EVERGREEN ECONOMICS

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

Volume 1 of 2

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Table of Contents

1 EXECUTIVE SUMMARY 1

1.1 BACKGROUND 1

1.2 OVERVIEW OF STUDY OBJECTIVES 1

1.2.1 Energy Affordability and Burden 1

1.2.2 Program Accessibility, Unique Challenges, and Opportunities 2

1.2.3 Beneficial Energy Efficiency Measures 3

1.2.4 Income Documentation 3

1.3 OVERALL RESEARCH APPROACH 3

1.4 SUMMARY OF KEY FINDINGS AND CONCLUSIONS 4

1.4.1 Household Energy Burdens 4

1.4.2 Unique Customer Needs 8

1.4.3 Beneficial Measures 9

1.4.4 Income Documentation 9

1.4.5 Observations and Recommendations 10

2 INTRODUCTION 12

2.1 BACKGROUND 12

2.2 CARE PROGRAM 12

2.3 ENERGY SAVINGS ASSISTANCE PROGRAM 14

2.4 STUDY OBJECTIVES 15

3 STUDY METHODS 19

3.1 PROGRAM MANAGER INTERVIEWS 19

3.2 LITERATURE REVIEW 20

3.3 CUSTOMER TELEPHONE SURVEY 20

3.3.1 Survey Topics 20

3.3.2 Sampling Approach and Methodology 21

3.3.3 Survey Weights 24

3.4 SECONDARY DATA ANALYSIS 25

3.5 COMMUNITY-BASED ORGANIZATION INTERVIEWS AND FIELDWORK 25

3.6 FOCUS GROUPS WITH HIGH BURDEN CUSTOMERS 30

3.6.1 Focus Group Topics 31

3.6.2 Sample 32

3.6.3 Pre-Recruitment Screening and Participant Characteristics 33

3.6.4 Recruitment 33

3.6.5 Focus Group Completes 35

3.7 MULTIFAMILY TENANT TELEPHONE INTERVIEWS 35

4 RESULTS: CUSTOMER ENERGY NEEDS AND HARDSHIP 39

4.1 SELECTED CHARACTERISTICS OF THE STUDY POPULATION 40

4.2 METRICS THAT MEASURE ENERGY BURDEN 46

4.2.1 Energy Burden 49
4.2.2 Modified Energy Burden – Accounting for Non-Income Resources 58
4.2.3 Energy Insecurity 61
4.2.4 Material Hardship: Examining Burden Beyond Energy 64
4.2.5 Comparing Energy Burden, Energy Insecurity, and Material Hardship 73
4.2.6 Summary and Conclusions 74

4.3 RESOURCES CALIFORNIA HOUSEHOLDS DRAW UPON FOR EVERYDAY EXPENSES 77

4.3.1 Resources Used for Living Expenses 77
4.3.2 Household Fluidity of Financial Situation 79
4.3.3 Energy Bill Management and Payment Practices 82

4.4 HOUSEHOLDS WITH HIGH ENERGY BURDEN 86

4.4.1 Health, Comfort, and Safety 87
4.4.2 Energy Bills 89
4.4.3 Self-efficacy and Control Over Energy Costs 91
4.4.4 Utility Support 95
4.4.5 Measure and Program Ideas 96
4.4.6 Ancillary Energy Education and Behavior Change Reference Material 98
4.4.7 Summary and Conclusions 98

5 RESULTS: PROGRAM ACCESSIBILITY, UNIQUE CHALLENGES, AND OPPORTUNITIES 100

5.1 CARE PENETRATION AND ELIGIBILITY OF SURVEYED HOUSEHOLDS 101

5.2 RENTERS IN MULTIFAMILY PROPERTIES 103

5.2.1 Characterization of Multifamily Renters' Energy Costs and Incomes 103
5.2.2 Multifamily Tenant In-Depth Interviews 105

5.3 COMMUNITY-BASED ORGANIZATION RESEARCH 114

5.3.1 Low-Income Households with Undocumented Residents 118
5.3.2 Low-Income Households with Predominately Asian Cultural Identities and Linguistic Practices 122

5.4 LOW-INCOME HOUSEHOLDS WITH SENIOR OR DISABLED RESIDENTS 125

5.4.1 Low-Income Households with Seniors 127
5.4.2 Low-Income Households with a Disabled Resident 129

5.5 IMPLICATIONS FOR PROGRAM DESIGN, IMPLEMENTATION, AND POLICY 133

5.5.1 Multifamily Tenants 133
5.5.2 Asian Language Households and Undocumented Immigrants 135
5.5.3 Households with Seniors and Disabled Residents 136

6 RESULTS: BENEFICIAL ENERGY EFFICIENCY (AND OTHER) MEASURES 137

6.1 INTRODUCTION AND BACKGROUND 137
6.2 CROSS-CUTTING RESULTS 137
6.3 RENTERS IN MULTIFAMILY PROPERTIES 142
6.4 HOUSEHOLDS WITH ASIAN LANGUAGE CUSTOMERS AND UNDOCUMENTED IMMIGRANTS 142
6.5 SENIORS 143
6.6 HOUSEHOLDS WITH DISABLED RESIDENTS 144
6.7 CLIMATE ZONES 144
6.8 SUMMARY / IMPLICATIONS 146
7 CONCLUSIONS 148
7.1 ENERGY BURDENS AND NEEDS 148
7.2 UNIQUE CUSTOMER NEEDS 156
7.2.1 Asian Language Customers and Undocumented Immigrants 157
7.2.2 Seniors and Disabled Residents 157
7.2.3 Multifamily Tenants 158
7.3 BENEFICIAL ENERGY EFFICIENCY MEASURES 158
7.4 INCOME DOCUMENTATION 159
7.5 OBSERVATIONS AND RECOMMENDATIONS 159

1 Executive Summary

1.1 Background

The California investor-owned utilities (IOUs) provide no-cost services and reduced rates to income-qualified customers to alleviate their energy burden while improving health, comfort, and safety. These services are delivered through the Energy Savings Assistance (ESA) Program and the California Alternate Rates for Energy (CARE). CPUC policy dictates that all willing and eligible customers be served by ESA by 2020. This study is the third Low Income Needs Assessment conducted on behalf of the California Public Utilities Commission (CPUC) and the IOUs: Pacific Gas and Electric Company, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company. The findings and recommendations are intended to provide information that may be used to plan and implement the next cycle of low-income energy efficiency programs, the ESA and CARE programs.

1.2 Overview of Study Objectives

The 2016 Low Income Needs Assessment is required by CPUC Decision 14-11-025 pursuant to Assembly Bill (AB) 327. As per AB 327, a Low Income Needs Assessment study is expected to be conducted every three years. For the 2016 Needs Assessment study, several topic areas initially identified as relevant to the CPUC[1] were subsequently discussed in a public workshop to solicit stakeholder feedback and input prior to the development of the request for proposal. Following an examination of what is known via the prior studies and stakeholder input, several primary topics were identified as areas to study for the 2016 Needs Assessment including energy burden and insecurity, unique customer needs, beneficial energy efficiency (and other) measures, and income documentation, which are briefly described below.

1.2.1 Energy Affordability and Burden

This study examined in greater detail important concepts associated more broadly with energy affordability among low-income customers. In particular, energy burden, material hardship, and energy insecurity were examined with additional information and complexity than past studies, which focused largely on energy burden as a function of energy bills' shares of incomes and potential indicators of energy insecurity. The study builds off the prior analytical approaches by incorporating additional information and methodologies to provide further understanding of different issues that may be associated with energy affordability and burden. In particular, this study sought to assess and understand the level of difficulty customers have in managing their energy bills given their energy burden and determine the relative economic burden of low-income customers

[1] See Decision 14-11-025, Attachment Q, p. 29.

due to energy burden or energy insecurity. In particular, the research was intended to address the following questions:

- What is the extent of the energy burden and energy insecurity among eligible low-income customers and relative to non-low-income customers?
- Are there certain groups or sub-groups (based on demographic/psychographic or other variables for the eligible customers) that are especially impacted by energy burden?
- Similarly, are there certain groups or subgroups of the eligible population that are more energy insecure or have relatively high energy burden? And to what extent do these groups overlap?
- How do ESA and CARE program participants differ from the CARE-eligible non-participant population and sub-populations in terms of burden and energy insecurity?
- Are there program measures/services that may alleviate such burden or insecurity for specific subgroups?
- Are there particular program measures or needs that might reduce energy burden or insecurity among those with particularly high energy burden or high energy insecurity?
- What, if anything, can and have customers with different burden/insecurity levels done to mitigate burden/insecurity?
- Are there alternative, better ways to understand burden and insecurity than what have been used in the past? (for example, are we asking the right questions or have the right approach to such data collection?)
- Are there multiple ways to "measure" these issues to get more reliable and valid data? (i.e., Are we using the right methods and assumptions in the analyses?)

1.2.2 Program Accessibility, Unique Challenges, and Opportunities

In addition to increasing our understanding of energy affordability among low-income customers, this study sought to learn more about several specific subpopulations and issues associated with program accessibility and interest. These include:

Understanding more about the needs of Asian-language speaking customers, undocumented immigrants, high energy burden households and tenants in multifamily housing. With regard to this topic, the study sought to:

- Identify what, if any, unique needs (outreach, enrollment, measures) of selected subpopulations may be addressed with some kind of alternative approach;
- Understand enrollment challenges and potential solutions for the targeted population groups; and

- Understand particular needs of the targeted population groups and useful measure solutions.

1.2.3 Beneficial Energy Efficiency Measures

The study also sought to inform our understanding of how specific measures may be important or relevant to particular segments including those in certain regions or those with particular vulnerabilities. With regard to this topic, the study sought to:

- Obtain community-based organization (CBO) perspectives on customer benefits (especially for health and safety) among existing measures and other potential measures;
- Identify how measure eligibility screening contributes to—and limits—the benefits provided to customers (e.g., central AC measure eligibility based on customer climate zone); and
- Determine needs and benefits of measures from the customer point of view.

1.2.4 Income Documentation

To some extent the requirement of income documentation for participation in ESA and CARE was examined. Although the prior Needs Assessment study suggested this was not necessarily a barrier to program participation, stakeholders remain interested in understanding if this is a barrier to key hard-to-reach segments (e.g., undocumented immigrants) who may be reluctant to provide this documentation. With regard to this topic, the study sought to:

- Determine the extent to which providing income documentation for CARE and ESA is a barrier to eligible customers participating in the programs and why.

1.3 Overall Research Approach

The study included numerous primary and secondary data and information sources. Large samples of customer survey and billing data were used to address the energy burden and affordability study objectives, while qualitative and secondary data were used to inform the other objectives. See Section 3 for more information on the study's research methodology.

In order to explore the study objectives of energy burden and affordability, we developed additional metrics to account for more of the complex factors relevant to understanding energy affordability among households. As shown in Table 1, this study explored a total of four metrics that were used to explore the hardship and challenges faced by low-income households imposed by their energy usage and bills.

Table 1: Measures of Energy and Household Burden

Measure	What it Measures	Key Inputs
Energy burden	Actual home energy costs as a percentage of household income	Household energy costs and income
Modified energy burden	Actual home energy costs plus valuation of medical, housing, and food stamp assistance as a percentage of self-reported gross household income	Household energy costs, income, and valuation of non-cash assistance
Energy insecurity	Household challenges regarding affordability of energy bills and monthly trade-offs between meeting energy needs and bill payments	Self-reported difficulty paying energy bills, household disposition and motivation to save energy, heating/cooling system sufficiency
Material hardship	Household challenges regarding broader affordability of basic necessities such as food, shelter, and energy, etc.	Household income, household size, and self-reported difficulty paying household bills and basic living expenses (not limited to energy)

1.4 Summary of Key Findings and Conclusions

1.4.1 Household Energy Burdens

The 2016 LINA telephone survey and utility billing data suggest that the California IOUs' low-income customers faced energy bills that, on average, amounted to 5.6 percent of their self-reported income. This metric is typically referred to as ***energy burden.*** The median energy burden was 3.9 percent, while the range was 0 to 41 percent.[2] The 2013 data demonstrated a mean burden of 8.0 percent for low-income customers, suggesting that overall burden on this metric is less than was experienced in prior years.[3] National comparisons show that California's energy burdens are among the lowest in the country.

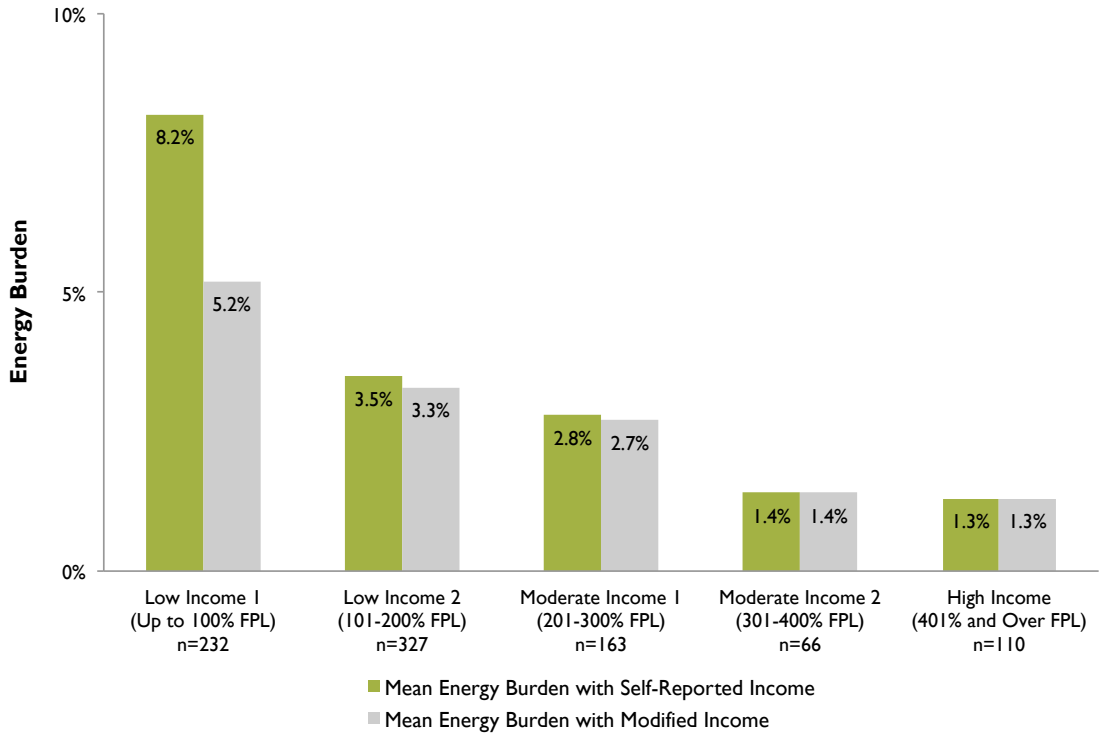
When several non-cash benefits (e.g., housing, medical and food subsidies) some households receive are considered in conjunction with reported income, the "modified energy burden" for low-income households drops to 4.1 percent and is considerably

[2] These energy burden values and other burden-related metrics are based on self-reports from survey respondents of their 2015 incomes, other current and recent household parameters, and utility billing data for these same households from 2014 and 2015.

[3] There are some differences in the sampling and self-report telephone survey income methodologies that compromise the comparison of burden over time.

reduced among households below 100 percent of the federal poverty level (FPL).[4] This becomes relevant when we try to understand 'affordability' in relation to comparisons between households with respect to their overall resources, expenses, and needs. Figure 1 illustrates both the average energy burden and ***modified energy burden*** by income level.

Figure 1: Conventional and Modified Energy Burden by Income Group



Household burdens related to energy manifest themselves differently across customer groups. As shown in Table 2, customer segments with the highest measures of burden or hardship vary to some degree across the four metrics. Some key results include:

- Households with lower reported income tend to face higher levels of burden across all four metrics, although there are some important variations.
- The households at the lowest income levels (i.e., those below 50 percent of the FPL[5]) have the highest energy burden—this is especially evident when considering the energy burden as traditionally defined.

[4] Households are eligible for the IOUs' low-income programs up to 200 percent of FPL. We explored energy burden metrics for households at several levels of income below, at, and above the eligibility threshold in order to better understand burden across the distribution of households.
[5] A household's FPL is based on income and household size. During the study period, a family of four with an annual income of $12,000 would be considered to be at 50 percent of the FPL.

- It appears, however, that households with incomes all along the distribution all the way up to 300 percent of the FPL (which includes all low-income households and extends half way through the moderate-income range) report similarly elevated struggles paying their energy bills (measured by the ***energy insecurity*** metric).
- Households in the mountain and desert regions and those that include a member with a disability[6] consistently face higher levels of burden relative to other low-income households regardless of metric.
- Households with seniors report more struggles than other low-income households in paying energy bills (i.e., more ***energy insecure***), but working-age adults with dependents face more challenges paying basic living expenses overall (i.e., reflect more ***material hardship***).
- Burdens measured by the four metrics vary across housing types and tenure. Renters in multifamily buildings show higher ***energy burden*** in 2016 (a change since the 2013 study) due to comparatively lower incomes, but their energy usage and bills are the lowest of the three housing groups analyzed.
- When some non-cash resources are taken into account, single-family owners and renters face higher ***modified energy burden*** than multifamily renters.

[6] It is important to note, this study did not differentiate between (a) households led by a senior or disabled person and (b) households that included a senior or disabled person, potentially led by a non-senior/disabled customer. This differentiation may be relevant when discussing the needs and applicability of specific services and outreach.

Table 2: Comparison of Characteristics Associated with Relatively Higher Energy Burden, Energy Insecurity, and Material Insecurity

Household Characteristics	Energy Burden	Modified Energy Burden	Energy Insecurity	Material Insecurity
Demographics	Lowest income (below 50% of FPL) Higher usage (above $1,000 in energy costs annually) Households with disabilities	Lowest income (below 50% of FPL) Higher usage Households with disabilities	Lower and moderate income (below 300% of FPL) Households with seniors Households with disabilities	Lowest income (below 100% of FPL) Households with working-age adults and dependents Households with disabilities
Housing	Renters in multifamily buildings	Single-family owners and renters	Single-family owners	Renters in multifamily and single-family homes
Geographic	Desert/mountain regions (i.e., areas with higher heating and cooling loads)	Desert/mountain regions Central Valley	Desert/mountain regions South coast region (i.e., areas with higher housing costs)	Desert/mountain regions

Other key findings related to energy burdens and hardships include:

- A third of low-income households indicated that they struggle with energy bills either often or constantly. Fewer than half of these households (43%) say they consistently follow the basic energy conservation practices we asked about in our survey. Conversely, more than half of all low-income households said that they could not heat or cool their homes any less (i.e., to try to lower their energy bills) without impacting their households negatively.
- Although CARE customers receive bill discounts, the results suggest that CARE customers and their income-eligible non-CARE counterparts have a similar degree of energy burden. On average, however, the (income-eligible) households not enrolled on CARE tend to have slightly higher incomes and higher energy costs.
- Rates of payment delinquencies that lead to final notices or disconnections are fairly consistent and highest among households up to 300 percent of the FPL. Households over 300 percent of the FPL have significantly lower rates of disconnections.
- Households that consistently take low cost energy-saving practices are less likely to be delinquent in payments or receive disconnect notices.

1.4.2 Unique Customer Needs

Analysis of survey data and qualitative research related to five specific sub segments indicate that:

Low-income ***Asian language customers and undocumented immigrants*** do not appear to differ fundamentally from other low-income households in their energy-related needs. That said, they may benefit from more customized marketing and outreach that are sensitive to language and cultural differences. IOUs may be able to leverage word-of-mouth information sharing about programs and resources that is already common in these communities. Furthermore, customers who speak Asian languages may respond better to messaging that features collective benefits rather than individual ones. There are indications that customers who do not speak English or Spanish may not follow up with the ESA enrollment process when language barriers inhibit scheduling appointments and in-home visits.

Households that include a member who is a senior and/or disabled person tend to reflect similar energy related interests and needs. These households have high awareness of both ESA and CARE[7] and seem to be well served by existing marketing approaches, although they tend to use electronic communication less than most other low-income households. These households also reported needing more heating and cooling to stay comfortable, although few indicated having energy-using medical equipment.

Low-income households that include a member with a disability exhibit moderate energy-related burden across the metrics, while households with seniors exhibited less overall burden but more energy insecurity as indicated by challenges associated with paying energy bills.

This study used a fairly broad definition of 'disability', which included different types of disabilities. Given there are likely differences among households' energy use and payment practices based on the members' type of disability, additional analyses may be useful to better understand the relevance of specific disabilities associated with energy-related needs or constraints.

Low-income ***tenants in multifamily buildings*** have higher energy burdens largely due to their lower incomes. Their energy usage is lower than that of low-income households in single-family homes, pointing to potentially fewer energy savings opportunities. While some tenants we interviewed expressed interest in (or need for) equipment replacements, it was not possible to discern whether the identified needs reflected inadequate maintenance practices by landlords or energy-saving opportunities.

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[7] Based on the 2013 Needs Assessment customer telephone survey.

1.4.3 Beneficial Measures

This study sought to understand more about the benefits of certain measures for customers. This was a relatively small component of this scope of work, and the findings are based on qualitative research with customers and CBOs as well as some additional analyses of the 2013 and 2016 Low Income Needs Assessment customer survey data. The 2013 Needs Assessment addressed this topic using a large sample of customer survey data, and this effort was intended as a very focused follow-up effort to get the perspectives from CBOs that serve low-income customers. We also took the opportunity to obtain limited feedback on customer energy efficiency measure needs from customers who we interviewed and conducted focus groups with in order to meet the unique customer needs study objective. Primary findings associated with the value of certain measures include:

- Low-income households perceive a need for ***envelope measures*** in most areas of the state; households in the Central Valley and much of Southern California also expressed a desire for ***air conditioning measures***. This finding is based on 2013 telephone survey data, which was conducted with a large sample of low-income customers.
- ***Customers report an interest in usage alerts*** to help them manage day-to-day energy choices as they manage monthly costs. Both the high burden energy focus group attendees and multifamily tenants we interviewed were interested in getting these types of alerts from their utility.
- C***ustomized energy education continues***[8] ***to be of interest to customers***. In particular, the high burden energy focus group attendees and multifamily tenants we interviewed were interested in receiving customized information on their usage and opportunities for energy savings practices customized to their household from their utility.

1.4.4 Income Documentation

A limited exploration of potential barriers or issues associated with the need to provide income documentation supports prior findings that providing income documentation is not likely a major stumbling block to CARE enrollment or ESA/FERA[9] program participation. In fact, the existing program participation rules associated with CARE and ESA tend to be more flexible and accommodating than many means-tested programs.

[8] This finding is consistent with the 2013 Needs Assessment findings. The IOUs continue to study this issue and the programs are making modifications to energy education in response to study results.
[9] FERA (Family Electric Rate Assistance) offers a reduction in energy bills similar to CARE, but is for households just over the CARE income threshold that have a minimum number of household members.

1.4.5 Observations and Recommendations

Energy burden and affordability. The expanded metrics developed for this study to further inform energy burden and affordability are useful tools to better understand the complexities that contribute to variations in low-income households' energy burden and affordability. Comparisons of low-income households at varying income levels below and above the income-qualifying threshold for program eligibility provide additional valuable insights.

- We recommend that the IOUs and the CPUC continue supporting the development and use of multiple metrics in order to both better serve the unique needs of low-income households and make the most efficient use of program resources. Future needs assessments should continue to examine households above and below the income threshold for income-based program eligibility.

Unique customer needs. The study's qualitative research suggests that Asian language customers and undocumented immigrants do not have different energy-related needs than other low-income customers, suggesting that the ESA Program's current measure offerings are applicable to these segments. CBOs indicated that existing in-language outreach by the IOUs is an important factor in getting these segments to participate in programs. However, the availability of in-language interaction with customers during the ESA scheduling, assessment, and education visits could be expanded, especially for customers who do not speak English or Spanish.

- We recommend that the IOUs explore the opportunities and costs associated with expanding in-language program services or otherwise overcoming language barriers during ESA scheduling and in-home visits.

Beneficial energy measures. Focus group attendees from low-income households with high energy burdens were highly interested in receiving information from their utility in real time and customized to their household. The study's quantitative survey results also found that many low-income households are practicing no-cost conservation measures that could help them reduce their bill only inconsistently. There may be value in on-going engagement with low-income customers that extends beyond one-time transactions to enroll them in CARE, treat them through ESA, and provide energy education on a single visit. Approaching low-income programs as part of a continuing and coordinated customer-utility relationship can enhance energy education efforts and encourage customer-driven conservation efforts. This relationship could include participation in CARE and ESA and interactions concerning payment arrangements.

- We recommend that the IOUs explore the benefits and costs associated with engaging with low-income customers (particularly high burden customers) on an ongoing basis to deliver customized energy education and usage alerts.

Income documentation. ESA and CARE are in line with—and, in some cases, go above and beyond—what other means-tested programs do to prove income eligibility. Qualitative research with CBOs serving undocumented immigrants indicated that program requirements are not a barrier to participation, suggesting that the programs' current requirements are appropriate and are not a barrier to participation. The 2013 LINA study reached a similar conclusion.

- We recommend that the IOUs maintain their current income verification processes, as they have not been found to be a substantial barrier to participation.

2 Introduction

2.1 Background

The IOUs provide no-cost services and reduced rates to income-qualified customers to alleviate their energy burden while improving health, comfort, and safety. These services are delivered through the ESA and CARE Programs. CPUC policy dictates that all willing and eligible customers be served by ESA by 2020.

The 2016 Low Income Needs Assessment is required by CPUC Decision 14-11-025 pursuant to AB 327. As per AB 327, a Low Income Needs Assessment study is expected to be conducted every three years. For the 2016 Needs Assessment study, several general topic areas were identified in the CPUC's 2015-2017 ESA and CARE Program Application Guidance Document (D.14-11-025, Attachment Q, p. 29). Given the legislated deadline for this study and lacking a formal Decision, the IOUs hosted a public workshop in May of 2015 to discuss the potential scope of this work given the prior work and potential needs identified by Energy Division[10] as well as stakeholders and prior research. Following this meeting, the Energy Division and the IOUs finalized key objectives[11] for the 2016 Low Income Needs Assessment which covered areas including: including energy burden and insecurity, unique customer needs, beneficial energy efficiency (and other) measures, and income documentation. The initial scope of work included numerous possible research questions associated with these topics to help inform the programs' continued efforts to understand customer needs, reach all income-qualified customers, and better serve them through ESA and CARE. The final project plan addressed the core objectives with a subset of key research questions as noted in Table 8 in Section 3.

2.2 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 3 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,

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[10] California Public Utilities Commission 2015-2017 ESA and CARE Program Application Guidance Document (d.14-11-025, Attachment Q)

[11] The original CPUC Guidance document included an examination of "savings potential"; however, upon further reflection, discussion and as result of the public workshop, it was agreed that this objective was better suited to be examined as part of the Energy Efficiency Potential and Goals Study conducted by Navigant Consulting Inc.

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 percentage of the total CARE residential population annually to ensure that enrolled households do meet the program's income guidelines. Documentation regarding income and/or participation in categorically eligible programs are required as part of this process.

Table 3: CARE Eligibility Requirements (Effective through May 31, 2017)

Size of Household	Income limit (must be at or below)
1-2	$32,040
3	$40,320
4	$48,600
5	$56,880
6	$65,160
7	$73,460
8	$81,780
Each Additional Person Add	$8,320

Source: IOU CARE online application.

The CPUC approved $1.3 billion for the 2015 CARE program year (Decision 14-08-030) and $641 million each for the first and second halves of the 2016 CARE program year (Decisions 15-12-024 and 16-06-018, respectively) in bridge funding.[12] Table 4 below presents the funding budgets authorized by the CPUC for 2015 and 2016 by IOU.

[12] D. 14-11-025 was issued on November 20, 2014, D. 15-12-024 was issued on December 17, 2015, and D. 16-06-018 on June 9, 2016, all in relation to the IOUs' applications for the 2015-2017 CARE and ESA Programs (Applications 14-11-007, 14-11-009, 14-11-010, and 14-11-011).

Table 4: CARE 2015-2016 Bridge Funding Budget

IOU	CARE 2015 Budget	CARE 2016 Budget	CARE 2015-2016 Budget
PG&E	$620,896,832	$621,044,852	$1,241,941,684
SCE	$423,823,970	$423,971,990	$847,795,960
SDG&E	$89,102,339	$89,174,909	$178,277,248
SoCalGas	$147,508,850	$147,633,640	$295,142,490
Total	$1,281,331,991	$1,281,825,391	$2,563,157,382

Sources: Decisions 14-08-040, 15-12-024 and 16-06-018.

2.3 Energy Savings Assistance Program

The Energy Savings Assistance (ESA) Program is offered by all four IOUs and provides no-cost weatherization, energy efficient appliances, and energy education services to low-income households that meet the income and program guidelines. Services provided may include attic insulation, energy efficient refrigerators, evaporative coolers, air conditioners, weather stripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs. The program also provides 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 $391 million for the 2015 ESA program year (Decision 14-08-040) and again in 2016 via bridge funding (Decisions 15-12-024 and 16-06-018, respectively). Table 5 below shows these funding authorizations by IOU.

Table 5: ESA 2015-2016 Bridge Funding Budget

IOU	ESA 2015 Budget	ESA 2016 Budget	ESA 2015-2016 Budget
PG&E	$161,862,111	$161,862,111	$323,724,222
SCE	$72,736,631	$72,736,631	$145,473,262
SDG&E	$23,772,250	$23,772,250	$47,544,500
SoCalGas	$132,417,191	$132,417,191	$264,834,382
Total	$390,788,183	$390,788,184	$781,576,367

Sources: Decisions 14-08-040, 15-12-024 and 16-06-018.

