone and in-home survey analysis on which this particular need is assessed, who did not respond to our survey, may have different or greater health, comfort and safety issues.
[10] The self-reported change in energy bills was consistent with the change in actual bills, and also with the ESA impact evaluation that found that while many households saved energy, some actually increased their usage.

landlord needs. However, there may be opportunities to expand efforts to address barriers for renters, including gaining more approvals from landlords. Single-family renters in particular have greater barriers, more burden and energy savings potential.

Some customers may have missed opportunities for receiving HVAC and weatherization measures if their heating fuel does not match the fuel of the IOU providing the outreach. There may be additional opportunities in IOU overlap areas (which is the majority of SCE and SoCalGas's CARE-eligible population) for the IOUs to coordinate more. There are additional study results that relate to these research questions, which are too detailed to provide in this synthesis. We refer the reader to Section 3.4.4.2 below and to Section 5.5.5 in Volume 2 of this report.

20. What data are available that may be used to determine the remaining energy savings potential among eligible households?

We estimate based on Navigant Consulting's[11] recent energy efficiency potential study combined with our study's estimates of willingness to participate[12] that:

- Total ESA electric savings potential = 208 kWh x 52% (WTP) x 3,133,942 income-eligible electric IOU customers = 339 MWh.
- Total ESA gas savings potential = 9 therms x 52% (WTP) x 3,714,462 income-eligible gas IOU customers = 17.4 million therms.

21. What could the programs add or modify to better serve the needs?

We offer the following recommendations:

- ESA could explore the tradeoffs associated with screening customers based on energy usage, estimated energy burden and health, comfort and safety criteria to determine priorities for treatment and/or tailor its services to the home.
- The CARE program should continue to require ESA participation for high users and automatic post-enrollment verification for households on CARE that exceed some limit of usage for their region.
- The ESA program should ensure that it is effectively coordinating with the LIHEAP program to address a gap in service to customers that do not use an IOU fuel source for their heating and to offer customers additional measures that ESA does not currently offer.

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[11] Analysis to Update Energy Efficiency Potential, goals and Targets for 2013 and Beyond – Track 1 Statewide Investor-Owned Utility Energy Efficiency Potential Study. Prepared for the California Public Utilities Commission. Navigant Consulting, Inc. and Heschong Mahone Group, March 19, 2012.

[12] We are using the estimated willingness to participate from the telephone survey, which does not include some unwilling non-participants whose barriers could be addressed by the program, such as renters who do not want to ask their landlord for permission.

- The IOUs should ensure that in IOU overlap areas (especially SCE and SoCalGas) that as many customers as possible are screened for both IOU measures in an efficient manner to increase the number of customers that pass the modified three measure minimum rule and to provide comprehensive treatment.
- The ESA program should explore the tradeoffs associated with providing energy efficiency education and basic measures during the outreach and assessment visit for homes that are income-qualified but fail the modified three measure minimum rule[13].
- The ESA program should explore the tradeoffs associated with offering certain targeted customers expanded measure eligibility criteria based on the prior recommendation where customers are screened based on higher energy burden and insecurity.
- The ESA program should continue to explore adding additional measures such as solar water heaters, light emitting diode (LED) lamps and fixtures and lighting controls.
- The ESA program should explore the tradeoffs from going back to homes that have received ESA treatment since 2002 to provide additional measures.
- The ESA program should explore the tradeoffs from offering replacement of a second refrigerator, such as for households that demonstrate a need for it (e.g., based on size of household or medical need.) For those that have a second refrigerator that is not needed, the program could offer a significant rebate for surrendering the unit for recycling.
- The IOUs should explore the tradeoffs from lowering the threshold for income self-certification for ESA.
- The IOUs should explore how to increase ESA participation among single-family renter households.
- The IOUs and CPUC should consider conducting an on-site survey with non-participants to collect detailed energy equipment information and energy efficiency values that may be used to develop estimates of remaining potential.
- The IOUs and CPUC should consider augmenting the assessment of energy insecurity in future low-income needs assessment studies.
- This data on varying levels of energy burden and insecurity should be used for future study of the CARE program, since it may be used to help the IOUs and the CPUC to explore the tradeoffs of offering varying rate assistance.

[13] See Section 5.4.1 in Volume 2 of this report for an explanation of this rule.

1 Introduction

This document is Volume 1 (Summary Report) of the Needs Assessment study that Evergreen Economics conducted for the Energy Savings Assistance (ESA) and the California Alternate Rates for Energy (CARE) programs for the joint California investor-owned utilities (IOUs): Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas and Electric Company (SDG&E) and Southern California Gas Company (SoCalGas), and the Energy Division of the California Public Utilities Commission (CPUC). Our team includes Evergreen Economics, the Energy Center of Wisconsin, Tetra Tech and Wirtshafter Associates (the Evergreen Team).

1.1 Background

On August 23, 2012, the CPUC issued Decision 12-08-044, approving approximately $5 billion for the IOUs' 2012-2014 ESA and CARE programs. The same Decision mandated that the IOUs conduct this Needs Assessment. The CARE program is funded by the public purpose program surcharge that is only applicable to customers who are not on CARE. The ESA program is funded by the public purpose program surcharge on all customers. The CPUC approves budgets and directs the IOUs' administration of the programs, and monitors progress towards the California Long-Term Energy Efficiency Strategic Plan[14] (Strategic Plan) goals.

1.1.1 CARE Program

The CARE program is offered by all four IOUs and provides a monthly discount on energy bills for income-qualified households and housing facilities.

Table 1 shows the current income and household eligibility requirements for CARE, which is based on 200 percent of federal poverty guidelines. To enroll in the program, customers must self-certify that they meet the income and household eligibility requirements on a CARE program application. Customers can enroll online, by mail, over the telephone or through a community based organization (CBO). Through categorical eligibility, customers who are enrolled in one of several public assistance programs, including Medicaid/Medi-Cal, Supplemental Security Income and CalFresh/SNAP (food stamps), are also eligible for automatic enrollment in CARE, regardless of whether they meet the income guidelines. Participants must recertify their eligibility every two years, or every four years if they are on a fixed income. The IOUs are mandated to verify a certain percent of the total CARE residential population annually to ensure that households enrolled do meet the program's income guidelines. Documentation regarding income and/or participation in categorically eligible programs are required as part of this process.

[14] California Energy Efficiency Strategic Plan, California Public Utilities Commission, September 2008. http://www.cpuc.ca.gov/NR/rdonlyres/D4321448-208C-48F9-9F62-1BBB14A8D717/0/EEStrategicPlan.pdf

The CPUC approved nearly $4 billion for the 2012-2014 CARE program cycle, which includes both the subsidy and the operational costs to administer the program. Table 2 below shows the program expenditures for 2012 based on the 2012 IOU CARE Annual Reports.

Table 1: CARE Eligibility Requirements (Effective June 1, 2013 to May 31, 2014)

Size of Household	Income limit (must be at or below)
1	$22,980
2[1]	$31,020
3	$39,060
4	$47,100
5	$55,140
6	$63,180
7	$71,220
8	$79,260
Each Additional Person Add	$8,040

Source: IOU ESA and CARE Programs 2012 Annual Reports

[1] Assembly Bill 327 requires that 1-2 person households qualify at the 2-person income criteria, effective January 1, 2014.

Table 2: 2012 CARE Program Expenditures

IOU	Expenditures
PG&E	$710,765,680
SCE	$346,208,897
SDG&E	$66,925,052
SoCalGas	$111,854,554
Total	$1,235,754,183

Source: IOU ESA and CARE Programs 2012 Annual Reports

There is a 90 percent penetration goal set for the CARE program, which was originally established in CPUC Decision 08-11-031, and retained in Decision 12-08-044. In 2011 and

2012, the IOUs collectively reached the goal, as shown in Table 3 and **Table 4** below. As shown in the tables, PG&E, SCE and SoCalGas met or exceeded the goal, while SDG&E achieved an 85 percent penetration rate.

Table 3: 2011 CARE Penetration Rate

IOU	Eligible Participants	Participants Enrolled	Penetration Rate
PG&E	1,699,660	1,532,692	90%
SCE	1,451,325	1,437,537	99%
SDG&E	362,551	308,596	85%
SoCalGas	1,847,296	1,716,495	93%
Total	5,360,832	4,995,320	93%

Source: CPUC Decision 12-08-044

Table 4: 2012 CARE Penetration Rate

IOU	Participants Enrolled	Eligible Participants	Penetration Rate
PG&E	1,491,413	1,663,059	90%
SCE	1,402,052	1,456,590	96%
SDG&E	309,605	364,424	85%
SoCalGas	1,649,360	1,830,118	90%
Total	4,852,430	5,314,191	91%

Source: IOU ESA and CARE Programs 2012 Annual Reports

Given high penetration rates and questions regarding the remaining potential population, CPUC Decision 12-08-044 identifies the need to attend to and more proactively monitor the eligibility of enrolled customers over time. As part of this effort, the IOUs have enhanced their verification and recertification processes. These processes have resulted in some attrition whereby customers who were formerly on the rate are no longer on the rate.

SDG&E noted in its 2012 Annual Report that 64,000 CARE customers were lost to attrition, either requesting removal or not responding to post enrollment verification requests or recertification requests, and that they are struggling to increase enrollments to exceed that rate. They speculate that the improving economy reduces the likelihood a customer will respond to CARE outreach or a recertification request. Penetration rates for the other IOUs are also expected to decrease given newly implemented practices associated with the verification and recertification processes. The research conducted as part of this study will assist in providing more information to assist the CPUC and the IOU programs in understanding how to best identify and serve the eligible population.

Customers who are on CARE receive at least a 20 percent discount on their electricity and gas bills and are charged a lower rate for electricity usage above baseline. A recent presentation at the California Low-Income Oversight Board meeting[15] noted that these discounts ranged from 30 to 47 percent. Table 5 shows the average monthly electricity bill amount for CARE and non-CARE customers. The average CARE customer uses 547 kWh, pays $58 (after the CARE discount) and saves $29 per month. PG&E CARE customers use more electricity than non-CARE customers,[16] while the other electric IOU CARE customers use less electricity than non-CARE customers.

Table 5: 2012 CARE Electricity Bill Amount (CARE v. Non-CARE) and Average CARE Bill Savings

IOU	CARE				Non-CARE	
	Average Usage (kWh/month)	Average Electricity Bill ($/month)	Average Savings on CARE ($/month)	Average Percent Savings on CARE	Average Usage (kWh/month)	Average electricity bill ($/month)
PG&E	576	$55	$40	42%	546	$101
SCE	540	$62	$20	24%	598	$107
SDG&E	437	$53	$14	21%	511	$98
Overall Average	547	$58	$29	33%	Not available	

Source: IOU ESA and CARE Programs 2012 Annual Reports

Table 6 shows the average gas monthly bill amount for CARE and non-CARE customers. The average CARE customer uses 31 therms, pays $27 (after the CARE discount) and saves $6 per month on their monthly bill. CARE customers use less gas than non-CARE customers.

[15] Low-Income Oversight Board Meeting, CPUC Residential Rate Structure Rulemaking R.12-06-13 Status Update Presentation by Gabe Petlin, Energy Division, August 21, 2013 at the CPUC, San Francisco, California.

[16] PG&E average CARE kWh usage was around 5 percent higher than non-CARE in 2012. Excluding the approximately 70,000 high usage (above 400% of baseline in any monthly billing cycle) customers who will be required to complete the enhanced verification process over the next year, the PG&E average CARE kWh usage drops to around 4 percent lower than non-CARE.

Table 6: 2012 CARE Gas Bill Amount (CARE v. Non-CARE) and Average CARE Bill Savings

IOU	CARE				Non-CARE	
	Average Usage (therms/ month)	Average gas bill ($/month)	Average Savings on CARE ($/month)	Average Percent Savings on CARE	Average Usage (therms/ month)	Average gas bill ($/month)
PG&E	34	$29	$7	20%	38	$42
SDG&E	23	$19	$5	20%	26	$29
SoCalGas	30	$26	$5	16%	40	$34
Overall Average	31	$27	$6	18%	Not available	

Source: IOU ESA and CARE Programs 2012 Annual Reports

1.1.2 ESA Program

The ESA[17] program is offered by all four IOUs and provides no-cost weatherization services to low-income households who meet the income and program guidelines. Services provided may include attic insulation, energy efficient refrigerators, evaporative coolers, air conditioners, weatherstripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs. The program also provides energy efficiency education and referrals to other income-qualified programs. The program's objective is to help income-qualified customers reduce their energy consumption and costs while increasing their health, comfort and safety in the home. The ESA program provides services to both qualified renters and homeowners, in all housing types.

According to Public Utilities Code Section 382(e), the ESA program shall "by no later than December 31, 2020, ensure that all eligible low-income electricity and gas customers are given the opportunity to participate in low-income energy efficiency programs, including customers occupying apartments or similar multiunit residential structures." The ESA program is also intended to evolve into a resource program that garners significant energy savings.

The CPUC approved just over $1 billion for the 2012-2014 ESA program cycle. Table 7 below shows the expenditures for 2012 based on the 2012 IOU ESA Annual Reports.

[17] Prior to 2011, ESA was known as the Low-Income Energy Efficiency program, and was marketed to customers differently by each IOU. Starting in 2011, the program is consistently marketed to customers as the Energy Savings Assistance program.

Table 7: 2012 ESA Program Expenditures

IOU	Expenditures
PG&E	$131,145,519
SCE	$39,378,995
SDG&E	$21,046,806
SoCalGas	$82,252,135
Total	$273,823,455

Source: IOU ESA and CARE Programs 2012 Annual Reports

The CPUC projected that the ESA program should treat 1,093,442 homes during the 2012-2014 program cycle, which is one-third of the remaining untreated homes,[18] with two more program cycles (2015-2017 and 2018-2020) to reach the 2020 goal. Table 8 shows the number of homes that each IOU targeted to treat and the number they actually reported treating in 2012 in their Annual Reports. As shown, the IOUs treated 83 percent of the projected homes target. SDG&E exceeded the number of projected homes target, and PG&E treated 96 percent of the projected homes target. SCE[19] and SoCalGas treated 79 and 71 percent of projected homes target, respectively. SoCalGas attributed this in its Annual Report to uncertainty about program funding during the delay between the end of the previous program cycle (2009-2011) and the approval of the current program cycle (2012-2014). SoCalGas treated a record number of homes in 2011 (161,020), and reportedly, its network of contractors needed time to ramp back up in 2012 once the programs were approved. SCE similarly reported not meeting its 2012 goal of treated homes due to the CPUC delay in issuing the decision that authorized the 2012-2014 programs, creating uncertainty and a late ramp-up of the program year.

[18] Estimated at 2,534,461 in CPUC Decision 12-08-044 (Appendix F).

[19] SCE counts 19,833 homes that were assessed but failed the modified three measure minimum rule, which we describe in Section 5.4.2.1 of Volume 2 of this report.". Excluding those homes, 49,026 were treated. The homes that failed the three measure minimum rule will be eligible for electric measures if SoCalGas provides gas measures to them, and they will be treated by SCE as go-back visits in 2013.

Table 8: 2012 ESA Number of Homes Treated - CPUC Projected versus Actual

IOU	CPUC Projected Number of Homes to be Treated	Actual Number of Homes Treated	% of Planned
PG&E	119,940	115,229	96%
SCE	87,389	68,859	79%
SDG&E	20,316	22,415	110%
SoCalGas	136,836	96,893	71%
Total	364,481	303,396	83%

Sources: CPUC Decision 12-08-044 and IOU ESA and CARE Programs 2012 Annual Reports

Table 9 shows the savings claimed by each IOU for the 2012 ESA program, including energy, demand and gas. The IOUs reported that the ESA program saved a total of 66 million kWh, 15,000 kW and 2.5 million therms in 2012.

Table 9: 2012 ESA Program Savings Claims

IOU	Energy (kWh) Savings	Demand (kW) Savings	Gas (therm) Savings
PG&E	37,479,398	7,824	1,208,745
SCE	19,185,248	6,493	-
SDG&E	8,962,474	642	311,324
SoCalGas	-	-	999,408
Total	65,627,120	14,959	2,519,477

Source: IOU ESA and CARE Programs 2012 Annual Reports

1.2 Study Objectives

The overall study objective is to provide updated information to support important program and regulatory decisions related to the needs of the low-income customers who are eligible for the ESA and CARE programs.

The specific study objectives are to:

1. Report the most recently available estimates of eligible households for CARE and ESA;
2. Explore the accessibility of ESA and CARE programs to eligible low-income customers;
3. Obtain participating customers' perceptions of the CARE and ESA programs;
4. Assess eligible non-participating low-income customers' willingness and barriers to participate;
5. Assess the energy-related needs of low-income IOU customers, which includes an examination of customers' needs for specific energy efficiency measures;

6. Provide data that can be used to support updates of estimates of the energy savings potential remaining among eligible low-income customers' homes;
7. Collect data on energy burden and insecurity from eligible low-income customers; and
8. Assess the non-energy benefits that participants receive from participating in the ESA program.

1.3 Organization of Report

The remainder of Volume 1 of this report contains the following sections:

- Section 2: Study Methods
- Section 3: Summary of Findings, Conclusions and Recommendations

Volume 2 (Detailed Findings Report) of this report contains the following sections:

- Section 4: Low-Income Population and Program Characterization
- Section 5: Low-Income Population and Program Assessment

Volume 3 (Technical Appendix) contains the following:

- Section 6: Energy Needs Detailed Results
- Section 7: Low-Income Population Characterization Detailed Results
- Section 8: Telephone Survey Detailed Results
- Section 9: Detailed Modeling Results
- Section 10: In-Home Interview Detail
- Section 11: Low-Income Program Review Detail
- Section 12: Study Methods Detail
- Section 13: Research Instruments

2 Study Methods

This section describes the methods we used to conduct each of the study research and analysis tasks. More detail is provided in Volume 3 – Section 12.

2.1 Overview of Study Approach

We used numerous data and information sources for this study including primary and secondary research:

- Literature Review and Program Staff and Contractor In-Depth Interviews - We reviewed relevant reports and program information, combined with interviews with program staff and contractors, to provide background on the program and to obtain perspectives from implementers on some of the key study objectives.
- Secondary Data Analyses - We gathered and analyzed secondary data from the U.S. Census and American Community Survey, IOU ESA and CARE program tracking data, IOU customer billing data, Athens Research estimates of CARE and ESA eligibility, geographic data for California IOU and climate zone boundaries, California Residential Appliance Saturation Survey data,[20] and California Lighting and Appliance Saturation Survey data.[21]
- Customer Telephone Survey – We conducted 1,028 surveys with households enrolled in CARE, stratifying CARE enrollees by their ESA participation status (their home was treated by ESA since 2010, their home was treated by ESA between 2002-2009, or their home has not been treated by ESA since 2002[22]) and whether they were aware of the ESA program.
- CARE and ESA Modeling – We developed statistical models to understand drivers of and barriers to enrollment in CARE and participation in ESA.
- Conjoint Analysis – We conducted a conjoint survey to inform our understanding of drivers of and barriers to ESA participation.
- In-Home Visits – We conducted 88 in-home visits with current CARE enrollees whose homes had not been treated by ESA since 2002.
- Low-Income Program Review – We reviewed several low-income energy efficiency programs operating across the country to review enrollment, eligibility and marketing and outreach procedures in an attempt to identify ways in which the California IOU ESA and CARE programs could expand participation and enrollment, reduce barriers and/or increase participating customer benefits.

Table 10 illustrates the study approach, with columns indicating the source (secondary data, primary research, analysis), and rows indicating the detailed results that are reported in

[20] California Statewide Residential Appliance Saturation Study, RASS Reporting Center, KEMA, Inc. http://websafe.kemainc.com/rass2009/

[21] Draft onsite data files provided by KEMA, Inc., to the CPUC on April 9, 2013.

[22] We chose 2002 as a cut-off period since that year is being used as a baseline from which to measure cumulative ESA participation and penetration towards the state's Strategic Plan goal.

Sections 4 and 5 of this report (which are summarized in Sections 3.2 and 3.3). The final column indicates the numbered study objectives that were listed above in Section 1.2. In the table, "LI" refers to "Low-Income" customers.