In the same decisions described above, the CPUC adopted the target for the number of homes to be treated by the ESA Program (shown in Table 6). The IOUs' collective target was approximately 360,000 homes per year, for a total of about 730,000 homes during the bridge funding period (the first two years of the 2015-2017 program cycle).

Table 6: ESA 2015-2016 Bridge Period Target Homes to be Treated

IOU	ESA 2015 Homes	ESA 2016 Homes	ESA 2015-2016 Homes
PG&E	119,940	119,940	239,880
SCE	87,389	87,390	174,779
SDG&E	20,316	20,316	40,632
SoCalGas	136,836	136,836	273,672
Total	364,481	364,482	728,963

Sources: Decisions 14-08-040, 15-12-024 and 16-06-018.

2.4 Study Objectives

As noted above, the overall study objectives covered several key areas of inquiry. The initial scope of work included numerous possible research questions associated with these topics to help inform the programs' continued efforts to better serve low-income customers through ESA and CARE. The final project plan addressed the core objectives with a subset of key research questions as noted in Table 7.

Table 7: Research Topics and Objectives

Topic Area	Research Objectives
Energy burden and insecurity	• Assess and understand the level of difficulty customers have managing their energy bills given their energy burden. • Determine the relative economic burden of low-income customers due to energy burden or energy insecurity. *More detailed research questions:* ○ *What is the extent of the energy burden and energy insecurity among eligible low-income customers and relative to non-low-income customers?* ○ *Are there certain groups or sub-groups (based on demographic/psychographic or other variables for the eligible customers) that are especially impacted by energy burden?* ○ *Similarly, are there certain groups or subgroups of eligible population that are more energy insecure or have relatively high energy burden? And to what extend do these groups overlap?* ○ *How do ESA and CARE program participants differ from the CARE-eligible non-participant population and sub-populations in terms of burden and energy insecurity?* ○ *Are there program measures/services that may alleviate such burden or insecurity for specific subgroups?* ○ *Are there particular program measures or needs that might reduce energy burden or insecurity among those with particularly high energy burden or high energy insecurity?* ○ *What, if anything, can and have customers with different burden/insecurity levels done to mitigate burden/insecurity?* ○ *Are there alternative, better ways to understand burden and insecurity than what have been used in the past? (for example, are we asking the right questions or have the right approach to such data collection)* ○ *Are there multiple ways to "measure" these issues to get more reliable and valid data? (i.e., Are we using the right methods and assumptions in the analyses?)*
Unique customer needs	• Identify what, if any, unique needs (outreach, enrollment, measures) of selected subpopulations may be addressed with some kind of alternative approach. • Understand enrollment challenges and potential solutions for the targeted population groups. • Understand particular needs of the targeted population groups and useful measure solutions.
Beneficial energy efficiency measures	• Obtain CBO perspectives on customer benefits (especially for health and safety) among existing measures and other potential measures. • Identify how measure eligibility screening contributes to—and limits—the benefits provided to customers (e.g., central AC measure eligibility based on customer climate zone). • Determine needs and benefits of measures from the customer point of view.
Income documentation	• Determine the extent to which providing income documentation for CARE and ESA is a barrier to eligible customers participating in the programs and why.

Energy burden and insecurity are indicators of the challenge customers face in paying for the energy they need for everyday life, as well as their capacity (or lack thereof) to fund energy efficiency improvements. Traditional metrics for low-income energy research nationwide tend to focus on energy burden (defined as the portion of total household income that goes towards paying utility bills), while California studies have also explored energy insecurity, which is characterized as self-reported challenges households face in paying energy bills and compromises they make in affording needed in-home energy costs. As noted in forthcoming sections, this study builds off the approaches that have been used in the past to understand these concepts by incorporating additional information and methodologies. The additional information and analyses provide further insight into understanding some of the issues associated with the economic challenges different customers face in paying their energy bills. Affordability and burden, for example, are examined in conjunction with additional information regarding the nature of customers' income, expenses, available resources, and circumstances. In addition, including customers above the programs' low-income eligibility threshold allowed for additional comparisons of the "relative burden" utility customers face.

Unique customer needs are addressed by this study in order to provide additional inquiry on the needs of selected customer groups and insights on how to best serve them. In particular, this study examined several segments that have not been well understood by prior research. These include Asian language groups, undocumented immigrants, high energy burden households and tenants in multifamily housing. In addition, we explored the needs of two additional population segments—seniors and people with disabilities—as well as two geographies of particular interest (the San Joaquin Valley and the Aliso Canyon area).

Beneficial energy efficiency (and other) measures inquiry is intended to identify which measures are particularly important to eligible households—especially segments or individuals that may be more vulnerable —to address health, comfort, safety, and bill savings. Specific sub-groups—such as seniors, people with disabilities or relevant medical conditions, families with young children, and households with especially high energy burdens—were of particular interest. This study builds on the prior Needs Assessment, distinguishes between different subgroups of low-income customers, and includes both customer perceptions and CBO insights.

Income documentation is required for participation in ESA for all households, and for CARE post-enrollment verification for a sample of households. The prior Needs Assessment study found that providing income documentation was not necessarily a barrier to program participation. Given this is a requirement for some customers as part of the verification process and the fact that some harder to reach customers (e.g., undocumented immigrants) may be reluctant to provide this documentation for reasons that could not be accounted for in the prior study on account of telephone survey self-

selection bias and that only English and Spanish languages were addressed, this effort sought to learn more on this topic via other approaches (e.g., indirectly through CBOs).

Although analysis involving the Family Electric Rate Assistance (FERA) program was not a priority for this study, we do present analyses of households above and below 250 percent of the FPL, which is the income threshold for FERA eligibility.

3 Study Methods

Table 8 summarizes the methods employed to address the different research objectives. This section provides details on the methods used to conduct each of the research activities shown.

Table 8: Map of Research Activities to Research Topics

Research Activities	Research Topics: Energy burden and insecurity	Unique customer needs	Beneficial energy efficiency (and other) measures	Income documentation
Program manager interviews	X	X	X	X
Literature review (on energy insecurity, material insecurity and burden measurement)	X			
Customer telephone survey (905 completions)	**X**	X	X	
Secondary data analysis				
- Prior LINA telephone survey data (2013)		X	X	
- IOU low-income customer segmentation studies		X		
- IOU billing and payment practices data	X			
Community-based organization interviews and fieldwork (6 total, with 4 contractors serving Asian language constituencies and all 6 serving undocumented workers)		**X**	X	X
Customer focus groups (4 with high energy burden customers)	X	**X**	X	
Customer telephone interviews (20 with multifamily building tenants)		**X**	X	

Note: Primary research topics for a task, where applicable, are signified with a bold **X**.

3.1 Program Manager Interviews

We conducted in-depth telephone interviews with program staff from each of California's investor-owned utilities (IOUs) to obtain their input on all of the study research topics. These interviews provided relevant and current information about current ESA and CARE

program design and important policy context that we used to inform the development and implementation of the remaining study research methods. In particular, the interviews highlighted the challenges the program staff perceive in serving the targeted population groups, efforts to overcome those challenges, and key information needs. We conducted six interviews in February of 2016 with program, marketing and evaluation staff working on both the ESA and CARE Programs. The objectives were to inform the design of our data collection instruments and our analysis, especially for the research questions on unique customer needs and beneficial measures. We sought to solicit program staff perspectives on program challenges and opportunities to help us explore the research questions more thoroughly and analyze results with the programs in mind. Interviews were generally an hour long.

3.2 Literature Review

A literature review was conducted to inform our approach to developing metric(s) for energy insecurity and material insecurity. The literature review comprised an examination of academic papers, Census Bureau reports, and energy industry literature on measures of energy burden, general household wellbeing, and material hardship. The purpose of this literature review was to inform the design of survey questions related to households' material hardship, wellbeing, and resources used to meet everyday living expenses, of which energy costs are an important part.

3.3 Customer Telephone Survey

3.3.1 Survey Topics

The telephone survey was designed to address three of the four study objectives, and primarily to inform the first study objective of energy burden and insecurity. Topics the survey covered included:

- Home characteristics (home ownership, size of building for multifamily tenants)
- Heating and cooling characteristics and practices
- Home comfort
- Conservation practices and attitudes
- Internet / computer access
- Special medical needs related to energy
- Financial situation (general – ability to pay all bills, buying food and medicine)
- Financial support (both given and received)
- Changes to financial situation
- Energy bill situation (issues paying energy bills, energy bill support from IOU)
- Sources of income and non-cash assistance

- Self-reported household income
- Household demographics

3.3.2 Sampling Approach and Methodology

We conducted 905 telephone surveys with households in geographic areas with high concentrations of low-income and moderate-income IOU customers. We defined low-income households as those whose income and household sizes place them at or below 200 percent of the federal poverty level (FPL), consistent with the ESA and CARE guidelines, and moderate-income as between 200 and 400 percent of the FPL. We utilized Athens Research data[13] to select a stratified random sample of customers from zip codes known to have high percentages of low-income and moderate-income households.

We developed a sample design that maximized the concentration of low- to moderate-income households, minimized cost, and encompassed a wide enough geographic area to be representative of the state's low- to moderate-income households. We ruled out screening by income via the telephone survey due to concerns about biasing the sample.[14] After comparing several sampling approaches in collaboration with the study team, we chose a two-stage sampling approach using CARE enrollees and zip code-based sampling. This approach draws low-income and moderate-income households from two different sample frames, but keeps the geographic dispersion of these sample frames uniform across the two samples and supports a better statewide representation.

We first drew the sample of moderate-income households from the population of non-CARE IOU customers using a seven-digit zip code-based sampling approach. The sample allocation was divided into five strata defined by the share of households, in any given seven-digit zip code, that are projected to be at 400 percent of FPL or less.[15] The mechanics of the sample design are as follows. First, we placed the IOU service territory seven-digit zip codes into quintiles based on the concentration of low- to moderate-income households using Athens Research data. We retained the top two quintiles of seven-digit

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[13] The sampling method we chose was the most effective way to get both low- and moderate-income households while minimizing cost and sample points allocated to high-income households. The resulting sample represents households living in neighborhoods that have high concentrations of low- and moderate-income households. It is not directly comparable with the previous LINA telephone survey sample, which was a random sample drawn from households on the CARE rate.
Athens Research. 2015. *Joint Utilities Low Income Working Group: Documentation For 2014-2015 Estimates Of CARE/FERA/ESA Eligibility and Other Household Size-By-Income Related Parameters*.

[14] Sample bias occurs and is a problem when characteristics of a group that would tend to self-select themselves into a survey (in this case, be able to answer a required income screening question in order to complete our survey) would cause problems (in this case, fewer respondents who have issues being able to or willing to report their income.) See De Leeuw, Edith, Joop Hox and Don Dillman. 2008. *International Handbook of Survey Methodology*. European Association of Methodology.

[15] Using 7-digit zip codes for the geographic sampling rather than 5-digit zip codes gives us greater precision in targeting populations of interest.

zip codes (with the highest concentration of low- and moderate-income households) for the sample frame. The sample frame includes:

- 53 percent of all seven-digit zip codes served by the IOUs
- 65 percent of all low- to moderate-income households served by the IOUs
- 71 percent of households up to 200 percent of FPL (low-income/CARE-eligible)
- 61 percent of households between 200 and 300 percent of FPL (moderate-income)
- 51 percent of households between 300 and 400 percent of FPL (moderate-income)

Next, we created five strata based on concentration of low- and moderate-income households (or target households) in the sample frame. The first stratum has the highest concentration of target households, and is comprised of zip codes with 95 percent or more of target households. The next three strata are comprised of zip codes with between 90 and 95 percent, 85 and 90 percent, and 80 to 85 percent of target households, respectively. The fifth and final stratum is comprised of zip codes with between 60 and 80 percent of households. We allocated the most sample points to the strata with the highest concentration of low- to moderate-income households and decreased the allocation as we progressed down the strata.

We then drew the sample of low-income households from CARE enrollees in the same proportion, from the same seven-digit zip codes selected in the sample approach described above for moderate-income households. Table 9 shows the sample allocation by strata.

Table 9: Sample Allocation by Stratum

Strata	Sample Allocation (Non-CARE)	Sample Allocation (CARE)	Total Sample Allocation
Stratum 1 (comprised of zip codes with 95-100% concentration of households below 400% FPL)	125	125	250
Stratum 2 (90-95% concentration below 400% FPL)	125	125	250
Stratum 3 (85-90% concentration below 400% FPL)	75	75	150
Stratum 4 (80-85% concentration below 400% FPL)	75	75	150
Stratum 5 (60-80% concentration below 400% FPL)	50	50	100
Total	**450**	**450**	**900**

Table 10 and Table 11 show survey completes by IOU and income category. Note that we did not explicitly address overlapping IOU service territory in the sample design. We expected to increase the number of completes for Southern California Edison (SCE) and Southern California Gas Company (SoCalGas) once we accounted for customers who completed the survey and are served by more than one IOU. Table 11 further breaks down the survey completes to show the number of respondents who are customers of SCE only or SoCalGas only, and customers of both SCE and SoCalGas based on self-reported data from the survey. (343 of the respondents have SCE service, and 337 have SoCalGas service.)

Table 10: Survey Completes by Income Category and IOU

Income Category	PG&E	SCE	SoCalGas	SDG&E	Total Survey Completes
Low (up to 100% FPL)	73	65	61	34	**233**
Low (100% - 200% FPL)	110	96	80	43	**329**
Moderate (200% - 300% FPL)	58	24	54	28	**164**
Moderate (300% - 400% FPL)	22	6	22	18	**68**
High (over 400% FPL)	37	14	33	27	**111**
Total	**300**	**205**	**250**	**150**	**905**

Table 11: Survey Completes by Income Category and IOU – With SCE and SoCalGas Overlap

Income Category	PG&E	SCE Only	SCE and SoCalGas	SoCalGas only	SDG&E	Total Survey Completes
Low (up to 100% FPL)	73	41	52	33	34	**233**
Low (100% - 200% FPL)	110	59	83	34	43	**329**
Moderate (200% - 300% FPL)	58	10	45	23	28	**164**
Moderate (300% - 400% FPL)	22	4	18	6	18	**68**
High (over 400% FPL)	37	3	28	16	27	**111**
Total	**300**	**117**	**226**	**112**	**150**	**905**

As mentioned previously, the IOUs and the California Public Utilities Commission (CPUC) were interested in obtaining sufficient sample points for disadvantaged communities in the San Joaquin Valley. We obtained a total of 198 completes for this customer segment, which allows for robust analysis of energy burden and the other study objectives. We also obtained 283 completes from customers located in the Aliso Canyon area, another geographic area that was of interest to the study team.

In order to boost the response rate and minimize non-response bias, we mailed out a letter in advance of the survey to explain the study and request sampled households' participation. We also conducted the survey in both English and Spanish, and provided a $25 incentive for all respondents. Additional detail on the sampling approach can be found in Appendix B; the survey instrument is included in Appendix C.

3.3.3 Survey Weights

We developed sample weights for the survey data to weight the data in proportion to the population. Sample weights for each respondent are based on the ratio of survey completes to the total population in each category. Each respondent is classified based on their income category (LI1, LI2, MI1, MI2, and HI) and IOU (PG&E, SCE only, SCE w/ SoCalGas, SoCalGas only, and SDG&E). Weights were calculated and applied to each of these categories and used for analysis of survey data.

3.4 Secondary Data Analysis

We used a number of secondary data sources to both support the design of the study and to support analyses and development of findings.

We obtained IOU billing and payment practices data for calendar years 2014 and 2015, which we used to support the analysis of energy burden, insecurity, and hardship, and to develop the high burden customer focus groups. We also collected ESA participant tracking data for calendar years 2013 through 2015 to support the study analyses on the survey and renter telephone interview data.

We also examined the prior (2013) LINA study telephone survey data to inform the approach to—and provide supplemental data for—addressing the beneficial energy efficiency measures and unique customer needs objectives. The prior telephone survey had lengthier survey batteries related to energy efficiency measures, making it a useful data source.

Finally, we reviewed the related IOU low-income research studies on segmentation to inform the approach to addressing the unique customer needs objective.

3.5 Community-Based Organization Interviews and Fieldwork

We conducted four in-person visits and six telephone-based interviews to better understand the four primary customer segments previously identified as having potentially unique needs and warranting greater exploration. For two of these customer segments—Asian language customers and undocumented immigrants—we identified and tapped into the expertise of contractors and community-based organizations (CBOs) that know these customers well.

The Asian language groups we targeted for research are households that speak Chinese or Vietnamese and are either immigrants from the countries in which these languages are spoken or have strong connections to their cultures (see Section 5.3 for additional detail). For undocumented immigrants, we targeted CBOs that serve immigrants in permanent housing rather than organizations that focus on any highly transient clients who live in non-permanent housing or reside in any location for only a very short period of time.

The contractor locations and languages covered for the CBO-based research are shown in Table 12 and Table 13. We made these selections based on input from the IOUs and the Low Income Oversight Board.

Table 12: Locations for Asian Language Research

Contractor Locations	Languages Covered	IOU
Bay Area, Fresno	Mandarin, Cantonese	PG&E
Orange County	Vietnamese	SCE, SoCalGas

Table 13: Locations for Undocumented Immigrant Research

Contractor Locations	Description	IOU
San Joaquin Valley, Sacramento	Immigrant farm workers, Spanish speaking	PG&E
San Diego	Recent immigrants, Spanish speaking	SDG&E

The CBO-based research was designed to tap into the experience and expertise of the selected organizations with the targeted customer segments. We planned for an average of a half day of direct contact with each of the selected organizations in addition to a phone interview, although the length of time varied based on the opportunities for accompanying the organizations to community events and other out-of-office outreach.

We performed a series of three data collection efforts with selected organizations: an initial screening call, a phone interview, and an in person visit. The in-person visit occurred after the phone interview in order to account for travel arrangements and to find a day that best represents the type of outreach efforts that the organization performs.

Each phone interview lasted close to an hour and was intended to gather information that informed how a possible site day could be structured. We also asked questions regarding program outreach strategies, cross promotion, community traits, interactions of community with energy related to health, comfort and safety, beneficial measures, and income documentation.

The in-person research allowed us to observe the strategies discussed in our in-depth interview and to see first-hand interaction with customers rather than just hear about customer reactions via program staff. Where feasible during in-person research, we looked for opportunities to speak with additional staff who work directly with customers. Depending on the activity, we spent anywhere from one to four hours at each site. The on-site visits were often with different staff than our initial phone interview, which allowed us to get the perspectives of staff members who do more work directly with community members. During the on-site visits, we focused on interactions with

community members, both by observation and by hearing from CBO staff about their interactions during our visit. We asked questions about barriers, differences (if any) between the community of interest and the general low-income population, outreach strategies, income documentation, and beneficial measures. The on-site visits allowed us to expand upon what we learned from the initial phone interviews and see how specific outreach strategies were implemented.

Table 14 presents more detail on the questions and topics that each type of CBO research addressed.

Table 14: CBO Data Collection Topics

Question or Topic	Phase Addressed	
	Initial Phone Interview	**Observation Based: Ride Alongs/Site Visits**
Introduction		
Information about organization, who they serve, goals and mission	x	
Unique Customer Needs		
How does the group served differ compared to the low-income population in general? How do these differences guide your interactions? *(Probe on issues of who makes decisions and if it is done alone or together and if there are cultural barriers to accepting assistance)*	x	x
What are the unique needs of this group and how do these unique needs affect: 1. Health/comfort/safety (with a focus on energy-related issues) 2. Energy practices and savings opportunities 3. ESA/CARE Program participation	x	x
How do CBOs handle non-English speakers (Probe on staff ability to speak necessary language(s))		
How do CBOs handle literacy issues, if present?	x	x
At what point does organization become aware of customers needs (probe on what happens during installation - i.e. identification of fire dangers, need for improved air quality, regulating extreme temperatures)?	x	x
What strategies encourage customer participation in any programs?	x	x
Is outreach done in tandem with other program outreach? What programs pair well with IOU programs?	Informs in-person research	x

Question or Topic	Phase Addressed	
	Initial Phone Interview	**Observation Based: Ride Alongs/Site Visits**
Why? *(probe on concerns related to overwhelming customers with information, and approach)*	strategy	
How does organization decide where to do outreach? Where/how do they reach customers?	Informs in-person research strategy	
What messaging works? How does this vary by outreach type or other trait?	Informs in-person research strategy	
Where else do customers ask for assistance or help?	x	
How frequently does the organization work with a certain household?	x	x
Beneficial Measures		
What are organization's thoughts on how IOUs can help reduce customer's energy burdens and increase health, comfort, and safety through ESA and CARE? Are there improvements (including measures for ESA) that would help with health/comfort/safety and/or reduce energy burden? (probe on needs specific to this group of people)	x	
Which energy-saving measures offered by ESA resonate most with customers in this group? Why? How do these measures tie to specific health/comfort/safety benefits?	x	x
Which, if any, measures are of lower or no interest or associated with higher barriers to acceptance? Why?	x	x
How do certain measures fit into messaging used when reaching out to customers?	x	x
Customer Perception		
How is information about programs that could help target constituents shared? (*what are preferred methods of communication and do the preferred methods vary by topic?*	x	x
What ESA/CARE offerings resonate with them?	x	x
What ESA/CARE offerings are unpopular or concerning? (probe on: trust of utilities, trust of organization, willingness, ability to provide income documentation)	x	x
[Program specific] Does organization help customers with next steps after interested in CARE/ESA? What		x

Question or Topic	Phase Addressed	
	Initial Phone Interview	**Observation Based: Ride Alongs/Site Visits**
barriers exist after participant is interested?		
Customer Education and Knowledge		
How aware are customers of ESA and CARE before coming in (if at all)? What type of education is provided?	x	x
How do constituents view saving energy? Is it a priority? What are the gaps in knowledge? Do they have awareness of what they can do?	x	x
How much time, if any, is spent educating customers about energy saving behaviors related to ESA and/or CARE outreach?	x	x
Income Documentation		
How does organization communicate need for income documentation?	x	x
How do customers react to request for income documentation? What steps are needed?	x	x
Are there certain types of documentation of income that are easier or harder for customers to provide?	x	x
Are certain enrollment paths easier for customers than others? (*tax filings, SSN, vouchers attesting to cash income)*	x	x
Have customers had issue with CARE post enrollment verification? What issues exist for customers trying to prove their income or understand what is required of them, if any?		
What role does organization play in helping customers? (probe on types of documents, and preferences for communication) Any suggestions for improving the process to make it easier for income-eligible customers to respond to the request and remain on the rate?	x	x
If using utility materials such as brochures, what feedback do organizations have to improve their effectiveness? (probe on content, approach and mode)	x	x

3.6 Focus Groups with High Burden Customers

We conducted four focus groups with 29 low-income customers who have high energy burdens in Riverside and Fresno (two in each) during the week of June 20, 2016. Our geographic selections were based on:

- The availability of focus group facilities;
- Likely concentrations of sufficient eligible households within convenient commuting range of the focus group facilities;
- Inclusion of varied geographic areas and demographic targets in the state;
- Inclusion of several utility service territories; and
- Inclusion of some groups in the San Joaquin Valley, which is of interest due to other CPUC proceedings.

The focus groups covered health, comfort, and safety concerns; concerns about energy use and bills; interest in and ability to take action through program participation or self-directed efforts; insights into ways to engage them in the program; and measure needs.

Table 15 shows geo-demographic and other characteristics for our selected focus group locations.

Table 15: Locations for High Burden Customer Focus Groups

Focus Group Locations	Geographic and Demographic Targets	Energy Usage	IOU	# of Focus Groups
Riverside	Inland, south, suburb	Climate Zone 10 - colder winter, warmer summer	SCE, SoCalGas	2
Fresno	Inland, north, rural	Climate Zone 13 - colder winter, hot summer	PG&E	2

We used a three-step process to develop and pull the sample and recruit high burden customers for the focus groups. We began with a sample of IOU customers on the CARE rate in the Fresno and Riverside areas; the sample was provided by SCE and PG&E. We narrowed that sample to households with an elevated probability of experiencing high energy burden based on data provided by the utilities, Census data, and some simple modeling. Then, we recruited from that list with some additional screening to ensure our focus group participants face high energy burdens and represented a mix of household types. We describe these steps below.

3.6.1 Focus Group Topics

Research topics and questions that informed the development of the facilitation guide included:

- Primary home-related health, comfort and safety concerns
  - Do participating households have concerns about health, comfort or safety that is related to their housing?
  - Are any of these concerns related to their energy-using equipment?
  - Do these concerns affect their use of energy?
- Level of concern about energy use and bills
  - Are households aware of their energy spending? How does it compare to their overall cost centers? How much of a concern is or is it not?
  - What, if anything, do households do to manage energy consumption?
  - What do participating households consider to be a sustainable and reasonable amount to spend on home-based energy? How do they think they compare? How important are further reductions in energy costs to the households?
- Interest in—and capacity to take—action through program participation or self-directed efforts
  - What, if anything, do participating households think they can do to reduce their consumption further?
  - What do interested households think they most need to reduce their energy consumption and costs further?
- Insights into ways to engage them in the program
  - What are participating households' levels of awareness, participation in or perceptions of the ESA program?
  - Where have they heard of the ESA program?
  - Have participants told others about it?
  - What is their level of trust in word-of-mouth information about programs and services? Have they acted on word-of-mouth information in the past?
  - How can the program promote or support organic word-of-mouth information sharing about ESA and CARE?
- Measure needs
  - What energy efficiency "waste" or inefficiencies are households aware of?
  - What services could ESA provide to address health, comfort and safety concerns related to energy usage?
- Capacity and interest in energy management and feedback tools

- Do participants have the physical infrastructure to support energy management systems, including reliable in-home Internet and energy-using systems that can be controlled with energy management systems?
- Are participants interested in having energy management systems installed and using them?
- Do participants have interest in more real-time and interactive feedback on their energy use, encompassing usage updates and alerts and algorithm-based estimates of end-uses that make up their consumption?

3.6.2 Sample

We recruited from a sample of utility customers on the CARE rate who live within commuting range of the selected focus group facilities in Fresno and Riverside.[16] The sample data we obtained from PG&E and SCE included energy costs. (PG&E's dataset included both electric and natural gas costs; SCE's dataset includes just electric costs.) The sample data for SCE also included household income self-reported by the households as part of the CARE enrollment and verification process.

We further screened the data to ensure the households we attempted to recruit had a high probability of having a high energy burden. We restricted recruiting to lower income Census block groups. Specifically, we separated the focus group sample into three strata based on the median income value for the block group derived from the American Community Survey.[17] The first stratum included Census block groups with an upper 90 percent confidence bound on median income of $35,000 or less. The second stratum included Census block groups with an upper 90 percent confidence bound on median income between $35,000 and $45,000. The remaining cases were in the third stratum. We dropped all households in the Census block groups in stratum three and recruited from the remaining households. Using median income as our selection parameter in this way ensured that we selected focus group participants from a sample with a higher likelihood of being at the low end of the low-income scale and therefore more likely to be experiencing high burden. However, we maintain a distribution of income levels within the low-income range, including households at the higher end of this range. This ensures we would also have households in the sample that were experiencing high energy burden due to high usage as well as being low income, rather than being very low income alone.

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[16] The geography we drew from is comprised of a 15-mile radius around Fresno and a 20-mile radius around Riverside (but is limited to IOU customers).

[17] U.S. Census Bureau. American Community Survey. "2013 American Community Survey 5-Year Estimates." http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t (Accessed March 30, 2016).

3.6.3 Pre-Recruitment Screening and Participant Characteristics

We recruited participants whom we predicted having high energy burden, based on available data. For purposes of the focus groups, we defined *high energy burden* as falling in the upper quartile of energy burden among households on the CARE rate in the geographic areas of the focus groups. We computed energy burden as the ratio of annualized energy costs to annual income for each household.[18] Examination of the full set of sample data suggested that the thresholds for households in the upper quartile of energy burden were in the 5.5 to 6.0 percent range in both the Fresno and Riverside areas.

In computing energy burden for our recruitment sample, we used actual or estimated data on energy costs and household income. For Fresno, we had energy cost data for both gas and electricity from the PG&E sample, but did not reliably know households' incomes. We imputed incomes based on median household income in each sample point's Census block. Furthermore, to ensure Census block data was as reliable as possible, we restricted our recruitment to Census blocks in which household income is $45,000 or less, which represents approximately the upper 80th percentile of CARE enrollee incomes reported by SCE for its customers in the Riverside sample.

For Riverside, we had income data for 70 percent of the households in the sample received from SCE. This income data was self reported by CARE enrollees as part of their application for the CARE rate. However, we only had electric billing data from SCE and could not easily combine SCE and SoCalGas usage data. Hence, we applied a multiplier based on electric consumption to estimate gas consumption. This multiplier was based on the gas-to-electric consumption within the PG&E sample for Fresno, which has a similar total number of annual heating degree days (of about 2,500).

Households from the sample that met the criteria described above were included in the recruitment sample. We took some additional steps during the recruitment process to verify that households we invited to the focus groups did indeed have an elevated energy burden.

3.6.4 Recruitment

We recruited 12 high burden customers per focus group, offering an incentive of $100. The recruitment process included some additional verification of energy burden and an effort to create a mix of households representing a variety of household types. Table 16 presents the targeted mix of respondents for each group.

[18] For example, a home with an annual energy bill of $500 and an annual income of $10,000 would have an energy burden of 5 percent ($500 divided by $10,000).

Table 16: Recruitment Targets

Criterion	Quota type	Limit / Target Per Group
CARE rate	Firm criterion	All participants on CARE rate
Energy burden	Minimum threshold	Estimated energy burden in the upper quartile or higher and verified to be at least in the upper half
High users	Soft	No more than 50% of participants with usage in the upper quartile of energy usage among the recruitment sample
Extremely low income	Soft	No more than 50% of participants below100% of FPL
Large households	Soft	No more than three participants with households exceeding four members
Presence of seniors	Soft	At least two participants with seniors in the household; no more than four
Presence of people with disabilities	Soft	One or two participants with a person in the household who has a disability
Mix of white and non-white participants	Soft	At least two participants who are white/non-Hispanic and at least two participants who are non-white or Hispanic

Verification of energy burden was intended to confirm our estimates of approximate household income to ensure that households that we recruited were at least in the upper half of energy burden among CARE participants in the respective focus group areas (although our initial target was the upper quartile, as noted earlier).