Table 10: Overview of Study Approach

Report Section:	Data Sources													
	Secondary data						Primary research				Analysis			
	CLASS	RASS	Census, ACS	IOU program data	IOU billing data	Athens	In-home	LI program review	Program staff/ contractor INTVs	Phone survey	CARE model	ESA models	Conjoint survey	Study Objectives
4 - LI Pop and Program Characterization														
4.1 - Eligible Population for CARE and ESA				X		X								1
4.2 - CARE and ESA Participation														
4.3 - LI Population Characteristics	X	X	X		X	X				X				
4.3.1 - Demographic Characteristics														
4.3.2 - Home and Equipment Characteristics														
4.4 - ESA Program Measures				X										
4.5 - Remaining ESA Program Energy Savings POTN						X								6
5 - LI Pop Needs and Program Assessment														
5.1 - Overview of Sources														
5.1.1 - Sample Representation														
5.2 - ESA Program Accessibility							X	X	X	X				2
5.2.1 - Overview of ESA Marketing and Outreach														
5.2.2 - Customer Telephone Survey														
5.2.3 - In-Home Visits														
5.3- CARE Program Accessibility									X	X	X			2
5.3.1 - Overview of CARE Program Marketing and Outreach														
5.3.2 - Program Staff Interviews														
5.3.3 - Contractor Interviews														

Report Section:	Data Sources													
	Secondary data						Primary research				Analysis			
	CLASS	RASS	Census, ACS	IOU program data	IOU billing data	Athens	In-home	LI program review	Program staff/ contractor INTVs	Phone survey	CARE model	ESA models	Conjoint survey	Study Objectives
5.3.4 - Customer Telephone Survey														
5.3.5 - In-Home Visits														
5.3.6 - CARE Modeling Results														
5.4 - ESA Participation Drivers and Barriers														
5.4.1 - Overview of Customer Enrollment and Assessment														
5.4.2 - Program Staff Interviews														
5.4.3 - Contractor Interviews														
5.4.4 - Customer Telephone Survey														
5.4.5 -ESA Modeling Results												X		4
5.4.6 - Conjoint Analysis Results														
5.4.7 - In-Home Visits														
5.4.8 - LI Program Review														
5.5 - Energy Needs and LI Program Benefits														
5.5.1 - Energy Insecurity							X							7
5.5.2 - Energy Burden					X									7
5.5.3 - Non-Energy Benefits							X		X	X				8
5.5.4 - Energy Efficiency Measures							X		X	X				5
5.5.5 - CARE Program Benefits										X				3

2.2 Literature Review

We reviewed relevant reports and program documents to inform our understanding of the ESA and CARE programs and our research approach. In particular, we focused on the following sources:

- **The latest ESA (formerly LIEE) program process evaluation** – 2009-2010 Low-Income Energy Efficiency (LIEE) Program Process Evaluation, conducted by Research Into Action for the IOUs and the CPUC, June 10, 2011.
- **The prior low-income needs assessment study** – Final Report on Phase 2 Low-Income Needs Assessment (LINA), prepared by KEMA, Inc., for the CPUC, September 7, 2007.
- **A recent low-income household segmentation research study –** Low-Income Energy Efficiency Household Segmentation Research, prepared by Hiner & Partners, Inc., for Southern California Edison Company and Pacific Gas and Electric Company, December 2011.
- **A recent low-income high usage needs assessment study –** Low-Income Energy Efficiency Household High Usage Needs Assessment, prepared by Hiner & Partners, Inc., for Southern California Edison Company, September 2011.
- **ESA and CARE IOU program monthly and annual reports and CPUC Decisions.**

2.3 Program Staff and Contractor In-Depth Interviews

Evergreen conducted interviews with ESA and CARE program staff and contractors to gain background information on ESA and CARE and obtain implementer perspectives on the study research questions.

Senior staff from Evergreen Economics conducted telephone interviews with each of the four IOU program staff for CARE and ESA in April 2013. Each interview lasted between one and two hours and included the program manager, relevant support staff and the LINA study team IOU representative. These interviews were conducted to provide background information on ESA and CARE and to obtain program staff perspectives on the study research questions.

Evergreen staff completed 17 total in-depth interviews with ESA outreach and assessment[23] and CARE outreach contractors in May and June of 2013, and Table 11 shows how the interviews were distributed by IOU and program. Each interview lasted between 30 minutes and one hour and they were typically conducted with program managers with broad knowledge of program operations, challenges and successes. In some cases, additional information was provided in brief follow-up emails.

[23] We did not interview any ESA installation or inspection contractors.

Table 11: LINA Contractor Interviews Completed

IOU	ESA Program Completions	CARE Program Completions
PG&E	3	1
SCE	3	3
SoCalGas	3	1
SDG&E	2	1
Total	11	6

2.4 Secondary Data Analyses

Evergreen assembled several existing data sources to leverage for the study analyses, from a variety of sources.

- **Athens Research estimates of 2013 ESA and CARE eligibility** – Athens Research provided estimates of the number of IOU customers that are eligible for CARE and ESA in 2013. Athens Research developed these estimates in early 2013 using data from the American Community Survey 2011, the Current Population Survey, and labor market information data from the Employment Development Department. Evergreen received these data from Athens Research on April 11, 2013. We used the Athens data as the primary data source for our CARE modeling task, to estimate the eligible low-income population for CARE and ESA, and for the low-income population characterization.
- **The California Residential Appliance Saturation Survey (RASS) –** The California Energy Commission and the IOUs sponsored a large-volume residential mail survey in 2009/2010 conducted by KEMA, Inc., that provides self-reported demographic, home and equipment information from a representative sample of residents in the California IOU service territories, including low-income residents. The data are available online and may be queried by IOU service territory, by Title 24 climate zone and by various demographic categories including income level and number of people in the home. We used the RASS data to support the ESA modeling effort and the low-income population characterization.
- **The California Lighting and Appliance Saturation Survey (CLASS)** – The CPUC and the IOUs sponsored a comprehensive on-site appliance saturation survey in 2013 that is currently being finalized by KEMA, Inc. The CPUC provided our team with the raw data files from this effort that included IOU service territory and various demographic categories including income level and number of people in the home, which allowed us to approximate whether each sampled home was eligible for CARE and ESA. We used the CLASS data to support the low-income population characterization.
- **US Census and American Community Survey Data (ACS)** – We utilized three data sources available from the US Census Bureau: the 2010 US Census, the 2011 ACS and the 2004 and 2011 ACS Public Use Microdata Sample (PUMS). We compiled demographic and housing characteristic data from the standard pre-tabulated data available for the 2011

ACS and 2010 US Census via the American Fact Finder portal. We used these data to supplement the Athens, RASS, and our study phone survey sample demographic data for the ESA and CARE modeling. The standard pre-tabulated data for the 2011 ACS and 2010 Census did not provide the granularity required for the low-income population characterization task. For this task, we made use of the 2004 and 2011 ACS/PUMS database. The PUMS database is a set of untabulated responses to the ACS about individual people or households from a subset of the total ACS respondents. The structure of the database allowed us to characterize the low-income population by IOU service territory,[24] urban or rural county, primary language and housing type.

- **IOUs' Customer Information System data** – We obtained billing data from each IOU including CARE status, energy usage and cost, and payment and arrearage history. We used these data for the energy burden analysis, for the CARE and ESA models and to characterize the energy usage for the low-income population characterization.
- **ESA program tracking data (2002-2012)** – We obtained historic ESA tracking data going back to 2002. For the period 2010-2012, we obtained measure detail, and for 2002-2010, only basic descriptive information about the homes that were treated. We used these data for the phone survey sample design and the ESA measure characterization.

2.5 Customer Telephone Survey

Tetra Tech conducted 1,028 phone surveys with IOU customers that are on the CARE rate, as a proxy for being income-qualified for both CARE and ESA. Due to the reportedly very high CARE penetration rate (91%, based on the IOU ESA and CARE Programs 2012 Annual Reports), we did not attempt to conduct surveys with CARE non-participants.

We stratified the CARE population based on whether their home had been treated by the ESA program since 2002, with 300 sample points allocated to "Recent ESA Participants (2010-2012)", 315 to "Prior ESA Participants (2002-2009)" and the remaining 385 sample points to "ESA Non-Participants".

Table 12 shows the telephone survey sample allocation. We used the IOU billing and ESA tracking data to develop the telephone survey sample frame. We also stratified by awareness of the ESA program, based on the phone survey screening questions, to ensure a balanced sample. Finally, we stratified by IOU service territory, allocating 375 to PG&E and SCE, 200 to SDG&E and 50 to SoCalGas-only customers. We expected to achieve a much greater number of SoCalGas completes since the majority of SCE customers also have SoCalGas service.

[24] ACS/PUMS geographically identifies households by assigning them to one of 233 Public Use Microdata Areas (PUMAs) in the state of California. We assign ACS/PUMS households to IOU service territory at the Public Use Microdata Area level using information provided in the Athens Research eligibility estimate data.

Table 12: LINA Telephone Survey - Sample Allocation

IOU	Aware of ESA	Recent ESA Participants	Prior ESA Participants	Non-participants	Total
PG&E	Yes	75	75	85	375
	No	35	35	70	
SCE	Yes	75	75	85	375
	No	35	35	70	
SoCalGas only	Yes	10	10	10	50
	No	5	5	10	
SDG&E	Yes	40	40	40	200
	No	20	20	40	
Total		295	295	410	1000

Tetra Tech conducted the surveys in both English and Spanish during the months of July and August, 2013. 93 percent of California's low-income population speaks either English or Spanish, based on our analysis of 2011 ACS/PUMS data (reported below in Section 3.2 and also in more detail in Volume 2 – Section 4.3.1.). Table 13 shows the final disposition of telephone survey completes (1,028 surveys). Awareness of the ESA program was a lot higher than expected, so we increased the quota for "aware of ESA" for all categories.

Table 13: LINA Telephone Survey - Completes

IOU	Aware of ESA	Recent ESA Participants	Prior ESA Participants	Non-participants	Total	Total – SoCalGas Customers
PG&E	Yes	80	78	113	271	0
	No	32	38	48	118	0
SCE	Yes	87	88	91	266	264
	No	25	28	65	118	116
SoCalGas only	Yes	7	12	11	30	30
	No	8	5	9	22	22
SDG&E	Yes	46	42	51	139	0
	No	16	18	30	64	0
Total		301	309	418	1,028	432

2.6 CARE and ESA Modeling

2.6.1 CARE Modeling

We developed and estimated statistical regression models to examine two aspects of the CARE program. The participation (first) model is based on the ratio of CARE customers to total customers in a given census block group. The penetration (second) model is based on the ratio of CARE customers to CARE-eligible customers in a given census block group. The observations are Census block groups (rather than customers). The models are looking at variations in participation and penetration ratios across census block groups, and what variables (that we may observe at the Census block group level) might predict higher or lower rates, all else constant.

- **CARE Participation:** The CARE *Participation* model examines the relationship between the rate of CARE participation at the Census block group level and the demographic and economic characteristics of that block group. We define CARE Participation as the ratio of the number of households on the CARE rate to the total number of households in the block group.

- **CARE Penetration:** The CARE *Penetration* model examines the relationship between the tendency of CARE-eligible households to participate in CARE, also at the block group level. We define CARE Penetration as the ratio of the number of households on the CARE rate to the total number of CARE-eligible households in the block group.

We estimated the regression models using block-group level data provided by the IOUs and produced by Athens Research, as well as data obtained from the U.S. Census Bureau.[25]

Table 14 describes the types of variables we considered for their explanatory contribution in the CARE participation and CARE penetration models, respectively. The final set of explanatory variables included in the regression models are a subset of these variables and were included in the models based on their incremental relationship to the respective dependent variable. Many pairs of variables within the Athens and Census data sets are highly correlated—i.e., have a strong positive or negative linear relationship. Because of this, they have the same or very similar relationship with the dependent variable, which can lead to problems in the estimation of the econometric model.[26] For example, the percent of households with income below 100 percent of the Federal Poverty Level (FPL) is highly correlated with the percent of households below 150 percent of the FPL. Including both of these variables in the regression model would not only be unnecessary, but would likely result in large variances on the coefficient estimates of the collinear variables because the variables provide essentially the same information for predicting the dependent variable (proportion of households on a CARE rate).

[25] A block group is a geographical designation used by the U.S. Census Bureau that consists of a cluster of census blocks having the same first digit of their four-digit identifying numbers within a census tract. Block groups generally contain between 600 and 3,000 people, with an optimum size of 1,500 people. Block groups never cross the boundaries of states, counties, or statistically equivalent entities, except for a block groups delineated by American Indian tribal authorities, and then only when tabulated within the American Indian hierarchy. Block groups never cross the boundaries of census tracts. Source: http://www.census.gov/geo/www/geo_defn.html [May 29, 2012]

[26] The estimation problem, multicollinearity (or simply collinearity), is a condition occurring when two or more independent variables in the same regression model contain high levels of the same information and, consequently, are strongly correlated with one another. When significant collinearity is present, the coefficients of the independent variables in the regression model can be unstable, and even the signs of these coefficients may change when different variables are included, making it difficult to interpret the regression coefficients. In addition, standard errors may be inflated, resulting in insignificant t-statistics and incorrect conclusions regarding the statistical significance of the coefficients.

Table 14: Potential Explanatory Variables for the CARE Penetration Model, Census Block Group

Variable	Source	Description
Income distribution variables	Census/Athens	Summary and descriptive household income statistics (e.g. % of household at or below 100% of poverty)
Population Density and Rural/Urban designations	Census/Athens	Population per square mile; Athens data includes various rural statistics
Household Member Demographics	Census/Athens	Such as persons per home, race/ethnicity, seniors, children and disabled member information, primary languages
Participation in non-energy low-income assistance programs	Census/Athens	Public assistance income, SSI income, food stamp recipients, etc.
Housing stock and related economic data	CIS, Census/ Athens, housing authority	Home type, home size, home vintage, housing starts, vacancy rates, own versus rent, rental rates ($s)/home prices and recent trends, housing starts
Energy use data: gas and electric	CIS/billing	Average usage, usage per square foot, per household member, metrics of seasonal burden/variance (relationship to HDD/CDD)
IOU service territory (elec/gas) and IOU CARE marketing data	CIS	Available data regarding mass market or geographically focused CARE marketing over last three years
IOU Rate and billing information	CIS/billing	Percent of customers on FERA, Medical Baseline. Statistics reflecting rates of billing arrearages and service interruptions
Population eligible for CARE - number and percent of household	Athens	As documented in Athens research

The model results are presented in Section 5.3.6 and details on CARE model specification are provided in Section 12.2.

2.6.2 ESA Modeling

We developed statistical models that will assist the IOUs in better understanding the factors that affect participation in the ESA program. Our modeling approach included individual "Stage 1" models based on large samples of CARE participants for each of the four IOUs and a single "Stage 2" model, which included information on only those 1,028 CARE participants that responded to the phone survey.

For the Stage 1 models, we used logistic regression to develop models that predict the likelihood that a customer on CARE has either participated in the ESA program or lives in a home that was treated through the ESA program. Logistic regression is used when the dependent variable is binary (i.e., is equal to either 0 or 1). It is a non-linear, S-shaped distribution, which constrains the estimated probabilities to lie within the interval zero to one and is by far the most popular method for estimating statistical models when the dependent variable is binary. The dependent variable in each of the four Stage 1 models is equal to "1" for any customer living in a premise that was treated through the ESA program—regardless of whether the current customer is responsible for participation or the premise was treated prior to the current customer living in the home. The dependent variable is equal to "0" if the home has not been treated through the ESA program. Because most customers who are eligible for ESA are also on a CARE rate,[27] the samples of data used for each of the four Stage 1 models include only CARE customers.

We also used logistic regression to estimate the Stage 2 model. The dependent variable was the same as for the Stage 1 models; however, the Stage 2 model differs in that it is based largely (but not entirely) on information provided by respondents to the phone survey. The objective of the Stage 2 model was to explain ESA participation based on attitudinal and behavioral characteristics of customer otherwise unknown to the IOUs.

Table 15 and Table 16 describe the types of variables we considered as explanatory variables in the Stage 1 and Stage 2 ESA participation models. The final set of explanatory variables included in the regression models are a subset of these variables and were included in the models based on their ability to predict the dependent variable (i.e., that a residential premise was treated through the ESA program). Many pairs of variables within the data set are highly correlated—i.e., have a strong positive or negative linear relationship. Because of this, they have the same or very similar relationship with the dependent variable, which can lead to problems in the estimation of the econometric model.[28] Including two (or more) highly correlated explanatory variables in the regression model would not only be unnecessary, but would likely result in large variances on the coefficient estimates of the collinear variables

[27] It is possible, though not likely, that some ESA participants can decline to be on CARE.
[28] Ibid.

because the variables provide essentially the same information for predicting the dependent variable (likelihood that a residence participated in the ESA program).

Table 15: Potential Explanatory Variables for Stage 1 ESA Participation Models

Variable	Source	Level	Description
Location and climate	Census/Athens	Census Block Group	Population per square mile; rural/urban distinctions and climate zone
Household demographic & income, Workforce	Census/ Athens	Census Block Group	Such as persons per home, race/ethnicity, seniors, children and disabled member information, primary languages; median household income; employment statistics
Participation in non-energy low income assistance programs	Athens, Census	Census Block Group	Public assistance income, SSI income, food stamp recipients, etc.
Housing stock and related economic data	CIS, Census, Athens, housing authority	Customer and Census Block Group	Distributions of home type, home size, home vintage, own versus rent,
Energy Usage and IOU territory	CIS/billing	Customer	Monthly kWh and therm consumption, Serviced by kWh/Gas IOU
IOU tariff/rate and payment information	CIS/billing	Customer	FERA, Medical Baseline. Arrearages and service interruptions
ESA Participation	ESA data	Customer	If and when home was –treated through ESA
CARE enrollment characteristics	CARE data	Customer	Household is currently enrolled in CARE; timing of current enrollment; enrollment type (categorical versus income)

Table 16: Potential Explanatory Variables for Stage 2 ESA Participation Model

Variable	Source	Level	Description
IOU service territory	CIS	HH	Electric and Gas utility
Income	Survey	HH	Annual household income, dollar value or range. May be adjusted for local cost of living.
Documentation barriers	Survey	HH	Need for and access to income eligibility documentation (cash wages, no income); is right name on bill; renter/ landlord MM documentation requirements
Scheduling barriers	Survey	HH	Time and flexibility to be home during weekdays/for ESA appointments.
Cultural attributes	Survey	HH	Language isolation and English literacy, trust in IOU/gov't programs, perceptions of LI assistance. Affiliation/membership/participation with CBOs/events
Energy efficiency motivation	Survey	HH	Awareness and knowledge of energy efficiency measures and practices; EE behaviors and recent actions (e.g. turn off lights/TV, buy CFLs, Energy Star appliances); control over energy bill
Household demographics	Survey	HH	Detailed household demographics (persons/home, ages, race/ethnicity, disability, languages), length of time in home
Selected home characteristics	Survey	HH	Home type, vintage, size, pool/spa
Selected home inventories	Survey	HH	CFLs, number of televisions, internet, home computer, air conditioning, heating type/fuel source, age of refrigerator.
Home-related health	Survey	HH	Perceptions and concerns regarding condition of home and operations of

and safety concerns			equipment. E.g.- heating/cooling, window/doors
Energy consumption/ patterns	CIS/billing	HH	kWh and therm consumption, usage per square foot, per HH member, metrics of seasonal energy burden
Energy Burden	Survey/billing	HH	Energy bills as a percent of income, self-reported

2.7 Conjoint Analysis

The primary goal of the conjoint analysis was to collect information on customer preferences for participating in the ESA program. This information identifies participation drivers and barriers and determines the relative importance of several factors that affect willingness to participate.

The conjoint analysis results may also be used to calculate the probability that a customer is willing to participate in the ESA program, and then see how this probability varies with changes in program characteristics. Note that since this probability is estimated using stated preference data on a limited number of factors influencing the participation decision, it has limited value for estimating potential market share. Nevertheless, the nature of conjoint analysis that focuses on tradeoffs made across program attributes makes it a useful tool for gauging the relative importance of various program characteristics.

We developed an online conjoint analysis survey, where respondents were asked to rank various ESA program options. Tetra Tech recruited respondents for the conjoint analysis from the phone survey, offering a $10 gift card for completing the online survey. Phone survey respondents who indicated they were willing to take the conjoint survey provided Tetra Tech with their email addresses, and Evergreen sent them a separate email directing them to the conjoint website including a unique web link. The Energy Center of Wisconsin (ECW) also conducted a small number of conjoint surveys in conjunction with the in-home visits, which are described below. A total of 53 responses were used in the conjoint analysis.

2.8 In-Home Visits

The Energy Center of Wisconsin (ECW) conducted 88 in-home interviews and site visits with ESA non-participants who are enrolled in CARE (and thus likely income-eligible for ESA[29])

[29] Note that to be enrolled in CARE, customers must self-certify their income. A sample of enrolled customers are required to verify their income. To participate in ESA, most customers must show documentation to prove their income. Thus, there may be some households in our sample that may not actually qualify for ESA due to lack of documentation or their income is too high. We relied on self-reported income and number of household members to confirm ESA eligibility from the phone survey for screening in-home visit participants.

July – September 2013. All of the completed visits were with customers who had also completed a telephone survey. The primary purpose of these interviews and site visits was to better understand ESA non-participants who are likely income-eligible to provide insights about the ways they can best be reached and served by the ESA and CARE programs. The in-home visits also afforded an opportunity for a simple walk-through assessment of energy-saving opportunities in the home.

Interview participants were offered a $100 incentive for participating in the 1.5 to 2-hour interview and home walk-through. Our sample frame comprised income-qualified households (i.e., enrolled in CARE) that had not participated in ESA from 2002 through 2012, the ESA participation period we studied.[30] Within this population, we developed a sampling approach to achieve the following objectives:

1. Distribute in-home visits among the service areas of the California IOUs
2. Achieve scheduling efficiencies (i.e., leveraging the phone survey respondents)
3. Achieve travel efficiencies (i.e., cluster in-home visits within geographic boundaries)
4. Conduct interviews in Spanish to willing households that prefer to communicate in Spanish
5. Include a broad range of income-qualified ESA non-participants (i.e., use Census data to inform the selection of geo-demographic clusters to select the sample frame)

Statewide, we targeted about 60 homeowners residing in single-family homes, 15 renters residing in single-family homes and 25 renters residing in multi-family households. We gave preference to moderate and high-energy users, seeking to avoid those with the lowest comparative energy consumption (33th percentile and lower), as they have less opportunity to save through efficiency measures and face a relatively lower energy burden. We targeted between 15-18 Spanish language interviews, though we conducted a higher number of interviews in homes that use Spanish (but speak some English). Spanish interviews were conducted across the clusters (defined below) where there are higher concentrations of Spanish-only homes.

Within the IOU-specific quotas, we identified geo-demographic clusters that, based on Census and IOU data, contain higher densities of low-income residents, represent a variety of geo-demographic characteristics (e.g., inland versus coastal, urban higher density versus suburban or rural) and allow for reasonably efficient travel between interviews. However, we expanded those clusters greatly during recruiting when it became apparent that we would not be able to fill our quotas with tight geographic clusters.

[30] Nevertheless, we encountered 16 households that appeared to have gotten ESA treatments at their present home (or participated in a program that the households said matched our description of ESA), mostly in the months immediately prior to our visit.

We completed 88 in-home visits across the IOU service areas as described in Table 17 below. These in-home visits were conducted by three trained ECW interviewers between August 13 and September 27, 2013.

Table 17: Targeted and Completed In-Home Visits by IOU

IOU	Target Completions	Completed Visits	Targeted Geographic Clusters
PG&E w/out SCE	22-33	28	Bay Area, northern Central Valley, Fresno
PG&E w/ SCE		1*	
SCE with SoCalGas	22-33	30	Los Angeles County, western Riverside County
SCE w/out SoCalGas		6	
SoCalGas-only	(no target set)	7	Los Angeles (city & county), western Riverside County
SoCalGas - total	22-33	37*	
SDG&E	11-22	17	San Diego, Chula Vista
Statewide	100	88	

* Not counted in total because these sites also appears in SCE and/or SoCalGas-only tally

Recruitment challenges, participant cancellations, and no-shows left us with 88 completions by the end of September. To facilitate timely reporting, the team chose to end fieldwork and shift to analysis and reporting at that time.

Figure 1 illustrates the geographic distribution of the in-home visits by housing type and language in which the interview was conducted. In all, we completed visits to 49 single-family homes, 36 multi-family homes and 3 mobile homes. 36 of the single-family homes were owner-occupied; 13 were rented. 72 of our visits were conducted in English, and 16 were completed in Spanish. Table 18 shows housing types by language in which the interview was conducted.

Figure 1: Distribution of In-Home Visits by Housing Type and Language

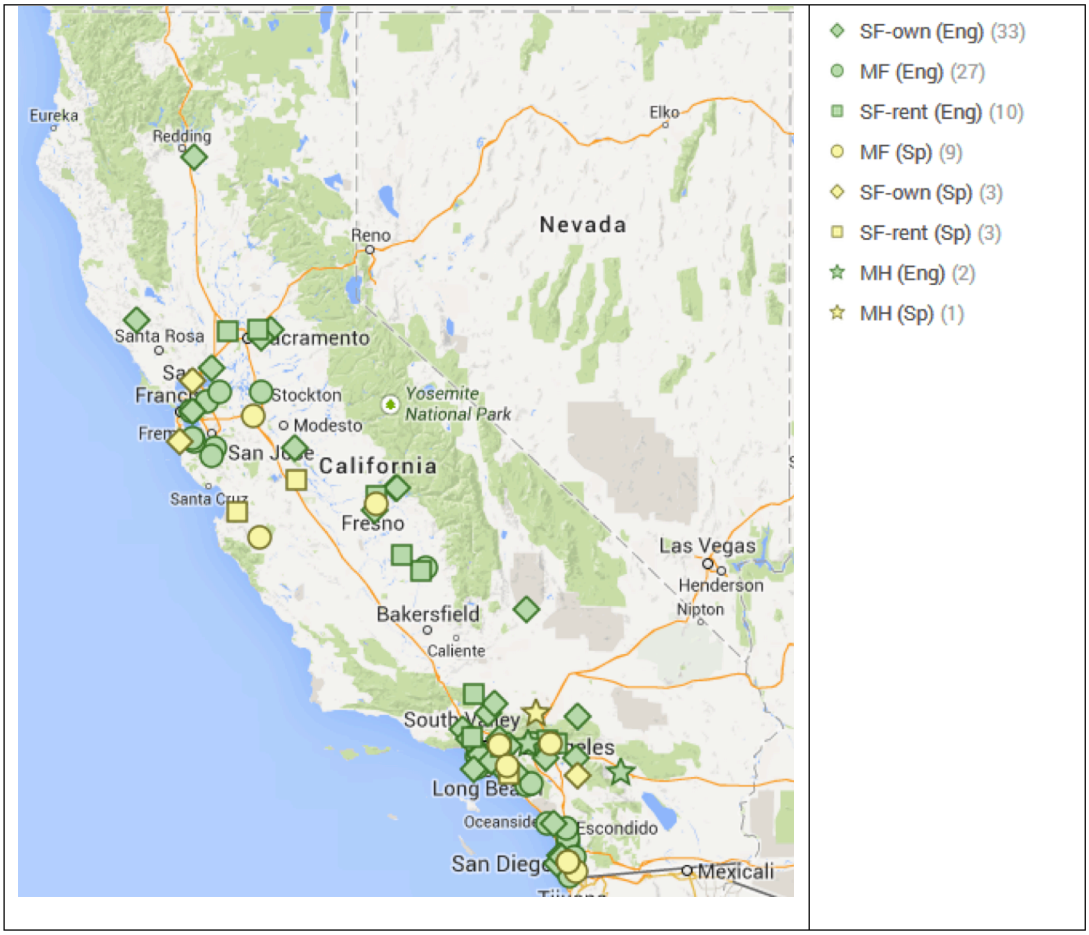


Table 18: In-Home Visits: Housing Types and Language

Home Type	Ownership	Language	Total
Single family	Owner-occupied	English	33
		Spanish	3
	Rented	English	10
		Spanish	3
Multi-family		English	27
		Spanish	9
Mobile home		English	2
		Spanish	1
Total		English	72
		Spanish	16
		All	88

2.9 Low-Income Program Review

The Energy Center of Wisconsin (ECW) conducted a low-income program review based primarily on secondary research and program staff interviews about selected parameters of low-income programs that are considered to be well-designed and effective at obtaining broad participation and reducing energy burden for low-income customers through efficiency interventions. The main purpose of the program review was to provide context and perspectives for interpreting results from this study and for framing recommendations. Emphasis of the program review was on programs that perform efficiency interventions (i.e.,

that are similar to the ESA program) rather than those that only reduce bills or help to offset them through cash transfers (i.e., the CARE program).

We focused primarily on customer eligibility and enrollment issues and program offerings (such as measures) with a secondary focus on outreach/marketing, program delivery and performance. We also attempted to identify best practices based on the success of these programs. We developed a matrix of program characteristics along one dimension and example programs along another. The program characteristics we tracked are:

- Primary Priority:
    - Program eligibility criteria;
    - Participant enrollment process and requirements, including eligibility verification;
    - How eligible measures are/were selected for inclusion in the program (i.e., measure inclusion at the program level); and
    - How measures are selected for individual homes (i.e., measure selection at the participant level).

- Secondary Priority:
    - Program outreach and marketing;
    - Other programs that exist alongside (for context);
    - Coordination with other programs (if at all);
    - How delivery models are used; and
    - Where their main energy savings or other impacts come from (measures or types of homes, etc.).

Our process for conducting the program review comprises three steps:

- Identifying exemplary programs;
- Reviewing publicly available documentation that describes the programs; and
- Interviewing program staff to fill in information not available from public documents.

We identified exemplary programs based on (1) our knowledge of low-income energy efficiency programs from ECW's work on the national Weatherization Assistance Program evaluation, (2) nominations from our partners and contacts who conduct many of the state- and utility-specific low-income evaluations, and (3) recommendations from program staff we interview. We developed an initial list of 5-10 programs that provide efficiency interventions in the homes of low-income households.

For the selected programs, a member of our research staff identified publicly available documentation to begin to populate the matrix described above. Mostly, this step was an online search of program documentation posted by the program itself or its funders.

Thereafter, the research staff person called the program director or other applicable program staff to conduct a telephone interview that provided any information in the matrix not sufficiently explained in program materials. We leveraged the relationships we already had with all state weatherization programs and many local agencies throughout the country as an entry point or to obtain a referral to the appropriate contact to interview. The interview was conversational in nature (i.e., not scripted) and focused on understanding the program's characteristics and approaches to the issues of interest. In these interviews, the researcher also inquired about the program representative's perceptions about the key drivers of the program's success. In some cases we collected additional documents available from our program contact. The research staff person completed the matrix based on the information provided by program staff. In total, we contacted seven program staff, obtaining information for a total of six programs.

3 Summary of Findings, Conclusions and Recommendations

This section presents a summary of the study findings, conclusions and recommendations. The discussion is organized around 21 sets of research questions that were identified in the study research plan as the focus on this study. For more detailed study findings, please see Volume 2 of this report.

3.1 Overview of Sources

We used a variety of sources to develop the study findings, described below along with important caveats to consider when reviewing the findings.

- **2004 and 2011 ACS/PUMS data** that provide demographic characteristics based on a large sample of the state's general and low-income population.
- **2013 CLASS data** that provide household and energy-using equipment characteristics of the state's general and low-income population based on a sample of on-site surveys conducted by KEMA, Inc.
- **1,028 telephone surveys of CARE customers**[31] including ESA participants (from 2002–2012) and ESA non-participants. We conducted both English and Spanish language surveys, representing 93 percent of the state's low-income population (the remaining 7 percent do not speak English or Spanish). The sample is biased, where respondents represent English and Spanish-speaking customers who are willing to talk with a surveyor on the phone about energy issues. The CARE and ESA modeling (Stage 1), described below, are based on the low-income population and are used in conjunction with the telephone survey results to address the study objectives.
- A nested sample of **88 in-home visits** within the ESA non-participant telephone survey sample, providing a fuller picture of ESA non-participants' characteristics and energy needs. These findings are qualitative due to the small sample size, and have similar bias issues as the telephone survey.
- **A review of several low-income programs** similar to ESA offered in other states, providing insights from other similar programs; and
- **Modeling and analysis** of IOU, Athens Research and Census data, informing CARE program participation and penetration, ESA participation and ESA willingness to participate.
    - **CARE modeling**: We developed statistical regression models to understand the drivers of and barriers to CARE program participation based on Athens Research data. The models examine variations in participation and penetration ratios across census block groups, and what variables (that we may observe at the Census block group level) might predict higher or lower rates, all else constant.

[31] Due to the CARE program's high penetration rate (see Section 2.1.1) and the consistent income and household size eligibility criteria for CARE and ESA (see Section 2.1), CARE customers are a proxy for customers who are income-eligible for both CARE and ESA.

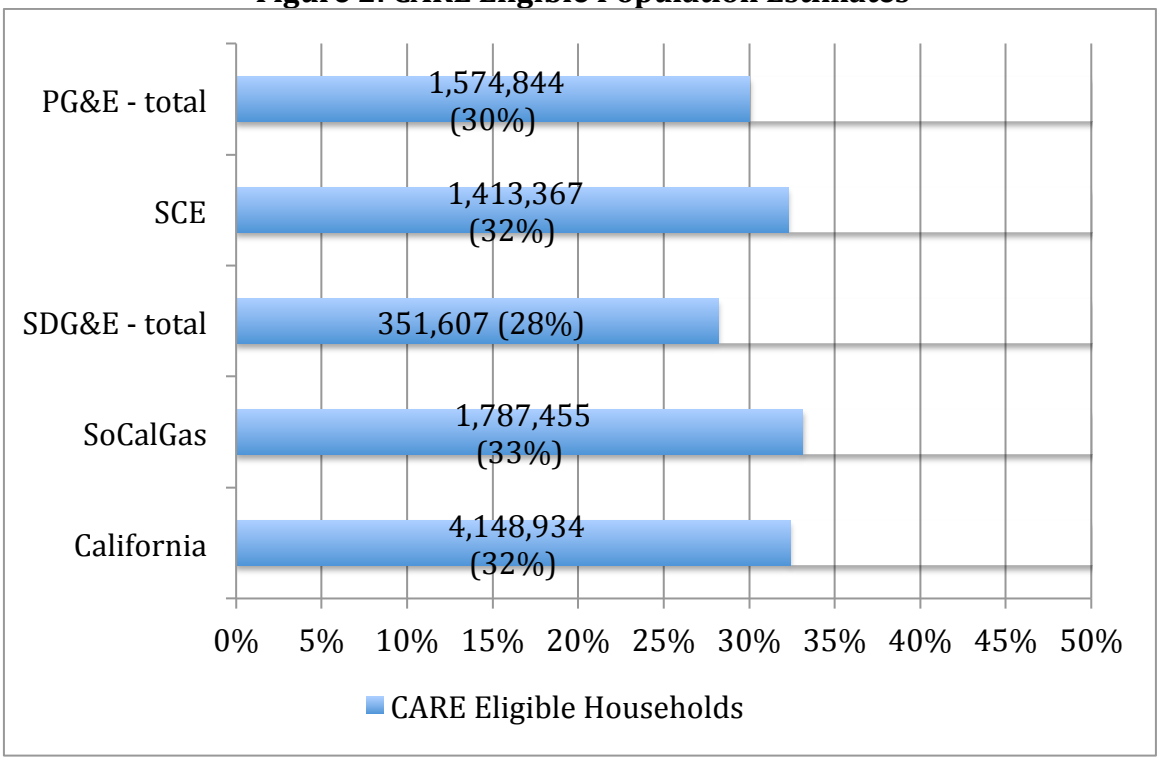
- **ESA modeling**: Similar to the CARE modeling, we developed regression models to understand drivers of and barriers to ESA program participation. We used customer level data from the IOUs (Stage 1) supplemented with telephone survey data (Stage 2).
- **Conjoint analysis:** We used a stated preference survey technique that involves having respondents sort through and rank options that reflect different choices. For this analysis, participants responded to an online/onsite survey where they were first asked to rank choices that reflected different types of ESA program scenarios. For all these scenarios, each choice was defined by several attributes, and respondents were asked to rank the options from most to least preferred based on these attributes, and then to indicate which scenarios they would actually participate in.

3.2 Overview of Low-Income Population Characteristics

This subsection provides a summary of the demographic characterization that is presented in Volume 2 – Section 4.3.1.

Figure 2 below shows the number and percent of households in each IOU service territory, and for the state, that are estimated as eligible for CARE based on Athens Research analysis. Statewide, 32 percent (4.1 million households) are technically and income-eligible for the CARE program.

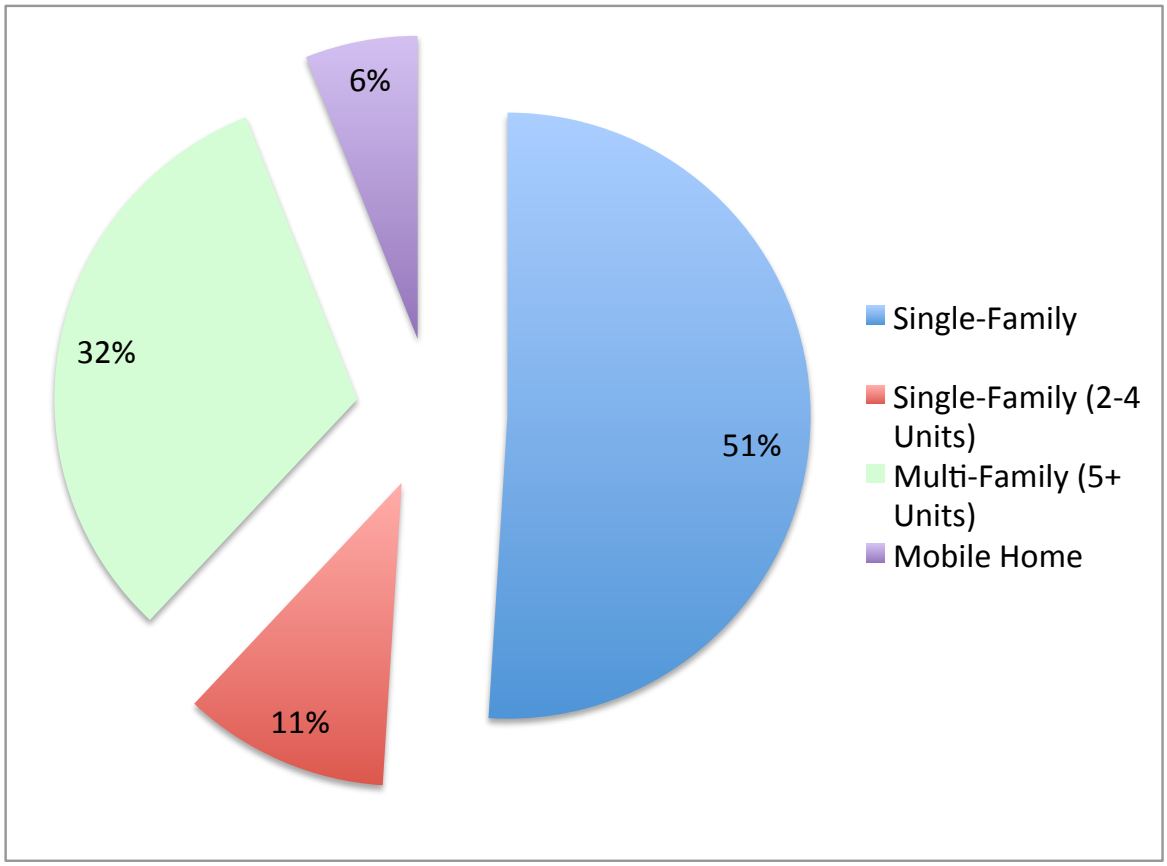
Figure 2: CARE Eligible Population Estimates



Source: 2012 data developed by John Peterson of Athens Research under subcontract to the IOUs.

As shown in Figure 3 below, 32 percent of the low-income market resides in multi-family dwellings (as defined by the ESA program as having 5 or more units.) 62 percent reside in single-family dwellings (11% in 2-4 unit buildings and 51% in single-unit structures.) The remainder (6%) live in mobile homes.