Through the recruitment process, we also sought to balance the mix of households for the focus groups by some key characteristics. Specifically, we wanted the focus group participants to represent households whose high burden is due to a mix of possible causes (high usage or very low income) and a variety of household demographic characteristics.

To identify a household's reason for being high burden, we compared each home's ratio of energy cost to income to determine if the cause of a high value was high costs (the numerator) or low income (the denominator). As noted previously, the individual values for energy cost and income were derived either from data provided by the IOUs or from modeled estimates described above. For household makeup, we used responses provided by potential participants in response to the recruitment screener.

As indicated previously in Table 16, some of our recruitment criteria were absolute, while others were soft targets. CARE participation and modeled energy burdens in the highest quartile were firm limits. Quotas for the household mix were soft targets.

3.6.5 Focus Group Completes

We recruited a total of 48 customers, with 29 ultimately attending across four focus groups. Information about each of the focus groups can be found in Table 17.

Table 17: Locations for High Burden Customer Focus Groups

Focus Group Locations	Geographic and Demographic Target	Energy Usage	IOU	# of Focus Groups
Riverside	Inland, south, suburb	Climate zone 10 - colder winter, warmer summer	SCE, SoCalGas	2 (8 and 6 participants)
Fresno	Inland, north, rural	Climate zone 13 - colder winter, hot summer	PG&E	2 (7 and 8 participants)

With the aid of a moderator's guide that had been developed for the focus group sessions, Evergreen's research manager moderated the focus groups with a consultant observing and taking notes. The focus groups were videotaped to facilitate the analysis. The moderator's guide is included in Appendix C.

3.7 Multifamily Tenant Telephone Interviews

We conducted a total of 20 interviews of low-income tenants in multifamily buildings in order to supplement existing data from multifamily tenants regarding overall program awareness, and potential needs and measures. We provided a $25 incentive for respondents. This research task was intended to explore research topics, and given the small sample size, was not intended to be representative of the multifamily population as a whole.

Research topics and questions that informed the development of the interview guide included:

- Opportunities to reach and market to these households (with emphasis on word-of-mouth)
    - Are the renters aware of the ESA program?

    - How did they become aware of it? Have they heard about it from social contacts or neighbors at all?
    - Have participants told others about it? What did or would they tell others?
- Determining what aspects of ESA services and what in-unit measures made the greatest difference (or might do so)
    - What in-unit improvements made the biggest difference for participants?
    - What in-unit improvements did participants wish they would have gotten, but did not?
    - What in-unit improvements do non-participants (those whose units were not treated) think would make the biggest difference in their energy bills?
- Levels of tenant self-efficacy for controlling their energy consumption and opportunities to facilitate renters' ability to control energy use through energy education and energy management tools such as feedback on consumption
    - What, if anything, do tenants think they can do to reduce their energy bills?
    - Do tenants have interest in more real-time and interactive feedback on their energy use, encompassing usage updates and alerts and algorithm-based estimates of end-uses that make up their consumption?
- Value, if any, tenants perceive from common area measures
    - Were the tenants aware of the common area treatments?
    - What, if anything, was communicated to them about the work?
    - Who pays for energy costs and by what mechanism? Have the tenants noticed any change in energy costs since the common area treatments?
    - As far as they know, have the tenants' lease rates changed (or not changed) as a result of the common area treatments?
    - Have the common area treatments changed the comfort or aesthetics of the building in any way?

Our sample frame for the interviews of multifamily renters was based on respondents to the LINA telephone survey and further limited to those who:

- Rent their home in a multifamily building;

- Self-reported as being low-income (based on 200% of federal poverty level); and
- Indicated during the survey that they would be willing to participate in a follow-up interview.[19]

From this group, we stratified our sample as follows:

- **Self-reported ESA participants** -- Eligible households with self-reported participation comprise fewer than 5 percent of households in our sample frame; we targeted up to seven of these households for interviews to ensure that a share of respondents would be able to discuss programs and measures from a standpoint of having had experience with ESA participation.
- **Self-reported participants in any other utility assistance or rates program** – These households comprised about 55 percent of our sample frame; we targeted at least eight of these households for interviews.
- **Households that reported not participating in—or receiving—any utility assistance**, even if they are on CARE. These households comprised about 40 percent of our sample frame; we targeted up to five of these households for interviews.

Within each group, we sorted eligible households in random order and contacted potential interviewees beginning with contacts at the top of the list. We tracked demographic and housing characteristics to ensure that we did not overrepresent any particular group. Characteristics we tracked were:

- **Size of multifamily building** – We sought a range of building sizes to avoid overrepresentation of buildings with 50 or more units compared to the distribution we saw in the full LINA set of respondents.
- **Utility territory and fuels** – We sought a balance between Northern California and Southern California households, as well as inclusion of households that have gas service with a soft target of at least 50 percent of interviewees having a gas account.
- **Building ownership** – We researched building ownership in an attempt to identify buildings owned by housing authorities, where available data existed. We attempted to limit these to no more than five interviews.

We also tracked household size, race and ethnicity, presence of seniors, presence of people with disabilities, income, self-reported energy-saving practices, and self-reported struggle with energy bills.

[19] Approximately 70 percent of eligible respondents said they were interested in participating in a follow-up interview.

The tables below show the distribution we achieved across our sample of 20 eligible renters.

Table 18: Multifamily Telephone Interviews by Units in Complex

Number of Units in Complex	# of Interview Completes
2-4	2
5-10	3
11-50	8
51 – 150	3
150 or more	2
Don't Know	2
Total	**20**

Table 19: Multifamily Telephone Interviews by IOU

IOU	# of Interview Completes
PG&E	6
SCE only	3
SCE & SoCalGas	6
SoCalGas only	1
SDG&E	4
Total	**20**

Table 20: Multifamily Telephone Interviews by Receipt of Housing Assistance

Received Housing Assistance Last Year	# of Interview Completes
Yes	9
No	11
Total	**20**

4 Results: Customer Energy Needs and Hardship

Evergreen Economics investigated California household energy needs and hardships from multiple perspectives to provide a more thorough understanding of the energy-related and general hardships that customers of California's investor-owned utilities (IOUs) face, what compromises they make, how they approach energy bills and costs, and what resources they draw upon to support basic needs including access to affordable energy. The examination drew upon a 2016 telephone survey of 905 households, focus groups with high burden customers, and prior low-income studies (including the 2013 Low Income Needs Assessment). As noted in the methodology section, he telephone survey was implemented in the spring of 2016 and conducted in English and Spanish within zip codes with elevated concentrations of low-income households.

While the study and analyses focused on low-income customers whose incomes are at or below 200 percent of the federal poverty level for a household of their size (the CARE and ESA income eligibility threshold), households with incomes above that level are included to understand and compare some of the key issues with households above the threshold. Comparing income-qualified households to those with moderate incomes was proposed and fully vetted during the research plan development and initial public workshops. As noted in the methodology section, the 2016 telephone survey (on which the majority of this section is based) was designed to provide reasonably representative coverage of low-income households and those with moderate incomes. Results about high-income households, however, are limited to those who live in zip codes with high concentrations of low-income households.

For this report, Evergreen uses the term "low income" to refer to households whose incomes are up to 200 percent of federal poverty level, to which we refer by its acronym FPL. We refer to households from 201 to 400 percent of the FPL as "moderate income."

Figures in this section draw on responses from either just low-income households or both low- and moderate income households included in our telephone survey, depending on the analysis being presented. Text and figure captions identify the population being shown. When presenting subgroups within low-income and moderate income households, we use the nomenclature LI1 to refer to households in the lower range of low-income (i.e., 0-100 percent of the FPL) and LI2 to refer to those in the upper range of low-income (101-200 percent of the FPL); we use similar notations for moderate-income households (MI1 for 201-300 percent and MI2 for 301 to 400 percent of the FPL).

For a limited number of analyses, households above 400 percent of the FPL are included to illustrate a broader continuum of income and trends. We refer to these households as "high income" (or HI), but acknowledge that the label is relative and the data for this latter group are drawn from households residing in zip codes that include relatively larger concentrations of low-income households.

This section is divided into four primary parts. The first provides some background on the demographics and housing characteristics of our survey respondents and how low-income households resemble or differ from higher-income segments. The second part explores various metrics that measure energy-related and broader financial hardships and presents our telephone survey findings for households for each burden metric Evergreen employed. This section also explores how non-income benefits from existing government programs influence effective energy burden. The third part discusses the resources households draw upon to cover their costs of living. In each case, Evergreen examined how households at various levels of poverty and income differ and examined demographic and geographic trends. The final part of this section takes a substantially closer look at customers with high energy burdens—those whose share of energy costs as a share of income fall in the upper quartile among low-income households.

Appendix D provides more detailed results and supporting charts not included in the body of the report.

4.1 Selected Characteristics of the Study Population

Evergreen examined how selected characteristics differ between lower and moderate income categories among our telephone survey respondents—and for California households overall. As noted, we based our references to low, moderate, and high income on the FPL because it is the established metric of poverty, considers both income and household size, and serves as the measure by which income guidelines for participation in IOU low-income programs are based. Table 21 lists the income for each household size that defines poverty (i.e., equals 100 percent of the FPL).

Table 21: Federal Poverty Level by Household Size[20]

Household Size	Income at Federal Poverty
1	$11,880
2	$16,020
3	$20,160
4	$24,300
5	$28,440
6	$32,580
7	$36,730
8	$40,890

Table 22 lists the number and share of households in California in each of the income categories Evergreen uses for comparison in this study. As shown, roughly a third of California households fall below 200 percent of the FPL and are thus income-eligible for ESA and CARE; households below 250 percent of the FPL are income-qualified for FERA.

Table 22: Distribution of California Households by Poverty Level[21]

Income Category	Number of California Households	Share of California Households
Low Income 1 (up to 100% FPL)	1,873,603	15%
Low Income 2 (101% - 200% FPL)	2,260,457	18%
Moderate Income 1 (201% - 300% FPL)	1,806,217	14%
Moderate Income 2 (301% - 400% FPL)	1,433,616	12%
High Income (over 400% FPL)	5,080,479	41%
Total	**12,454,372**	**100%**

[20] This table shows the poverty guidelines for 2016, which are updated periodically in the Federal Register by the U.S. Department of Health and Human Services under the authority of 42 U.S.C. 9902(2). U.S. Department of Health and Human Services. *U.S. Federal Poverty Guidelines Used to Determine Financial Eligibility for Certain Federal Programs*. 2016, aspe.hhs.gov/poverty-guidelines (Accessed on Nov 4, 2016).
[21] Athens Research. 2015. *Joint Utilities Low Income Working Group: Documentation For 2014-2015 Estimates Of CARE/FERA/ESA Eligibility and Other Household Size-By-Income Related Parameters*.

We refer readers to the 2013 Low Income Needs Assessment for a thorough characterization of demographic characteristics of low-income households. We highlight a few selected demographic results from the 2016 telephone survey here simply to show selected demographics of the survey sample (and of lower income California households).

Generally, lower incomes and higher poverty levels are more likely than other households to

- Live in rented homes.
- Have dependents (predominately children, but could be seniors living in their homes too).
- Have disabilities present in the home (although disabilities exist across all income levels and do not necessarily correlate with poverty).

In determining how to report on income categories, Evergreen referred to Fisher, Sheehan & Colton's (FSC) work on the home energy affordability gap,[22] which presents results by six income brackets up to 200 percent of the FPL.[23] Our samples do not support reporting at such high resolution, but where appropriate, Evergreen breaks income categories down beyond the 100 percent of FPL level, replicating at least one or more of the FSC brackets.

Throughout the main body of the report, Evergreen focuses on presenting differences across subgroups of interest (e.g., demographic, geographic and income categories) that are meaningful and also statistically significant,[24] unless otherwise noted. As noted previously, the sample frame for the survey was designed to be representative of the IOUs' low-income customers and survey these households in an efficient manner by focusing on 7-digit zip codes that represent higher concentrations of low-income households. This sample frame represents 71 percent of all IOU residential customers with low incomes (up to 200 percent of the FPL) and 57 percent of those with moderate incomes (between 201 and 400 percent of the FPL). Although we also show results for higher income households in selected instances, these only represent households within 7-digit zip codes with elevated concentrations of low-income households.

For reference, Appendix A presents additional tables with frequencies and cross-tabulations of the survey data.

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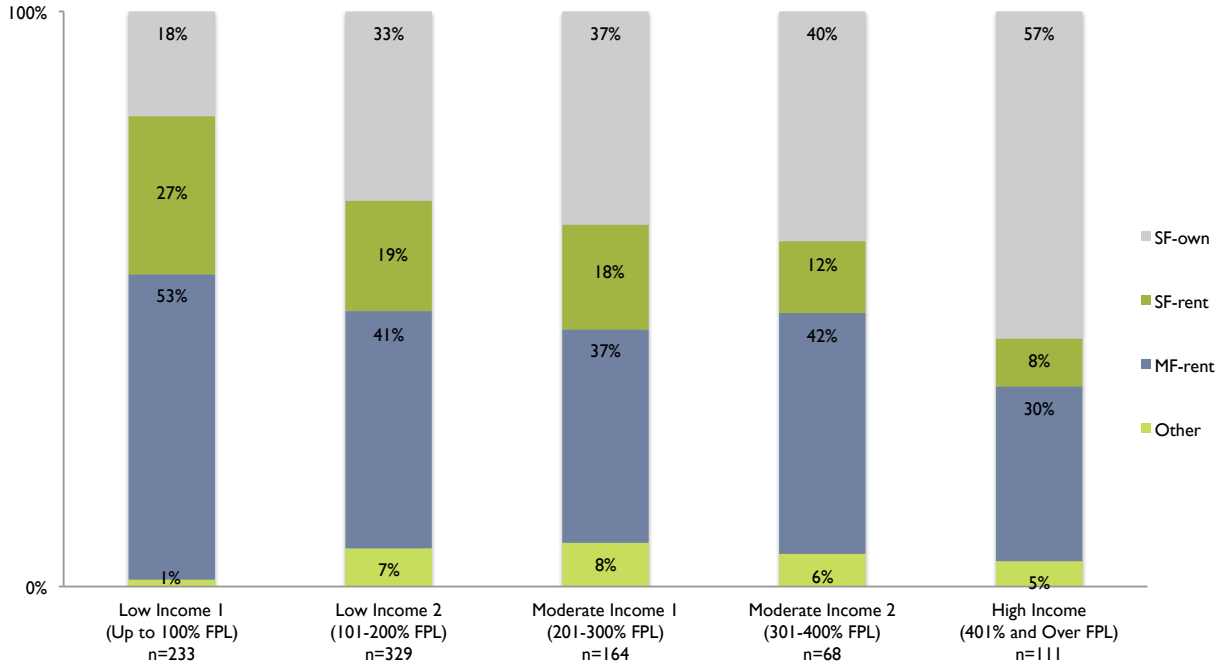
[22] Fisher, Sheehan & Colton (FSC). "What Is the Home Energy Affordability Gap?" 2013. http://www.homeenergyaffordabilitygap.com/01_whatIsHEAG2.html

[23] FSC reports on energy affordability by county using estimates of energy costs and household income at the following FPLs: less than 50%, 50–100%, 100-125%, 125-150%, 150-185% and 185-200% FPL.

[24] At the 90 percent level of confidence

As noted in Figure 2, households of all income categories live in the full range of housing types, but the prevalence of single-family homeownership differs noticeably (with statistical significance) between households below and above 100 percent of the FPL. It appears to increase with income from 100 percent of the FPL up to the higher income ranges, where differences between high income and more moderate income households are statistically significant as well.

Figure 2: Home Type and Ownership by Income Category (2016 Survey, All Incomes)[25]



Another distinguishing factor among households is reflected in household composition. These data show that the higher income households tend to be less likely to have dependents, which include either minor children (younger than 18) or seniors (aged 65 or older) other than the householder living in the home.[26] (See Figure 3.) Meanwhile, households led by seniors (with or without dependents) exist in mostly even proportions across the income scale.

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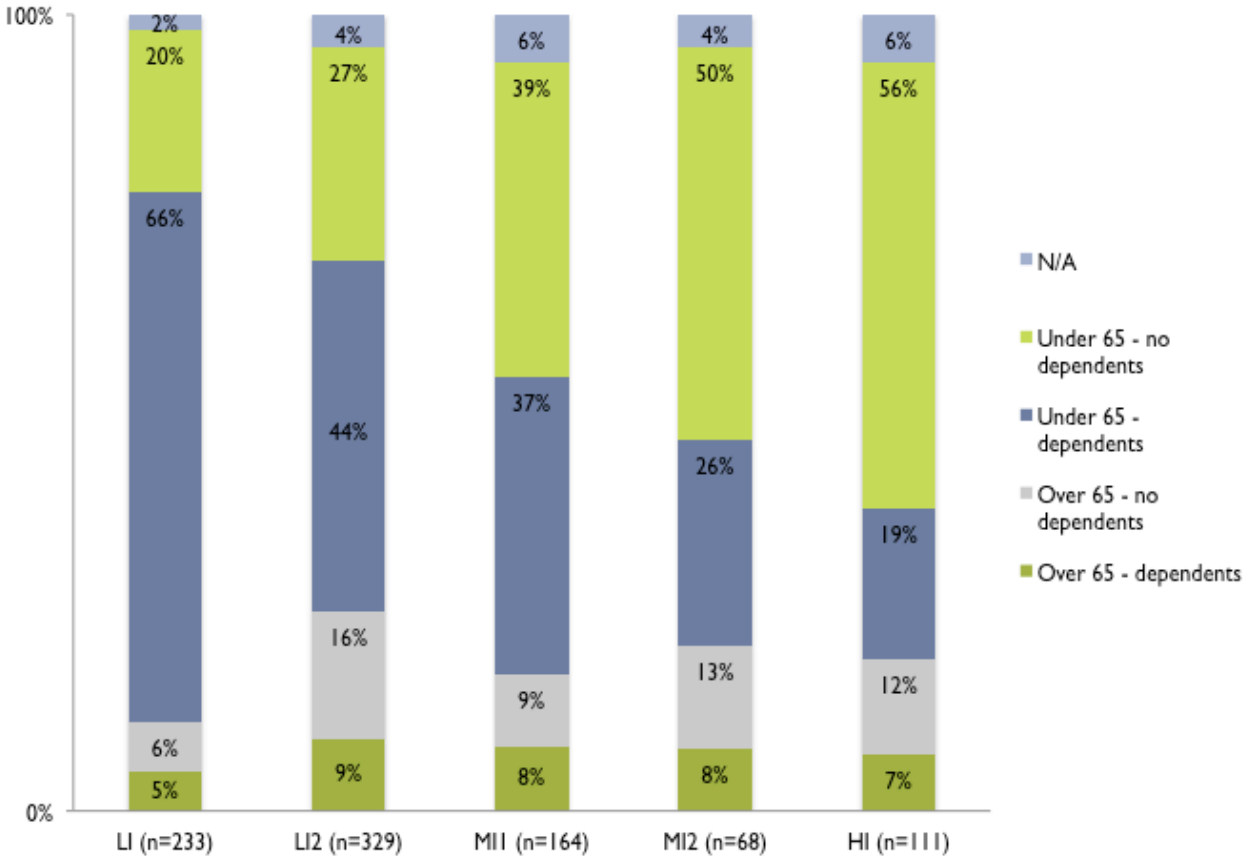
[25] Households classified as "other" are mostly residents of mobile homes and occasional owners of multifamily units. There were too few respondents to show them as a distinct group for analytical purposes.
[26] For dependents who are minors, our definition is consistent with traditional uses of the term "dependents," but we acknowledge that our approach overstates the number of households with seniors who are dependents by including both seniors who are reliant on the main householder for support (i.e., multi-generational households) as well as seniors who are simply household partners with the main householder. The ultimate impact on the results shown is low, as 79 percent of the dependents shown are minors. We present more detailed analyses that distinguish by type of "dependent" in Appendix D.

Figure 3: Head of Household Age and Dependent Status By Income Category (2016 Survey, All Incomes)[27]

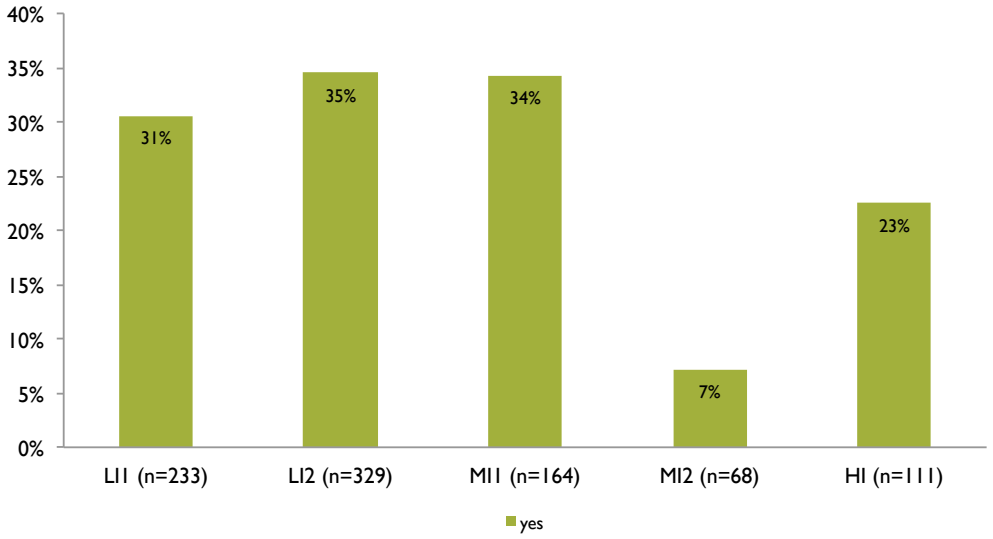


Households with members who have disabilities exist across all the income levels, but appear to be somewhat more common in the lower income ranges, as shown in Figure 4.[28]

[27] "N/A" denotes households we were not able to classify into one of these four categories.

[28] Differences between households in the upper moderate income category (MI2) are statistically different from all other categories, but we cannot explain why they would have such a drastically lower incidence of disabilities in their households. Comparisons between high income households and the remaining income groups are near the threshold for statistical significance, with some falling above and others below the threshold.

Figure 4: Households with One or More Disabled Members by Income Category (2016 Survey, All Incomes)



4.2 Metrics that Measure Energy Burden

Energy affordability is an important consideration for California's low-income program administrators and policy makers. The California Alternate Rates for Energy (CARE) are mandated by California law to help ensure in-home energy is affordable for low-income households through reduced rates. The Energy Savings Assistance (ESA) Program seeks to improve health, comfort, and safety, as well as to reduce energy consumption. Reducing household energy consumption lowers energy bills and makes essential energy use more affordable. The program does this by assisting customers who may not otherwise be able to afford energy efficient upgrades to their homes and through energy education.

The degree to which California households face difficulties with the cost of in-home energy for heating, cooling, and operating basic home appliances and lights can be measured in various ways. Traditional metrics for low-income energy research nationwide tend to focus on energy burden, while California studies have also explored a metric called energy insecurity. We investigated both energy burden and energy insecurity among California households, and added a broader metric of material hardship that encompasses more than energy costs to put energy affordability in a broader context for households that have a difficult time making ends meet.

In addition, we developed a modified version of the energy burden that includes a conservative valuation of non-cash benefits received by some households. These benefits have an income effect that is not measured by traditional metrics of income. The modified energy burden metrics makes a conservative attempt at estimating the impact of such benefits on the effective burden of households.

Energy burden (traditional or modified), energy insecurity, and material hardship are different ways to look at the same issue—the challenge households face to meet their energy-related and basic needs. Table 23 summarizes these metrics of burden.

Highlights of our investigations into energy burden, energy insecurity, and material hardship follow in the subsections below. We then compare, contrast, and discuss all three metrics. (More detailed results on energy burden, energy insecurity, and material hardship can also be found in Appendix D.)

Table 23: Measures of Energy and Household Burden

Measure	What it Measures	Calculation Method	Meaning of Categories
Energy burden	Actual home energy costs as a percentage of household income	Household Energy Bill / Self-Reported Gross Household Income	• High: 6.3 percent or higher • Medium: 3.9 to 6.3 percent • Low: 1.0 to 3.9 percent • Very low: energy burden < 1.0%[29]
Modified energy burden	Actual home energy costs plus valuation of medical, housing, and food stamp assistance as a percentage of self-reported gross household income	Household Energy Bill / Self-Reported Gross Household Income + Valuation of Non-Cash Assistance	Same breakpoints as for energy burden
Energy insecurity	Household challenges regarding affordability of energy bills and monthly trade-offs between meeting energy needs and bill payments	Points allocated based on responses to survey questions about: • Difficulty household faces in paying energy bill (C5) • Household disposition to and motivation for saving energy (A19) • Equipment-related inability to keep home temperature comfortable	Primary assignment based on challenges paying energy bill (with adjustments based on other inputs): • High: Constantly struggle (or usually struggle with high degree of energy saving practices) • Medium: Usually struggle • Low: Sometimes struggle • None: Never struggle and few energy practices motivated by

[29] Categories for energy burdens were based primarily on quartiles of energy burdens among low-income respondents to the survey. The quarter of households with the highest energy burdens were classified as having a high burden. These households have energy burdens of 6.3 percent or higher. (The exact minimum was 6.3252 percent.) Households in the second highest quartile were classified as having a moderate energy burden. These households have energy burdens of 3.9 to 6.3 percent. (The exact range was 3.8707 to 6.3159 percent.) The remaining households were classified as having low energy burdens, except that we designated any households with burdens of 1 percent or less as having a very low burden.

Measure	What it Measures	Calculation Method	Meaning of Categories
		(A15/A18)	need
Material hardship	Household challenges regarding broader affordability of basic necessities as food, shelter, and energy, etc.	Points allocated based on: • Federal Poverty Level (FPL)** • Survey question about difficulty of paying household bills and basic living expenses (C2)	• High: LI and regularly or sometimes struggles with basic living expenses* • Moderate: LI and sometimes or occasionally struggle with basic living expenses* • Low: MI and occasionally or never struggle with basic living expenses* • None: MI or HI and never struggle with basic living expenses*

*The formula for this metric also distinguished between different FPLs within the low-income and moderate income ranges, so households with similar self-reported struggles with basic living expenses could be classified in different categories based on their income. See Appendix C for more detail.
**Federal poverty level was based on self-reported income and household size.

4.2.1 Energy Burden

Defined as the share of a household's income spent on home-related energy consumption, energy burden represents a well-established and easily measurable metric associated with a household's ability to pay for the energy.

National Comparison and Prior Results

Due to California having a temperate climate, energy burdens in California are much lower than in other states, even among low-income households. A national study recently ranked 48 metropolitan areas by the energy burden among low-income populations[30] within their geographies. The six California cities[31] represented in the study ranked among the nine areas with the lowest energy burdens, ranging from 4 to 6 percent (median energy burden among low-income households), while median energy burdens among all 48 metropolitan areas nationally were 7.2 percent.[32]

The 2013 Low Income Needs Assessment found that mean energy burden was 8 percent and had remained unchanged[33] in the preceding seven years and varied substantially among low-income households. Energy burdens among our telephone survey respondents were highest in the Central Valley (in climate zones 11-13, as defined by the California Energy Commission) and for PG&E customers. Energy burdens were lowest in the southern inland (climate zones 9 and 10) and the desert (climate zones 14 and 15) parts of the state. Energy burdens were highest among renters of single-family or mobile homes at 11.5 percent. All other housing types—owners of single-family homes and those in multifamily buildings—faced energy burdens below the state average.

The remainder of this section presents new results and insights from the 2016 telephone survey as part of this study.

Energy Burden – Overall and by Income Category

Overall, we found that energy burdens decrease as incomes increase, as one would expect. Low-income households (i.e., those at or below 200 percent of the FPL) had an average energy burden of 5.6 percent. The median energy burden for this group was 3.9 percent.

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[30] The national study cited here defined low income as falling below 80 percent of the median household income in the geography studied.

[31] The California cities included in this study were Los Angeles, Riverside, Sacramento, San Diego, San Francisco, and San Jose.

[32] Drehobi, Ariel and Lauren Ross. 2016. *Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities.* Washington, D.C.: American Council for an Energy-Efficient Economy.

[33] Compared to energy burdens found by the preceding Low Income Needs Assessment. When measured as "overall energy burden," these burdens were approximately 8 percent for the low-income population as a whole.

These energy burdens—and those presented below—are based on self-reported gross incomes for 2015 and actual average energy bills for 2014 and 2015.