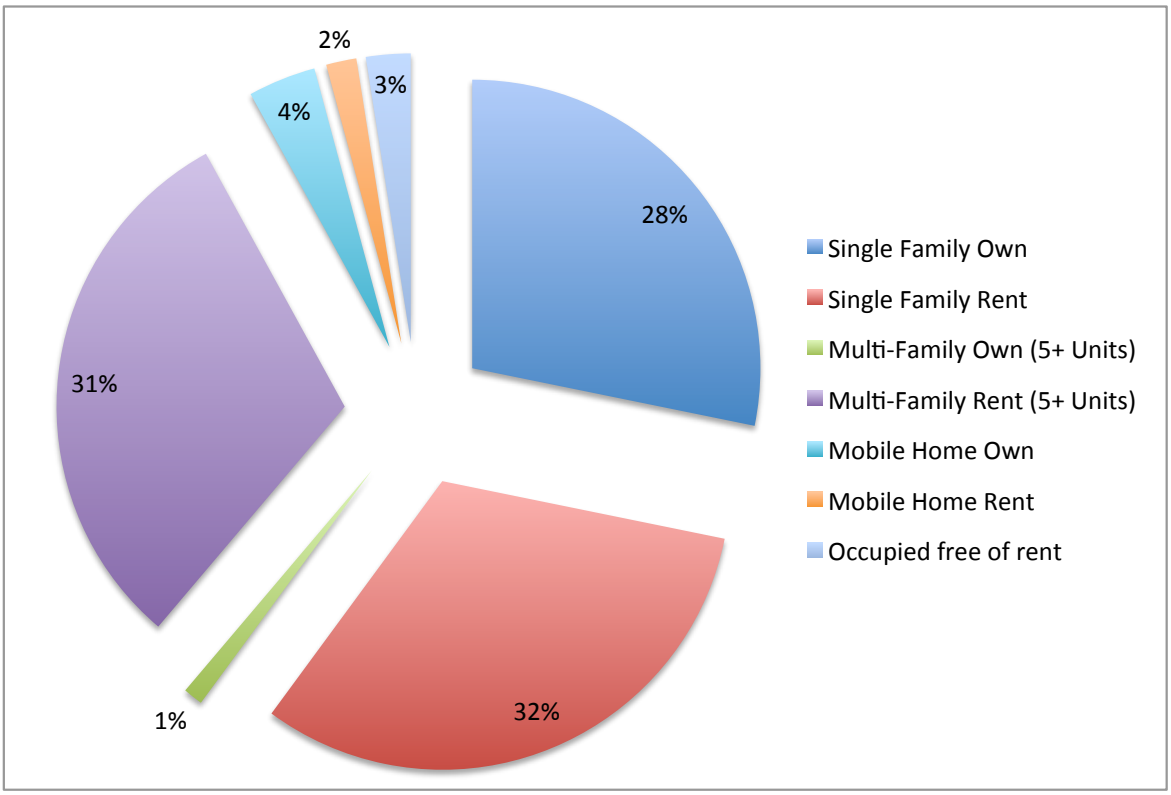
Figure 3: Home Type for California Low-Income Population



Source: 2011 PUMS.

64 percent of low-income households rent their homes, compared to 55 percent of the general population. The renter market is about evenly split between multi-family (5 units or more) and single-family dwellings (including homes in 2-4 unit buildings), as shown in Figure 4 below. Single-family renter homes comprise the largest segment of the low-income market (at 32%), followed closely by multi-family rented homes (at 31%) and single-family owned homes (at 28%).

Figure 4: Home Ownership by Type for California Low-Income Population

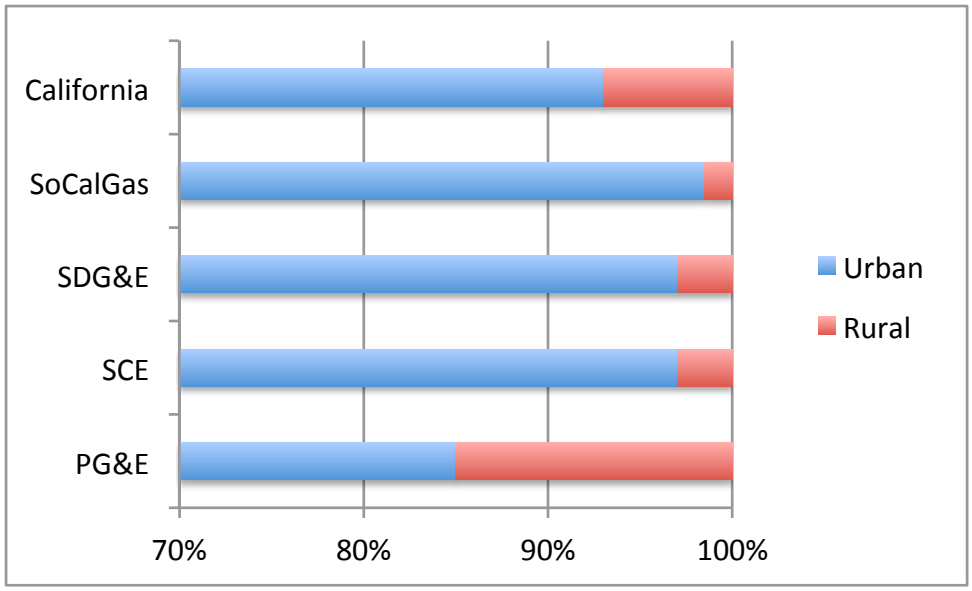


Source: 2011 PUMS.

As shown in Figure 5 below, 93 percent of the state's low-income households reside in counties that are classified as urban, and 7 percent are in rural counties.[32] This varies by IOU service territory, with PG&E having a higher percentage of low-income homes located in counties designated as rural (15%).

[32] If a home was in a county that was in a metropolitan area with population of 250,000 or greater, as identified by the 2013 USDA Rural Urban Continuum Code, the home was considered to be in an urban area. Otherwise it was considered rural. We defined rural based on county since that was the lowest geographic area available in the ACS/PUMS that could be associated with a rural or urban designation. This approach may lead to an under statement of rural residents.

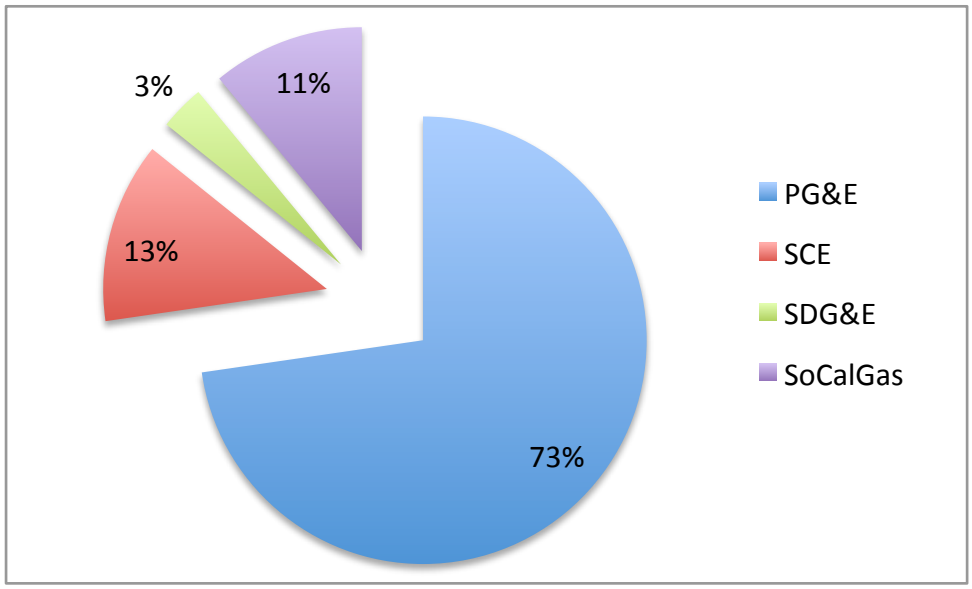
Figure 5: Urban Versus Rural for California Low-Income Population



Source: 2011 PUMS.

Figure 6 below shows how the rural[33] low-income population is distributed by IOU service territory, with 73 percent located within PG&E's service territory.

Figure 6: Distribution of Rural Low-Income Population By IOU Service Territory

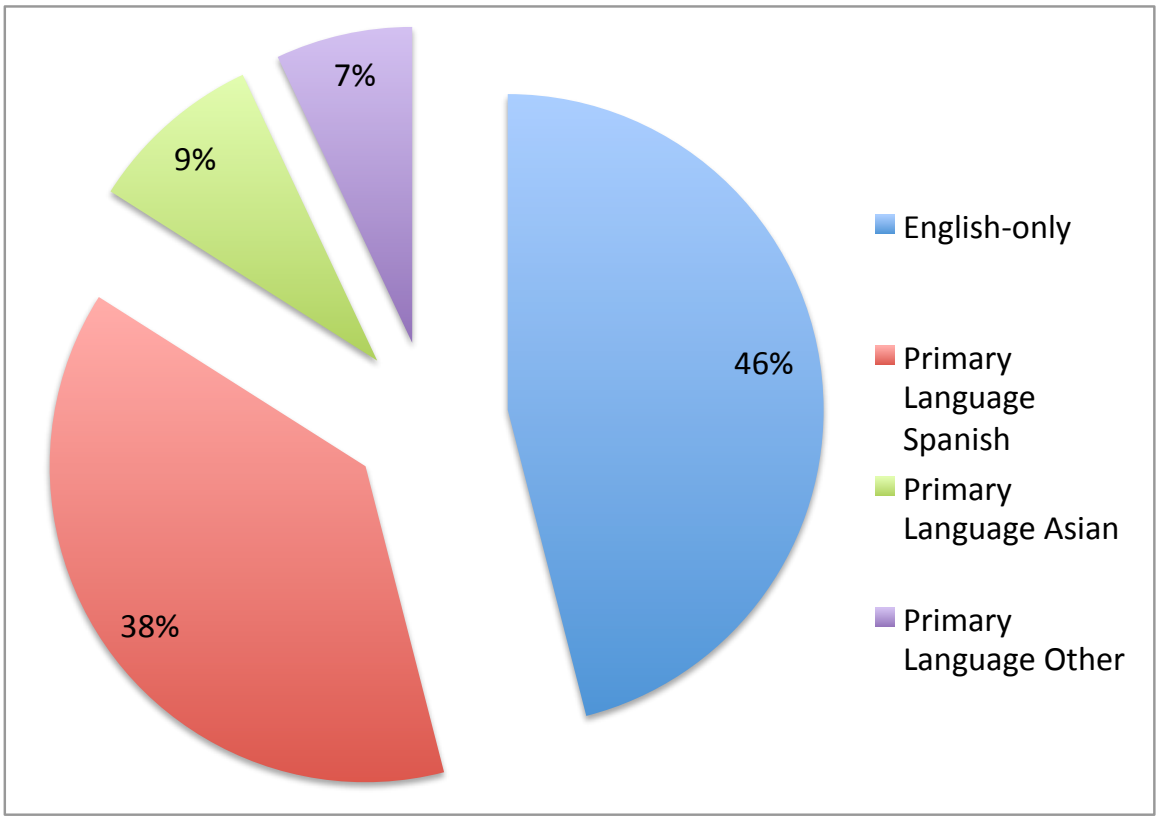


Source: 2011 PUMS.

[33] Ibid.

The majority of low-income households speak a language other than English, with 46 percent only speaking English. As shown in Figure 7 below, 38 percent use Spanish as the primary language, followed by 9 percent that use an Asian language primarily.[34] A complementary finding that we report on in Volume 2 – Section 4.3.1 is linguistic isolation, which is defined a household in which no one in the household aged 14 and over speaks English only or English very well. 20 percent of low-income households are linguistically isolated, as compared to 10 percent of the general population.

Figure 7: Languages Spoken in Household for California Low-Income Population

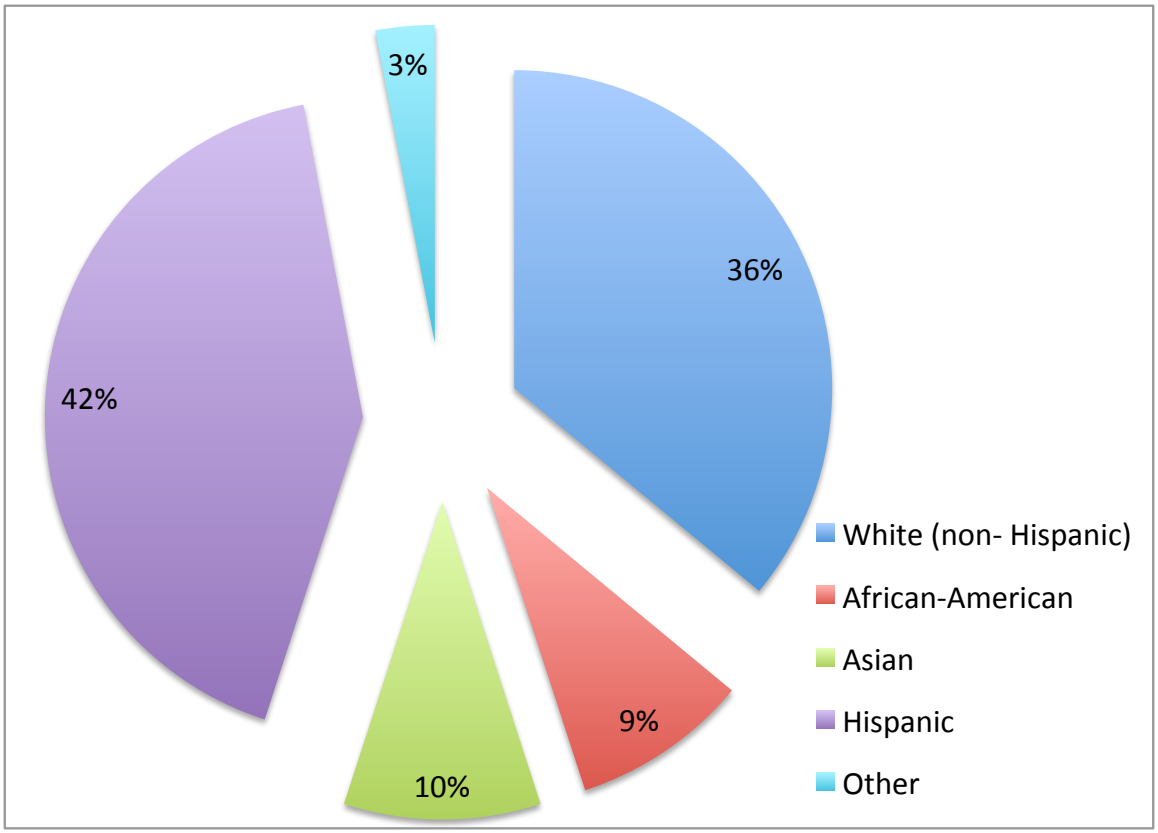


Source: 2011 PUMS.

There is no majority race among California low-income households as shown in Figure 8 below. 42 percent of heads of households reporting Hispanic ethnicity, followed by 36 percent white and 10 percent Asian.

[34] The ACS asks respondents if they speak a language other than English, and if so, what language (allowing only one).

Figure 8: Ethnicity of Head of Household for California Low-Income Population

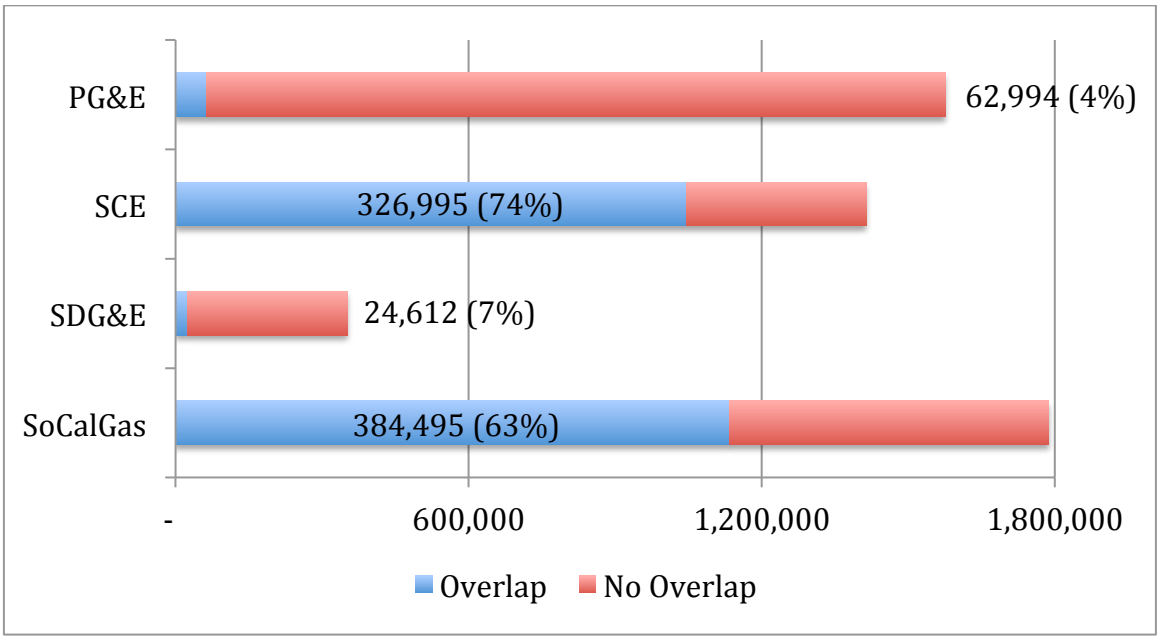


Source: 2011 PUMS.

Figure 9 shows the number and percent of the CARE eligible population for PG&E, SCE and SDG&E that overlaps with SoCalGas; and for SoCalGas, the number and percent that overlaps with the other three IOUs. (The overlap between PG&E, SCE and SDG&E is relatively miniscule[35]). 4 percent of PG&E's, 74 percent of SCE's and 7 percent of SDG&E's CARE-eligible population has gas service with SoCalGas. 78 percent of SoCalGas's CARE-eligible population has electric service with another IOU, predominantly SCE.

[35] Based on our analysis of utility service territories by census block group, the overlap between SCE and PG&E is 1 percent and the overlap between SDG&E and SCE is less than 0.5 percent. There is no overlap between PG&E and SDG&E.

Figure 9: Overlap of IOU Service Territories for CARE Eligible Population



Sources: Athens Research data (for CARE eligible population) and KEMA Inc. RASS data (for percent of households that overlap with SoCalGas service territory)

3.3 Program Accessibility and Barriers to Participation

This subsection summarizes findings and presents conclusions and recommendations related to ESA and CARE program access and barriers. The next and final subsection addresses energy needs.

3.3.1 Program Penetration Findings

This section answers the research questions:

1. *What is the current program penetration rate? How many eligible customers have not yet been served?*

The detailed results are found in Volume 2 – Sections 4.1 and 4.2.

Based on 2012 Athens Research data, 32 percent of California IOU households are technically and income-eligible for CARE and ESA. 95 percent of eligible IOU households were enrolled in CARE as of the end of 2012[36], leaving 5 percent or 207,000 California IOU households not enrolled.

[36] Note that as the IOUs increase post-enrollment verification, the penetration rate is going down as more households are removed from the program.

59 percent of 2012 eligible California IOU households have been treated by ESA during the period of 2002-2012,[37] leaving 41 percent or 1.7 million untreated California IOU households.[38]

3.3.2 Program Outreach Findings

This section answers the research questions:

2. *How do most customers get reached by the programs? What methods are the most effective? How does that differ by customer segment?*

The detailed results are found in Volume 2 – Section 5.2.

3.3.2.1 Program Awareness

Prompted ESA awareness has increased significantly over time based on our phone survey; 68 percent of low-income households are aware of the ESA program and the services it provides (based on a prompted question that included a general program description)—up from 27 percent in 2007, based on the prior LINA study. There is higher awareness of the ESA program and its services among low-income households where English is the primary language based on our telephone survey (73% versus 57% among low-income households where English is not the primary language). However this study's modeling results, discussed below in Section 3.3.3.4, indicate that this does not translate to higher participation.

There is low awareness of the specific brand "Energy Savings Assistance" based on our phone and in-home surveys, which is not surprising given that it is a fairly new name. However, there is much higher awareness of the services offered by the program. Based on the in-home results, ESA non-participants who are not located within low-income communities and lack social contacts are much less likely to know about ESA program services. This finding is consistent with related findings that will be discussed below in Section 3.3.3.1, that rural households[39] are less likely to enroll in CARE based on the CARE penetration model and participate in ESA (with the exception of PG&E) based on the ESA population model.

We could not assess CARE awareness among the low-income population since the sample frame of the telephone survey was based on CARE enrollees. However, we did find that 77 percent of those on the CARE rate are aware of it, with households whose primary language is English having slightly higher awareness of the rate (84% v. 65% among low-income

[37] This estimate includes about 20,000 customers that SCE reported as treated in 2012 that were only enrolled and not treated (since they failed the 3 measure minimum rule). They reported that 68,859 were enrolled and 49,026 were treated.

[38] Note that the 2020 goal for ESA removes homes that have been treated by the Department for Community Services and Development and estimated unwilling homes (which was 5% based on the prior KEMA LINA study.)

[39] The definition of urban and rural is based on county, since that is the geographic information provided for the PUMS data. If a home was in a county that was in a metropolitan area with population of 250,000 or greater, the home was considered to be in an urban area. Otherwise it was considered rural.

households where English is the primary language). Some households have been on the rate for some time, and may not recall that they are still on it, or someone else in the household is enrolled.

3.3.2.2 Program Outreach

Most ESA participants learn about the program from either friends/family/colleagues or from IOU outreach methods, based on our telephone survey. Non-participants who recently became income-eligible for the programs due to a life event were most likely to learn about the program from a social worker or other professional who referred them to support programs, based on our qualitative in-home results.

Low-income households learn about the CARE program based on the same methods as mentioned above for ESA, but with IOU bill inserts being more common than learning about the program from friends/family/colleagues.

Program staff say that with such high CARE penetration rates, it is difficult to find the pockets of remaining eligible customers where they are increasingly relying on data to locate customers and inform targeted marketing strategies. But contractors and program staff report that many of the hardest to reach are often not home and are very difficult to contact. The CARE modeling results, presented below in Section 3.3.3.1, have a consistent finding where penetration is relatively lower in the highest poverty census blocks, where barriers are greatest.

Based on our telephone survey, low-income households overwhelmingly prefer to be reached by mail (this finding does not differ significantly by low-income household segment). This finding is supported by the additional telephone survey result that 82 percent of low-income households receive a paper bill and 62 percent of CARE enrollees mailed in their application. Though these trends may shift due to IOU efforts to expand online bill pay, only a small percentage of low-income households currently pay their bill online or go to the IOU website.

3.3.2.3 Motivations for ESA Participation

Low-income households are most likely to have participated or want to participate in ESA to save money and/or lower their energy bills, based on our telephone survey. The second most common driver is the need for something the program offers.

3.3.3 Program Participation Characteristics and Barriers to Participation Findings

This section answers the research questions:

3. *What are the characteristics of eligible customers that have not been reached by CARE and ESA? How do those differ from those who have? Are there concentrations of certain geodemographic characteristics of underserved customers?*
4. *What fraction of ESA non-participants is willing to participate in ESA?*

5. *What are the main barriers preventing ESA non-participants from participating? What were the main drawbacks for ESA participants?*

The detailed results are found in Volume 2 – Section 5.3 and 5.4.

3.3.3.1 CARE Participation Characteristics and Barriers to Participation

As mentioned above, we developed two models to examine access to the CARE program. We used Athens Research data at the Census block group level that contained rates of CARE eligibility and participation and demographic information. The CARE models examined differences in demographic characteristics of Census block groups that had varying rates of CARE participation and penetration (which is equal to the ratio of participating to eligible customers). The modeling allows the examination of each characteristic, while holding all other characteristics constant. This is a useful tool since many of the characteristics we are attempting to explore are correlated with each other. The modeling helps to tease out what is the most important factor.

We found that census block groups with higher concentrations of the following households have, all else constant, relatively higher CARE participation rates:

- Single-parent households,
- Spanish-speaking households,
- Households with seniors,
- Poverty-level households (income less than 100% of federal poverty level),
- Larger households,
- Non-English/non-Spanish-speaking households,
- Households on public assistance, and
- African-American households.

Census block groups with relatively higher concentrations of higher-income households (with annual incomes of $200,000 and greater) and homeowners have, all else constant, relatively *lower* CARE participation rates. This first model largely reflects characteristics of census block groups that are 200 percent of federal poverty level or below, which is the CARE income-eligibility threshold. The results are not surprising, but do show the program has enrolled larger percentages of customers in census block groups that have characteristics that may be associated with greater needs and/or barriers.

A second model that examined CARE penetration by census block group (the rate of enrolled customers to eligible customers) found that census block groups with a higher percentage of the following households had higher CARE penetration rates:

- Single-parent households
- Spanish-speaking households,
- Households with seniors,
- Larger households,

- Non-English/non-Spanish-speaking households,
- African-American households,
- Households in higher population density areas, and
- Homeowners.

Census block groups with a higher percentage of the following households had *lower* penetration rates:

- Higher-income households (with annual incomes of $200,000 and greater),
- Households at or below 100 percent of the federal poverty level, and
- Higher CARE customer energy usage.

This second model reflects characteristics of census block groups that have higher CARE penetration rates. Some of the characteristics are consistent with the first model; for example, the results suggest that the CARE program has had success enrolling eligible customers that speak non-English languages, likely due to its broad outreach approaches.

However, the second model indicates that the program may need to focus on areas with higher rates of renters (who tend to be more transient and may not pay as close attention to their energy bills and advertising about energy programs such as CARE). However, as we explain below, multi-family renters have relatively lower energy burden and need for the program and may be aware and just not interested in participating since they lack the need.

There may be a need for the program to focus on rural households (who may be less trusting of the IOU and less likely to know they are eligible and/or take assistance) and households at or below 100 percent of the federal poverty level (who may have greater barriers to participating, be less likely to read their energy bills and follow through with a CARE application).

The results also identify that the CARE program may not be reaching as many households that are very low-income. Also, there are areas with high CARE participation rates relative to eligibility (which are by definition medium and higher-income areas) that could warrant further study to ensure enrolled households are actually eligible.

3.3.3.2 ESA Program Willingness to Participate

Based on the telephone survey, we estimate that 52 percent of current ESA non-participants are willing to participate in ESA. This estimate is adjusted to attempt to correct for the non-response bias inherent in the telephone survey. (The original telephone survey self-report estimate is 72 percent.)

The conjoint analysis, based on an addition web-based survey administered to a smaller sample of telephone survey respondents, estimates willingness to participate at 60 percent.[40]

The in-home visits with ESA non-participants estimated that about 66 percent or two-thirds would be willing to participate in ESA. These samples are even more biased than the telephone survey, since telephone survey respondents selected themselves into follow-up surveys. However, they help corroborate the range of estimates from the telephone survey.

Note that if these estimates are used to update ESA program treatment goals, the reasons for not being willing to participate should be factored in. E.g., there are customers who are not willing because they do not want to ask their landlord for permission (23% of the 29% of unwilling customers, or about 7% of ESA non-participants), which the program could try to address, along with other barriers identified in this report. Whereas the CPUC could consider whether customers that do not have a need for the program that are unwilling (which accounts for the vast majority of the remaining unwilling non-participants) could be skipped.

3.3.3.3 ESA Participation Characteristics

We compared the characteristics of ESA participants v. non-participants based on telephone survey self-reported demographics. Households occupying homes that have been treated by ESA[41] are more likely to be or have the following characteristics as compared to households occupying homes that have not been treated by ESA:

- Hispanic
- Lower-income
- Have one or more disabled member(s)
- Lower education
- Longer tenure
- Seniors

Note that 63 percent of participants said they have a disabled member(s) in the home (compared to 54 percent of non-participant homes) – a much higher percent than what is reported by the ESA program (less than 15%). This may be an upper bound based on an expansive definition (see Section 13 for the telephone survey instrument, questions D15a-15e), but it helps illustrate the difference between what a contractor is able to report based on the current rules and the actual disabled rate (which we reported as 31%, in Section 4.3, based on 2011 ACS/PUMS, compared to 34% in 2004).[42]

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[40] Based on an expectation of $10 savings per month, which is about twice the savings that the average participant realized based on the 2013 ESA Impact Evaluation Study (Evergreen Economics).
[41] For the purpose of this study, "treated by ESA" is defined as treated through the ESA program since 2002.
[42] As reported in Section 5.2.1.2, the prior KEMA LINA study estimated that 14 percent of LI households have disabled members and an additional 13 percent have both elderly and disabled members for a total of 27 percent of households that have disabled members. (Based on the study's on-site survey that looked at physical,

There are no statistically significant differences in home ownership, home age, population density, building type, children, number of members in the household, language spoken and employment status.

Note that this is a simple two-dimensional analysis, with many variables being correlated with one another. The ESA modeling results, presented below in the next subsection, help tease out the most important drivers of variation in ESA participation. We also remind the reader that the telephone survey results do not include non-English/non-Spanish speakers.

3.3.3.4 ESA Barriers to Participation

According to our telephone survey, the main reasons that non-participants are not interested in participating in ESA are:

- Needing their landlord's permission, which is reported more often by multi-family renters than single-family renters (more often reported by multi-family residents in buildings with 11 or more units, which might indicate that the issue is related to landlords of larger buildings, or residents of larger buildings).
- No need for the program/appliances are working well, which is reported mostly by single-family homeowners and mobile home occupants.
- Trust/skepticism, which is reported mostly by households in mountain and/or rural areas.

The most commonly cited barriers to participation reported by participants and non-participants who were willing to participate based on the phone survey are:

- Being home during the day/taking time off work, which is reported more often by Spanish-speakers, single-family homeowners and mobile home occupants.
- Having contractors in the home.
- Trusting the contractor, which is reported more often by multi-family renters as compared to single-family renters (which may be because multi-family occupants are less likely to have experience with a contractor).
- Getting landlord's permission, which is reported more often by multi-family renters than single-family renters.

Trusting the IOU and trouble producing income documents were reported as problems the least often. However, these barriers might impact those who did not respond to our telephone survey the most. The ESA population modeling could not explicitly include these barriers since these are not things we could observe from the population data.

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emotional and mental disabilities.) We think that these results may have been misinterpreted, such that the 14 percent estimate of LI households that have disabled members but do not have elderly members was used to support the development of the 15 percent target.

Anecdotally, the in-home non-participant surveys suggested that some non-participants have trust issues, had difficulty keeping their appointments and/or letting someone in their home. These issues were more likely to be observed in our small sample among PG&E customers, seniors and women living alone. The in-home non-participant sample respondents had very positive attitudes towards IOUs (though the sample is biased towards households who are willing to conduct surveys related to IOU energy programs).

The ESA modeling Stage 1 results, based on customer-level population data, allow us to examine each characteristics that might impact ESA participation one by one, holding all other characteristics constant. This approach allows us to determine which factors matter most, since many of the variables that might predict participation are correlated with one another. We are using population data in this analysis, thus we may represent all low-income households. The limitation is that there are only so many variables we may observe in the population data, based on Athens Research, Census and IOU data. The Stage 2 results incorporate self-reported survey data on barriers to participate, but those results do not reflect the population. Together, however, the two sets of modeling results provide a fairly comprehensive picture of barriers to ESA participation. (We offer recommendations for future research to address this study's gaps in Section 3.3.5.)

The Stage 1 modeling results suggest that the ESA program, like CARE, has been successful reaching some segments of customers that might have greater needs and/or barriers: seniors, single-parents, the very poor, non-English speakers (Spanish more than other languages), African-American. Also like the CARE model, with the exception of PG&E, rural households are less likely to participate than urban households. (7 percent of low-income homes are in rural areas, 73 percent of which are in PG&E's service territory. We assume it is likely that that PG&E has had more success reaching rural low-income customers in its service territory because there are many more of them, so it may have been more of a priority. The other IOUs have few rural low-income customers.)

The ESA Stage 1 model also offers some common sense observations about program targeting, with older homes, households participating in other low-income programs, on medical baseline and those with longer tenure on CARE and in their present home being more likely to participate.

CARE participants who have recertified are more likely to participate, which may reflect that such customers are more likely to be truly income-eligible. Higher electricity usage customers are less likely to participate, which might reflect regional or housing stock variables that we were not able to include in the model.

ESA Stage 1 results relating to the housing stock include single-family homes,[43] households located in climate zones where cooling loads are greatest, inland households, households with

[43] Note that this variable was only available for SCE. The Stage 2 model included a variable across all IOUs based on the survey data with home type, but was not statistically significant. We do note that the Stage 2 model is

both electricity and gas service from the IOU(s) and households with electric IOU service (if a SoCalGas or PG&E customers) being more likely to participate. These results may reflect both targeting by the program where the need and/or energy-savings opportunity is perceived to be greater.

There are some inconsistent results related to bill payment delinquency, with customers having a higher number of disconnects and failed payments (except for PG&E) being less likely to participate in ESA, and those with higher numbers of overdue payments, IOU calls related to payment issues and for PG&E, failed payments, being more likely to participate in ESA. We obtained these data late in the study schedule, and with more time we could have analyzed the underlying data to better understand these results. For example, there are very few disconnects and failed payments by CARE participants reported by PG&E and SDG&E (mean of 0.1 or less), but much higher incidence of failed payments reported by SCE (mean of 2.3). SDG&E reports a much higher number of overdue payments (mean of 8.8) compared to SCE (mean of 2.3.

The ESA modeling Stage 2 results are based on the survey data sample, so we can incorporate self-reported information that we lacked in the Stage 1 model. However, this model has the same non-response bias issues as the telephone survey on which it is based. These results are reported in conjunction with the Stage 1 results to try to retain the best of both modeling approaches and reduce the impact of the phone survey bias.

In this model that accounts for self-reported barriers such as lack of trust of a contractor, difficulty being home for appointments and providing income documents, we did not find that non-English speakers, African-American, single-family and single-parent households participate at higher levels. These results may suggest that once those barriers are accounted for, there are no significant differences in treatment rates (even after accounting for self-reported barriers) amongst these segments. The exception is that households that took our Spanish language survey were found to be less likely to participate than those that took the English survey.

However, we did find that "other race" households (Native Hawaiian, Other Pacific Islander, American Indian or Alaskan Native, Guamanian or Chamorro, Samoan or some other race) are more likely than White, Asian and Hispanic households to participate. Similar to the CARE and ESA Stage 1 models, lower-income households (of all households on the CARE rate) and larger households were more likely to participate, and again, lower electricity usage was correlated with enrolling in CARE.

Households that have a member with a chronic medical condition are more likely to participate in ESA, likely due to the effort of the program to target disabled customers. Respondents that said they turn down the heat or cooling to keep their bill down were more

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based on the phone survey data that excludes non-participants who would not respond to a telephone survey, so home type may be an important barrier, though our results are not conclusive.

likely to participate in ESA, complementing the telephone survey results presented previously showing that the program is having a substantial impact on improving participants' home comfort.

Consistent with the ESA Stage 1 model result related to length of time being on the CARE rate, we found that tenure predicts participation, with a greater likelihood of participating for households that have been in their home longer.

The most important drivers of and barriers to ESA participation, based on the Stage 2 modeling results, are:

- (Barrier) Trusting a contractor;
- (Barrier) Getting the landlord's approval;
- (Barrier) Being home for appointments; and
- (Driver/Barrier) Needing something the program offers – if the household perceives the program offers something they need, this is a driver of participation, while this factor may be a barrier to those who do not perceive (correctly or not) that the program will provide them with something they believe they need.

Note that we could not test whether the driver of saving energy was important, because almost every household said that was important. While we are not able to say in the context of this particular ESA modeling effort how important saving energy is as a driver, the survey result itself, in addition to other complementary findings presented in this study, suggests that saving energy is a primary driver of participation. (There is just no variation to explore in the model.) However, we did not examine how much energy savings is worth the hassle factor of participating.

The conjoint modeling is a complementary effort to help tease out the motivations and barriers to ESA program participation. It is based on a smaller sample of telephone survey respondents (all ESA non-participants) who agreed to respond to a web-based survey. It has non-response bias issues, but helps to corroborate the previous findings on barriers to participation. The analysis requires respondents to trade off attributes of participation based on a consistent metric—in this case, dollar savings. The respondent is presented with sets of options, and is essentially forced to determine which are the one or two most important factors that they care about.

In this analysis, we found that energy savings and increased comfort are the primary drivers, which is consistent with the phone survey results of ESA motivations for participating. Note that we did not include options that varied the measures that the program would provide, which is not part of the conjoint analysis of potential drivers and barriers.

Providing income documents was not found to be a major barrier among this sample, which is consistent with the phone survey and ESA modeling Stage 2 results. But these are not conclusive results that this is not a barrier; this issue may be important among non-

participants that were less likely to respond to our surveys (above, we mentioned that anecdotally program staff and contractors mentioned this as a barrier to ESA participation).

The ESA non-participant in-home surveys also explored barriers to participation in our smaller qualitative sample. The primary barrier in that sample was lack of program awareness. Though the program has not had problems having enough leads (the IOUs are restricted by budgets each year), this barrier has not been a problem. As penetration increases in the near and mid-term, this could become an issue.

The second most important barrier was lack of perceived need—respondents who did not use much energy, lived in homes that were already efficient, or sometimes had a non-IOU heating source. This barrier was also noted in the phone survey and program staff and contractor interviews, but is not a true barrier for homes that do not need the program. It is more of an explanation as to why some homes are unwilling to participate. However, homes that use a non-IOU heating source do face real barriers, and the ESA Stage 1 modeling results reinforce this finding.

The in-home surveys found that renters mentioned issues with getting their landlord's permission, consistent with the other research methods, and that providing income documents would not be a barrier. Though as we mentioned previously, households that would not respond to our surveys may have trouble providing documentation; this barrier should be not be dismissed based on our research.

Finally, being home for multiple visits was cited as a potential barrier by non-participants in our in-home sample. This result is consistent with the ESA stage one modeling results.

3.3.4 Conclusions

We offer conclusions on ESA and CARE program accessibility below in the following three subsections, organized around five research questions.

3.3.4.1 ESA and CARE Program Participation by Low-Income Population Characteristics

This section answers the following research question, based on our population models, which are not biased:

6. *Are the programs designed effectively to reach and enroll non-participants based on their characteristics?*

The ESA and CARE programs are reaching many segments of the low-income population that might be considered hard-to-reach such as non-English speakers, African-American households, seniors, larger households, single-parents, and, for ESA, reaching those with a

chronic medical condition, suggesting that the programs are effectively designed to reach those segments.

The CARE program is not reaching as many renters and rural areas, all else constant, suggesting the CARE program could improve its outreach to these customers. Note that two-thirds of low-income renter households reside in multi-family properties, which is 41 percent of the total low-income population (including residents in 2-4 unit buildings).[44] Renter-occupied households are less likely to read their IOU bill inserts and also less likely to stay in their home for as long as homeowners (average tenure of around 6 years compared to 17 years for homeowners). Multi-family renters also have relatively lower energy bills and energy burden, and may less motivated to respond to an IOU request to participate. Rural residents have greater trust issues and also may not be as likely to accept assistance or to know they are qualified.

The CARE program may not be reaching as many households that are very low-income (i.e., households living in small areas with high percentages of households that are below 100% of federal poverty), which might have more major barriers to reaching them (e.g., characteristics we could not include in our CARE model, not related to race, language and household composition, but may be related to immigration status, fear or trust issues). There may also be customers enrolled in CARE that are not income-eligible, as some of our research may suggest.

The ESA program is not reaching as many rural households (except PG&E, which accounts for the nearly three-quarters of the low-income rural population), households with single-fuel IOU service, and households that have been in their homes a shorter period time, all else constant, suggesting the ESA program could improve its outreach to these customers.

The ESA program is reaching many more disabled customers than is being reported (67% of participants report having a disabled household member), suggesting the program is much more successful in reaching households with disabled members than it is able to report.

3.3.4.2 ESA and CARE Program Outreach and Marketing Strategies

This section answers the research questions:

7. *Are the programs designed effectively to reach and enroll non-participants based on their preferences and information channels?*
8. *Are the programs using the appropriate channels to reach all segments of eligible Customers?*

The programs use many methods to reach eligible low-income households, with friends/family/colleague and IOU outreach methods being the most common way that low-

[44] Classifying 2-4 unit buildings as "single-family", about half the renter low-income households reside in multi-family properties, which is 31 percent of the total low-income population.

income households learn about CARE and ESA. The broader marketing methods likely build a foundation of awareness, such that once a direct IOU outreach method is used, the customer is more likely to respond. The programs also coordinate with community organizations, and some IOUs contract with community organizations and private contractors to do targeted door to door outreach. These methods are consistent with what low-income households say are their preferences for being reached based on our telephone survey. However, we do not know if this is true for non-English/non-Spanish speaking households. However, both the ESA and CARE programs have successfully reached those other language speakers, based on the population model results.