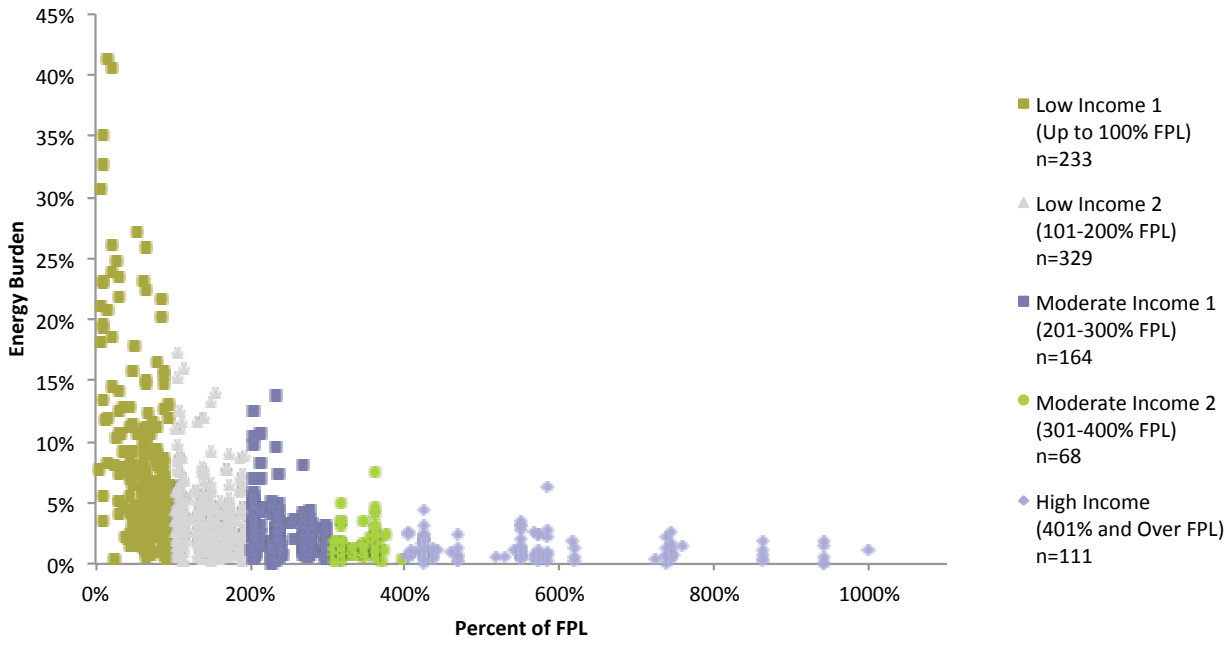
Households below 100 percent of the FPL have disproportionately higher energy burdens with average burdens of 8 percent,[34] as shown in Table 24 and Figure 5. More importantly, the range is much greater at lower incomes, with some households facing energy costs as high as 40 percent of household income.

Table 24: Average and Maximum Energy Burden by Income Category (2016 Survey, All Incomes)

Income Category	Average Energy Burden	Maximum Energy Burden
Low Income 1 (up to 100% FPL)	8.2%	41%
Low Income 2 (101% - 200% FPL)	3.5%	17%
Moderate Income 1 (201% - 300% FPL)	2.8%	14%
Moderate Income 2 (301% - 400% FPL)	1.4%	8%
High Income (over 400% FPL)	1.3%	6%
Total Average	**3.7%**	**N/A**

[34] It should be noted that 1.2 percent of our low-income sample uses propane or wood as a heating fuel. These costs are not included in the energy burden calculations (and these households have more limited access to support to address energy needs for that component of their energy costs). Furthermore, three outliers were excluded from the energy burden analysis: two with energy burden just below zero and one with energy burden over 100 percent. Another four households did not have sufficient data to calculate energy burden. These households are excluded from our energy burden calculations as well.

Figure 5: Energy Burden by Federal Poverty Level (2016 Survey, All Incomes)



Among the 20 respondents to our survey with very high energy burdens of 20 percent or more, the defining characteristic was extremely low income. Eighty percent of these households reported incomes at or below $7,500.[35] Their explanations of how they live on such low incomes included references to borrowing money, getting help from family members or others, living very frugally, and citing their various income sources (from work or government assistance programs).The mean and median households sizes for this group were 3.6 and 4, respectively.

Also notable is the apparent difference in burden between households just below and above the CARE and ESA income threshold of 200 percent of the FPL. While statistically indistinguishable at our samples sizes, average energy burdens for households between 175 and 200 percent of the FPL had a lower energy burden than those between 200 and 225 percent (3.2 vs. 3.7, respectively). Energy costs and usage are both higher for the households in our sample that were just above the 200 percent threshold than those just below, but with only slightly higher incomes.

[35] The average income for this group was $5,430, compared to approximately $25,000 for all other low-income households. These households also have higher energy bills of approximately $1,450 compared to $1,050 for all other low-income households. Half of these households are multifamily renters, although all housing and ownership types are represented. Nearly half are located in the mountain/desert region of the state. Only 12 of the households with very high energy burdens are on CARE, however. Their self-reported energy-saving practices and the degree to which they say they struggle to pay their energy bills mirrored those of other low-income households.

We also explicitly explored how CARE affects energy burdens. Table 25 compares energy costs, incomes, and energy burdens of the subset of these households that are *income-eligible* households—both those that are on CARE and those not on CARE. As shown, households not enrolled in CARE tend to have higher incomes, higher energy bills, and relative similar energy burdens (even when accounting for the reduction in energy burden associated with the CARE discount and flatter tiers) than those that are income eligible and on the CARE rate. In other words, there do appear to be some meaningful differences in households that choose to enroll in CARE and those that do not.

Table 25: Comparison of Income-Eligible CARE and Non-CARE Households (2016 Survey, Low-Income Only)

CARE Enrollment Status	Average Energy Burden	Average Annual Income	Average Annual Energy Bill	Average Percent of FPL
CARE rate (n=372)	5.7%	$23,000	$950[36]	1.06
Not on CARE rate (n=187)	5.4%	$26,100	$1,350	1.12

Further investigation into income-eligible households enrolled in CARE and those who are eligible, but not enrolled, reveals many more similarities than differences. Overall, their demographic characteristics are generally the same, except that income-eligible households that are not enrolled tend to:

- Be better educated (56 percent of income-eligible non-enrollees have some college education and 16 percent have a college degree, compared with 37 percent and 9 percent, respectively, for income-eligible enrollees);
- Be more likely to speak English (70 percent vs. 59 percent), and
- Have somewhat larger households (but not to a statistically significant degree; 35 percent have households comprising five or more members vs. 28 percent).

The degree to which income-eligible non-CARE households feel financial burdens seems to be similar too.[37] Income-eligible CARE and non-CARE households say they struggle to

[36] Energy costs include CARE discounts for enrolled households.

[37] Our comparisons of income-eligible CARE enrollees and non-enrollees included reviews of these households' energy usage, energy bills, geographies (climate region and binary flags for presence in the San Joaquin Valley and Aliso Canyon areas), and numerous survey responses. Survey responses we considered included home characteristics (housing type, owner/renter status, how long the household members have lived in the home, heating fuel, presence of air conditioning, heating and cooling equipment limitations), household practices and attitudes concerning saving energy, household member demographics and characteristics (presence of seniors or people with a disability, medical or physical needs for additional energy usage, languages spoken at home), survey respondent characteristics (educational attainment, race),

pay energy bills at similar rates, and the non-CARE households report needing to conserve due to an inability to afford their energy bills at only slightly lower and statistically indistinguishable levels (79 percent vs. 85 percent).

However, the income-eligible non-CARE households make use of government assistance programs at a somewhat lower rate. Fifty percent of non-CARE households reported receiving government assistance compared to 63 percent of CARE households. While it is possible that some of the non-enrolled households have become recently eligible for CARE and need-based assistance, changes in income do not appear to explain enrollment differences to any meaningful degree. When asked whether they were better or worse off financially than three years ago, the non-CARE households reported greater tendencies toward financial improvement by a slight (and generally statistically insignificant) margin. In other words, for the most part, they are not households that have recently experienced a relative decline in income and become newly eligible for need-based programs.

Key Drivers of Energy Burden

Two deeper explorations into the relationship between household characteristics and energy burden provide additional insight into the drivers of elevated levels of energy burden among our telephone survey respondents. One exploration focused on the relative contribution of the two inputs to the energy burden calculation: energy cost and household income. The other exploration employed a classification tree analysis to conduct a multivariate analysis in an effort to identify the key characteristics most strongly associated with higher energy burden.[38]

Both lower incomes and higher energy costs (and usage) seem to work together more or less equally to cause high energy burden. As shown in Table 26, households with high energy burdens have *both* lower incomes and higher energy costs, on average, than their peers with more moderate energy burdens. While either low income or high energy costs can lead to a high energy burden for any given household, neither of these factors seems to be the singular factor driving energy burdens across the population.

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and household financial variables (income, ability to cover household expenses, and receipt of government assistance).

[38] While reviewing potential criteria for determining a threshold for high burden, we reviewed Fisher, Sheehan & Colton's work on the home energy affordability gap. ("What Is the Home Energy Affordability Gap?". 2013. http://www.homeenergyaffordabilitygap.com/01_whatIsHEAG2.html), which uses 6 percent energy burden as a cutoff point for energy affordability. To define high energy burden for our study, we identified the threshold for the upper quartile of energy burden among households within our low-income population sample frame, which was also 6 percent. We used this threshold in defining "high energy burden" for our two different quantitative research samples (telephone survey and focus group samples).

Table 26: Average Energy Burden, Income, and Bill Cost by Burden Category (2016 Survey, Low-Income Only)

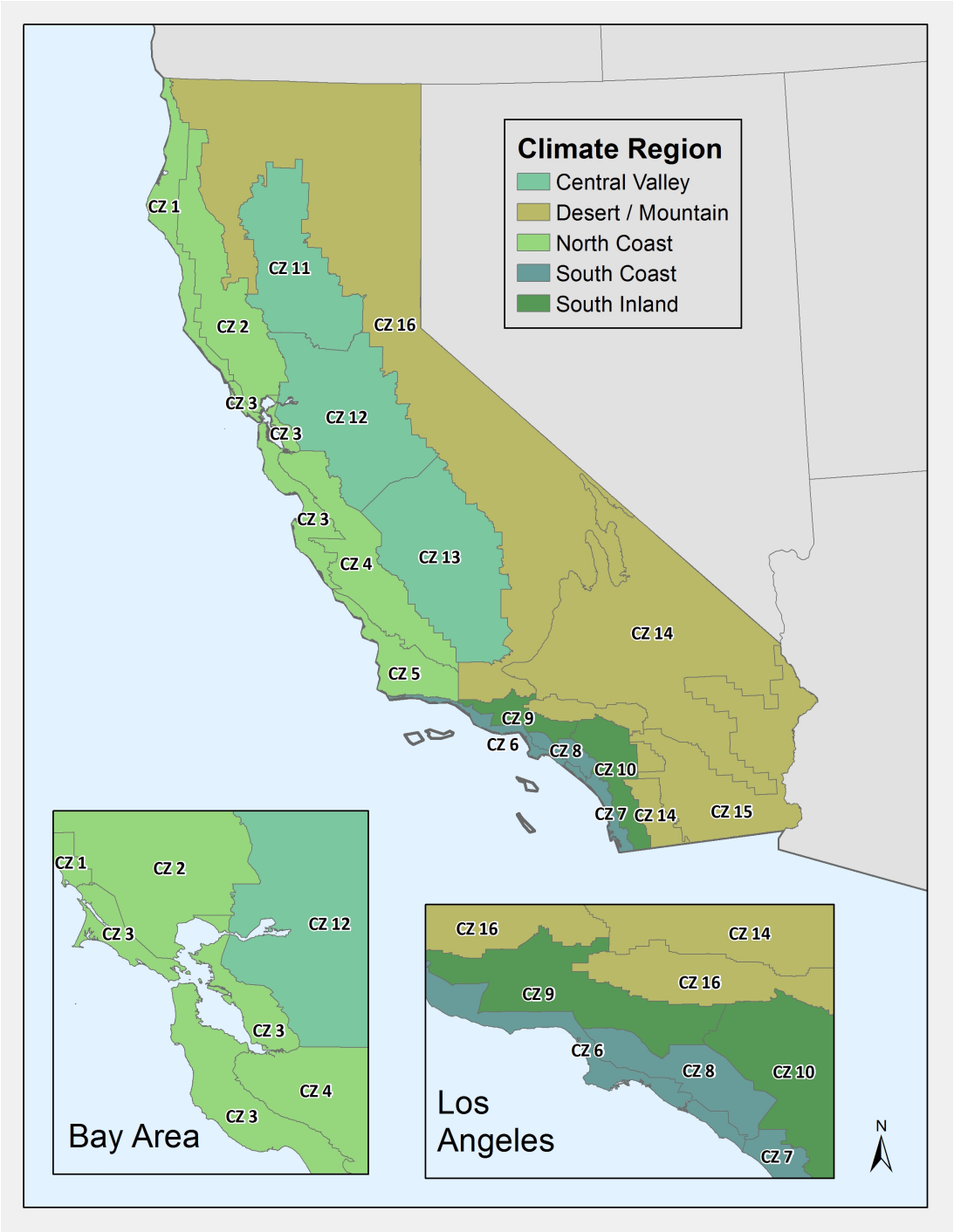
Burden Category	Average Energy Burden	Average Annual Income	Average Annual Energy Bill
High Burden Households (n=138)	13.5%	$15,336	$1,689
Moderate Burden Households (n=130)	4.9%	$22,947	$1,140
Low Burden Households (n=245)	2.4%	$29,024	$733
Very Low Burden Households (n=46)	0.7%	$29,256	$233

Separately, we also attempted to tease out the underlying factors associated with high energy burdens (which are often correlated with each other) by analyzing a full set of household characteristics among low-income survey respondents in an exploratory classification tree analysis. This form of multivariate regression analysis identifies both the relative strengths of associations between independent and dependent variables and logical break points in the data (to inform empirically based groups and categorizations of the data points). In this way, it gives a more holistic picture of what variables seem to matter, how they are interrelated, and where natural breaks between households occur among independent variables. Because analyses are exploratory, they are meant to be indicative of relationships and trends only and inform future research on high energy burden among low-income populations.

When we examined underlying factors associated with energy burden in this way, we found that climate region was the most important non-financial geographic/demographic variable followed by the language(s) spoken by respondents. Households located in the desert/mountain region of the state were found to have higher burden, which seems intuitive given the higher heating and cooling loads in those regions.[39] Figure 6 shows the climate regions we used in this and other analyses involving geographic differences among households.

[39] The mountain and desert regions consist of California Energy Commission's Climate Zones 14, 15, and 16.

Figure 6: Climate Regions



Further, households that reported fluency (by any household members) in both Spanish and English faced lower energy burdens than those who speak English alone, as shown in Table 27. It seems that, among low-income households, bilingual households face lower energy burdens than monolingual ones, while monolingual Spanish-speaking households

have lower annual energy costs than monolingual English-speaking households. The causes of these relationships are not clear, but it may be worth investigating whether cultural factors lead monolingual Spanish speakers to use less energy.

Numerous other factors did not rise to a similar level of correlation with energy burden. These factors include length of time in home, presence of seniors, household members with disabilities, being on the CARE rate, education level, heating fuel type, presence of air conditioning, size of household, energy saving practices, difficulty paying energy bills, and difficulty keeping the home warm or cold enough.

The various characteristics identified by the classification tree analysis as most meaningful—such as climate and language—exhibited the strongest relationships with energy burden. As noted, some of these factors may also be associated with household characteristics that were not singled out, but that had weaker relationships with energy burden.

Table 27: Average Energy Burden, Income, Bill Cost, and FPL by Language (2016 Survey, Low-Income Only)[40]

Language	Average Energy Burden	Average Annual Income	Average Annual Energy Bill	Average Percent of FPL
Monolingual English (n=210)	7.1%	$20,319	$1,087	113%
Monolingual Spanish (n=31)	3.9%	$22,179	$881	110%
Bilingual English-Spanish (n=243)	4.8%	$27,140	$1,105	107%
Multilingual English and Other (n=61)	4.8%	$24,482	$900	103%
All other (n=16)	6.3%	$24,806	$1,300	111%

We also ran the exploratory classification tree analysis including income as one of the dependent variables in order to identify breakpoints within variables and combinations of characteristics that distinguish households across the range of energy burdens. Below, we present how energy burdens differ along the selected dimensions identified by the analysis where energy burden was shown to be meaningfully different between groups.

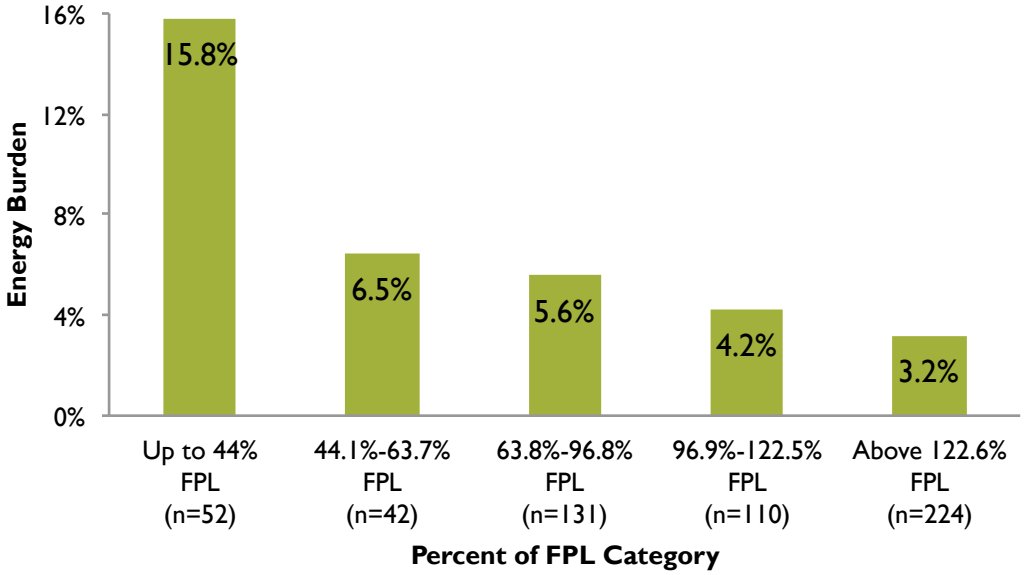
Not surprisingly, household income is a strong predictor of energy burden. This is particularly meaningful for households with incomes of $7,500 or less—regardless of household size—that are most prone to high energy burdens. These households' burdens

[40] This table includes all low-income respondents to the 2016 telephone survey, but clearly shows higher energy burdens among some groups than others.

averaged over 15 percent, while all other income groups within the low-income population averaged less than 6 percent.

When household size is taken into account too, households whose incomes place them at or below 44 percent of the FPL were particularly prone to high energy burdens. (Households of up to two people at this poverty level will also have incomes below $7,500, but larger households may have somewhat higher incomes.[41]) These households also faced average energy burdens above 15 percent, as shown in Figure 7, while all other groups had average energy burdens below 7 percent.

Figure 7: Mean Energy Burden by FPL Category (2016 Survey, Low-Income Only)



Among annual energy costs, the thousand dollar mark appears to be a meaningful threshold. Households whose energy bills were more than $1,029 per year had energy burdens of 7.6 percent, while those with lower energy bills faced energy burdens of 4.4 percent.

Energy Burden by Geography, Household Type, and Housing Types

In parallel to the classification tree analysis, we examined energy burden of low-income households by geography, household type, and housing type. Each of these household characteristics are either associated with variations in energy burden or have causal relationships with an input to the energy burden calculation.

[41] For example, for households with four members, an income of $10,700 corresponds to an FPL of 44 percent.

We found that the following low-income households tend to face higher energy burdens than their counterparts:

- Households in the diverse desert/mountain region[42] (consistent with the classification tree analysis described previously) (7.6%);
- Multifamily renters (6.2%);[43]
- Households led by working-age adults without dependents (6.6%); and
- Households with members who have disabilities (6.0%).

Energy burden of multifamily renters (6.2 percent) surpassed that of renters and owners of single-family homes (5.5 and 4.8 percent, respectively). In the 2013 Low Income Needs Assessment, single-family renters had been identified as having the highest energy burdens of these three groups. Our analysis in the present study suggests that relatively lower incomes among multifamily renters (as opposed to higher bills) is the primary contributor to their relatively higher energy burdens presently; we saw no similar (income) drop among low-income owners or renters of single-family homes.

Also, our examination of energy burdens by household type (defined by respondent age[44] and presence of dependents) shows that households led by working age adults have the highest energy burdens (6.6 percent for those without dependents and 5.4 percent for those with dependents).

4.2.2 Modified Energy Burden – Accounting for Non-Income Resources

In parallel to the energy burden metric, we calculated a modified energy burden that takes into account non-cash program benefits available to some households. Like the energy burden, this metric calculates the share of household income needed to pay energy bills, but it incorporates other available resources that offset basic expenses as a broader definition of income. Rather than just relying on self-reported cash income, this approach also estimates the cash equivalent value of housing subsidies, subsidized medical assistance, and food stamps received by some households and includes them with those households' cash incomes for the burden calculation. Including these benefits as equivalent to income may provide a more realistic comparison of energy burdens, particularly when comparing households that receive these benefits to those that do not

[42] We combined the mountain and desert regions (climate zones 14, 15, and 16) because the number of respondents from these regions alone was too small to analyze separately. Together, they represent the vast eastern portions of California that represent the highest heating and cooling loads in the state.
[43] For this analysis, multifamily includes all housing types with two or more units. Twenty percent of these households live in buildings with two to four units, while 80 percent live in units with five or more units.
[44] The telephone survey was directed at the utility account holder, whom we presume to be the main householder. However, any adult decision-maker could have completed the survey.

and thus need to use greater shares of their cash incomes for basic housing, medical, and food needs. The aim of this exploration into a modified energy burden is to investigate how non-cash resources affect the effective burden of households that receive such program support and how accounting for them affects broader energy burden calculations.

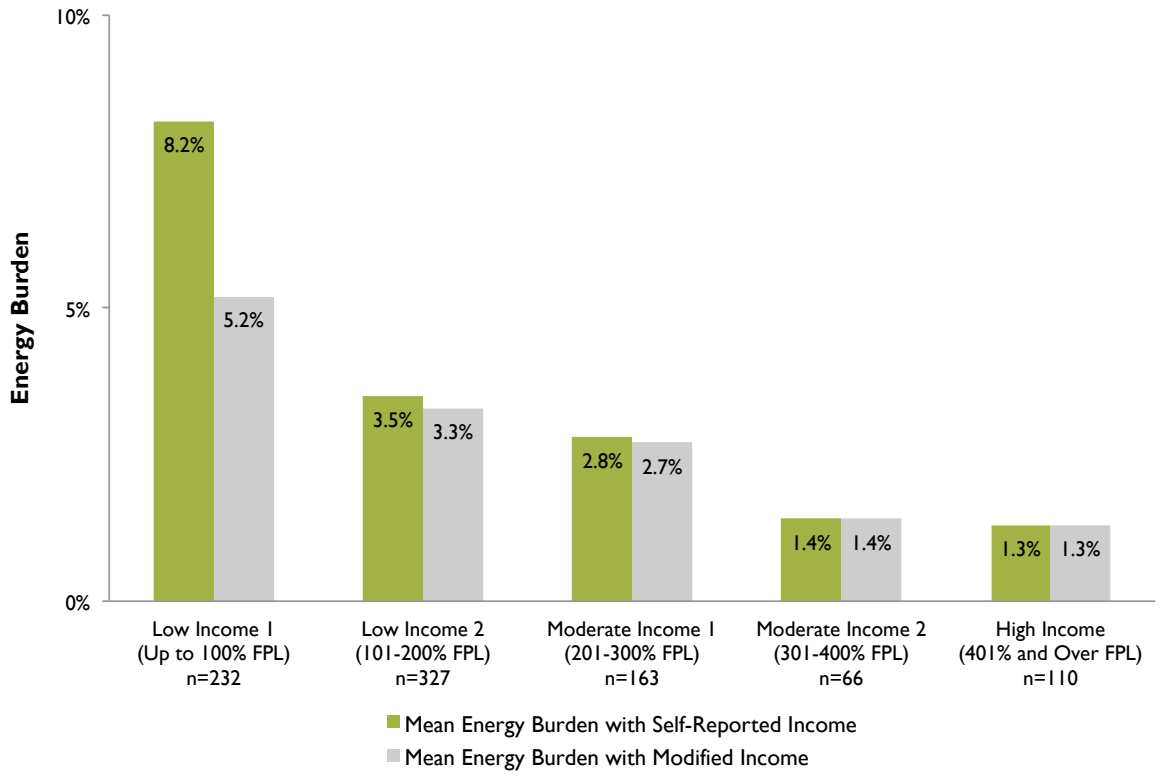
As noted, program resources included in this analysis are housing subsidies, medical assistance, and food stamps. It is not possible to fully monetize some of these resources, however, as this research assigned approximate values to the benefits these programs provide to households that reported receiving benefits from them in the telephone survey. The estimates of non-income resources were based on a targeted literature review of publicly documented sources for housing, food stamps, medical insurance, social security income, and cash assistance.[45] For example, households that reported receiving housing assistance were assigned an approximate financial value of that assistance based on the U.S. Department of Housing and Urban Development's fair market rent for housing specific to the county and minimum unit size for each household receiving benefits. See Appendix B for a full description of our approach.

The modified energy burden resulting from the inclusion of these non-cash benefits causes some households' calculated burden to drop from the energy burdens described above. Average burden for low-income households dropped from 5.6 percent when these non-cash benefits were excluded (i.e., the energy burden) to 4.1 percent when they were included (i.e., modified energy burden). Households below the poverty line (i.e., 100 percent of the FPL) were affected most noticeably, as their calculated burden dropped from an average energy burden of 8.2 percent to an average modified energy burden of 5.2 percent. Figure 8 compares energy burdens by income level using both reported income and a modified income estimate based on these additional analyses.

This estimate is an attempt to incorporate other resources into energy burden calculations and likely could be examined and refined to expand our understanding of the role these and other non-income resources such as retirement savings, support from family members, or non-government support from food pantries or other non-profit organizations may play in mitigating a household hardship and burden. As implemented this year, the modified energy burden should be viewed as a conservative attempt to include non-cash benefits.

[45] Sources included HUD Fair Market Rents average value of subsidy by metro and non-metro areas in California, CalFresh average food stamp benefits received by count, Medicaid reductions in out-of-pocket spending by Census region and various demographic variables, Supplemental Security Income benefits by eligibility type and Temporary Assistance for Needy Families (TANF) average cash assistance by household size.

Figure 8: Energy Burden Using Modified Income Estimates (2016 Survey, All Incomes)



As with energy burden, we examined modified energy burden of low-income households by geography, household type, and housing type to identify which customer segments face higher comparatively higher modified energy burdens. By definition, differences in which customer segments face higher modified or traditional energy burdens are driven by tendencies of some groups to receive fewer (or more) non-cash benefits included in the modified energy burden calculations.

Generally, the same types of households have elevated energy burdens and modified energy burdens with two notable differences:

- When non-cash benefits are factored in as available resources, low-income multifamily renters' average modified energy burdens drop from 6.2 to 3.9 percent. Modified energy burdens for single-family owners and renters are both higher than those of multifamily renters, as shown in Table 28.
- Modified energy burdens of low-income households in the Central Valley are equal to those of households in the mountain and desert regions. (Comparisons of traditional energy burdens alone had shown households in mountain and desert regions as having higher burdens than all other regions, including the Central Valley.)

Table 28: Standard and Modified Energy Burdens by Housing Type and Tenure (2016 Survey, Low-Income Only)

Housing Type and Tenure	Energy Burden (mean)	Modified Energy Burden (mean)
Single-family owners (n=158)	4.8%	4.4%
Single-family renters (n=118)	5.5%	4.3%
Multifamily renters (n=251)	6.2%	3.9%

Accounting for non-cash resources changed not only the energy burden values for households in different housing types, but also affected the ranking of which of these customer segments has the highest burden. This change illustrates the effect and significance of considering non-cash resources available to households when computing household burden.

4.2.3 Energy Insecurity

Energy insecurity is a broader, more subjective metric than energy burden that captures some of the trade-offs households make to pay their energy bills. The two prior Low Income Needs Assessment studies defined energy insecurity using a brief battery of survey questions related to how often homes cut back on food or medicine or borrow money to pay utility bills, encounter disconnections or disconnection notices, or engage in unsafe practices to heat their homes.

For the 2016 Low Income Needs Assessment, the energy insecurity metric and the survey questions on which it is based were revised to focus more on the household's overall struggle with energy bills. The metric incorporates an initial assignment into high, moderate, low, or no energy insecurity based on the degree to which the household says it struggles to pay the energy bills. The initial assignments were modified upward or downward based on responses to questions that sought to establish the household's capacity to reduce energy use further without impacting health of family members as well as equipment-related challenges to maintain comfortable temperatures. For a full description of our approach to defining this metric, see Appendix B.[46]

[46] The core question (C5) asked the degree to which households struggled to pay the energy bill. Those who reported struggling constantly were assigned an initial level of high energy insecurity; those who struggled often, medium; those who struggled occasionally, low; those who said paying the bill was not an issue, none. That assignment was adjusted upward or downward by up to one level if households indicated that they were already conserving due to financial constraints and could not conserve further. (See questions A19 b, c, e, and f.) Finally, households that reported frequent occurrences of uncomfortable temperatures in the home due to heating and cooling equipment's inability to keep up (A15, A18) were elevated a step to the next level of energy insecurity. We considered using unsafe heating practices as a scoring input too, but found the incidence of such practices to be so low that it would have been materially meaningless to the metric. See our

Characteristics of Energy Insecure Households

Comparisons of this metric across various household characteristics indicate that the following households face comparatively higher levels of energy insecurity:

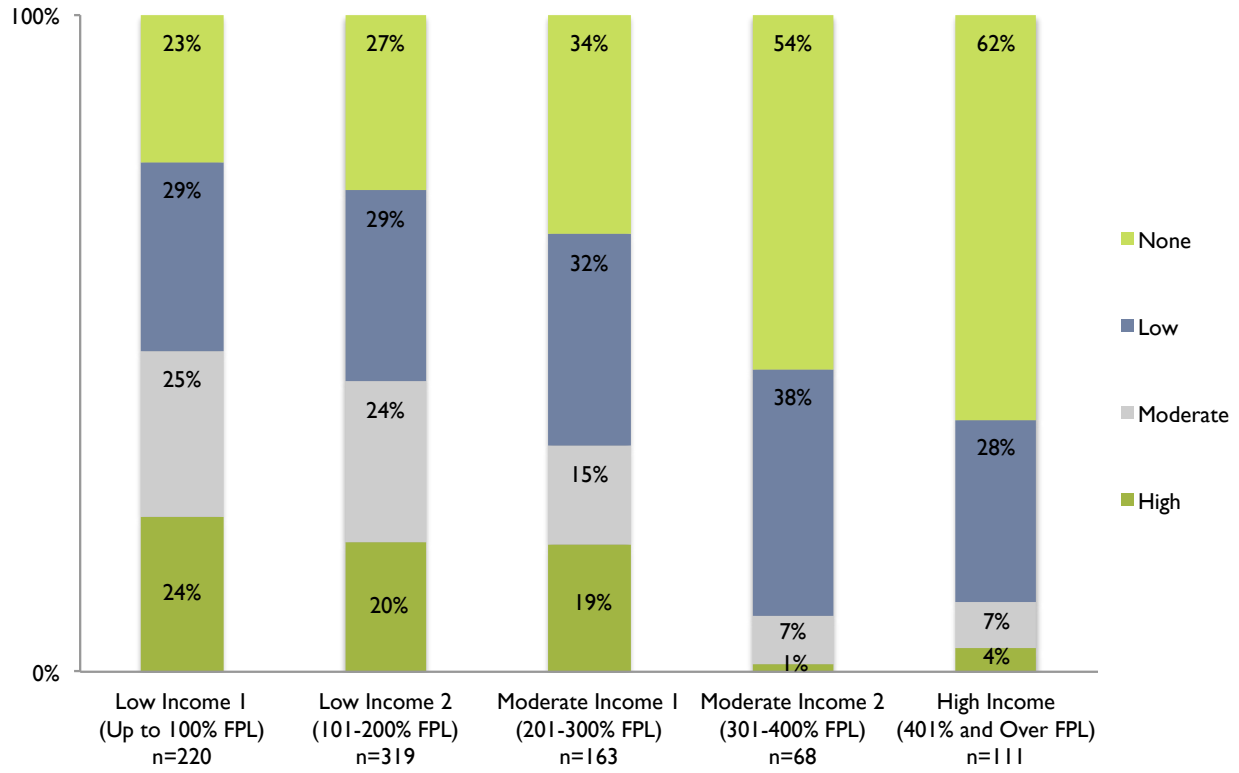
- Households below 300 percent of the federal poverty level;
- Households in the desert/mountain regions;
- Households in single-family homes, especially owner-occupants;
- Households with seniors; and
- Households with members who have disabilities.

Energy insecurity—when examined primarily in relation to struggles with energy bills—shows that households in the lower income ranges face similar levels of energy insecurity all the way up to 300 percent of the FPL. As illustrated in Figure 9, between a fifth and a quarter of households in these income ranges face high energy insecurity, which indicates that they struggle constantly to pay the energy bill or reported struggling often and had done as much as they can to cut back. The data show that customers above 300 percent of the FPL are significantly less energy insecure than those below that threshold.[47]

methodology in Appendix B for more information. Disconnections were not taken into account, but are discussed separately in section 4.4.3.

[47] Differences above and below 300 percent of the FPL are statistically significant for the share of households at high energy insecurity, as well as those at either high or medium energy insecurity.

Figure 9: Energy Insecurity Level by Income Category (2016 Survey, All Incomes)

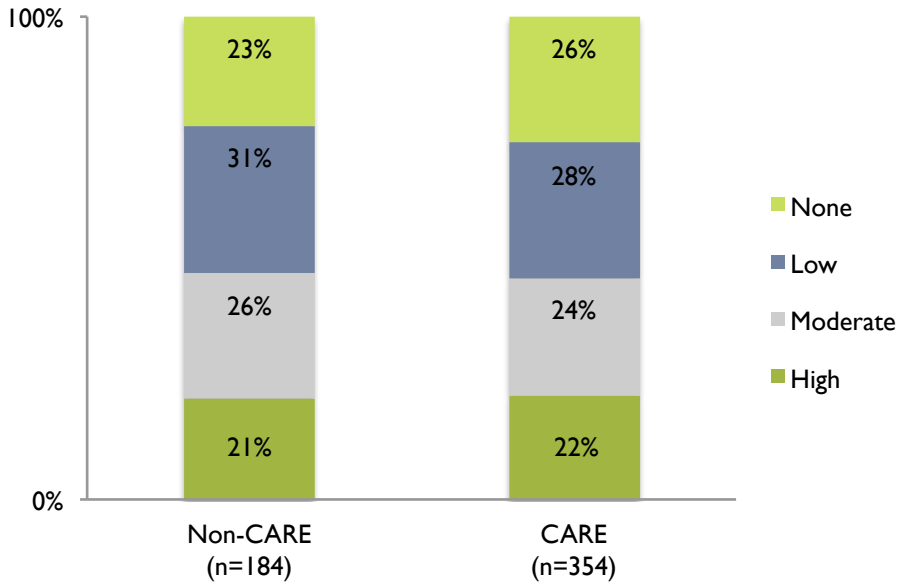


The data also show that low income homeowners living in single-family homes are considerably more energy insecure than customers renting multifamily residences. Based on our analyses, it appears that significantly higher energy bills among single-family homeowners are driving these differences.[48] Relative to multifamily renters, single-family homeowners also reported a greater likelihood that family members would suffer if they reduced their heat/cooling.

We also examined energy insecurity among income-eligible households by enrollment (or non-enrollment) in CARE and found very similar distributions between CARE and non-CARE populations. Hence, CARE does not appear to substantially affect energy insecurity categories as we have defined them. (See Figure 10.)

[48] Energy costs included in rents are not a meaningful factor. Only a handful of renters indicated that their energy costs are included in their rents.

Figure 10: Energy Insecurity Level by Actual CARE Enrollment (2016 Survey, Low-Income Only)



Finally, Table 29 summarizes mean incomes and energy costs among low-income households for each level of energy insecurity. Energy insecurity among low-income households is distributed across varying energy burdens and not necessarily correlated with income, energy cost, or degree of poverty. Whether or not households struggle to pay their energy bills (or report doing so) appears to depend on other factors.

Table 29: Financial Characteristics of Low-Income Households by Energy Insecurity Level

Energy Insecurity Level	Annual Customer Burden (mean)	Annual Household Income (mean)	Annual Energy Cost (mean)	Percentage of FPL (mean)
None (n=140)	5.7%	$23,489	$1,112	112%
Low (n=156)	4.9%	$24,394	$948	110%
Moderate (n=128)	6.0%	$23,657	$1,124	107%
High (n=114)	5.7%	$23,857	$1,063	104%

4.2.4 Material Hardship: Examining Burden Beyond Energy

Energy burden and energy insecurity are both energy-centric measures of household needs and challenges. While appropriate for energy-related explorations of household needs to inform program managers and policymakers about energy affordability, they

offer just a partial view into a more complex picture involving trade-offs, multiple needs, and complex combinations of resources used to cover household living expenses.

California households juggle multiple expenses, have different resources to manage those expenses, and make trade-offs among them—both within energy expenses and between energy and other living expenses. The 2013 Low Income Needs Assessment and other past research[49] has shown that low-income customers—even at similar levels of income and household sizes—have greatly varying levels of financial need and distress. Those with debt, medical issues or disabilities, and no other sources of formal or informal support may have a harder time. Others with little income may have other resources such as home equity, retirement savings, or family support to draw upon that is not captured by income-based assessments of wellbeing or need.

Energy burden and energy insecurity do not typically examine these types of differences between households. In the past, measures of energy insecurity have offered some limited understanding of these trade-offs. The current study examines additional associated financial issues by exploring other dimensions of material hardship among survey respondents.

The Material Hardship Metric

A fourth metric of burden classifies households as facing a high, moderate, low, or no challenge facing basic needs generally. The metric was intended to provide insights on overall hardship that extends beyond energy for a more holistic picture of household burden. This metric was largely based on data derived from several questions asked in the survey. These included:

- Reported income and household size which determined the household's FPL.
- Frequency with which households are unable to meet basic living expenses. [50]

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[49] See the following studies:
Siebens, Julie. 2013. *Extended Measures of Well-Being: Living Conditions in the United States: 2011.* Washington, D.C.: U.S. Census Bureau, Household Economic Studies, 70-136.
Short, Kathleen. "*Material and Financial Hardship and Alternative Poverty Measures 1996*". Paper presented at the 163rd annual meeting of the American Statistical Association, August 2003, San Francisco, California.
Heflin, Colleen, John Sandberg, and Patrick Rafail. 2009. "The Structure of Material Hardship in U.S. Households: An Examination of the Coherence behind Common Measures of Well-Being". *Social Problems,* 56(4), 746-764.
Heflin, Colleen, Andrew S. London, and Ellen K. Scott. 2011. "Mitigating Material Hardship: The Strategies Low-Income Families Employ to Reduce the Consequences of Poverty". *Sociological Inquiry,* 81(2), 223-246.
Sullivan, James X., Lesley Turner, and Sheldon Danziger. 2008. "*The Relationship Between Income and Material Hardship. Journal of Policy Analysis and Management,* 27: 63–81.
[50] The survey question was worded as follows: In the past three years, has there been a time that you were not able to pay all of your bills and cover your basic living expenses for such things as food and housing? A follow-up question inquired about the frequency of such occurrences.

The federal poverty level serves as a *theoretical* metric of how challenged a household may be to afford basic living expenses. The second indicator serves as a *customer*-reported assessment of the household's challenge. Appendix B provides additional details about the metric and other inputs that were considered.

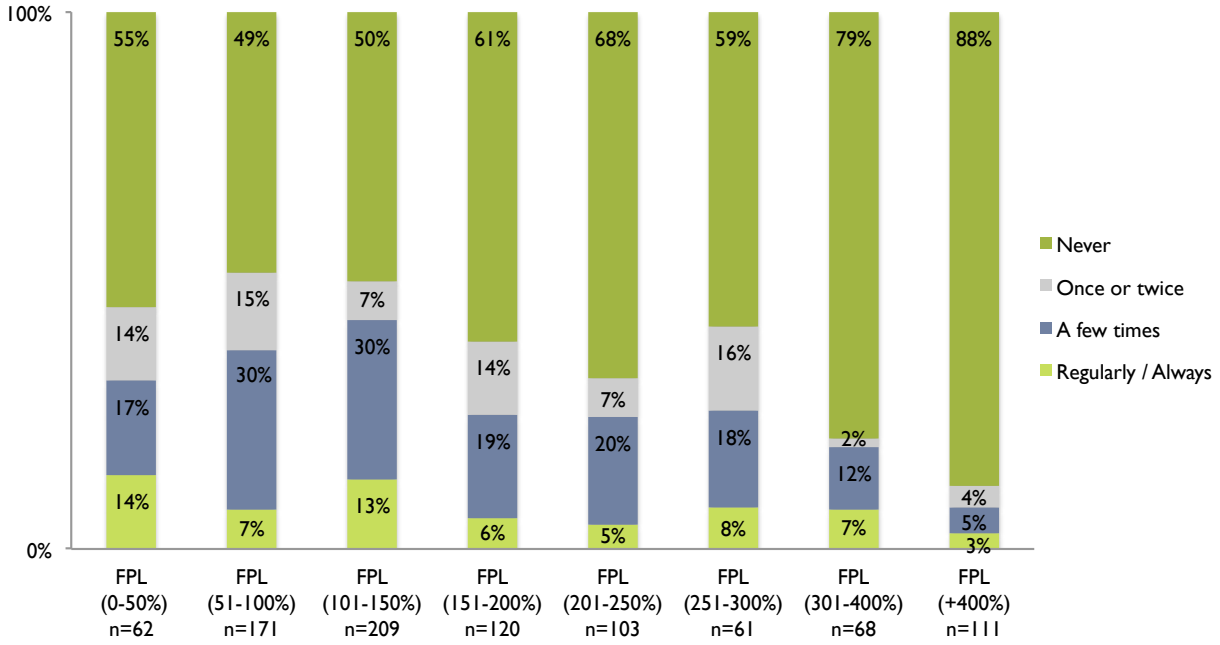
Because we used FPL categorical levels as an input to the material hardship metric, comparisons of hardship across these same income levels will naturally show higher hardship at lower FPLs by definition. This will affect comparisons across 100-point FPL bins, such as 0-100 percent of FPL, 100-200 percent of FPL, and so forth. Differences *within* these income levels are due to self-reports by households on the challenges they face to meet basic living expenses and pay bills.

Characteristics of Households with Higher Material Hardship

To better understand how households at the all income levels compare, we examined their challenges in making ends meet. Among low-income households at varying levels of poverty, we see no clear or statistically significant pattern in self-reported challenges to afford basic necessities and pay the bills.[51] For households above 150 percent of the FPL, self-reported challenges in meeting everyday living expenses appear to diminish with the greater income, although clear decreases in challenges with bills do not appear until 400 percent of FPL. (See Figure 11.)

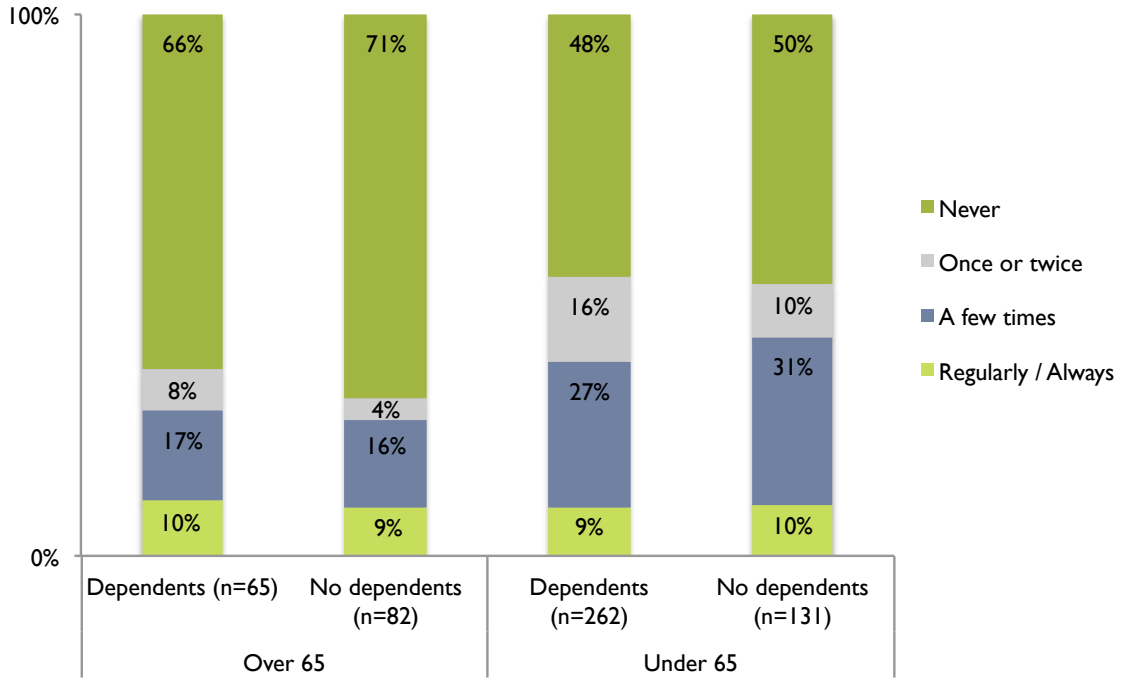
[51] There appears to be increasing ability to handle everyday expenses without struggle—and decreases in the share of households struggling to make ends meet regularly—beyond 150 percent of the FPL. The differences to the next higher categories are not statistically significant at our sample sizes, however.

Figure 11: Self-Reported Inability To Pay Basic Living Expenses In Past Three Years: By Income Category (2016 Survey, All Incomes)



There are some differences between senior-led households and those run by working-age adults. As illustrated in Figure 12, similar shares of households in both groups—with or without dependents—experience regular challenges paying household bills and expenses (a key input for material hardships), but a greater number of senior-led households reported that they always manage to handle their household bills and expenses.

Figure 12: Frequency of Customer Inability to Pay Household Bills By Age and Dependents (2016 Survey; Low-Income Only)



Among other characteristics, Evergreen found the following low-income households to face higher material hardships:

- Households in the desert/mountain regions;
- Renters of single-family and multifamily homes;
- Working age adults with dependents; and
- Households with members who have disabilities.

Among household types, we found that 20 to 23 percent of households led by working-age adults faced high material hardship, compared to 12 to 14 percent of households led by seniors.[52]

[52] A review of these rates of material hardship by household size suggests that households without dependents face noticeably lower rates of material hardship when there are multiple household members, while households with dependents face slightly increased (but not statistically significant) rates of material hardship with increasing numbers of household members.

We also examined material hardship by enrollment in CARE among income-eligible households. As with energy insecurity, households enrolled in CARE do not distinguish themselves with lower (or different) levels of material hardship than those who are income-eligible, but not enrolled in CARE.

Figure 13: Material Hardship by CARE Enrollment (2013 Survey; Low-Income Only)

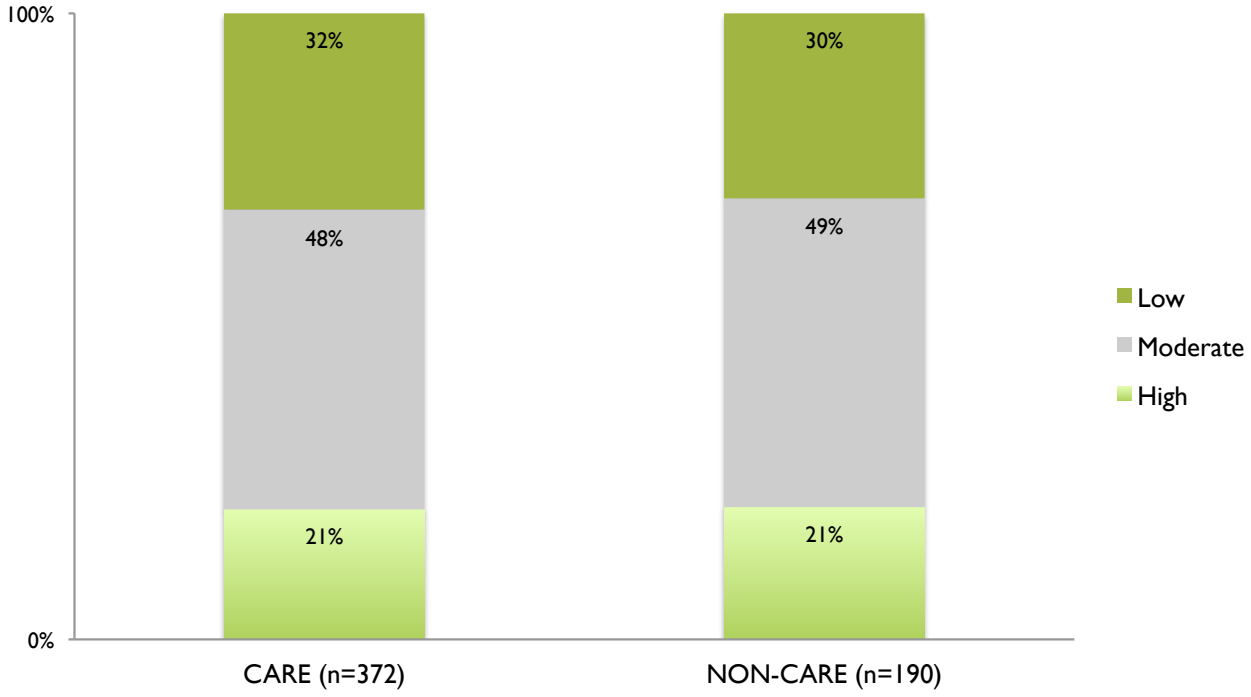


Table 30 summarizes mean incomes and energy costs among low-income households for each level of material hardship. Not surprisingly, households with higher levels of material hardship have lower incomes[53] and higher energy burdens, but they do have nearly the same energy costs.

[53] Even within the same income category and thus not due to our definition of material hardship.

Table 30: Financial Characteristics of Low-Income Households by Material Hardship

Material Hardship	Annual Customer Burden (mean) (n=560)	Estimated Income (mean) (n=562)	Annual Energy Cost (mean) (n=492)	Average FPL (mean) (n=562)
Low (n=184)	3.5%	$29,840.96	$1,033.60	147%
Moderate (n=249)	6.4%	$22,554.97	$973.78	95%
High (n=129)	7.0%	$19,159.42	$964.36	84%

To further understand households with elevated material hardship, we explored behavioral practices and attitudinal dispositions of households across all income groups by their level of material hardship. This goal of this exploration is to understand the extent to which these households have remaining capacity to reduce their own energy costs through basic no-cost energy-saving practices such as consistently turning off lights and electronic equipment and setting back heating and cooling when not at home. Understanding these opportunities can inform energy education efforts.

Households with elevated material hardship appear to follow basic energy-saving practices at similar levels as those with lesser levels of material hardship. A battery of survey questions assessed the consistency with which households turn off lights and electronic equipment, set back heating and cooling temperatures, and keep showers to five minutes or less. Based on their responses, households were classified as relatively following energy saving practices to a high, elevated, medium, or low degree.[54]

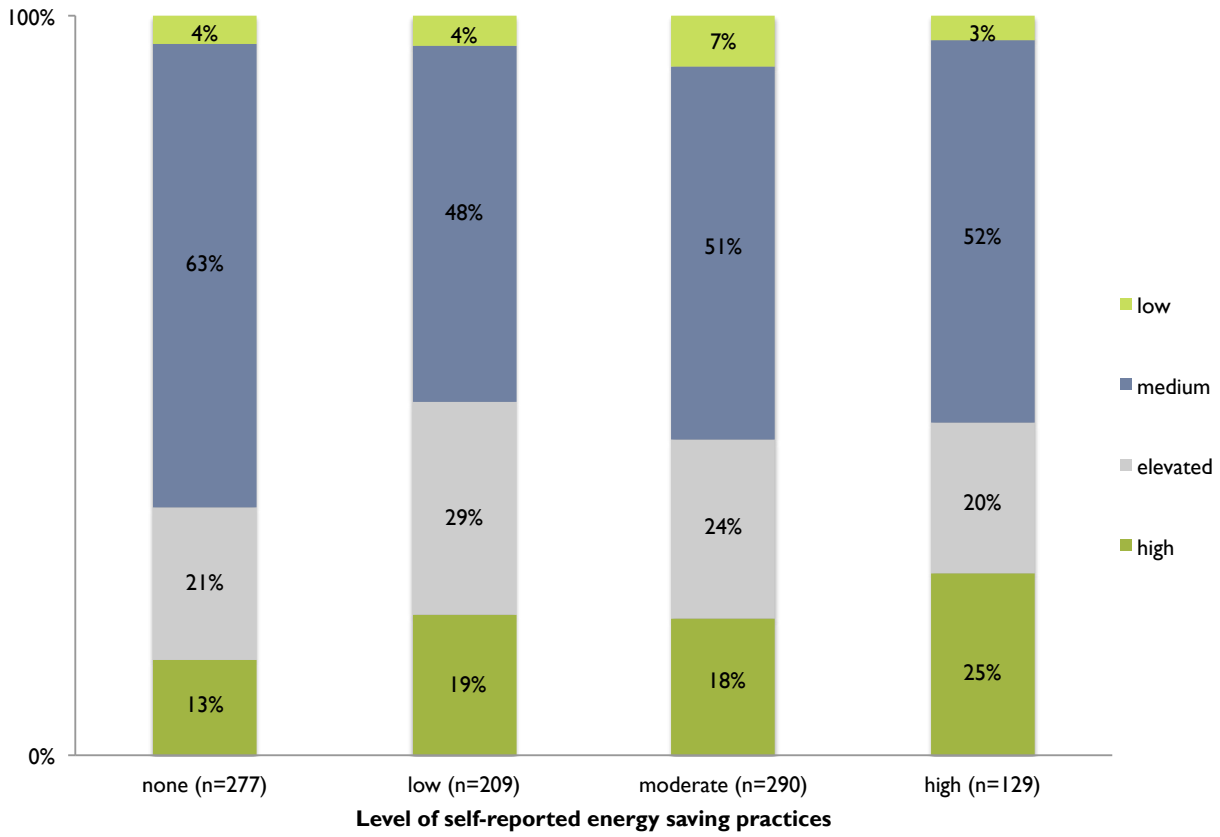
As shown in Figure 14, roughly a quarter of households across most of the material hardship categories report consistently follow these standard energy-saving practices very regularly and half overall follow them fairly regularly. There is little difference between material hardship categories, suggesting similar levels of behavioral saving opportunities across all of the categories.[55]

[54] Those respondents who did the activity always for all (unless they did not have an AC) were put in the "high" category. The "elevated" category contains those who answered always to everything and sometimes to one item (usually shower length). Those who answered, on average, that they do an activity sometimes, were put in the "medium" category.

[55] In fact, a similar comparison using other measures of household burden—including energy burden and energy insecurity—revealed the same result. With few exceptions, low-income households reported similar levels of energy-saving practices across all energy burden metrics. The only exception was for those with very low energy burdens who also reported substantially lower levels of energy-saving practices. When we included the full spectrum of incomes, differences in energy-saving practices did appear among those with

A simple look at these households' energy costs reveals no consistent differences between those who report more consistent energy-saving practices and those who do not. (See Table 31.) This could mean that differences in the energy efficiency levels of households due to housing stock, climate zone, or household size are greater than those related to behaviors. Alternatively, self-reports of households' energy-saving practices might be inconsistent.

Figure 14: Material Hardship by Level of Energy Saving Practices (2016 Survey, All Incomes)



more moderate burdens too, but those with the higher burden levels continued to show similar levels of energy-saving practices.

Table 31: Energy Costs of Households by Degree of Energy-Saving Practices (2016 Survey, All Incomes)[56]

Level of Energy-Saving Practices	Annual Energy Cost	Estimated Income	Average FPL
Low (n=28)	$1,112	$45,669	269%
Medium (n=358)	$1,072	$49,821	278%
Elevated (n=179)	$1,081	$48,226	248%
High (n=146)	$1,113	$38,790	214%

Similarly, there are only weak relationships between attitudinal disposition toward energy conservation and the degree of a household's material hardship. Households with high material hardship differed from those with lower degrees of hardship only when reporting a financially induced need to conserve. However, their responses were similar to other attitudinal questions, including whether:

- Improving the energy efficiency of the home is not a priority (about 60 percent of respondents overall disagreed);
- The household already only uses electricity when it's really needed (about 60 percent agreed with only those facing no hardship deviating in significant numbers);[57]
- It's not worth it to put on more clothes in winter to save a little energy (about two-thirds disagreed).

However, when we examined these same questions across the *other* energy-related burden metrics, we found more variation. In particular:

- Households with high energy insecurity were *more* likely to state that they only use electricity when it's really needed (83% of those with high energy insecurity agreed with this statement, compared to 65%, 51%, and 49% of those with moderate, low, or no energy insecurity); but
- Households with higher energy burdens and those with higher energy insecurity were somewhat *less* likely to find it worthwhile to put on more clothes in the winter to try to save a little energy.[58]

[56] This table includes all income levels, but is limited to the respondents for whom we have energy cost data of sufficient duration to provide annual costs.
[57] The survey inquired only about electricity for this question as an indicator of overall in-home conservation practices.

Further, we refer the reader to Section 4.3 below, which addresses the resources California households draw upon to cover their living expenses.

4.2.5 Comparing Energy Burden, Energy Insecurity, and Material Hardship

Energy burden, modified energy burden, energy insecurity, and material hardship are four different ways to look at the same issue—the challenge households face to meet their energy-related and basic needs. We compared these four metrics (burden, modified burden, insecurity, and hardship) to better understand what they each can tell us about household circumstances.

The three metrics point to similar household characteristics as most associated with financially oriented hardships and challenges—whether energy-related or not—albeit with some differences and nuances. Table 32 summarizes the household characteristics we identified above as being associated with high burdens (i.e., across all four burden metrics). Not surprisingly, reported income is consistently a common denominator given how the metrics are defined. On the other hand, the income thresholds associated with higher burden varied across these indicators, as did some of the corresponding results (sometimes due in part to the way we defined the categories). For all four indicators, the desert and mountain regions were consistently associated with higher burdens. Households with members who have disabilities consistently showed somewhat elevated levels of burden.

For other variables, characteristics of the higher burden households differed across the four measures of burden. For example, while higher energy usage affects energy burden, it does not appear to be a primary driver for energy insecurity or material hardship. Households with seniors (as well as households led by seniors) were more energy insecure, but households with working-age adults and dependents were more materially insecure overall. Similarly, renters of single-family homes, single-family owners, and renters of multifamily homes all appeared as the most challenged housing type for at least one of the four metrics.

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[58] Agreement with the statement that it's just not worth putting on more clothes in winter to try to save a little energy amounted to 36% of those with high energy burdens, 31% of those with moderate energy burden, 21% of those with low energy burden and 26% of those with very low energy burden. Meanwhile, 41% of those with high levels of energy insecurity agreed, compared with 31% of those with moderate energy insecurity, 24% of those with low energy insecurity, and 17% of those with no energy insecurity.

Table 32: Comparison of Characteristics Associated with Relatively Higher Energy Burden, Energy Insecurity, and Material Insecurity

Household Characteristics	Energy Burden	Modified Energy Burden	Energy Insecurity	Material Insecurity
Demographics	Lowest income (below 50% of FPL) Higher usage (above $1,000 in energy costs annually) Households with disabilities	Lowest income (below 50% of FPL) Higher usage Households with disabilities	Lower and moderate income (below 300% of FPL) Households with seniors Households with disabilities	Lowest income (below 100% of FPL) Households with working-age adults and dependents Households with disabilities
Housing	Renters in multifamily buildings	Single-family owners and renters	Single-family owners	Renters in multifamily and single-family homes
Geographic	Desert/mountain regions (i.e., areas with higher heating and cooling loads)	Desert/mountain regions Central Valley	Desert/mountain regions South coast region (i.e., areas with higher housing costs)	Desert/mountain regions

Differences regarding the reported struggles of low-income customers across the metrics are in part due to how the metrics are defined as well as how the thresholds are set to differentiate customers within each metric.