3.3.4.3 Addressing Barriers to ESA Participation

This section answers the research questions:

9. *Is the ESA program designed effectively to overcome non-participant barriers? And take advantage of what might drive future participation? And to improve the experience for participants?*
10. *Are enrollment and eligibility requirements preventing participation?*

The ESA program is all else constant, reaching fewer renters, especially multi-family renters, and renters that are concerned about seeking permission from their landlord (particularly those in buildings with 11 or more units). The program is also reaching fewer low-income rural residents in SCE, SoCalGas and SDG&E service territories (which only account for 2 percent of the total low-income population). Households that only have IOU service for a single fuel[45] are less likely to be treated by the ESA program, though our research did not assess the extent to which other programs such as LIHEAP are able to fill that gap. Some contractors that provide service in overlap areas may contract with both IOUs, but not all do.

Additional barriers that impact ESA participation, based on the Stage 2 modeling results, are households having trouble being home for multiple appointments and trusting contractors to be in the home.

Our research did not conclusively determine whether having access to and/or being willing to show income documents and trusting the IOU are barriers. This is a gap in our study that we recommend a future study address, below.

3.3.5 Recommendations

We offer recommendations on ESA and CARE program accessibility below in the following three subsections, addressing the following three research questions:

11. *What sources could the programs leverage or leverage more to increase participation?*

[45] About 74 percent of SCE and 63 percent of SoCalGas's CARE-eligible customers are served by the other single-fuel IOU. Roughly 650,000 CARE-eligible SoCalGas customers do not have IOU electric service.

12. *What improvements could be made to reduce barriers and increase and improve ESA participation?*
13. *What are the pros and cons of modifying ESA program requirements that might be impeding participation?*

3.3.5.1 General Program Outreach Methods

We offer the following recommendations related to program outreach that apply to both programs.

- The programs should continue past successful approaches that have lead to higher penetration rates among many hard-to-reach segments.

The programs have conducted marketing and outreach using a wide variety of channels, attempting to reach customers who speak different languages and those with disabilities that may have additional barriers to accessing the programs. Our research, based on population data, indicates that the programs have been successful in enrolling many hard-to-reach low-income population segments including those that speak non-English languages, African-American households, single-parent households and households with seniors.

- The programs should consider expanding outreach channels to address renters, particularly sing-family renters (which have greater energy burden, as explained below) and rural areas, which have unique issues.

The ESA program is already aware of the barriers to reaching renters, and they are working to improve landlord and tenant forms. Some IOUs offer renters basic measures even if they lack permission from their landlord. We offer recommendations around attempting to better meet the energy-related needs of renters in Section 3.4.5. We specifically focus on single-family renters, since they have a higher energy burden (presented in Section 3.4.1) than multi-family households and also because a concurrent study has just been released on the multi-family low-income sector that offers recommendations specifically for that sector.

Renters move around more than homeowners (average tenure of around 6 years compared to 17 years for homeowners), and the IOUs could explore increasing the follow-up with households on CARE that move. They could do research to determine if it would be effective to automatically enroll a household that moves, and then do post-enrollment verification for households that moved into an area with a higher average income than the area in which they previously lived. Since renters are less likely to read their bill inserts, the IOUs could look into outreach campaigns specifically for renters, or at least bill inserts that are targeted to renters.

For CARE, to reach rural residents may require more outreach with churches and senior centers (rural low-income households attend church more frequency than urban low-income households), since the low-income residents in lower population density areas are spread out and may not hear about the program via word-of-mouth as often. Rural residents also tend not to trust the IOU as often, tend to be unaware they are eligible and are less likely to accept assistance.

For ESA, since the majority of rural low-income households are located in PG&E's service territory (only 2 percent of low-income households live in rural areas served by IOUs other than PG&E), there may be a low priority placed on the other IOUs to reach the remaining rural low-income residents.

- The ESA program should continue the combination campaigns that do outbound calls/direct mail and then door-to-door canvassing, since those are common methods that participants learned about the program, and could be a good strategy to reach "pockets" of low-income households that are outside the more core areas that are reached by low-income community-based organizations.

Our study showed low-income households in general prefer to be contacted by mail about programs such as ESA. Also, we found that participants learn about ESA based on word of mouth, IOU bill inserts, phone calls and visits. The IOUs have increasingly relied on combination campaigns that make use of data such as recent CARE enrollments to identify potential ESA participants. The IOUs have not had a problem identifying enough prospective customers to meet their goals. The logistics of implementing ESA are more of a constraint, and the IOUs have honed their methods for effectively managing program implementation.

- To ensure that the newly low-income households are aware of the program, the IOUs could explore how to expand efforts that promote the CARE program through social workers, hospitals, low-income law centers and other agencies that interact with individuals who are going through life changes that might be associated with reductions in household income.

Through our in-home visits, we found some ESA non-participants that had learned about the CARE program from a social worker or other agency worker that they had encountered while getting assistance for a major life change such as a death in the family or a divorce. These channels may not lead to major increases in enrollment, but could provide assistance to needy households. It also may help address low-income households that are in rural areas or otherwise outside the urban core, where they would be less likely to learn about assistance programs based on word of mouth.

3.3.5.2 Overcoming CARE Barriers to Participation

We offer the following recommendation related to addressing remaining barriers to CARE participation.

- The CARE program should explore how to increase the penetration rate (i.e., the ratio of the number of customers enrolled to the number that are estimated eligible) in very high poverty areas.

This study found that the quartile of census block groups with the highest rates of households below the federal poverty level have the lowest CARE penetration rates. (Note that they have the highest participation rates, but the lowest penetration rates.) There may be greater barriers to reaching these customers, including safety issues for contractors doing outreach.

The IOUs already partner with many community groups, but they could explore ways to increase the impact that those partnerships have. The IOUs could continue or perhaps expand the use of the Athens Research data to identify specific census block groups that have high poverty but relatively lower penetration rates and determine characteristics that might inform marketing and outreach strategies. These strategies could be tested, measuring success by increases in penetration rates for those targeted areas.

Below we recommend further research be conducted to fill the gaps that were not addressed by this study (i.e., non-English/non-Spanish speakers and those with major outreach barriers), and such research might be helpful to provide more detail on the barriers associated with very high poverty areas.

Two of the IOUs are using paid contractors for CARE canvassing, providing the contractors with data on which customers are enrolled or not. We did not assess the effectiveness of this strategy. It might be useful to explore the cost-effectiveness of using contractors to increase CARE participation in specific areas. (The IOUs all informally coordinate with many community-based organizations, and pay a "capitation" fee for enrollments, but organizations do not formally contract with the IOUs and receive IOU data. Thus the impact of this arrangement is not significant, but anecdotally was much greater in the past when penetration rates were lower. However, we do not recommend any changes to it since it is an approach that seems to strike an appropriate balance: the organizations have one more program to offer their clientele, yet they do not have to meet rigorous data or other contractual requirements with the IOUs, that might limit the participation of organizations or take away from their broader missions.)

- The IOUs could research higher user customers, which have lower rates of CARE enrollment relative to estimated eligibility.

We found that higher usage customers were less likely to enroll in CARE relative to the eligibility rates that were predicted in small areas. When we examined this issue, we found it was the top 10 percent of higher users that were associated with lower penetration rates, so it may be anomalous situations that do not lend themselves to easy (and cost-effective) solutions. In Section 3.4.1, we present results on energy burden, which incorporates income, and is probably a better way to screen customers for program need.

3.3.5.3 Overcoming ESA Barriers to Participate

We offer the following recommendations related to addressing remaining barriers to ESA participation.

- The ESA program should be able to skip over treating households that do not want to participate in the program because they do not need it or want anything that is offered, such as for multi-family homes that have relatively lower energy burden. The goal for ESA treatment should be updated to make use of the new data provided by this study.

Willingness to participate in ESA is estimated at 52. Some of these households are not willing to participate due to barriers the ESA program could try to address, such as getting permission from the landlord (7% of non-participants). But there are other households who say they do not need the program that should be skipped. There are also households that though they may qualify, have a lower energy burden, and the program could consider that when developing priorities for treatment. We offer a more comprehensive set of recommendations around energy burden in Section 3.4.5.

The IOUs are already starting to track refusals, though such data was not available for this study, it could be used in the future to refine goals and program strategies for addressing barriers.

- The ESA program could try to target households that re-enroll in CARE after moving to ensure that those that move around a lot (such as renters) participate in the program in greater numbers.

These households could be placed higher on the ESA treatment queue to ensure that households that move get more equitable treatment.

- The ESA program could continue refining its outreach strategies to try to overcome the barrier of households who do not want a "hand out".

Our qualitative research based on program staff interviews and in-home visits with ESA non-participants found that this is a barrier, and the IOUs have tried to market the program as providing benefits (i.e., saving energy and the environment) that will benefit everyone. These efforts should be continued. Sharing information about how many homes in their neighborhood have participated and how much energy has been saved might also be explored, since often people are motivated to do what they perceive is the norm.

- The ESA program could continue refining its implementation strategies to reduce the number of visits so that households that refuse to enroll due to difficulties being home for subsequent visits may participate in greater numbers.

The IOUs have honed their implementation strategies over the years to try to reduce the number of visits, but there are still households that may refuse enrolling if there is going to be one or more follow-up visits. Our telephone survey research found that this was the most commonly cited difficulty associated with participation, based on participants' actual experience and non-participants' expectation of participation after we described the program. The ESA modeling also found that being home for visits was a potential barrier to participation.

The IOUs could explore offering those households more limited participation based on measures that could be installed during their outreach visits, such as energy education, lighting and basic weatherization measures. Such homes could be recorded as partially

treated and put on a list for contact to try to schedule follow-up visits. The IOUs could track data to determine the cost-effectiveness of such a practice.

- The ESA program should continue coordinating with community organizations and contracting with them to conduct outreach to overcome barriers related to lack of trust in contractors.

The IOUs use both private and non-profit contractors to implement the ESA program, and they should continue their partnerships with community-based organizations for outreach to help reach households who lack trust in contractors and are more likely to sign up with a trusted individual from their own neighborhood. Co-branding with the IOUs should continue, since at least among our telephone survey sample, trust of the IOU was not found to be a barrier.

- The IOUs should continue to coordinate with each other and improve the experience of households that have service with two different IOUs, and coordinate with LIHEAP to improve treatment of homes that use a non-IOU heating fuel source.

This recommendation is further fleshed out in Section 3.4.5.

3.3.5.4 ESA Messages for Marketing

We offer the following recommendation related to ESA marketing.

- The IOUs should continue to promote the ESA program based on saving energy and reducing energy bills/cost, since our study found that to be the main participation driver. Marketing messages should also emphasize comfort and the measures that the program offers, which are also perceived as benefits by participants and are participation drivers.

Though it is difficult to market the program based on measures, since it is never clear which measures the customer will be eligible for until after an individual assessment, the programs could market the programs based on tangible benefits of reducing their energy bills and improving the comfort of their home.

3.3.5.5 ESA Brand Awareness

We offer the following recommendation related to ESA brand awareness.

- The program should consider establishing a clearer identity and brand for ESA, by which customers consistently hear about the program and are able to refer to it when discussing with their friends, family and neighbors.

The most common way that customers learn about ESA is through word of mouth, but awareness of the actual program name is low. Once explained about the program, awareness is high. Currently the programs are not suffering for lack of leads, but that could change as penetration increases. And such marking efforts take time to build effectiveness, so once it becomes an issue it may be too late to build an effective marketing campaign.

It may have been shortsighted to change the name of the program to something consistent statewide that is difficult for contractors, program staff and likely customers to refer to. We found that only one stakeholder during our research effort used the full name of the program (and only once, when informing us that the program is not supposed to be referred to by its acronym), while all others that we interacted with (the researchers included) used the acronym "ESA".

3.3.5.6 ESA Disabled Target

We offer the following recommendation related to the ESA disabled target.

- The program should consider updating its ESA disabled target based on this study's data. However, any goal for reaching disabled customers should also take into account the discrepancy our study reveals between what the program reports (which is based on observation of an obvious disability during assessment) versus what a participating household reports about all the members in the home.

Our study reports that 31 percent of low-income household have one or more members that are disabled, based on the ACS/PUMS data (Section 4.3.1). The program goal is currently 15 percent, and the program has not quite met that goal. Our participant telephone survey results indicate that 63 percent of households treated by ESA since 2002 report that they have at least one or more member who the respondent reported as disabled.

3.3.5.7 ESA High Users

We offer recommendations related to high users in Section 3.4.5.

3.3.5.8 CARE Post Enrollment Verification

We offer the following recommendations related to CARE post enrollment verification (PEV):

- The IOUs should continue the use of data and targeted post-enrollment verification for the CARE program to reduce incidences of households being on the rate who are not income-qualifying, while not removing customers who truly qualify.

There is a balance that must be struck to try to remove customers who do not qualify, while not impeding the participation of customers who do qualify. The IOUs are increasingly relying on data and more sophisticated verification of CARE enrollees. These efforts should be continued and their effects monitored. It is very difficult to do research with customers who do not respond to such requests, but the IOUs could consider conducting research with customers who do not respond to PEV requests to better understand the implications of verification efforts (e.g., how many actually qualify for the program of those that do not respond to requests) to inform future efforts.

3.3.5.9 Further Study of Barriers to Participate in ESA

We offer the following recommendations related to further study to address gaps in this study.

- The IOUs and CPUC should consider focusing resources for the next low-income needs study on non-English/non-Spanish speaking low-income households that were excluded from this study's primary research (around 16 percent of the low-income population.)

While our population modeling efforts addressed all low-income customers, we could not include telephone survey results on self-reported barriers for the ESA program for non-English/non-Spanish low-income households, which comprise 7 percent of the state's low-income population.[46] These customers may have unique barriers that were not identified by this study. For example, contractors and program staff indicated that lack of or unwillingness to provide income documentation is a barrier for some households, which we did not corroborate with our primary research. This is anecdotal evidence that this is a barrier at least for some low-income households that we did not uncover with our study approach.

We excluded these customers from our primary research due to the cost and time required to address the many languages that low-income households speak in California, so such research will be relatively expensive and require more time than this study's approach.

- Future research efforts could consider including a general population survey, which our study did not include.

Such a survey could allow for comparisons with low-income households for such issues as energy insecurity (presented in Section 3.4.1) and also include some CARE non-participants. However, for the latter issue, it may not be a representative sample unless considerable efforts are made to address non-response bias since the CARE penetration rate is so high (even if it is actually lower than reported, it is still a relatively high rate among the eligible population for this type of research).

3.4 Energy Needs

This final subsection summarizes findings and presents conclusions and recommendations around energy needs, including energy burden.

3.4.1 Energy Burden

This section answers the research questions:

14. *What is the extent of the energy burden among eligible customers? How has that changed since the last LINA study? What segments have the most burden and experience the most insecurity? How do ESA participants v. non-participants differ in terms of their burden?*

[46] This is based on combining the linguistic isolation variable (which is households where no one over 14 speaks English very well) with the primary language variable from the ACS/PUMS to identify households that are linguistically isolated and whose primary language is not Spanish.

The detailed results are found in Volume 2 – Sections 5.5.1 and 5.5.2.

There are three different sources from our study that inform energy burden and energy insecurity: two sources based on the phone survey sample, and a third source from the ESA non-participant in-homes.

First, we calculated mean energy burden for the phone survey sample (weighted to reflect the low-income population) based on self-reported annual income and IOU billing data, equal to the ratio of energy cost to reported income. Second, we assessed energy insecurity for the phone survey sample (weighted to reflect the low-income population) based on respondent self-reported incidence of behaviors that demonstrate the extent to which the household is facing a hardship due to the cost of their energy usage. Third and finally, ECW qualitatively assessed the degree of financial constraints based on observation and respondent self-report for the sample of ESA non-participant in-homes.

The methods are internally consistent:

- Low-income households that we classified as "highly" energy insecure based on their responses to an energy insecurity battery have a higher mean burden (13.4% compared to the average of 8.0%).
- Respondents to the in-home survey who had greater self-reported and observed "financial constraints" had higher levels of both burden and insecurity.

3.4.1.1 Mean Energy Burden

We calculated the mean energy burden for low-income customers by calculating the ratio of energy expenditures (based on actual IOU billing data) to self-reported annual income based on our study's telephone survey.[47]

The mean energy burden for the low-income population is estimated at 8.0 percent.[48] This is likely a higher bound estimate since the low-income population would tend to have a greater proportion of their expenses covered by subsidies such as government assistance for housing, child care and/or food and earned income credit.

The mean energy burden for the low-income population is statistically unchanged from that reported in the prior LINA study published in 2007.[49] The low-income mean energy burden is estimated at 1.8 times the general population's mean energy burden.[50]

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[47] The telephone survey collected income in ranges. That is, customers reported having an annual household income in a range (e.g. "Less than $5,000 per year"). Please see telephone survey in Volume 3 Section 13, Question D12 for question wording and income range categories.
[48] Based on taking the mean of customer-level ratios of energy burden.
[49] Although the prior LINA was published in 2007, the data reported therein were collected in 2005.
[50] We calculated the general population's energy burden based on Census income data and IOU billing data at the zip code level.

The mean burden for ESA participants is 9.1 percent, compared to 6.7 percent for ESA (income-eligible) non-participants, due to higher non-participant income. Non-participant income is on average 30% higher than participants, and non-participant energy usage is 2.5% higher than participants'. This difference may also be due to participants "self-selecting" themselves for participation in ESA based on having a higher energy burden and thus a greater need for the program.

We also found that households that try to save energy in their home "most or all of the time" have about the same mean energy burden than households that try "sometimes" (7.6 percent).

Regions with higher mean energy burden among low-income households are (as compared to 8.0% across the low-income population):

- The Central Valley (climate zones 11-13) (11.2% annual, 13.6% winter)
- PG&E's service territory, which has the climate zones and regions with the relatively higher burdens (9.9% annual burden)
- The North Coast (climate zones 1-5) (9.7% winter burden)
- Households that said that climate or weather was a barrier to saving energy in their home (19.5% annual burden).

Demographic characteristics associated with higher mean energy burden among low-income households are:

- The very poor (by definition, since burden is based on income) – income less than $15,000 (16.4%)
- African-American (10.7%)
- Single-family renters (9.7%)
- Speaks a non-English/non-Spanish language[51] (9.1%).

Household characteristics associated with higher mean energy burden among low-income households:

- Reports being sick often due to home conditions (13.6%)
- Income has changed recently due to loss of job or fewer hours (9.4%)
- Presence of a disability (9.3%).

3.4.1.2 Energy Insecurity

We developed a summary energy insecurity measure based on the frequency with which respondents said they or others in their home do the following – a lot, sometimes or never:

[51] We remind the reader that this is a biased sample of non-English/non-Spanish speakers, since to respond to our survey someone in the household must have spoken English or Spanish. Our survey does not include households that *only* speak a non-English/non-Spanish language.

- Cut back on food or medicine in order to pay utility bill.
- Borrow money to pay utility bill.
- Receive a disconnection notice for utility service.
- Had utility service shut off.
- Use heat or cooling less than needed to keep utility bill lower.
- Use kitchen stove or oven to heat home.

We classified a household as having "high" energy insecurity if they said they experience at least two of the insecurity measures "a lot" and "never" experience two or fewer measures. We classified a household as having "low" energy insecurity if they said they "never" experience at least three of the measures and did not say they experience any of the measures "a lot". The remainder is classified as having "medium" energy insecurity.

Based on this classification, we estimate that 6 percent of the low-income population is highly energy insecure, 37 percent has "medium" levels of energy insecurity and 57 percent have low energy insecurity. While we could compare energy burden to the general population, we could not do so for energy insecurity since the study did not include a general population survey.

Similar to energy burden, participants are more likely to be highly energy insecure – 7 percent v. 4 percent of non-participants (another 41% of participants have medium energy insecurity v. 33% of non-participants).

Segments within the low-income population that have higher insecurity are:

- Single-family renters are more likely to be insecure (7% are highly insecure and 39% have medium insecurity).
- "Other" language speakers[52] are more likely to be insecure (10% are highly insecure and 48% have medium insecurity).

3.4.1.3 Qualitative Assessment of In-Home Non-Participant Sample

We assessed the degree to which ESA non-participants experienced financial constraints based on a combination of self-report and auditor observation. We developed three categories based on this combination. The in-home visits with ESA non-participants estimated that just over half faced "elevated financial constraints"; 20 percent had a "substantially elevated level of financial distress" and about 25 percent "appeared more like a middle class household than a low-income one". We compared this assessment with phone survey burden and insecurity analyses for the same sample:

- Those with no financial constraints had an average energy burden of 6 percent, none were highly energy insecure and 10 percent had medium insecurity.

[52] Ibid.

- Those with small financial constraints had an average energy burden of 7 percent, 5 percent were highly energy insecure and 34 percent had medium insecurity.
- Those with medium financial constraints had an average energy burden of 10 percent, 5 percent were highly energy insecure and 47 percent had medium insecurity.
- Those with large financial constraints had an average energy burden of 6 percent, 7 percent were highly energy insecure and 43 percent had medium insecurity. This somewhat inconsistent result (with lower energy burden for households with larger financial constraints) is due to two outlier households that have very high burden that are in the moderate category. The median burden across the two groups is about the same (and is higher for the large financial constraint group, if the two outliers are removed).

Characteristics of ESA non-participants that we found to be correlated with higher financial distress, based on our qualitative assessment of the in-home sample, are:

- Presence of medical condition or disability
- Large number of children
- Multi-family[53]
- Households with seniors
- Households managed by young adults.

3.4.2 ESA Measure Benefits

This section answers the research question:

15. Which ESA measures contribute to the most benefit?

The detailed results are found in Volume 2 – Section 5.5.3.

A majority of ESA participants said they noticed changes (either "a lot" or "somewhat") in their safety (64%) and comfort (65%) and reduced bills (81%) as a result of ESA participation. 44 percent said they noticed an improvement in their health as a result of participating in ESA.

We found that HVAC and weatherization measures are most likely to generate improvements in health, comfort and safety. Larger households and homes with children were more likely to

[53] Multi-family households have lower incomes than single-family households, but they also have lower energy usage due to less energy-using equipment and smaller sized homes as reported below in Section 3.4.3.1 and in more detail in Volume 2 – Section 4.3.2, resulting in multi-family households having lower energy burden than single-family households (with single-family renters having the highest energy burden compared to single-family homeowners and multi-family low-income households). As noted above, energy insecurity was also highest for single-family renters compared to the other home type/ownership segments.

mention they noticed these benefits. (There are more members to experience benefits, and as presented in the next section, there are greater energy needs among larger households.)

We also found that HVAC and weatherization measures were the most common measures that generated benefits among participants and prospective non-participants. The next most beneficial measure was a refrigerator. There were no measures that ESA offers that we found were not beneficial based on our research methods, either to those who participated and received them, or non-participants who responded about the usefulness. (We did not look at measure cost-effectiveness. Our assessment of "needs" and "benefits" was also largely based on self-report with some observation by in-home auditors, but it was not a robust effort.) We did find in the low-income home and equipment characterization that there not much need for water heater replacement, with only 78 percent less than 10 years old.

3.4.3 Addressing Energy Needs

This section answers the research questions:

16. *What support and services (including energy efficiency measures) do customers need to address their energy-related needs? What is needed most? Do the needs differ by customer segment/characteristics? Which needs are the highest priorities?*

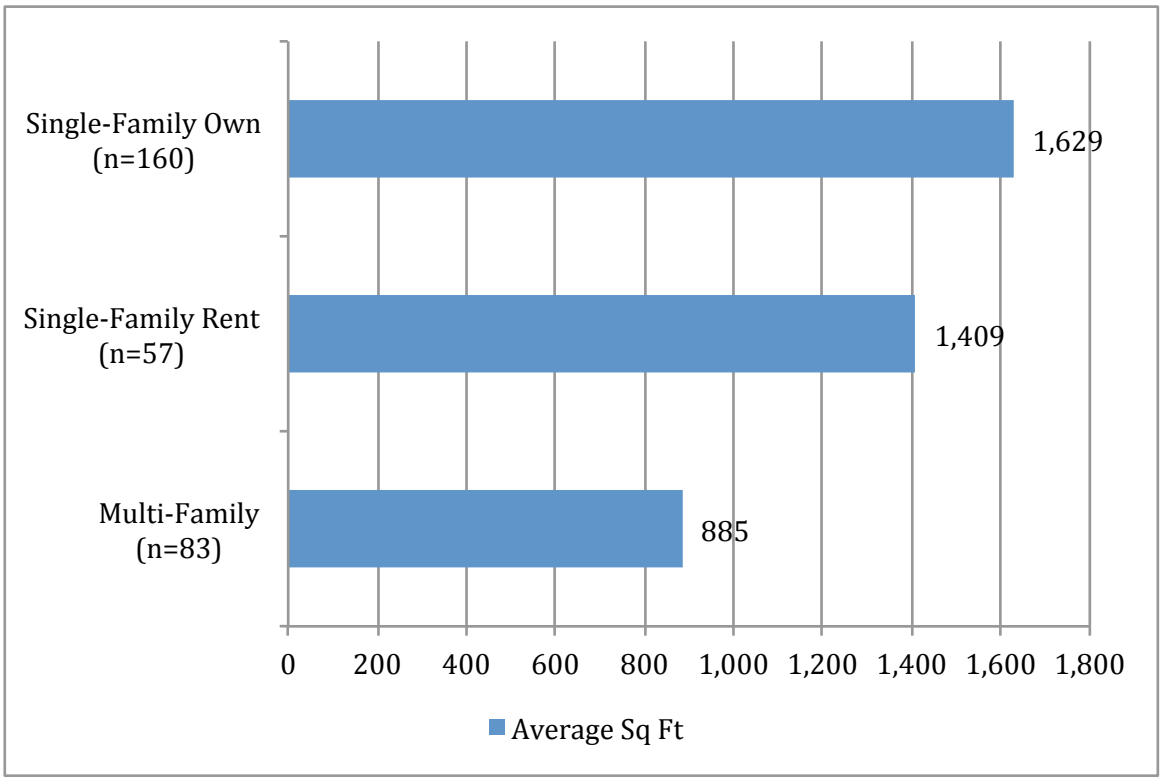
The detailed results are found in Volume 2 – Sections 4.3, 5.5.3 and 5.5.4.

3.4.3.1 Characterization of Low-Income Homes and Energy-Using Equipment

Based on our analysis of KEMA's on-site survey CLASS data, we were able to characterize the major energy-using equipment for the IOUs' low-income population. We supplemented these findings with additional information from our telephone survey.

We used these data to estimate the average home square footage for the low-income population, which is 1,311 square feet, compared to 1,643 square feet for the state's general population. As shown in Figure 10 below, single-family homes are larger than multi-family homes, with single-family homeowners having the largest homes.

Figure 10: Average Square Footage of Home – By LI Home Type For California LI Population



Source: 2013 CLASS.

Below we summarize the main findings from Section 4.3.2 to provide context to the assessment of energy needs. Note that the equipment age data is based on 2013 research (the CLASS and our study's telephone survey). We often used 10 years as a category of equipment age to report, even though the effective useful life of most equipment is longer. This is because many decisions that are made about measures do not impact programs right away, so we wanted to include all the potential equipment that could be considered for replacement over the mid- to long-term.

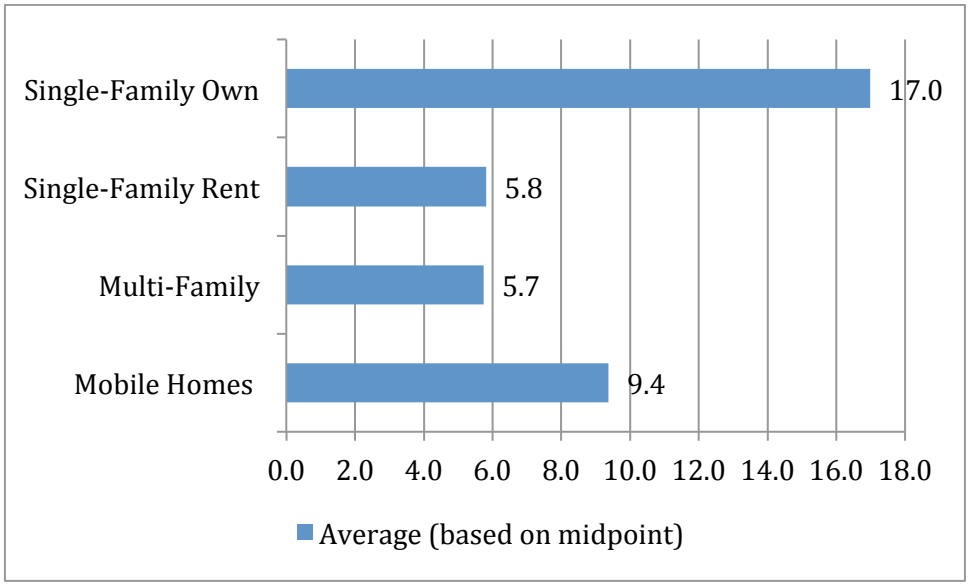
- Heating systems:
  - 11 percent of low-income household's primary heating systems are electric which is equivalent to the general population, with SDG&E having a higher proportion (25%) and SoCalGas having very few (3%) low-income households with electric primary heat.
  - Multi-family households are more likely to have electric primary heating.
  - Almost half low-income households (47%) use a natural gas furnace compared with 61 percent in the general population.
  - 27 percent of low-income households use a natural gas space or wall heater compared with 14 percent in the general population.

- 6 percent of low-income households use propane, wood or coal for their primary heat versus 5 percent in the general population.
- Based on our telephone survey, more than half of low-income homes have a furnace that is over 10 years old – suggesting some energy savings potential for early furnace replacement, though programs have found that measure not to be cost-effective.

- Cooling systems:
  - 32 percent of low-income households have central air conditioning and another 25 percent have room air conditioning (most prevalent in SCE and SoCalGas service territories), about half (53%) of which is over 10 years old as of 2013.
  - This compares with 47 percent of general population households with a central air conditioning and 15 percent with a room AC, with 60 percent over 10 years old.
  - Single-family owners most likely to have central air conditioning (45% v. 26% of single-family renters), but combining central and room air conditioning, it is about the same across single-family renters v. owners (around 75%).
  - Multi-family households are less likely to have central air conditioning (23%) and room air conditioning (24%).
  - Evaporative coolers are primarily found in single-family homes – 9% (1% of multi-family homes have evaporative coolers).
- Water heating:
  - 81 percent of low-income households use natural gas for water heating compared to 84 percent in the general population (of those that have their own system) with 8 percent using electric in low-income households versus 6 percent in the general population.
  - 22 percent of low-income household water heating units is 10 years old or older versus 16 percent in the general population.
  - 1 percent uses solar water heating, which is equivalent to the general population.
- Insulation:
  - 35 percent of low-income households have no wall insulation (note this particular result is based on a small and possibly biased sample size), compared to 26 percent in the general population.
  - 46 percent of low-income single-family renter homes and 32 percent of multi-family homes have no wall insulation. (Note that multi-family homes are less of a concern since most are interior walls).
- Refrigerators:
  - 22 percent of low-income households have 2 or more refrigerators compared with 29 percent in the general population.
  - 18 percent of all refrigerators, including both primary and secondary units, are between 11-15 years of age and 13 percent are 16 years of age or older.
  - Refrigerators in the general population tend to be slightly older with 24 percent between 11-15 years old and 16 percent older than 16 years old in 2013.

- Appliances:
    - 50 percent of low-income households have a dishwasher (74% in general population), 68 percent have a clothes washer (81% in general population) and 66 percent have a clothes dryer (79% in general population) – mostly fueled by natural gas.
    - Based on the telephone survey, about half of these appliances are likely more than 10 years old.
- Lighting:
    - 41 percent of bulbs in low-income households are CFLs – more than in the general population (34%). This is corroborated by phone survey results, where 47 percent of low-income homes reported that they have more than half or all CFLs.
    - Even though the saturation is fairly high among low-income households, there is still potential to install CFLs (or potentially LEDs), since an estimated 41 percent are incandescent.
    - There exists potential for lighting controls including dimmer switches, occupancy sensors and timers, since 86 of fixtures in low-income homes lack controls.
- Windows/doors:
    - Based on our telephone survey, 37 percent of low-income population says one or more windows are either not working or in need of repair.
    - Based on our telephone survey, 30 percent of low-income population says one or more doors are either not working or in need of repair.
- Cooking:
    - Based on our telephone survey, 25 percent of low-income population says their stove and/or oven are either not working or in need of repair.
    - Based on our telephone survey, 16 percent of low-income population says their microwave oven is either not working or in need of repair.
- Tenure:
    - Average tenure for low-income households is 9.2 years compared to 9.5 years for the general population based on the ACS/PUMS data. Figure 11 below shows how that varies significantly by home type and ownership. Homeowners in general have the longest tenure.

Figure 11: Length of Time Residing at Present Address - By Housing Type and Ownership For California LI Population



Source: 2011 PUMS.

Based on our telephone survey, ESA participants still have remaining unmet needs:

- Between 20 and 40 percent of ESA participant homes have windows, doors, stove/oven, furnace, microwave ovens, refrigerators that they say need repair or are not working.
- Between 10 and 20 percent of ESA participant homes have clothes washers, central air conditioning, water heaters, dishwashers, clothes dryers or room air conditioners that need repair or are not working.

We found that single-family renters have greater energy-related needs and barriers to participation, based on our telephone survey and population models. Also, our modeling results found that renters who feel that getting their landlord's permission is a barrier are less likely to participate in ESA, all else equal. Multi-family tenants also have barriers since they are renters – but they have lower energy usage, energy insecurity and mean energy burden since they have smaller homes, their systems are more likely to be centrally provided and there is less need for insulation at least for interior units. (Average annual fuel costs based on the ACS/PUMS data, which uses a representative sample, for multi-family low-income households is $918 compared to $1,699 for single-family renter low-income households.) The Multi-Family Segmentation Study that is being released this year provides greater characterization and assessment of multi-family low-income households' needs.

Below we provide a summary of characteristics of the renter low-income population, and specifically for single-family renters, based on the CLASS and ACS/PUMS data reported in

Section 4.3 of Volume 2 of this report (with more detail provided in Sections 7 and 8 of Volume 3 of this report.)

- 64 percent of low-income households are renter-occupied compared with 44 percent in the general population; 23 percent of low-income homes are renters in single-family homes and 41 percent are renters in multi-family homes.
- Single-family renters annual fuel costs are among the highest (with single-family owners).
- Single-family renters have older homes on average (46.5 v. 41.7 in the low-income population and 40 years in the general population as of 2011) and have much shorter tenure than single-family owners and mobile homes – multi-family and single-family renters have been at their homes on average 6 years v. 17 years for single-family own and 9 years for mobile homes as of 2011). They are a more transient population that is harder to reach.
- Single-family renters and multi-family more likely to have space/wall heating than a central heater (26% and 40% v. single-family own 15%) – which may be more difficult to provide comfort throughout the home, and may cost more to heat the home if they aren't in all the zones
- Single-family renter low-income households have a larger fraction of Hispanic household members (52% v. 42% in all low-income households v. 28% in general population households).
- Single-family renters are twice as likely to be linguistically isolated than the general population (19% v. 10%) but slightly less likely to be linguistically isolated than the low-income population in total (19% v. 20%), more likely to speak Spanish (46% v. 38% in the low-income population and 25% in general population).
- Multi-family households even more likely to be linguistically isolated (25% v. 20% in low-income population).
- Single-family renters have larger household sizes – 3.78 (v. 2.98 in the low-income population and 2.77 in the general population) and are much more likely to have children (65% v. 46% in the low-income population v. 37% in the general population). Our telephone survey indicated that larger households accrue more energy benefits from participating in ESA, a consistent finding.
- Single-family renter households much less likely to have senior(s) in the home (13% v. 26% in the low-income population and 25% in the general population), slightly less likely to have disabled member(s) (28% v. 31% in low-income population v. 22% in the general population) and the head of household is more likely to be working (50% v. 43% v. 63% in the general population). These households are probably less likely to be home and harder to reach.
- Single-family renters' head of households have less education than the other home types except mobile homes (9% have their bachelor's degree or higher v. 14% of all low-income households v. 34% in the general population).

Our population modeling results found that rural households are less likely to participate in CARE and outside of PG&E's service territory, less likely to participate in ESA. Characteristics of rural households are provided below.

- Rural households are more likely to reside in single-family homes (60% v. 51%) and less likely to be rent their homes (53% v. 64%).
- Rural households are much more likely to be English-only (71% v. 46%) – only 9 percent are linguistically isolated (v. 20%) – 61% are white v. 20%.
- Rural households are less likely to have children in the home (39% v. 46%), more likely to have a disabled household member (40% v. 31%).
- Rural households have much higher fuel costs ($1731 v. $1425), only 39% have natural gas heating – v. 59% - harder for IOUs to serve.

Since our telephone survey excluded non-English/non-Spanish speaking households, we summarize the unique characteristics of linguistically isolated households[54] from the ACS/PUMS data. Twenty-percent of low-income households are linguistically isolated, versus 10 percent of the general population.

- The majority of linguistically isolated low-income households lives in multi-family homes (55% v. 43% in low-income population vs. 31% in the general population) and are renters (76% v. 64% in low-income population v. 44% in the general population).
- 64 percent of linguistically isolated households are Hispanic / Spanish speaking.
- Linguistically isolated low-income households have slightly more employed heads of household (46% v. 43% in the low-income population) and fewer unemployed (8% v. 11% in the low-income population).
- Linguistically isolated households have significantly less formal education with 58 percent having less than a high school graduate level of education as compared to 31 percent in the low-income population and 15 percent in the general population.
- Linguistically isolated household energy costs are less than the average low-income home ($1,097 v. $1,425), likely reflecting that the majority live in multi-family homes, which tend to have lower energy costs ($918).
- A higher proportion of linguistically isolated homes use no heating fuel (8% v. 5% in the low-income population).

3.4.3.2 Energy Needs

Our assessment of energy needs is based on the telephone and in-home survey results. Based on telephone survey results, there are no major health, comfort and safety needs among the low-income population – with 10 percent or less saying they experienced health, comfort and

[54] A linguistically isolated household is a household in which no one in the household aged 14 and over speaks English only or English very well.

safety issues "a lot". However, we did find that the improvement in comfort associated with ESA participation may help sell the program (based on the conjoint analysis and telephone survey results). Even though there may not be major needs in this area, low-income households report benefits from improvements in comfort that ESA provides and non-participants report that that their health, comfort and safety would benefit from participating.

Households that have major non-response barriers that are largely excluded from the telephone and in-home survey analysis on which this particular need is assessed, who did not respond to our survey, may have different or greater health, comfort and safety issues.

We did not find a difference in health, comfort and safety needs across ESA participants and non-participants, but participants told us they noticed improvements in health, comfort and safety as a result of participating in ESA. These results might support a prior finding that non-participants have lower energy burden and insecurity than participants (i.e., participants had more health, comfort and safety issues before participating in ESA). This is an important point to consider, that we are comparing participants after they have been treated by ESA to non-participants who have not been treated.

We found that presence of energy-related health issues that could be addressed by ESA as reported by telephone survey non-participants and participants that did not recall participating, is correlated with certain characteristics: households with non-English speakers, elderly, no children, no disabled members, larger households and mountain areas. The potentially surprising finding that households with disabled members may not notice a substantial difference in their health due to energy-related issues may be because the impact from energy-related issues may be small compared to more significant day to day challenges they are facing.

The in-home visits with ESA non-participants found comfort issues in one-third of homes based on interview identification or respondent self-report. We found that those with comfort issues were much more likely to have higher energy insecurity and energy burden. However, homes that responded to our in-home may have more issues than the phone survey sample, since they are more motivated to discuss energy issues and low-income assistance programs as evidenced by their willingness to participate in our in-home survey, since they may have greater need for them. The in-home assessment suggested that cultural issues may be at play, with recent immigrants and Spanish-speaking households less likely to mention comfort issues.

The in-home assessment found that ESA non-participants are most likely to need water heater wrap, pipe insulation, CFLs and faucet aerators, based on our in-home basic assessment.

3.4.4 Conclusions

We offer conclusions on energy needs below in the following three subsections, organized around four research questions.

3.4.4.1 Reducing Energy Burden

This section answers the research question:

17. How are the programs helping low-income customers address their energy burden and insecurity issues?

More detailed results are provided in Volume 2 - Section 5.5.5.

The average CARE customer saves $29/month (33% savings) on their electric bill and $6/month (18% savings) on their gas bill, based on the 2012 IOU CARE Annual Report (previously reported in Section 1.1.1 of this volume). Twenty-five percent of low-income households on CARE say their bill is "a lot less" after being on CARE, and 52 percent say "somewhat less", based on our telephone survey.

Low-income households that reported higher energy insecurity are less likely to notice an impact from CARE (11% of highly energy insecure households said their bill is "a lot less" and 56% said their bill is "somewhat less"). It may be that since they are facing a greater hardship due to energy costs, the discount is not making as much of an impact as for those that have less hardship.