4.2.6 Summary and Conclusions

Our examination of household burden and hardship through the use of energy burden, energy insecurity, and material hardship offers a broader perspective on the needs and challenges of California households.

The energy insecurity and material hardship metrics lay a foundation on which to build and also offer additional perspectives on burdens and challenges faced by households that struggle with energy and other costs. In particular, they corroborate what is reflected by energy burden analyses while also revealing additional insights about customers that may be more vulnerable.

Regardless of how burden was measured, this study demonstrates that:

- Low-income households in some parts of California—especially the mountain and desert regions, followed by the Central Valley—face higher energy burdens and

energy-related challenges likely due to these regions' higher heating and cooling loads.

- Low-income households with members who have disabilities tend to face higher energy-related challenges. These challenges are likely comprised of two factors: income-based constraints (i.e., lower levels of resources) and elevated energy-related needs (i.e., greater need for heating or cooling or the use of energy-using medical equipment). Income-based challenges are already accounted for in program designs that differentiate based on household income, but energy-related constraints are not.[59]

The analyses using different burdens metrics also demonstrate some variation across households:

Variation at Different Poverty Levels

- The income-based program eligibility criteria of 200 percent of the FPL (and 250 percent for FERA) do not necessarily reflect household need or challenges. Our data suggest that there are households below the ESA/CARE threshold that demonstrate relatively little need or hardship while there are also households above the threshold that reflect relatively more burden-related needs.
- Empirically defined breakpoints for the burden metrics suggest that those below 50 percent of the FPL have substantially higher energy burdens, while higher energy insecurity tends to be reflected by households with up to 300 percent of the FPL.

Variation by Household Characteristic

- Low-income seniors and working-adults with dependents differ in the type of need they identified. Seniors were more likely to describe energy insecurity and struggles with energy bills, while working-age adults with dependents exhibited higher levels of material hardship, potentially because they have more expenses (and fewer resources).
- Low-income households in all major housing types face some form of elevated hardship, but the type of hardship varies by housing type and ownership status. Based on reported income, multifamily renters have higher energy burdens than households in single-family homes. However, when non-cash resources are included with income, single-family owners face higher levels of burden as

[59] It should be noted that our information on household income is based on self-reports and subject to respondent interpretation of what constitutes income. Our survey instrument primed respondents on whether they receive various sources of income and then asked a two-part question on what their income was in 2015. The questions are shown in the survey instrument, which is included in Appendix C. See, in particular, questions D2-D6.

reflected in the modified energy burden. Single-family owners also experience higher levels of energy insecurity. Renters in multifamily and single-family homes face the highest overall material insecurity.

Variation by CARE Enrollment

- *Individual* households on CARE face lower energy burdens than they would face without CARE under the same conditions, but income-eligible California households that are enrolled do not necessarily have lower energy burden, energy insecurity, or material hardship than those who are not enrolled. More investigation would be needed before conclusions could be drawn on the impact of CARE on households' overall wellbeing and hardships or the degree of awareness of—and interest in—CARE among these households.

4.3 Resources California Households Draw Upon for Everyday Expenses

Several resource-related topics were examined to further build on our understanding of low-income households and put these households' energy needs in a broader context. Some of the associated topics sought to understand:

- The range of resources low-income households use to make ends meet;
- The degree to which households report experiencing changes in financial situations that could move them across the income threshold for CARE and ESA;
- How the general financial wellbeing of California households has changed since the past Low Income Needs Assessment three years ago; and
- Payment practices of low-income households.

4.3.1 Resources Used for Living Expenses

An examination of how resources used by California households differ across the income categories provides additional insight about household burdens and understanding of the circumstances of lower income households. Telephone survey respondents were asked about a variety of resources[60] they might draw upon to cover their everyday expenses; Evergreen followed up this question to understand whether each resource used is a major or minor (supplemental) source of income or support.

Figure 15 shows the distribution of major resources self-identified by households by income category. Income from work was reported as a major resource by the largest share of households in all income categories, but was more commonly cited by high-income households (72%) than those below the poverty level (52%). Meanwhile, social security and disability payments were the second most common income source. These resources were most common in the range from 100 to 200 percent of the FPL, an income range that also presented a somewhat greater prevalence of seniors.

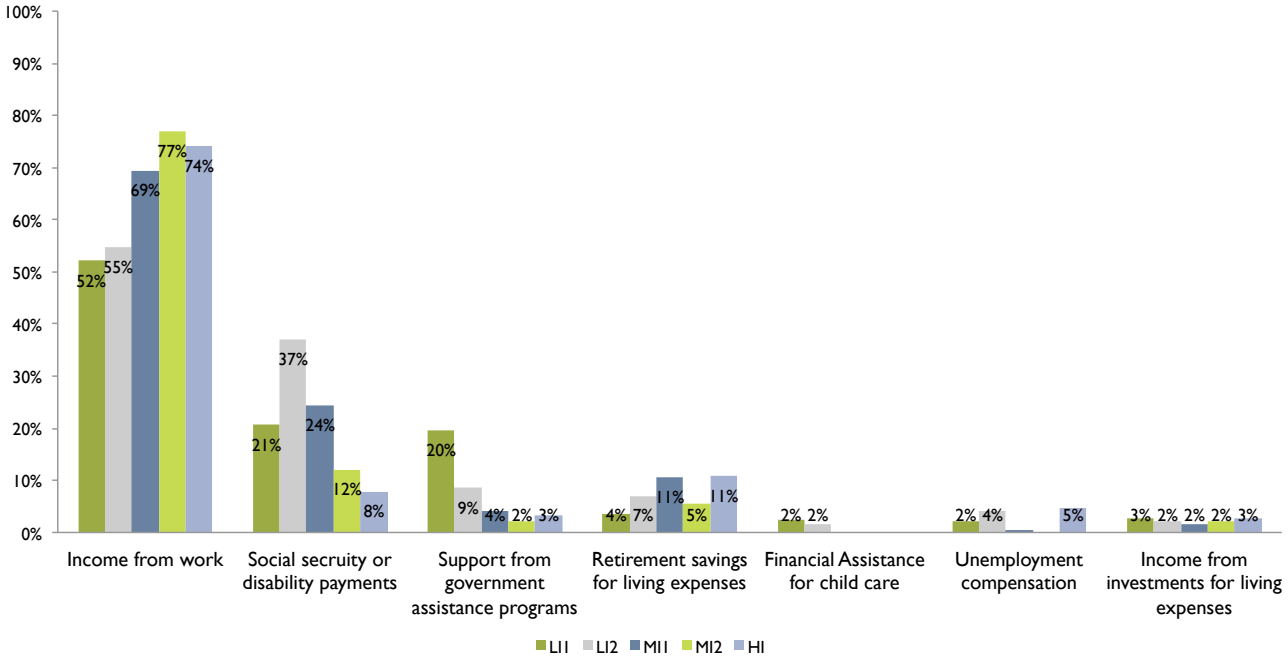
Support from government assistance programs[61] is considered a major source of assistance to make ends meet for a fifth of low-income households. These additional resources become relevant when we try to understand nuances of energy burden (costs of bills as a

[60] The survey question (D2) asked respondents to indicate whether they receive income from work, social security or disability payments, unemployment compensation, support from government, or financial assistance for child care. The question also asked whether they draw on retirement savings for living expenses or use income from investments for living expenses. For each affirmative response, the survey implementer immediately inquired whether that resource is a major or minor source of income. For the analysis, we also considered responses to prior questions (B3 and B5) about whether households give or receive regular financial support to or from others who do not live with them.

[61] For purposes of the applicable survey question and this report, we distinguished between "social security and disability payments" and "government assistance programs."

function of a households' stated income and available resources to meet basic needs). Other income sources were not identified by households as particularly significant in terms of providing a major resource to make ends meet.

Figure 15: Major Sources of Household Financial Resources for Everyday Expenses (2016 Survey, All Incomes)



Appendix D includes more detailed findings from an examination of major income sources for low- and moderate-income households at smaller increments than the 100 percent FPL increments shown above. When we looked at the mix of resources at these smaller increments, we found that:

- Income from work is the most common major resource for all ranges of low and moderate income.
    - Generally, the share of households reporting income from work as a major source of income increases with decreasing levels of poverty (i.e., higher FPL levels). However, households below 50 percent of the FPL were an exception to this trend, reporting their work-based incomes as a major resource at levels that match high-income households in our sampled zip codes.[62]

[62] Appendix D shows these relationships in a figure. Seventy-five percent of households with FPLs up to 50% reported income from work as a major resource, compared with 41%, 56%, 53%, 57%, and 68% of those at

- Income from social security and disability payments is the second-most common resource for all ranges of low and moderate income.
    - The prevalence of social security and disability payments as a major income source increases for households with higher FPLs up to twice the poverty level and then decreases from there.
- Support from government assistance was the third-most commonly cited resource for households with incomes up to 250 percent of FPL, but the prevalence of government assistance was statistically indistinguishable from retirement savings for some of the income groupings.

Other highlights from Evergreen's analysis include:

- Seniors rely predominately on social security and disability payments, but few low-income seniors reported retirement savings, income from continuing work, or government programs as meaningful sources of support.
- Low-income households led by non-seniors rely primarily on income from work, followed by social security and disability payments and government assistance programs.
- The most commonly identified government assistance programs were those that provide housing subsidies or assistance, medical assistance, and food stamps.
- Fewer than half of our low-income respondents—and just over a third of respondents overall—reported receiving any kind of support from their utility companies. About a third said they received reduced rates, but these self-reports understate the actual enrollment in CARE (which is about two-thirds for these same households).

4.3.2 Household Fluidity of Financial Situation

To provide greater context and insights concerning California household's financial challenges, Evergreen explored how people's sense of wellbeing and costs have changed in the past three years. The three-year period for which we tracked perceived changes in wellbeing coincides with the time span since the most recently completed Low Income Needs Assessment.

Evergreen asked households how they perceive their financial wellbeing to have changed in the past three years. In general, respondents across all income categories felt that their financial condition was about the same, and similar shares of respondents assessed their

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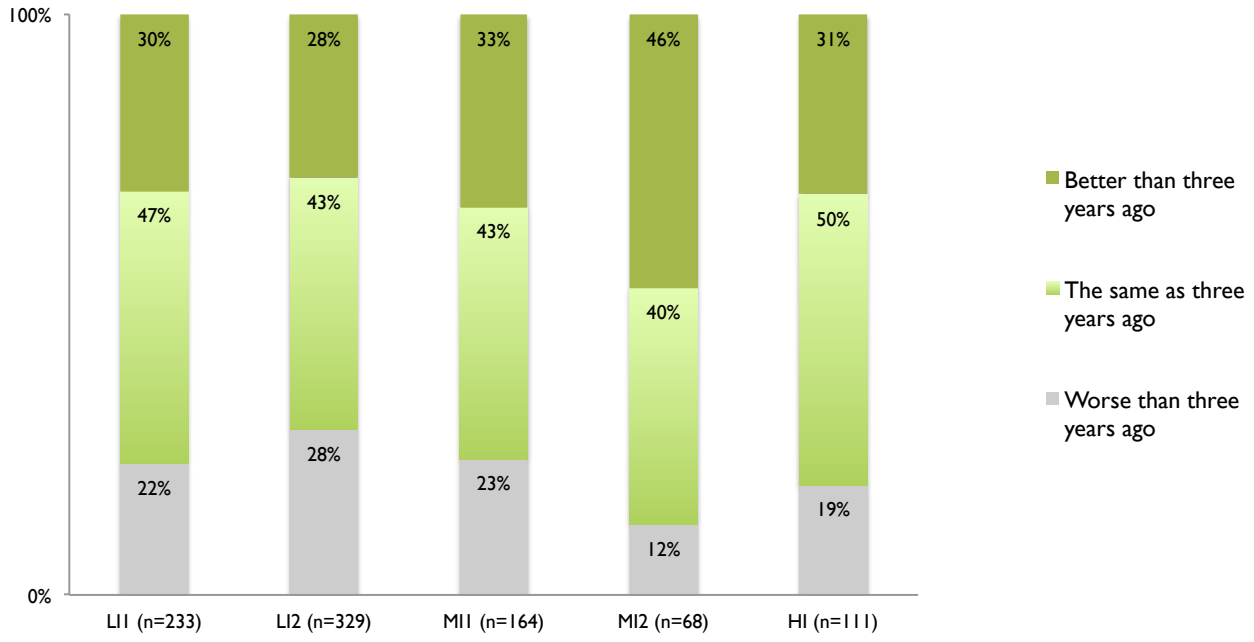
sequentially higher FPLs of 51-100%, 101-150%, 151-200%, 201-250%, and 251% and higher. Both of the lowest two FPL levels are statistically distinct from all others. The highest FPL level is statistically distinct from most lower levels, but not all.

wellbeing as better and as worse. Figure 16 shows comparative self-assessments of financial wellbeing by income level.[63]

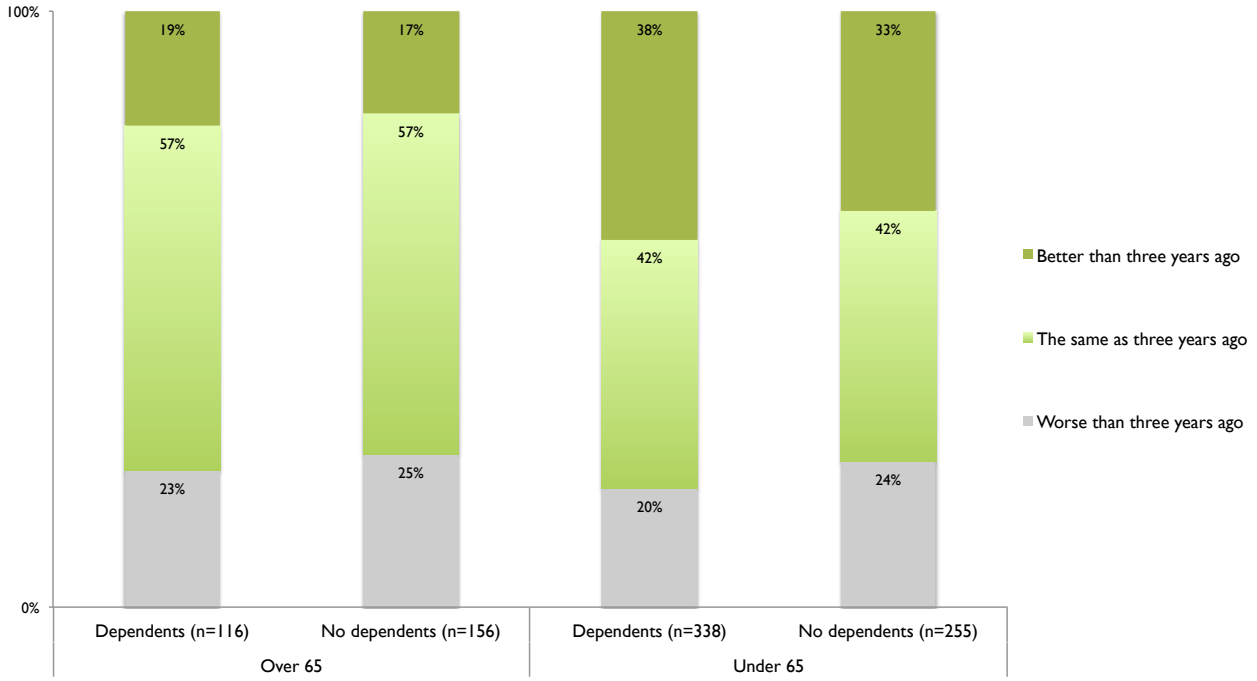
Households with working-age adults have sensed improvements in their financial wellbeing to a greater degree than seniors (Figure 17). This trend may be an indication that the economy has improved so people who rely primarily on income from work have seen improvements that those who are retired or rely on fixed incomes do not. As shown in Figure 17, over a third of households comprised of working-age adults reported better financial conditions, while fewer than a fifth of seniors felt they were better off.

Figure 16: Perceived Financial Situation Compared to Three Years Ago, by Income Level 2016 Survey, All Incomes)



[63] Only the moderate income 2 level (households with FPLs of 300 to 400 percent) distinguished itself as being statistically different from the other income levels. These households feel better off than three years ago in greater numbers by a margin that is statistically significant.

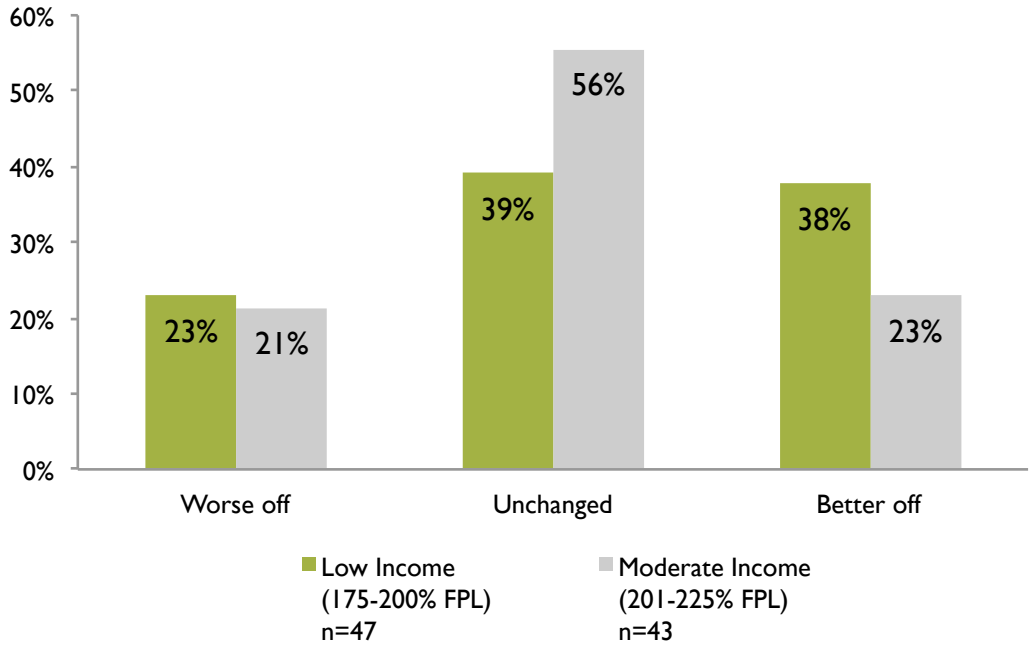
Figure 17: Perceived Financial Situation Compared to Three Years Ago, by Age and Dependents (2016 Survey, All Incomes)



We also explored the degree to which households near the income threshold for eligibility for CARE and ESA (200 percent of the FPL) fluctuate in financial wellbeing and thus may have become newly eligible or ineligible for these programs during that time.

We found that roughly half of the households near the income threshold experienced change in their financial condition in the past three years. As Figure 18 shows, 23 percent of households just below the income threshold (175–200% FPL) reported that they are worse off than they were three years ago, potentially indicating that they may have shifted from moderate income to low income. In the other direction, 23 percent of moderate-income households just above the threshold (200–225% FPL) stated that their financial situation is better than it was three years ago, perhaps indicating that they have shifted into the moderate income range from low income.

Figure 18: Change in Financial Situation in Last Three Years (2016 Survey, Households between 175% and 225% of the FPL)



This analysis is limited to households near the income threshold for program eligibility and based on a proxy variable (changes in financial conditions of the household) for actual variation in income. Future research could more fully investigate the extent to which households either remain income eligible for extended periods, cycle into and out of eligibility, or become income eligible for a short duration only. Such an investigation could also examine the extent of program awareness and participation by each of these groups of households for further insight on how these populations are being served.

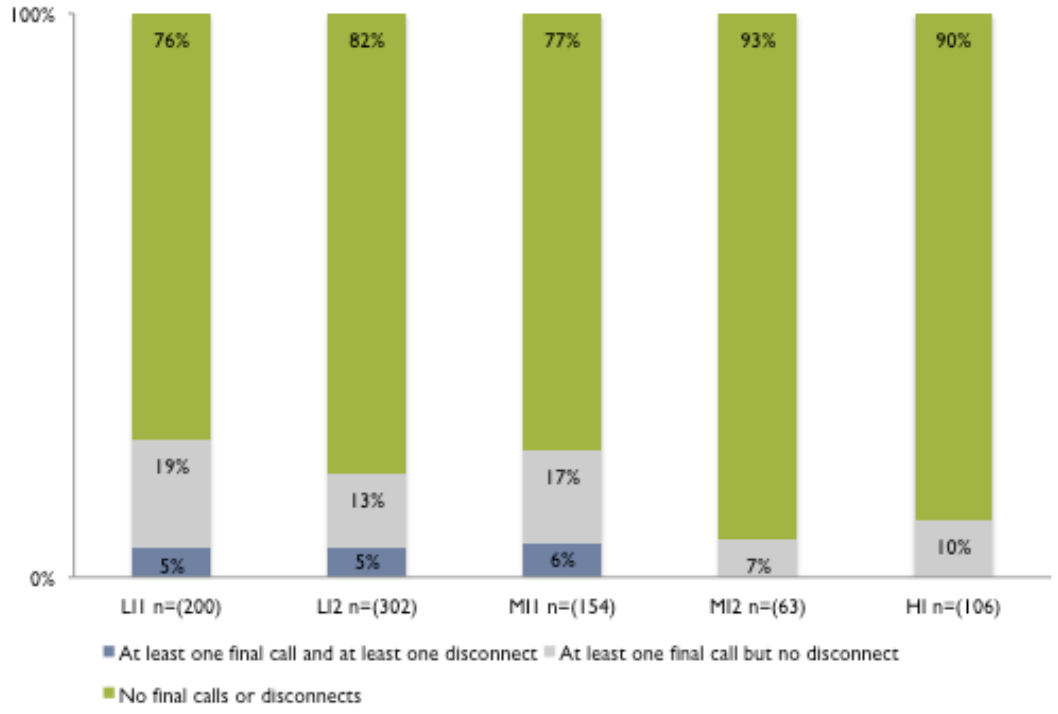
4.3.3 Energy Bill Management and Payment Practices

The measures of burden and hardship discussed above rely on basic calculations and reported income data. Evergreen sought to complement these metrics with an examination of actual payment practices for 2014 and 2015 from IOU billing systems, which provides a degree of "revealed burden." The most consistent measures of payment practices available were final notices prior to a disconnection and actual disconnections. These inputs became the basis of analyses involving payment practices data.

As one would expect, payment delinquencies result in more disconnects and final notices prior to a disconnect among households with lower incomes generally, although households at the low-income ranges and the lower half of the moderate income ranges present themselves similarly. As shown in Figure 19, payment-induced disconnects are fairly even among those whose incomes are up to 300 percent of the FPL. At higher

incomes, final notices do occur at about half the rate,[64] but tend not to result in disconnects. That might suggest household challenges that can be overcome or non-financially-oriented causes that lead to non-payment and final notices, but these are rectified by the households before their service is disconnected.

Figure 19: Payment Practices by Poverty Level (2016 Survey, 2014-2015 Billing Data)



Also not surprisingly, households with the highest burdens have higher rates of payment issues and disconnections, as shown in Table 33. However, it is interesting to note that households without any notices or disconnections range in energy burden up to 41 percent, showing that some households with high burdens still manage to keep up on energy bill payments.[65]

[64] A statistically significant difference.

[65] The number of households with such very high energy burdens of 20 percent or more is small (totaling 20 data points in our sample), so it is challenging to identify patterns. However, we did examine these households more closely and found that 12 households with very high energy burdens have no history of notices or disconnects. These same households were less likely to have experienced challenges making ends meet overall, while those with notices and disconnects tended to have reported challenges with other expenses too and seemed less likely to be enrolled in CARE.

Table 33: Energy Burdens by Payment Practices (2016 Survey, 2014-2015 Billing Data, All Incomes)

Energy Burden	No Final Calls or Disconnects	At Least One Final Call but No Disconnect	At Least One Final Call and at Least One Disconnect
Range	0%-41%	0%-41%	2%-22%
Median	2%	3%	5%
Mean	3%	5%	8%

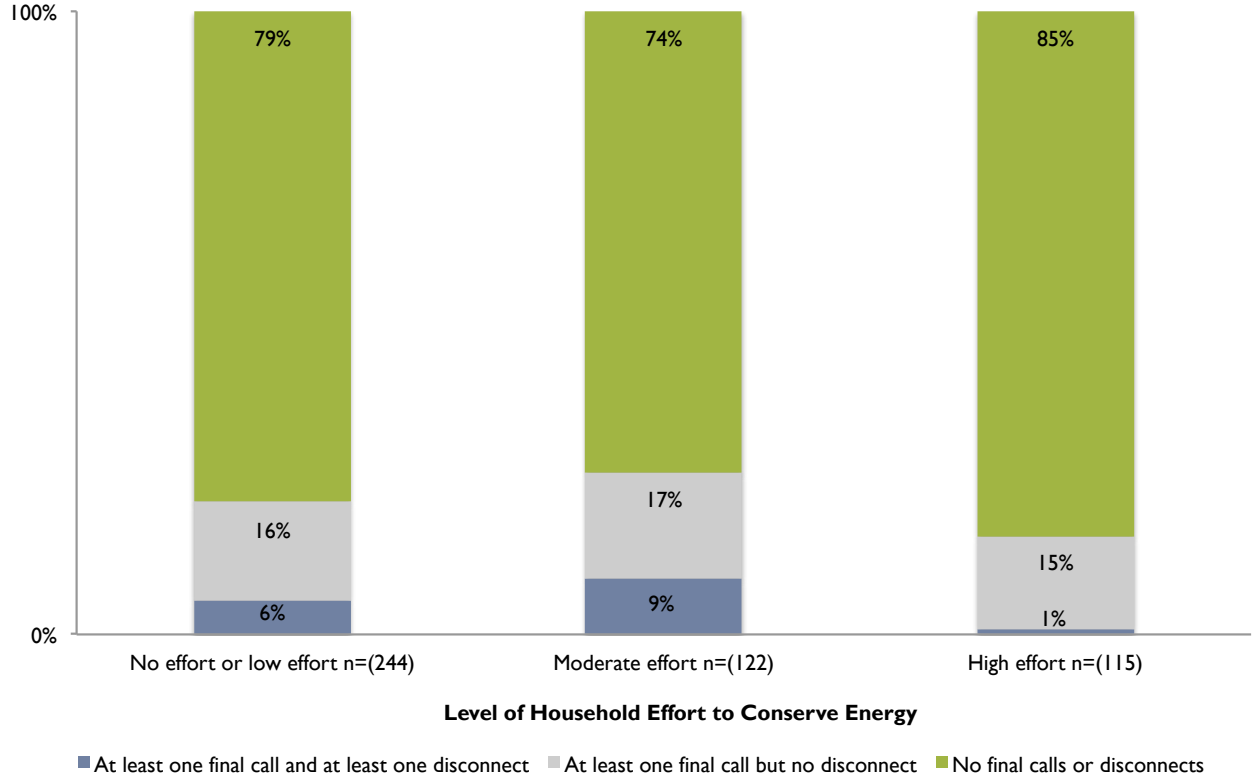
When Evergreen examined payment practices by various other household characteristics, we found more frequent final notices or actual disconnects among:

- Income-eligible households that are not enrolled in CARE (for disconnects, but not final notices);
- Households led by working-age adults; and
- Households with members who have disabilities.

Furthermore, we found that, generally, low-income households that make relatively greater efforts to save energy consistently also have fewer payment issues than those who reported taking steps to save energy less consistently.[66] As Figure 20 illustrates, households that make the most consistent efforts to conserve experienced almost no disconnects even though they did experience similar rates of last notices as other low-income households.

[66] Our metric on self-reported energy-saving behaviors was based on responses to questions about turning off lights and appliances regularly when not in use, setting back thermostats for heating and cooling systems, and taking short showers. (See also Section 6.)

Figure 20: Payment Practices Among Low-Income Homes By Reported Effort To Save Energy (2016 Survey, Low-Income)*



* Our metric on self-reported energy-saving behaviors was based on responses to questions about turning off lights and appliances regularly when not in use, setting back thermostats for heating and cooling systems (where applicable), and taking short showers. High effort is defined as taking relevant actions consistently. Moderate effort is defined as generally taking these actions, but not fully consistently. Low effort is defined as taking these actions only inconsistently.

4.4 Households with High Energy Burden

Understanding unique needs and circumstances of customers with high energy burdens was one of Evergreen Economics' research objectives. To inform Evergreen's understanding of customers with high energy burdens, we drew primarily on two data sources: (1) focus groups of low-income households with energy burdens that fell in the upper quartile in the two geographies selected for the discussions (the Central Valley and the South Inland region), and (2) responses to our telephone survey from the subset of low-income respondents who are in the top quartile of energy burden (compared to those who are not in the top quartile). The telephone survey provided quantitative data from a large and representative sample of California customers with high energy burdens. The focus groups were intended to provide a deeper, qualitative understanding from a smaller sample of high burden households who reside in warmer regions. A total of four focus groups were held in Fresno and Riverside (two in each location). Appendix D provides detail on the characteristics of the high burden segment of the telephone survey and for the high burden focus group attendees, along with other detailed findings that support this section.

The focus group results suggest that high burden customers: [67]

- Experience loss of heat and cool air and uneven temperatures in their homes, at least in the regions with non-temperate climates. This trend seemed to be particularly true of renters.
- Engage in trade-offs between energy usage, comfort, and convenience on one hand and energy costs on the other. Some households are more constrained in their ability to keep costs down due both to medical issues of some household members or differences in preferences and priorities among household members.
- Are aware of numerous strategies for managing energy usage, but also expressed misconceptions and uncertainties, as well as interest in having utilities provide more customized suggestions and energy education.
- Tend to overestimate their energy bills, but with possible geographic variation in their tendency to overestimate.
- Are highly aware of CARE, medical baseline (where relevant), and non-utility sources of financial support for their energy costs and are somewhat aware of ESA.
- Are thoughtful and resourceful in the manner in which they prioritize bills and make use of resources available to them.

[67] Note that the nature of some of the trade-offs that focus group attendees discussed are driven, in part, by their location in hot climates and the timing of the focus groups during the summer.

- Engage in word-of-mouth information sharing with their peers about resources available to financially constrained households and exhibited some information sharing during the focus groups.
- Appreciate the degree to which IOUs support their needs and constraints through payment arrangements, reduced rates, and other services.
- Would value usage alerts that would provide feedback (and suggestions) concerning their energy usage during the billing cycle. Customers of IOUs that already offer these alerts were generally not aware of them.
- Showed interest in ongoing engagement with their utility providers.

The remainder of this subsection focuses on findings from the focus groups and telephone surveys related to:

- Health comfort and safety
- Energy bills
- Self-efficacy and control over energy bills
- Utility support
- Measure and program ideas.

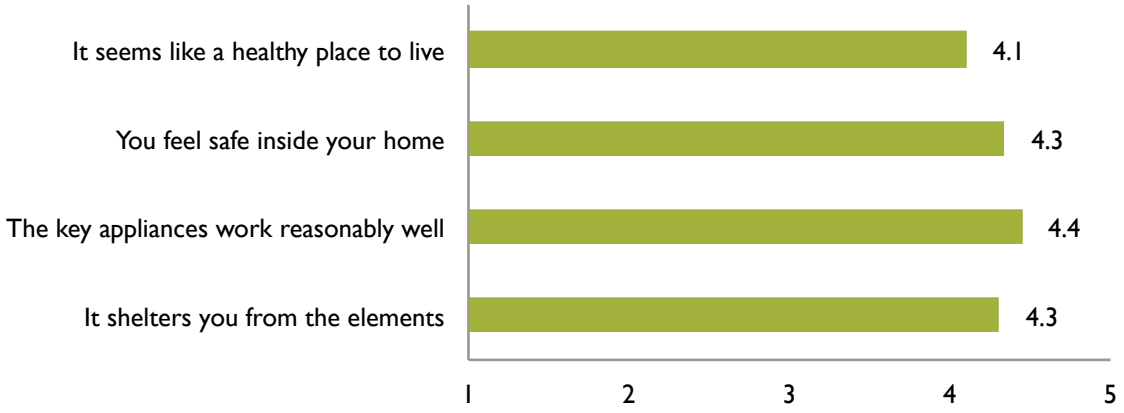
4.4.1 Health, Comfort, and Safety

Focus group attendees were asked about their perceptions of health, comfort, and safety in their homes in order to understand how energy usage may play a role. Increasing low-income customers' health, comfort, and safety is one of the ESA program objectives. Evergreen asked focus group attendees to privately (on a handout) rank their agreement with the following statements about their home on a scale of 1 to 5, with 5 being "strongly agree":

- It seems like a healthy place to live.
- You feel safe inside your home.
- The key appliances work reasonably well.
- It shelters you from the elements.

Ratings averaged above 4 (on the 1 to 5 scale) across the board (Figure 21), indicating that on average, focus group attendees feel safe and comfortable in their homes.

Figure 21: Average Feelings of Health, Safety, and Functionality of Home (Focus Group Attendees, n=29)



The average ratings for "It seems like a healthy place to live" and "You feel safe inside your home" differed between those who own and rent their homes. Owners, on average, felt safer inside their homes (4.9 among owners and 4.1 among renters) and felt that their home was a healthy place to live (4.9 among owners and 3.8 among renters). When they elaborated on their scores, focus group attendees tended to speak mostly of concerns about their neighborhoods. Some attendees, in particular renters, talked about insufficiencies in their homes' insulation and gaps that lead to noticeable air infiltration. We heard about landlord unresponsiveness or slowness to act to address such issues.

While households reported high average rankings for comfort and safety overall, a few Fresno attendees expressed concern or frustration with their neighborhood with regards to the homeless population, drug addicts that come into yards or homes, and the general condition of the houses in the area. In one case, the focus group attendee connected their need to stay out of the neighborhood with an increase in energy use: *"I'd rather have my kids in the house than in the streets and then I have to have everything in the house running."*

Attendee descriptions of homes often lead to mentions of poor insulation and air infiltration (whether it be due to door seals, windows, or insulation levels). A few attendees framed the insulation issue as important for the health of someone in their home that is affected by extreme temperatures including a baby with seizures, an elderly woman with health issues, and a child with asthma. In one case, a focus group attendee's home has a hole in the wall "*…and they can see outside. [I] stick it with toilet paper and that works for awhile until it gets too dry and falls out."*

Another concern among focus group attendees was the uneven distribution of heat and/or cold air. This is in part due to the insulation issues, but also has to do with the layout or size of the home, and with the type of heating and cooling systems being used.

4.4.2 Energy Bills

To introduce the topic of how energy bills factor into their needs and priorities, Evergreen asked focus group attendees to estimate their typical summer and winter bill. Almost all were able to provide plausible estimates for summer and winter, but they had an overall tendency to overestimate their bills (compared to actual amounts). In particular, Riverside attendees overestimated their summer and winter electric bills by about a third, while Fresno attendees' estimates were closer to their actual bills. This result is consistent with other research that has compared other perceived and actual energy bill amounts[68] and has implications for usage feedback strategies and framing of messages to customers. Informing customers that their bills are lower than they thought could potentially result in increased energy use.

Next, we asked focus group attendees about how they prioritize various bills. Among bills for cell phones, auto loans, rent, and cable/internet, focus group attendees prioritized rent and auto loans before energy bills. Energy bills were identified as a higher priority compared to cable/internet and cell phone bills, however. Attendees seemed to be strategic in prioritizing bills for essentials such as housing and transportation for which lack of payment can result in the most serious consequences, and they seemed aware that IOUs will work with them on payment arrangements. Conversely, they do prioritize energy bills before less essential services when asked what they do if they have to leave bills unpaid (with more than half saying they would pay their energy bill first).

Next, we asked focus group attendees to place a sticker on a chart that helped them compare the difficulty of paying an energy bill to the prioritization of energy costs when they needed to cut back. Figure 22 shows that the degree to which focus group attendees struggle to pay their energy bills varies, but energy usage is not often one of the first things to be cut back when money is scarce. This is especially true for gas bills, which are generally lower than electric bills (and therefore less impactful on household budgets). The sticker placement (shown in Figure 22) aligns with what Evergreen heard in subsequent discussions regarding difficulty of cutting back on gas use. Focus group attendees thought of most gas end uses as either necessary or had already cut back by cooking less or using blankets. Interestingly, water heating was not often associated with gas bills when focus group attendees were asked how they could reduce their gas bills.

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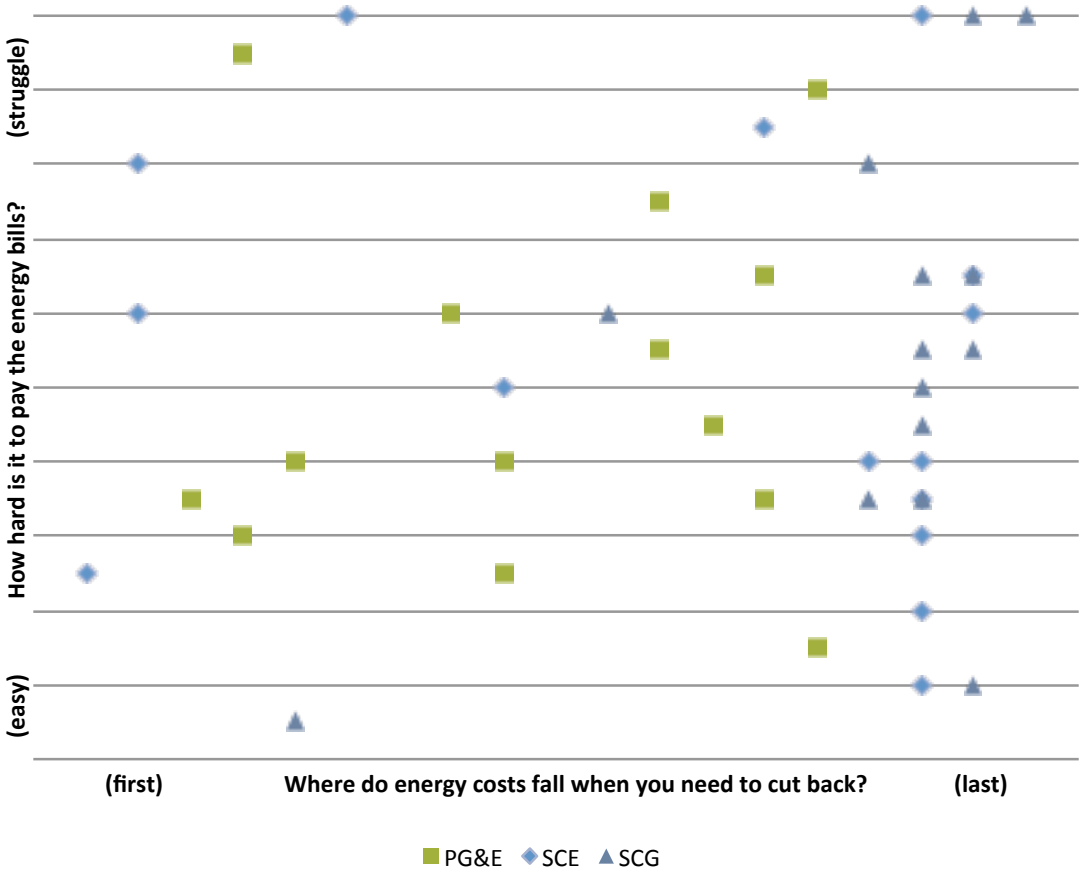
[68] Pigg, Scott, and Jeannette LeZaks, Claire Cowan, and Ingo Bensch. 2016. *Energy Efficiency Opportunities for Homes with High Usage: Market characterization and customer engagement strategies.* Prepared by Seventhwave for Minnesota Department of Commerce, Division of Energy Resources. http://mn.gov/commerce-stat/pdfs/card-high-usage.pdf

Figure 22: Difficulty Paying Bills and Priority on Energy Bills When Needing to Cut Back (Focus Groups, n=29)



Next, focus group attendees shared a number of thoughtful approaches to paying the bills and managing their resources to make ends meet. They were aware of a number of tools to help manage their bills including assistance from the Salvation Army (Relief for Energy Assistance through Community Help or REACH) to pay bills, Utility Medical Baseline programs, and IOU programs for level payments. One attendee had set up her own informal level payment program in which she always pays the same amount for her household's bill based on the average of the prior year's bills.

In general, focus group attendees seemed to understand that they could work with these various resources (including the IOUs) to help them manage payments. One went as far as to say that part of the reason they are willing to prioritize paying their electric bill is due to Southern California Edison's ability to extend payment due dates. *"What I like about Edison is that they will give you an extension. The reason I'd prefer to pay first is that they're working with you rather than flat out cutting your electricity so it is better to meet that commitment."*

4.4.3 Self-efficacy and Control Over Energy Costs

The focus group setting allowed for attendees to openly share their strategies for lowering their energy bill. These discussions revealed that attendees have taken a number of steps to reduce their usage (participation in ESA, changing air conditioning usage patterns, cooking at specific times to reduce additional heat gain) but that there are limiting factors in their approach including less attentive household members, a need for a certain level of comfort (which varied from person to person), and a need for additional energy education surrounding high energy using activities. Evergreen found the same to be true for low-income customers in our telephone survey: they are taking action in their home but there is a minimum threshold of comfort and convenience which they choose not to cross.

We referred to the telephone survey results to complement the focus group findings. To get an overview of what low-income customers already do in their households, we asked telephone survey respondents to let us know if they do the following activities always, sometimes, or never:

- Turn down or turn off the heat at night or when they leave the home.
- Turn down or turn off the air conditioning at night when they leave the home (if they have air conditioning).
- Turn off lights when not in use.
- Turn off electronics like TVs and computers when no one is using them.
- Limit showers to five minutes or less.

Each respondent was given a score based on how many of these activities they do and if they do them always, sometimes, or never. Those respondents who reported always engaging in all of the activities (unless they did not have an air conditioning unit) were put in the "high" category. The "elevated" category contains those who answered 'sometimes' to one item (usually shower length) but 'always' to all remaining energy-saving actions. Those who answered, on average, that they do an activity sometimes, were put in the "medium" category. About 20 percent of all low-income respondents fell into the high category, 24 percent were elevated, 50 percent medium and 5 percent in the low category.

Differences in these energy conservation efforts between households with higher or lower energy burdens were small, suggesting that those with higher energy burden levels are not doing more or less to conserve energy using the basic conservation strategies included in the survey. Focus group discussions lend themselves to a more granular discussion of activities customers are willing to perform.

Heating and Cooling

Focus group attendees reported a number of approaches to manage the heating and cooling needs within their homes. This included limiting the spaces in which household

members spend time in order to minimize the area needing to be heated or cooled, using blankets or jackets, closing blinds, and switching between air conditioning, open windows, and fans. They shared some specific strategies they use with each other during the focus groups, such as adding ice to an evaporative cooler to increase efficiency, visiting a friend's house to avoid additional energy expense from cooling, and getting equipment serviced.

In order to get a sense for how low-income customers feel about their heating and cooling systems, we looked to the low-income telephone survey responses to understand how often the respondents have trouble getting their home to the desired temperature. Survey respondents with heating or cooling systems were asked about how often their home is cooler or warmer than preferred because their heating or cooling system cannot keep up. The majority of respondents never have this issue (50% with heating systems, 38% with cooling systems), but 12 percent responded that this happens often with their heating system and even more respondents (21%) said this happens with their cooling system. This number did not differ between owners and renters, suggesting that renters who have air conditioning equipment do not have any more issues with the way it works than did homeowners.

Households with evaporative coolers or room air conditioners were most likely to experience inadequate cooling from their cooling systems, while those with central air conditioners resulted in the fewest equipment-related comfort issues.

Cooking

Cooking came up during the focus group in two ways: as an activity to cut back in order to limit gas use, or as an activity to leverage to keep the home warmer or cooler. Attendees reported changing their cooking habits to use less energy and keep the home cool, including grilling outside, using appliances such as the toaster oven or an electric grill to avoid using the oven, cooking early in the day before it gets warm, and making meals that can last for multiple dinners.

The focus group attendees generally focused on concerns related to keeping the home cool, likely due to the timing of the focus groups (during the summer of 2016), but a few also mentioned that cooking helps to keep the home warm in the winter. One focus group attendee reported that they "*…don't have to heat as much because everything is baked [in the winter]*" and another said, *"about cooking… it is great in the winter. It does heat up the house."*

Despite mentioning changing cooking habits as a way to reduce gas costs or heating and cooling costs, focus group attendees acknowledged that cooking at home helps them to save money that they would have spent eating out (which was generally acknowledged to be the more expensive option). Eating out is an example of an energy saving behavior that can help reduce one expense, but may increase another.

Household Member Challenges

Focus group attendees reported challenges in saving energy related to behaviors of other residents or visitors in their households. Many shared how their household members affect their energy usage.

Some said they worked to change behaviors of others to match theirs:

- *"My grandkids… love taking showers so if I allow them to, they will use up all the hot water, so I shut off the hot water heater while they're in the shower… They don't pay the bill so they don't conserve."*
- *"My kids are always moving around… leaving the lights on, radio on, TV on, not closing the door when the AC is on. I don't know how to keep telling them and they keep doing it."*
- *"I'll just tell my kids to put a sweater on."*

Others accepted that some of their household members have different preferences than they do themselves.

- *"My wife keeps the TV on and since I pay all the bills she kind of is like whatever, you know? I used to [say something] but… you know, that's my wife. What can I do?"*
- *"If it is just me, I put it at 80. With my grandson there I put it at 77."*

A couple of attendees noted that they adopted energy saving habits from their past living situations including an uncle who would always make then turn off the lights, and a mother who passed along energy saving habits to her son, who now works to engage his roommates in energy-saving behaviors.

The Extent of Behavioral Changes

The focus group format allowed for attendees to express what types of behaviors they were or were not willing to take on in order to save energy. This varied person to person, and focus group attendees justified their unwillingness to take on certain behaviors while acknowledging that they were aware that their actions would affect their energy costs. The tradeoffs between happier household members, added comfort, and convenience were all worth the higher bill.

- *"If it is too hot you want to turn the air on and if it is hot everyone gets grouchy, you don't want everyone like that."*
- *"AC to me is important but the way I see things is I don't drink, smoke, … I try not to eat out… I save in other stuff. I don't buy expensive clothes. But AC to me, I like that."*
- *"I'm sure everyone could unplug everything but realistically none of us are going to come back home and plug it all in."*

- *"If I don't use the AC then I can't sleep."*
- *"I don't make a lot of money and I don't see where we could cut back. I'm not willing to be miserably hot and I need to wash my clothes."*

The telephone survey results are also helpful in understanding if low-income respondents feel like they have already done all that they can do. The telephone survey responses to questions about attitudes concerning energy conservation suggest that at least a share of households recognize that there is room left for additional conservation. For example, eighty-four percent of low-income respondents agreed that they have to conserve energy at home because they cannot afford to pay higher utility bills, but only 64 percent agreed that they only use electricity when it is really needed. (Responses were not different across energy burden categories.) The focus group format allowed us to get information on the type of activities that attendees *can* do, but are not *willing* to do.

Usage Dictated by Medical Need

A third of the focus group attendees had someone who had a health issue in their home. Most who reported having someone in their home with medical needs were aware of or on the medical baseline program. Many of the medical needs we heard about required the home to be conditioned to a certain temperature. This was true for a variety of medical issues including asthma, diabetes, and seizures.

Medical equipment was reported to limit the ability to take advantage of the ESA evaporative cooler measure that was offered to one attendee due to their child's asthma (since the evaporative cooler would bring in outside air). One focus group attendee reported that the oxygen machine that a household member uses heats up the space that it is in. They keep it in one room with the doors closed whenever possible.

Similar to the focus groups, a third of the telephone survey respondents had someone in their household with a permanent disability related to mobility, hearing, vision, development or psychological conditions, or chronic disease. To better understand how certain disabilities may require additional energy use through heating and cooling, the telephone survey included a question about how the disability may require a home to be heated or cooled more than would be necessary otherwise. Between 59 and 77 percent of households with disabilities (varying by disability) report that the disability required additional heating and cooling with higher rates. We know from focus groups that this may be to offset the heat from equipment.

Misconceptions About Energy Using Equipment and Behaviors (TVs, ACs, and TOU Rates)

The focus group discussions revealed that while attendees had a fairly strong understanding of their energy usage and ways to reduce bills, they also identified a need for education that would help to clarify some misconceptions including:

- **How much electricity is used by televisions**. Many reported that television sets were one of the main contributors to their energy usage. In reality, televisions are estimated to be a relatively low percentage of all residential usage.
- **How to best use air conditioning**. Some thought it best to keep air conditioners at a higher set point, while others thought it is best to keep it off as long as possible. Others also worked to use more localized air conditioning in lieu of central systems. *"I use the portable one to save energy. I want to know if it saves energy to put it in the room where you're sleeping."* Another also had questions about which is best and asked *"Is it better to leave it on or turn it off and turn it back on. I want them to tell me what is best."* Due to the timing of our focus groups (summer), the attendees discussed their thoughts on air conditioning, but we believe there may be a similar level of uncertainty around heating in the winter.
- **How water and gas usage are tied together.** When focus group attendees were asked about what activities and end-uses accounted for their gas usage and bills, some brought up cooking and space heating but left out water heating. *"I don't know how you could waste gas."* This was not the case across the board as some focus group attendees reported gas usage due to hot water used in showers, laundry, and washing dishes.
- **How some items use electricity when plugged in, even if "off."** There was confusion among some attendees when other attendees shared tips about unplugging equipment when not in use. Many reported that unplugging items is inconvenient, specifically if they are hard to reach. *"I unplug things under the counter or toasters or things that are easy to do. I'm not going to get behind a TV..."* Education about tools such as smart power strips that make it easier to reduce plug load could be beneficial to this group.

The same discussions that divulged the misconceptions about energy usage also exemplified the type of word-of-mouth information sharing (about programs, opportunities, tips, etc.) that Evergreen had heard about in discussions with community-based organizations. When one attendee would bring up a resource that others did not know about, other attendees would actively ask questions and show interest in the topic. This may be indicative of how they approach information sharing in neighborhoods and in other social settings.

4.4.4 Utility Support

Focus group attendees also shared with each other how they have called the utilities in the past to understand why their bills are high and to get an idea of how they could lower their bills. They seem to view the utilities as a resource for lowering their energy costs and believe that they have detailed information on their energy usage:

- *"You can call PG&E and they told me we were using AC non-stop… they can see a peak in the energy."*
- *"The first thing I do in a house I'm going to rent is get a quote of what that house paid on average last year and if the bill is over the average then I have them [PG&E] come out and tell me why it is too much."*
- *"I used to stop answering the phone but then I realized they are helpful."*
- *"The back of the bill has hotline numbers on it. Once you dial that number they'll ask you what you need help with."*

There were mixed reviews on the level of benefit offered by programs that provide in-home energy-efficiency improvements like ESA. Overall, though, there were more positive comments about assistance from such programs than negative comments. While there was high awareness that attendees were on the CARE rate, only about half of the attendees were aware of an ESA-like service. Of those that did know about ESA (or described a similar service) and had participated, people reported appreciating that:

- The work was performed quickly (2).
- Their house is much cooler in the morning thanks to the evaporative cooler.
- Their fixtures now match.
- They have seen a bill reduction (2).
- There is a reduction in draftiness.

Focus group attendees who were less satisfied with ESA (or the ESA-like service in which they participated) explained their dissatisfaction by saying that:

- The weatherization did not work due to "a sorry job" and that this limits their ability to qualify for additional participation.
- The refrigerator was of a poor quality (2).
- They could not tell if the bill went down.
- The supervisor did not come out after issues with work quality (2) or they did not come when they said they would (1).
- The bulbs are too costly to replace once they burned out.

4.4.5 Measure and Program Ideas

As part of the focus group, the moderator asked all focus group attendees to imagine they were on a panel for the California Public Utilities Commission (CPUC). They were then asked to help brainstorm ideas to help serve the low-income community and to react to ideas that Evergreen presented to them.

There was a high level of appreciation for existing utility programs and a sense that the current offerings met a lot of needs. Ideas and feedback provided by the focus group attendees included additions to current programs, high interest in usage alerts, additional energy education, solar power offerings, and tips on where the utilities could advertise.

- **Usage alerts**. Usage alerts received a very enthusiastic response from focus group attendees. Many compared these to alerts they get from their cell phone companies and saw them as a way to help keep their bills consistent with prior bills and to encourage household members to help them save money on their bills. From the telephone survey, we know that 59 percent of low-income respondents reported having regular Internet access *and* that they use their cell phone as much as, if not more than, their computer to access the Internet. This shows that at least 59 percent of the targeted customers (likely more given that this is just out of those that claimed to have regular Internet access on their phones) could use such a tool. Awareness of existing usage alerts offered by some IOUs appeared to be low, however.
- **Additional education**. Focus group attendees were interested in energy education that goes beyond standard energy-saving tips that may apply to a broader group. They prefer tips that are customized to their household. *"Pamphlets you can ignore but if someone comes in and shows them what they can save, no one doesn't want to save money."* One focus group attendee noted that this sort of education happened at their initial ESA visit. *"We talked for two hours and she was telling me all we can do like putting window tinting."*
- **Solar**. Many focus group attendees were interested in customer-sited solar that is supported by the utilities because they think it would lower their bills. Focus group attendees cited current barriers to self-funded solar including upfront costs, concerns for repair costs, and that they may not own their home. One focus group attendee suggested that it would be better if a utility offered them solar rather than third-party providers because "*you know they are going to be reliable.*"
- **Advertisement locations**. The Penny Saver or weekly ads that come in the mail was the most frequently mentioned place to advertise utility programs. Many focus group attendees seem to review these each week. Other suggestions included a community day where a utility sponsors admission to a public pool where they can share messages about cooling off, television commercials, and being in locations where people look for jobs or get assistance such as the Social Security office.
- **Taking measures with you**. At least one attendee spoke of the value in on-going measures and measure services. This attendee suggested that energy efficiency programs engage with households on a more on-going basis, offering repeat measures or some other cost-share arrangement to help households replace aging equipment (or even light bulbs) when they need it in the future.

4.4.6 Ancillary Energy Education and Behavior Change Reference Material

Past reports on energy education and behavior change helped inform our thinking about opportunities to provide customized energy education that is more likely to lead to reduced energy consumption and bills.

In looking at behavioral literature,[69] there are existing recommendations regarding how to best engage customers including regular interaction and communication and customer pledges and goals to create greater commitment by the household. The same literature also included recommendations that community-based interventions be used to leverage social engagement and motivate households and suggested that customer information-sharing (as we saw in the focus groups) about discoveries on how to save energy can be effective. Another study[70] recommended that assessors pick a limited number of energy-saving suggestions for each household and that households get follow-up information in the form of newsletters or texts.

4.4.7 Summary and Conclusions

The insights from the focus group discussions and our examination of high burden telephone survey respondents highlight several implications for program design, delivery, and policy considerations. Some details of the discussions may also prove helpful to program implementers to build on their knowledge of high burden customers.

Evergreen's examination of high burden customers suggests that:

- There is interest in more extensive and customized energy education. While utilities are seen as a source of information already, high burden customers expressed interest in more detailed and household-specific energy-saving suggestions. Furthermore, they expressed confusion and misperceptions about the most efficient way to cool (and heat) their homes and held some misconnections about which end uses make up the bulk of their energy use (or, more importantly, which offer the greatest opportunities to realistically reduce consumption). There is clear interest in managing energy costs among high burden customers and in additional insights from their energy providers in practical, home-specific approaches that build on (or correct) the customers' existing practices.
- Usage alerts generated enthusiasm among the focus group participants and are a potentially helpful energy education tool if structured with customized tips. Such

[69] Schick, Skip, and Summer Goodwin. 2011. Bonneville Power Administration's *Residential Behavior Based Energy Efficiency Program Profiles*. Bonneville Power Administration.
[70] Westberg, Steven, and Valerie Richardson. 2013. *Energy Savings Assistance (ESA) Program Energy Education Research 2013 Final Report*. HINER & Partners, Inc. and DNV KEMA. http://www.calmac.org/publications/ESA_Energy_Education_Report_FINAL_103113_ES.pdf

usage alerts could be offered where not available yet and marketed better where they are available. Usage alerts could be real-time, scheduled during billing cycles, or triggered by usage levels and customer goals (or generic goals in the absence of customer-provided usage and bill targets).

- IOUs may consider ways to establish ongoing engagement with CARE, ESA, and FERA customers so participation and enrollment become a customer-utility partnership or relationship rather than a one-time transaction. Elements of this ongoing relationship could include information such as newsletters and usage alerts, and on-going services such as replacements of energy-saving light bulbs supplied by ESA upon burnout or check-ins on appliances that were provided to ensure they are still operating efficiently. The customer-utility partnership could even be communicated in a way that establishes a reciprocal expectation that the IOU help the customer with reduced rates and the customer does what he/she can to reduce usage. Commitments from customers to this effect at sign-up would leverage behavioral theory to spur behavior change and could help households where internal dynamics stand in the way of more conservation-oriented energy practices.
- While general residential consumers often seem to react only modestly to inducements intended to affect their energy practices, the focus groups for this study suggest that low-income, high burden customers do respond to the various trade-offs before them with deliberation. Rate designs, program services, and payment arrangements offered by IOUs do seem to affect how low-income high burden customers navigate their efforts to balance comfort, costs, and conservation. For example, lower rates through CARE reduce a household's energy costs and may well prompt some households to use more energy for increased comfort. Similarly, flexibility by IOUs in allowing payment arrangements reduces the imperative to pay energy bills first (as some households do with rents and car payments) and thus may increase arrearages, but also promotes cooperation from customers and supports their efforts to juggle bills and keep up on payments. IOU rates, programs, billing practices, and non-IOU resources work together to drive how low-income high energy customers balance energy and non-energy needs and make trade-offs between energy conservation and usage. It is important to keep these interactions and the perspective of the customer in mind in rate and program designs.

5 Results: Program Accessibility, Unique Challenges, and Opportunities

This section addresses selected program accessibility issues identified in the scope of work for this Low Income Needs Assessment. The research priorities were then refined during the research planning process and informed by interviews with the investor-owned utilities' (IOUs') low-income program teams.

In seeking to provide all income-eligible and willing households with program services, the program administrators have found that households often have unique issues and potentially more complex needs that might benefit from services or outreach approaches beyond what are currently offered via the Energy Savings Assistance (ESA) and California Alternate Rates for Energy (CARE) Programs. This section focuses on providing some additional information on five specific customer segments within the low-income population including:

- Renters in multifamily properties[71]
- Asian language households[72,73]
- Undocumented immigrants
- Seniors
- People with disabilities

For each of these groups, Evergreen sought to understand what, if any, unique needs and opportunities exist among these customer segments that IOU programs may address with alternative program designs or implementation approaches. In particular, we examined various issues associated with marketing, outreach, and enrollment. At times, we also discuss measure needs and opportunities, although this topic is covered more comprehensively in Section 6.