The ESA program results in 81 percent of participants noticing a reduction in their energy bills, with 64 percent noticing improvements in safety and 65 percent in comfort, and 44 percent noticing improvements in the health of household members.

The energy savings results are consistent with actual changes in bills based on our analysis of IOU billing data, with participants that said they noticed their bills going down "a lot" experiencing a 10 percent decrease; those that said "somewhat" a 4 percent decrease; those that said "no change" a 11 percent increase; and those that said "bills have gone up" having a 41 percent increase in their bills. These results are also consistent with the recent ESA impact evaluation, which found net positive average savings from ESA participation, but variations across participants with some experiencing an increase in energy usage after participation.

3.4.4.2 Addressing Energy Needs

This section answers the research questions:

18. How well aligned are the needs and the measures that are installed by ESA among eligible customer segments?
19. Is the ESA program designed effectively to address the needs? Is the ESA program designed effectively to address the needs of the customer segments that have the greatest need?

ESA currently offers a range of measures that tend to align with what customers need and what they find helpful, with a major focus on weatherization measures. ESA participants experienced improvements in their health, comfort and safety more often due to weatherization and HVAC measures, while non-participants stated those types of measures as

likely to be the most helpful. The program is constrained based on budgets and cost-effectiveness to offer more measures such as early furnace replacement that could benefit a significant number of households (since half of the low-income households said their furnace is 10 years or older, based on our telephone survey). Also, not all IOUs offer all appliances, and there are climate zones where certain equipment such as central air conditioning is not available but could be useful for certain customers.

Renters are unable to receive all ESA measures unless they get their landlord's cooperation – the program does not allocate ratepayer funds to subsidize landlords. However, there may be opportunities to expand efforts to address barriers for renters, including gaining more approvals from landlords. Single-family renters in particular have greater barriers and burden and energy savings potential.

Maintenance measures may be useful for all customers on their heating and cooling systems combined with education about how to use their systems optimally. The program offers maintenance for cooling and heating equipment, but not all IOUs offer both types of tune-ups. As mentioned above, half of low-income households said their furnace is 10 years or older, and KEMA observed a similar percentage with 10-year or older cooling equipment.

Some customers may have missed opportunities for receiving HVAC and weatherization measures if their heating fuel does not match the fuel of the IOU providing the outreach. The program cannot address insulation needs of a house that uses only wood for heating. But there may be opportunities to expand coordination with the LIHEAP program to addresses this gap. Assessing how well ESA is coordinated with LIHEAP was outside the scope of this study. There may be additional opportunities in IOU overlap areas (which is the majority of SoCalGas and SCE service territories) for the IOUs to coordinate more. There have been major efforts along this front especially between SCE and SoCalGas – likely much of what can be done within IOUs has been done or assessed. However, contractors that provide service in these areas have asked for a single assessment form to be used for both IOUs, which could be explored. And contractors that work in the overlap areas who only assess for a single IOU could be encouraged (or barriers removed) to contract with both IOUs to eliminate the gap or at least the inefficiencies or delays associated with treating these customers by referrals cross-IOU.

We found that ESA participants have remaining unmet needs that could be met by going back to the home, if budget was available. This may not be a high priority at this time, but there may be screening that could be done to identify participants that have the most pressing needs. When new measures are added, their equipment ages enough to become eligible for replacement, or other changes are made to rules that would open up more measures for those households, they could be targeted identified.

We also found that there is a need among between 5 and 10 percent of low-income households that have a second refrigerator older than ten years old to replace or surrender

their second unit. The program does not currently allow replacement of secondary refrigerators.

There may also be a need for furnace repair and replacement beyond what is currently done by the program to address old or broken furnaces. The program currently only repairs or replaces a furnace for safety reasons. The measure was not found to be cost-effective, so adding this measure would be based on need, not cost-effectiveness. About half of furnaces in low-income households are ten years or older.

There may be a need for more expansive window and door repair and replacement, with 30 percent of low-income households that responded to our telephone survey saying they have one or more doors that need repair or replacement, and 37 percent saying that about one or more windows. Currently, the program does minor repairs such as if window glass is broken in conjunction with installing weatherization measures. These measures have not been found to be cost-effective in the past, so expanding window or door replacement would have to be considered for other reasons besides saving energy cost-effectively.

Lighting controls and solar water heaters are measures that could be tested for feasibility, since there is energy savings potential for these measures. Solar water heaters require technical installation skills and the specifications vary depending on the household. The state of Hawaii installs solar water heaters for low-income households, since there is a lack of need in that state for heating or cooling measures, and the program could be reviewed to see how it overcame issues related to customized installation specifications.

3.4.4.3 Energy Savings Potential

This section answers the research question:

20. *What data are available that may be used to determine the remaining energy savings potential among eligible households?*

More detailed results are provided in Volume 2 - Section 4.5.

This study provides data on the number of eligible and willing non-participating low-income households and the types of equipment that they have in their homes. The recent ESA impact evaluation provides current energy savings estimates that together could be used to inform estimates of energy savings potential.

We can also combine the technical potential estimates from Navigant Consulting's recent energy efficiency potential study[55] with our study's estimates of willingness to participate to yield estimates of energy savings market potential. For low-income households, market

[55] Analysis to Update Energy Efficiency Potential, goals and Targets for 2013 and Beyond – Track 1 Statewide Investor-Owned Utility Energy Efficiency Potential Study. Prepared for the California Public Utilities Commission. Navigant Consulting, Inc. and Heschong Mahone Group, March 19, 2012.

potential is the technical potential[56] per household multiplied by the fraction of households that would be willing to participate (WTP)[57] in the ESA program. Based on this approach, we estimate that:

- Total ESA electric savings potential = 208 kWh x 52% (WTP) x 3,133,942 income-eligible electric IOU customers = 339 MWh.
- Total ESA gas savings potential = 9 therms x 52% (WTP) x 3,714,462 income-eligible gas IOU customers = 17.4 million therms.

Note that the energy savings estimates underlying Navigant's technical potential estimates may not reflect what remaining non-participants homes will save, since impacts have declined over time. A more reliable estimate of technical potential would be based on on-site research with current ESA non-participants, which was not part of this study due to resource constraints. We offer a recommendation (below) to address this issue by conducting more research.

3.4.5 Recommendations

We offer recommendations on how the programs can better meet low-income households' energy needs below in the following two subsections, addressing this research question:

21. What could the programs add or modify to better serve the needs?

We also offer a recommendation on gathering more data to inform questions about the remaining energy-savings potential and on energy insecurity in a third (and final) sub-section below.

3.4.5.1 Reducing Energy Burden

We offer the following recommendations related to reducing low-income customers' energy burden.

- The ESA program could explore the tradeoffs associated with screening customers based on energy usage, estimated energy burden (e.g., using Census data on income combined with IOU billing data) and health, comfort and safety criteria (e.g., based on individual household screening) to determine priorities for treatment and/or tailor its services to the home. These types of approaches might focus resources to homes that

[56] Technical potential is defined as the amount of energy savings that would be possible if all technically applicable and feasible opportunities to improve energy efficiency were taken, including retrofit measures, replace-on-burnout measures, and new construction measures. It does not take into account whether such retrofits are economically feasible (economic potential) or what fraction would be likely to occur given the current market conditions (market potential).

[57] We are using the estimated willingness to participate from the telephone survey, which does not include some unwilling non-participants whose barriers could be addressed by the program, such as renters who do not want to ask their landlord for permission.

need it most. However, these approaches are not equitable across homes and have tradeoffs that must be considered. There are also two assumptions that would need to be tested: that the IOU data may be used to effectively screen and target customers, and that the ESA program can provide assistance that lowers customers' energy burden.

Currently, the ESA program is required to treat every eligible home, and offers that home a set of measures based on eligibility criteria that is consistent within each IOU. The program is not –expected to prioritize homes based on need or energy savings criteria, though those issues are factored into the measure eligibility.

Based on the research presented in this study, there are homes that have a greater energy burden that could be screened based on location and/or energy usage. These homes could be prioritized for treatment under the existing measure eligibility criteria, and/or offered an expanded set of measures based on greater need and/or energy savings potential. There are tradeoffs associated with this approach. The upside is that homes with greater need and energy savings potential will be prioritized. The downside is that this approach may not be considered equitable, and may even reward some households for not conserving.

Based on the research in this study, there are varying degrees of energy insecurity and health, comfort and safety. The ESA program could screen households on an individual basis based on their level of insecurity and/or health, comfort and safety to identify households who are in greater need for program support, such as by delivering a household questionnaire that adapts this study's survey batteries related to insecurity and health, comfort and safety. The program could then offer an expanded set of measures (e.g., such as relaxed measure eligibility criteria) to improve their health, comfort and safety. There are also tradeoffs associated with this approach. The upside is that homes that have sacrificed to keep their energy usage low, who would not be rewarded by the higher energy burden screening recommended above, would receive help. The downside is that this type of approach may not be cost-effective and in fact may be associated with negative energy savings.

These approaches could tested together and research conducted on the targeted households to determine whether the first approach leads to greater energy savings per household, which might offset the negative (or at least lower) energy savings associated with the second approach. There may be the potential for striking a balance between the two approaches to address the burden and insecurity issues, while preserving some level of equity and cost-effectiveness. The test would also help the IOUs determine how well their data may be used to screen effectively.

- The CARE program should continue to require ESA participation for high users and automatic post enrollment verification for households on CARE that exceed some limit of usage for their region.

This practice should help ensure that high users on CARE are provided with ESA program assistance to help them try to address their energy burden and also ensure that the CARE program is providing assistance to households that are truly eligible. Our research indicated that there are census block groups that are on average above the CARE income requirements that have many more households than are estimated as eligible on the rate. This practice is one way to attempt to address that issue.

3.4.5.2 Addressing Energy Needs

We offer the following recommendations related to how ESA addresses low-income customers' energy needs.

- The ESA program should ensure that it is effectively coordinating with the LIHEAP program to address a gap in service to customers that do not use an IOU fuel source for their heating and to offer customers additional measures that ESA does not currently offer.

Our research shows that are is a small but significant number of low-income households who use non-IOU fuel sources for their heating. Many of these customers are located in rural areas that we found to be under-served (except for PG&E service territory) and in climate zones that we found to have higher energy burden.

The LIHEAP program offers some measures that ESA does not, and provides an opportunity to provide additional measures to households that have a need.

Our study did not examine the extent to which ESA coordinates with LIHEAP, though we know from talking to program staff and contractors that there is coordination.

- The IOUs should ensure that in overlap areas (especially SCE and SoCalGas) that as many customers as possible are screened for both IOU measures in an efficient manner to increase the number of customers that pass the modified three measure minimum rule[58] and to provide comprehensive treatment.

Our study did not extensively study this issue, however we did identify that there are significant numbers of low-income customers living in the overlap area (the majority of SCE and SoCalGas CARE-eligible customers). We also identified that not all contractors that work for the IOU(s) in the overlap areas assess measures for both IOUs. There are processes where the IOUs share data and homes that are treated by only one IOU are put into a list for the other IOU to later treat, but it is unclear how quickly the home is treated by the other IOU. We also heard anecdotally from contractors that customers in overlap areas can fail the modified 3 measure minimum rule based on a single fuel.

[58] See Section 5.4.1 in Volume 2 of this report for an explanation of this rule.

- The ESA program should explore the tradeoffs associated with providing energy efficiency education and basic measures during the outreach and assessment visit for homes that are income-qualified but fail the modified three measure minimum rule.

Our study did not assess whether it would be cost-effective, but we did identify that there are many homes being income-qualified but not receiving any measures based on SCE's recording of this information. It may be found to be cost-effective to install basic measures on that first visit and/or deliver energy efficiency education. The costs of such services should be looked at incrementally to the outreach visit (i.e., just the cost of the measures and the contractor's labor), since the costs of identifying and income qualifying the customer is already sunk.

- The ESA program should explore the tradeoffs associated with offering certain targeted customers expanded measure eligibility criteria based on the prior recommendation where customers are screened based on higher energy burden and insecurity.

Our research found that there are significant numbers of customers with older furnaces who might benefit from repair or replacement. Currently, this measure is not cost-effective and only offered for safety purposes. The IOUs could explore if there are certain customers where this measure might be cost-effective, such as based on a certain level of winter gas usage, or for customers living in certain regions where heating degree days exceed a certain threshold.

There may also be different criteria where this measure is offered to customers solely based on need (e.g., based on a health, comfort and safety and/or energy insecurity screening.) The IOUs could track such services in a separate database so that the impact evaluation does not include these homes, bringing down the whole program's cost-effectiveness.

The same approach could be considered for central air conditioning replacement outside the climate zones where it is currently allowed, and for more extensive window and door replacement work. These measure restrictions are currently based on cost-effectiveness, but that has not been based on attempting to screen higher-energy savings potential customers, which could be justified based on cost-effectiveness. This measure could also be based on need, which would have to be evaluated based on different criteria.

- The ESA program should continue to explore adding additional measures such as solar water heaters, light emitting diode (LED) lamps and fixtures and lighting controls.

The program has not added solar water heaters, even though there may be some customers that could benefit and the measure might be cost-effective in some areas, because it requires technical installation that varies from household to household. The state of Hawaii currently offers solar water heaters to low-income customers in conjunction with the state's weatherization assistance program. They partner with the energy efficiency program administrator, who provides inspections of the installations. These programs could be examined to see if the California IOUs could try a pilot program to test feasibility and cost-

effectiveness. The individualized installation requirements could be justified for certain regions and/or to help reduce high energy burden.

Even though the saturation of CFLs among low-income households is high, there are still opportunities to replace inefficient lighting. As the federal lighting legislation continues to phase in and CFLs become the baseline for more wattage categories, the IOUs could explore whether LED replacement lamps and/or fixtures are cost-effective. The prices are coming down rapidly, improving cost-effectiveness for energy efficiency programs. The program could also explore whether there are lighting control measures that could be used to save energy, such as for households where occupants are home all day and who use a lot of lighting. Our study found there are few low-income households who use controls.

- The ESA program should explore the tradeoffs from going back to homes that have received ESA treatment since 2002 to provide additional measures, either as new measures are added to the program, eligibility requirements are modified and/or the treated homes' equipment ages to now be qualified for replacement.

Currently, the program goes back to previously treated homes only very rarely, with a focus on meeting the 2020 goal of treating all eligible homes. However, there may be cost-effective energy savings from going back to homes and providing new measures (e.g., that are added to the program or where eligibility requirements have been expanded) and/or the treated homes' equipment ages to now be qualified for replacement. The program may need to collect additional data or improve how it records and accesses that data to be able to do this. The program could test this approach to determine the cost-effectiveness.

- The ESA program should explore the tradeoffs from offering replacement of a second refrigerator, such as for households that demonstrate a need for it (e.g., based on size of household or medical need.) For those that have a second refrigerator that is not needed, the program could offer a significant rebate for surrendering the unit for recycling.

Our study indicated there are significant numbers of low-income households that have second refrigerators, many of which are older than ten years. Some households may need the second unit due to a large household or medical need for additional refrigeration. The older units in those cases could be replaced and offer energy savings opportunity. Other households that use the unit mostly for convenience could be offered a rebate to recycle the unit. The IOUs' energy efficiency programs typically have such a program, which could be tapped or augmented with an additional rebate.

- The IOUs should explore the tradeoffs from lowering the threshold for income self-certification.

Currently, customers are allowed to self-certify their income in census block groups where 80 percent or more households are estimated as eligible for the ESA program. Based on anecdotal interviews with program staff and contractors, this currently impacts only a small number of

customers. The IOUs could look at whether the threshold should be lowered and identify the tradeoffs.

Our research did not identify that providing income documents is a significant barrier to ESA participation, however the research that explored such barriers was based on the telephone survey sample, which excludes households that do not speak English or Spanish and those that have major outreach barriers. Anecdotally, contractors and program staff said that providing income documents is a barrier for some households.

In the previous subsection, we recommended further research to try to understand more of the barriers among households that are the most difficult to reach, which could inform this issue.

- The IOUs should explore how to increase the participation among single-family renter households.

Our research showed that this segment of the low-income population has barriers associated with being a renter, but also faces greater energy burden and need for measures due to larger homes and more energy-using equipment.

The program could look at developing a package of measures across the low-income and energy efficiency programs that could be offered to landlords to increase the likelihood of engaging with the ESA program.

The program could also look at whether it could expand the basic measures that can be installed without landlord agreement. We did not study this program design issue thoroughly, but we did hear anecdotally that at least some IOUs install CFLs and other basic measures, and refrigerators that are owned by the tenant. The program has tried and should continue to strike a balance between helping renters with their energy burden, but not using ratepayer funds to subsidize improvements to private property owned by non-low income landlords.

- The IOUs that do not offer clothes washers, PG&E and SoCalGas, should explore the tradeoffs of adding this measure.

Our study found that many low-income households have clothes washers and a significant fraction are 10 years or older. There may be energy-savings potential to expand this measure to the other IOUs.

We heard anecdotally that PG&E did a pilot test with this measure and found it not to be cost-effective. However, if screening is allowed, households that have very old clothes washers or a large number of residents might lead to cost-effective energy savings. This measure could also be considered for households that pass a health, comfort and safety and/or energy burden/insecurity screening to help reduce their burden, even though it may not provide cost-effective energy savings.

3.4.5.3 Further Study of Energy Needs

We offer the following recommendations related to addressing the gap in data to inform energy savings potential for the ESA program.

- The IOUs and CPUC should consider conducting an on-site survey with low-income ESA non-participants, as representative as possible, to collect detailed energy equipment information and energy efficiency values that may be used to develop estimates of remaining potential.

This study did not have enough resources to include this component. A future study could focus on collecting data from a representative sample of income-qualified ESA non-participants, possibly including income verification. It is very difficult to address the non-response bias issue, though, as we have described in this study. The study design could include resources to attempt to address it partially, but the sponsors should be advised that non-response bias efforts are very expensive on a per unit basis. Moreover, any such efforts would probably still exclude the very hard-to-reach, who may have different equipment holdings and barriers than those that respond to a non-response follow-up effort. However, such households will probably also not ever respond to an ESA outreach contractor so could be excluded from the study without major implications.

- The IOUs and CPUC should consider augmenting the assessment of energy insecurity in future low-income needs assessment studies.

We did not include a general population survey, which could provide a comparison to the low-income levels of energy insecurity. A future study could also try to analyze the IOU delinquency data. We collected such data but lacked sufficient time and budget to make full use of it. The energy insecurity summary measure could include actual IOU delinquency data. The insecurity battery could also include questions about the household's lifestyle to understand the context with which they are making sacrifices to pay their energy bill.

- This data on varying levels of energy burden and insecurity should be used for future study of the CARE program, since it may be used to help the IOUs and the CPUC to explore the tradeoffs of offering varying rate assistance.

The CARE program currently offers tiered rate assistance that combines a flat rate discount plus a reduction in the impact of higher-usage tiers. This design offers varying rate assistance based on customers' usage, as indicated in this study (e.g., the average electricity rate reduction is 33%).

Even with the rate assistance, a small percentage (6%) of households report being highly insecure. Likewise, there are regions whose low-income households have a relatively higher burden due to climate. Conversely there are households on CARE that report little to no energy insecurity and households with very low energy burden.

There are tradeoffs to providing less assistance to lower burden households or greater additional assistance to higher burden households. If more assistance was to be provided to those with higher energy burden, the upside is that households that live in more extreme climates and/or have greater energy needs will get more support that would lower their energy burden (i.e., by increasing their CARE subsidy). The downside is that some households that have increased energy usage will be rewarded for using more, and households that have a lower burden based on sacrificing health, comfort and safety may not get the additional assistance.

We note that our study does not support a recommendation to *increase* CARE assistance. Instead, our research identified a range of burden and insecurity among low-income households who are enrolled in CARE, which we noted could be used to further study how the CARE program helps customers to reduce their energy burden. There are questions that our data can not answer, such as does equitable treatment mean that every household gets the same level of assistance, or does it mean that households with relatively higher energy burden and/or insecurity get relatively more assistance. And conversely, that households with relatively lower (or no) energy burden and/or insecurity get relatively less or even no assistance.

There are additional considerations to incorporating energy usage, burden and/or insecurity in the consideration of CARE rate assistance, including verification of eligibility and the reliability and accuracy of measures of energy insecurity and burden. The ability of the IOUs to confirm assistance goes to those who are truly eligible and of measuring true energy burden both impact the equity considerations mentioned above.

The purpose of this recommendation is to ensure that the CPUC and the IOUs make use of the data to consider such questions, if they are a priority for planning of the next program cycle.