The research methods and emphasis varied across these customer groups based on: (a) unique challenges in executing the research with some populations (e.g., immigrant

[71] These were introduced as renters in the research plan but were narrowed to multifamily renters for our research.
[72] Research concerning Asian language households concentrated on ethnically Asian households whose members maintain primarily Asian cultural identities and linguistic practices and may, thus, differentiate themselves with unique circumstances, needs, or opportunities. We refer to these households generally as "Asian language households."
[73] The research on households with predominately Asian languages and cultural identities and undocumented immigrants stemmed from an initial plan to better understand customers with limited English proficiency.

populations) (b) program administrators identified information needs and priorities, and (c) the extent to which past studies provide insight on these customer groups.

This section outlines some of the results based on qualitative interviews and observations, and analyses of the telephone survey responses from the current and past Low Income Needs Assessments. For key groups identified, overall CARE eligibility and penetration based on the telephone survey results are initially presented as background in so far as it guided the additional data collection and analyses relevant to the study objectives.

5.1 CARE Penetration and Eligibility of Surveyed Households

Generally, enrollment in CARE among eligible households is considered to be very high. Research by Athens Research establishes estimates of program eligibility which are used by the IOUs to report program penetration in their annual program filings. These reports suggest that 2015 CARE enrollment was, on average, 84 percent.[74] ESA program penetration from 2002 through 2012 was previously estimated at 52 percent (based on IOU ESA program tracking data).

Income-eligible respondents to the Low Income Needs Assessment's telephone survey appear to be enrolled in CARE at a lower rate than this overall average. Using self-reported incomes[75] and household sizes collected through the survey and actual CARE enrollment data from IOU records, we estimated that 66 percent of the survey respondents who are at or below 200 percent of the FPL are enrolled in CARE.

We note that the estimated enrollment rate for our telephone survey sample are provided for context and not intended to be compared directly to the overall statewide enrollment estimates. Computational and methodological differences may account for the differing estimates.[76]

An examination of income-eligible households *not* enrolled in CARE provides a valuable opportunity to understand this important segment of potential customers. We refer readers to Section 4.2.1 for a description of income-eligible households that are not enrolled in CARE.

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[74] IOUs' applications for the 2015-2017 CARE and ESA Programs (Applications 14-11-007, 14-11-009, 14-11-010, and 14-11-011).

[75] For the ten percent of respondents who did not report their incomes, we estimated their incomes based on Census data for the respondents' Census block.

[76] This study's estimate is based on a sample frame that comprises zip codes with elevated concentrations of low-income households (covering 71% of low-income households served by the IOUs), subject to non-response bias inherent in telephone surveys and potential reporting bias in incomes provided by households in response to our survey questions, and excludes categorically eligible households above 200 percent of the FPL.

Among the three household segments featured in this section for which we have telephone survey data, there are no meaningful differences in the share of eligible households enrolled in CARE. Multifamily renters, households with seniors, and households with disabled residents all show CARE enrollment rates of close to 66 percent, as shown in Table 34.

Table 34: CARE Enrollment and ESA Participation by Household Characteristics (2016 Survey, Low-Income Only)

Household Characteristics	CARE Enrollees[77]*	ESA Participants**
Multifamily renters (n=252)	68%	51%
Undocumented immigrants	n/a	Unknown
Asian language customers	n/a	Below average***
Household with seniors (n=198)	65%	56%
Household with disabilities (n=211)	66%	54%
Overall	66%	52%

* CARE enrollment based on 2016 IOU tracking data for LINA survey respondents and demographic (income and household size) data reported by respondents to gauge eligibility. The n-values shown for each respondent type correspond to the 2016 survey data only.
** ESA participation based on 2013 IOU tracking data and demographic data based on 2013 telephone survey responses.
*** The 2013 LINA survey provides an indication that Asian language-speaking customers participate in ESA less frequently than average. Among respondents (who also needed to speak English or Spanish to complete the survey), 2.9 percent of ESA participants reported speaking an Asian language, while 8.3 percent of non-participants reported speaking an Asian language. Because the survey was not fielded in Asian languages, these data should be interpreted as directionally indicative, but not as numeric estimates.

[77] While enrollment rates for the groups of survey respondents shown in the table are all similar among households with FPLs below 200 percent, there are substantial variations within income subgroups. For example, among multifamily renters, there are significantly more CARE enrollees in the LI1 category (74%) than in the LI2 category (62%). Households with seniors are more similar with 69 percent of LI1 households with seniors being CARE enrolled versus 63 percent in the LI2 category. Among households with disabilities, 71 percent of LI1 households are enrolled with CARE, compared to 61 percent of LI2 households.

5.2 Renters in Multifamily Properties

The vast majority of low-income households in California live in either single-family homes or in multifamily buildings, and nearly all either rent or own their homes. Multifamily buildings and rental arrangements each provide unique challenges and opportunities for the IOUs' low-income programs. Dwellers in multifamily properties generally have lower energy costs—and thus, generally fewer opportunities to save additional energy—while renters face barriers to participation in ESA associated with the need for landlord approval and more frequent moves than home owners.[78]

The study team identified multifamily renters in particular as a segment to examine in order to better understand the specific needs and barriers this customer group faces and what energy saving opportunities and benefits may be possible from in-unit and other types of common area building-level measures.

Study insights presented in this section are based primarily on 20 telephone interviews with low-income tenants in multifamily units. These interviewees were recruited from eligible respondents to the study's telephone survey. This section also draws on the 351 respondents to the 2016 telephone survey who rent their homes in multifamily buildings and on the 342 respondents to the 2013 Low Income Needs Assessment. We present a brief characterization of multifamily renters' energy costs and incomes and summarize key results from the tenant interviews.

5.2.1 Characterization of Multifamily Renters' Energy Costs and Incomes

As noted previously, multifamily renters generally have lower usage and thus lower energy costs than households in other housing types, but they also have lower incomes. As shown in Figure 23, the average annual energy bill for multifamily renters in this study's 2016 telephone survey was $807 compared to $1,066 for single-family renters and $1,251 for single-family homeowners. Similar patterns hold for low-income households in these housing types.[79]

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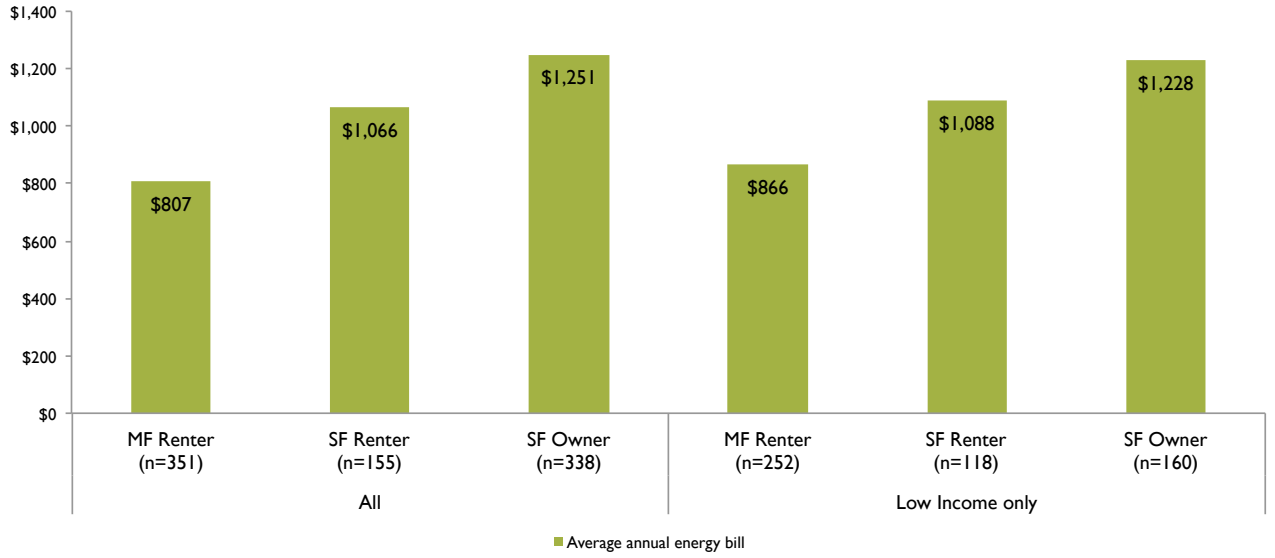
[78] Among respondents to the 2016 Low Income Needs Assessment telephone survey, low-income renters had been, at the time of the survey, in their home for a median duration of four years for those in multifamily properties and five years for those in single-family homes. In comparison, single-family homeowners had been in their homes for a median duration of 16 years.

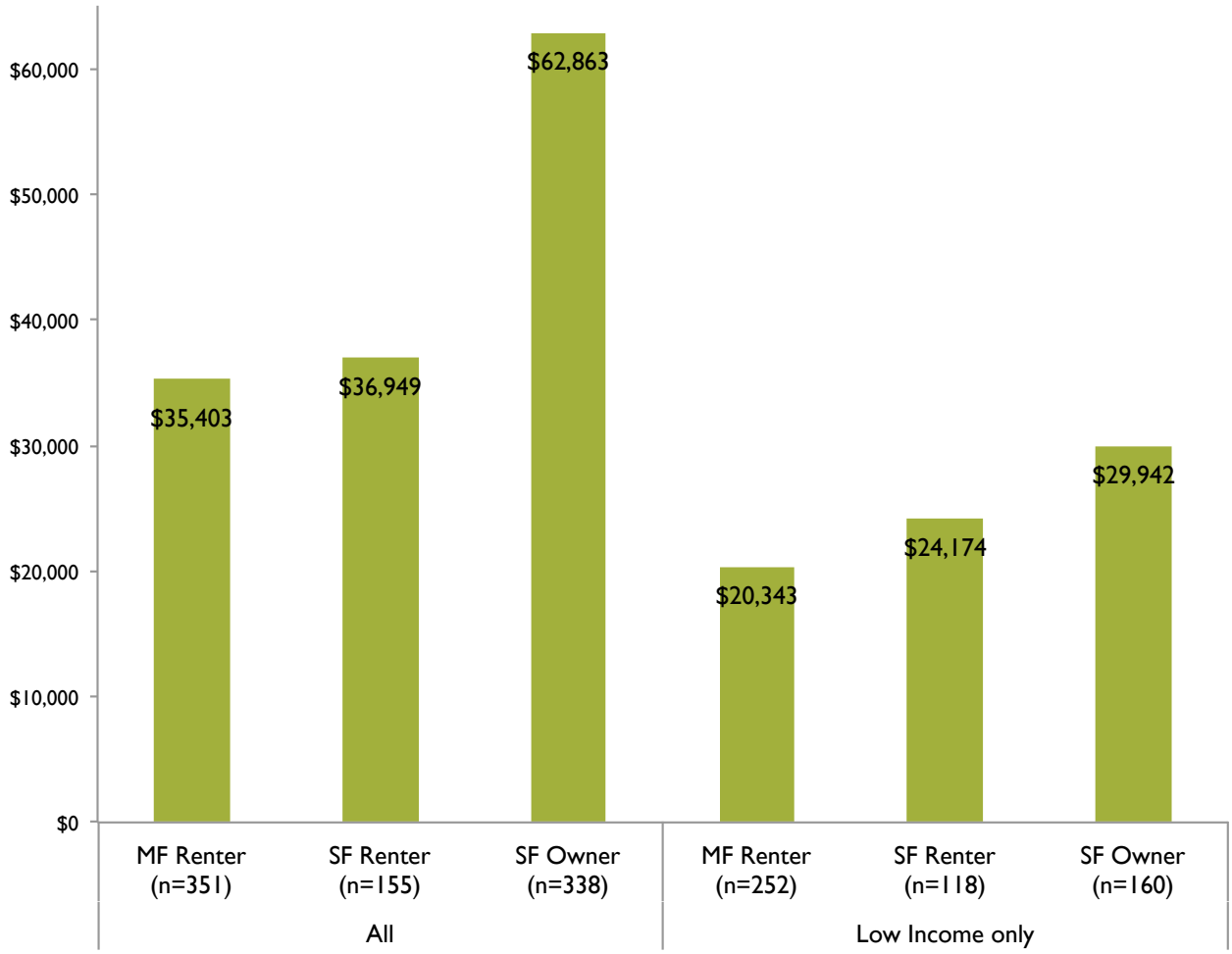
[79] Energy costs were based on billing data provided by the IOUs. For dual-fuel customers, we used billing data for the IOU whose sample allocation led to the household's inclusion in our sample and estimated the other fuel's costs based on ratios of electricity to natural gas costs among dual-fuel households for whom we had both sets of costs.

Figure 23: Multifamily Renters Compared with Single-Family Renters and Owners (2016 Survey, All Incomes and Low-Income Only)



Meanwhile, annual incomes tend to be higher for homeowners then they are for renters, especially those in multifamily homes. Homeowners across all income levels who responded to the survey had nearly double the income of either multifamily or single-family renters. Within low-income households, those who rent units in multifamily buildings also have the lowest household incomes (about $20,000, on average), but the differences among housing types are not nearly as drastic, as shown in Figure 24. Single-family renters averaged $24,000 in household income while single-family owners reported incomes of around $30,000.

Figure 24: Average Income – Multifamily Renters Compared with Single-Family Renters and Owners (2016 Survey, All Incomes and Low-Income Only)



5.2.2 Multifamily Tenant In-Depth Interviews

The qualitative research of multifamily renters consisted of 20 in-depth interviews with low-income tenants in multifamily buildings who had completed the quantitative telephone survey and agreed to an interview. While we present statistics on interview responses for the 20 interviewees, this research should be viewed as qualitative in nature and informative, but not necessarily representative of low-income multifamily renters overall.

We stratified this pool of interviewees into three distinct groups:

- Self-reported ESA participants (2 interviews);
- Self-reported participants in any other utility assistance programs or rates (11 interviews); and

- Households that reported not participating in—or receiving—any utility assistance (7 interviews).[80]

The interviewees lived in buildings that fall in a range of sizes. Just under half were in buildings with fewer than 50 units, and a quarter lived in buildings with 10 or fewer units. Average length of occupancy was five years, but most individual respondents had lived in their units for four years or less. While we sought information about the ownership structure of these buildings to understand how many were subsidized housing or owned by housing authorities, we were not able to determine ownership with sufficient consistently to report on it.

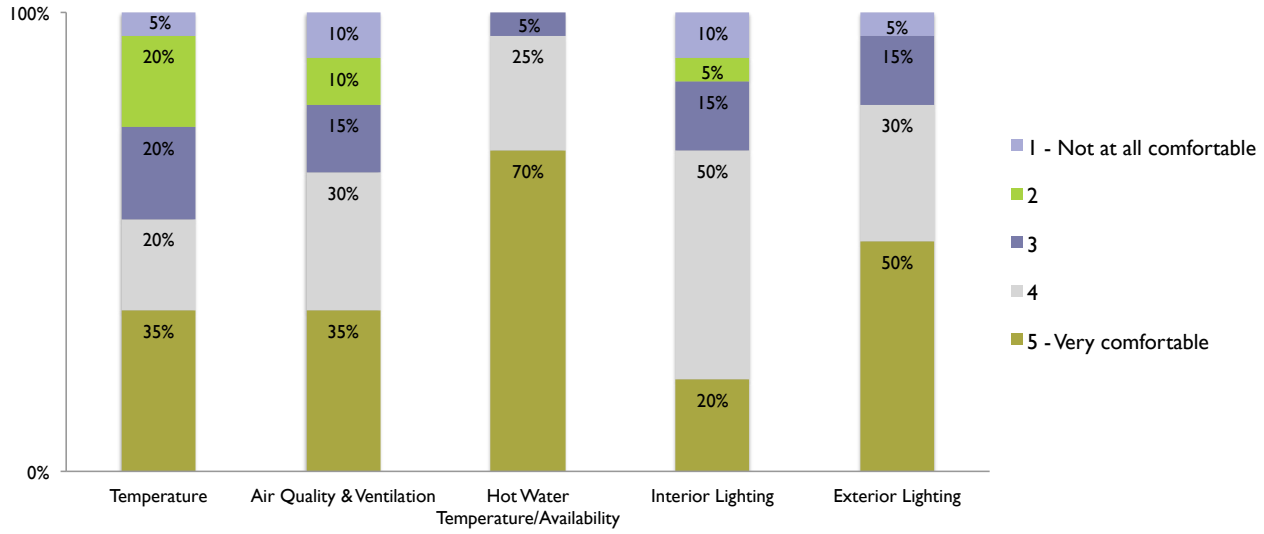
Appendix C includes the interview guide, more information about the sampling of the interviewees, and their characteristics.

Multifamily Tenant Comfort Levels

Most tenants reported moderate to high levels of comfort in their apartments. When asked to assess comfort on a five-point scale,[81] interviewees rated their unit's temperature at 3.7, air quality/ventilation at 3.8, hot water temperature and availability at 4.7, interior lighting at 3.7, and exterior lighting at 4.3. As shown in Figure 25, while 70 percent of respondents said they were very comfortable with their hot water temperature and availability, only 35 percent of respondents reported being very comfortable with their air quality/ventilation and temperature.

[80] Even if utility records indicated they participated in CARE.
[81] On this scale, 1 was defined as "not at all comfortable" and 5 was "very comfortable."

Figure 25: In-Unit Comfort Levels (2016 Multifamily Tenant Interviews)



One of the primary reasons some tenants reported lower satisfaction with their apartment temperature and air quality was excessive warmth during the summer months, especially among the nine interviewees who do not have air conditioning in their units. Some tenants said they have difficulty keeping any warmth in their unit during cooler months due to poor insulation. Additionally, multiple tenants reported lower scores on their interior lighting because they said they have no real overhead lighting; six interviewees rely primarily on plug-in lamps and natural sunlight.

In response to the telephone survey they had taken previously, over half of the interviewees had also reported that their apartments were sometimes too warm or cold because of heating or cooling equipment failures.[82]

Multifamily Tenant Perceptions of Building Upkeep

For general context on building upkeep and maintenance, we asked interviewees a series of questions regarding their perceived level of building and in-unit upkeep by their landlords. Overall, three quarters of interviewees (14 of 20) gave good marks to their units' and buildings' upkeep, while the remaining interviewees said their apartments were not well maintained.

Building interiors and units, in particular, were seen as needing the most work. Some interviewees described their apartments as old and needing foundational updates that

[82] Sixty percent of interviewees reported that their home was colder than they would have wanted on one or more occasions because their heating/cooling equipment could not keep up; 30 percent said their home was warmer than desired for similar reasons.

their landlord was not currently pursuing and that maintenance requests took too long to process. In contrast, building exteriors—including the landscaping, garden, and pool areas—were especially well maintained.

Nearly all respondents did say that their current building had some type of process in place for contacting the landlord or maintenance manager about maintenance issues, possible building upgrades, or equipment replacements. All of the respondents said the process is relatively informal and generally consists of them contacting their landlord or maintenance manager directly with their request, either by calling, approaching them in person, or leaving a note. A large majority of interviewees (17 of the 20) said they could not think of any reason why they would avoid making a maintenance request with their landlord.[83]

However, at the same time, just over half of the interviewees indicated that they had appliances or other equipment in their apartments that they wanted to upgrade but were unable to. These appliances included refrigerators (5 interviewees), stoves (4), air conditioners (2), and dishwashers (2). Respondents noted that they were unable to replace their appliances because their landlord was unwilling to pay for the new appliance and in general did not make major investments in new equipment upgrades unless the equipment was fully broken.

Building Efficiency Projects and Impact on Tenants

Interviewees were also asked about building upgrades to common area equipment in an effort to better understand the impact tenants perceive from such work. For these interviews, we did not distinguish between projects funded by building owners and those that might have obtained incentives from IOUs or any other sources.

Nearly half of the interviewees (9 in all) noted that they were aware of some type of major project involving their building's heating system, cooling system, water heater, lighting, or other types of projects at their apartment complex. Table 35 lists the building systems for which interviewees were aware of major work. Work involving water heaters, lighting, and windows were most common; only two interviewees mentioned any type of large-scale project involving heating and cooling equipment, which tends to have larger energy implications. Nearly all of these projects occurred in the past three years.

[83] The other three interviewees commented that they might not make a request that they think would not receive a response or could strain their relationship with their landlord.

Table 35: Multifamily Project Types (2016 Multifamily Tenant Interviews)

Equipment Type	Frequency	Project Types
Water Heater	7	Central Boiler Replacement (n=4) Central Water Heater Replacement/Piping Replacement (n=2) In-Unit Water Heater Replacement (n=1)
Lighting	3	Exterior Lighting Upgrades (n=2) Interior Overhead Lighting Replacement (n=1)
Heating System	1	Thermostat Replacement/Heating Vent Replacement
Cooling System[84]	1	Portable AC Installation
Other	8	Window Replacements (n=3) Roofing Replacements (n=2) Showerhead Upgrades (n=2) Dryer Replacement (n=1)
Total	**20**	

Of the nine reported water heater, heating system, and cooling system projects, seven were completed because the existing equipment was either not working or had continuous failures reported by tenants. For the three lighting projects, two interviewees said the projects were completed to improve the efficiency in their apartment complex, while the other interviewee said it was part of the regular maintenance program for their building. The roofing and dryer replacements were necessary repairs, while the window replacements and showerhead upgrades were completed to help improve efficiency. Two of the respondents that had window replacements also acknowledged the new windows helped control the internal temperature in their unit.

Across all of the reported projects, most interviewees (17 of 20) indicated that the upgrades did help improve their overall comfort and satisfaction with that particular piece of equipment.

Despite the respondents' increased overall comfort and satisfaction levels, only one respondent—whose landlord upgraded the complex's water heater, in-unit thermostats, and heating ventilation—observed a change in their energy bill since the project's

[84] One additional participant also noted that their landlord recently informed them of a major remodel that will be taking place in the next couple of months that will include a central AC installation.

completion, as the energy bills were lowered by over 50 percent. The remaining respondents said they have not observed any change in their utility bills as a result of the large-scale projects; however, three respondents noted their utility bills were relatively low to begin with, making it difficult to observe any type of change.

Additionally, none of the respondents said the major projects at their apartment complex had any type of observable effect on their rent; although three of the 20 interviewees said their rent had gone up, they were unsure of the reasoning behind the rent increase. Furthermore, respondents reported being unsure if the energy costs associated with common area equipment, including the equipment involved in major projects, factored into their rent and utility bills in general, with over half of all respondents (11 of 20) saying they had no idea on the effects of common area usage on their monthly bills.

Control Over Energy Costs and In-Unit Energy Efficiency

Interviewees indicated that they are able to control their heating and cooling—regardless whether heating and cooling is provided through a central or unit-level system. Overall, however, they feel they have only moderate control over their monthly energy costs. A third feel they have complete control, while a fifth said they have little or no control. On a five point scale,[85] interviewees rated their overall level of control over energy costs an average of 3.5.

One factor that may contribute to the interviewees' perception that they lack effective control over energy costs is uncertainty about what usage contributes most to their costs. When asked what accounted for the majority of their energy usage, over half of the interviewees indicated that they were not really sure and provided a variety of educated guesses ranging from electronics and stoves to heating and cooling systems, as shown in Table 36. The largest number (9) thought their biggest energy user was their air conditioning.

[85] On this scale, a rating of 1 was defined as "no control" and 5 represented "complete control."

Table 36: Multifamily Interviewee Perceptions of Their Largest Energy Usage / Equipment (2016 Multifamily Tenant Interviews)

Equipment Type	Frequency
AC	9
Stove	4
Heating System	4
Refrigerator	4
Household Electronics	2
Water Heater	2
Lights	2
Fans	1
Washer/Dryer	1
N/A	2
N	**20**

Additionally, just over half of the interviewees also said that at least one of their appliances or pieces of equipment that use significant amounts of energy was particularly old or not working properly. Specifically, these equipment types included refrigerators (5), stoves (3), heating or AC units (3), and other household electronics (2).

Multifamily respondents noted other factors that make it difficult to control and lower their current energy costs, including the necessity of longer heating and cooling equipment operating hours due to poor building insulation (5), the lack of landlord interest in improving their building's energy efficiency (3), and the overall lack of ability, knowledge, or resources to improve their current energy usage (3). Despite these barriers, nearly all interviewees indicated that they do pay attention to and actively try to reduce their energy usage.

The vast majority of these interviewees said keeping their monthly costs down is the main motivation for limiting energy use, while two respondents mentioned they were motivated by environmental issues and by limiting their energy footprints. The most common ways that multifamily respondents said they actively try to reduce their household energy consumption included turning off or unplugging appliances and electronics that are not in use (9), turning off their lights when not in use (7) and turning off their heating and/or cooling systems (7). Other strategies mentioned by individual interviewees included calling their utility company for advice, replacing existing bulbs with LEDs, comparing their utility bills month-to-month to create a savings goal, and

going to large retailers or public buildings during the day to limit heating and cooling needs and energy use in their homes.

A review of survey response data from the 2013 Low Income Needs Assessment suggests that, in general, a lower percentage of multifamily households said they know how to lower their household energy bill (59%) compared to single-family households (64%); however, the difference was not statistically significant. Of those customers that did say they knew how to lower their energy bills, multifamily households were significantly more likely to mention several energy-saving actions such as unplugging equipment when not in use, turning off the AC, and turning off the lights.[86]

Tenant-Utility Relationship and Needs

To understand the tenant-utility relationship and customer needs further, we inquired about various types of utility support (and other energy-related programs for low-income households). Most interviewees (18) said they were aware of at least one offering that their utility provided to help renters reduce their energy usage and subsequently lower their monthly bill. A majority (15) said they were aware of the CARE program, while 25 percent of respondents said they were aware of the Low Income Home Energy Assistance Program (LIHEAP), which is a federally funded program targeted at low-income customers.[87] No one mentioned ESA in response to this open-ended question, including the two interviewees who had referred to ESA during the telephone survey.

About half of the interviewees said they first learned about the utility programs directly through their utility—either through the mail or by a phone call—while a quarter said they first heard about the programs by word-of-mouth through friends or family members. Additional sources mentioned by individual interviewees included the respondent's landlord and online research. In general, when communicating with their utility company, interviewees' preferences were split evenly among telephone calls, direct mail, and e-mail.

Of the 18 interviewees who were aware of utility offerings, all felt the programs of which they were aware are helpful for multifamily renters, primarily because they help renters save money on their monthly bill. As one respondent noted, these savings can be very beneficial for low-income tenants who rely on their monthly income for other expenses:

> *"These programs are very helpful, especially for me because the utility worked with me on my bill so I could use the money for other things like food and other bills."*

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[86] A majority of multifamily households that said they actively try to save energy in the 2016 LINA survey also reported implementing these same energy-saving strategies.

[87] An additional five participants said they were unaware of the program names but described utility programs similar to CARE and LIHEAP.

In addition to CARE and LIHEAP, respondents also said they would be interested in other types of utility services such as rebate offerings for windows, AC units, refrigerators, and recycling. Respondents noted interest in rebate programs specifically because they felt that rebates would help renters update their own inefficient appliances and equipment that their landlords have been reluctant to replace because of the capital investment. While half of the interviewees discussed their interest in energy efficient rebates, only one interviewee—who happened to be the property manager as well—expressed awareness of existing rebate programs.

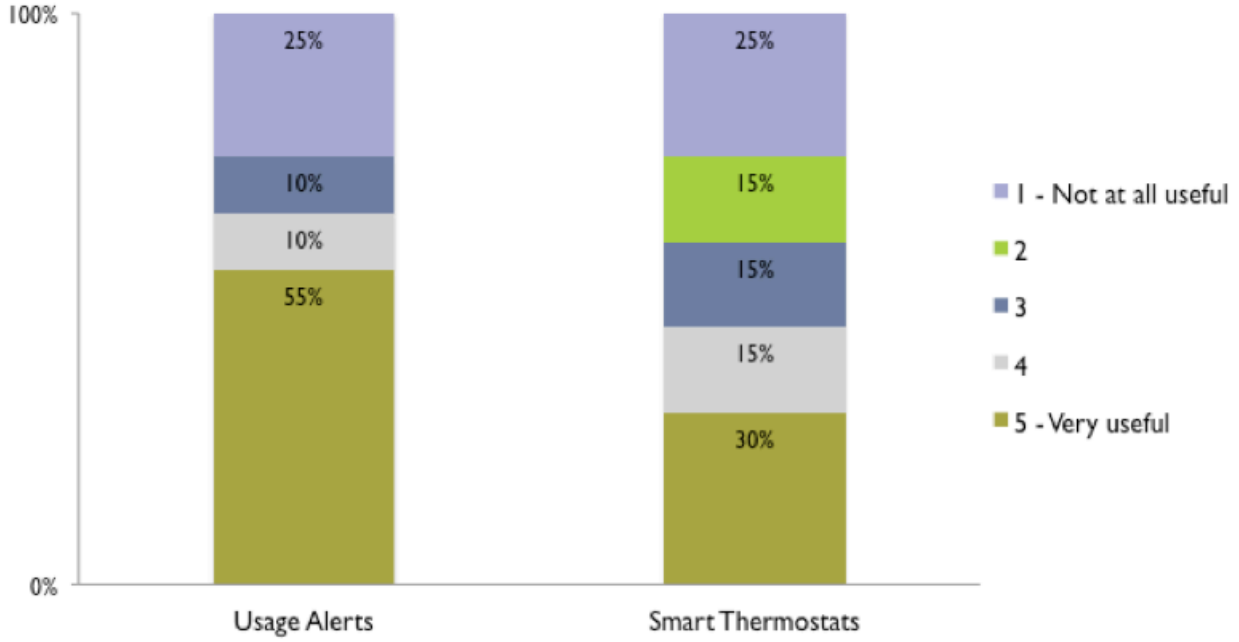
Interviewees were also asked about their perceived interest in other utility intervention strategies such as smart thermostats and usage alerts that tell them how much energy they are currently consuming in relation to an established goal. (These interventions had been identified by program administrators as possible future interventions and, in the case of usage alerts, are already offered by some IOUs.) Interviewees expressed high interest in usage alerts and moderate interest in smart thermostats. Eleven interviewees gave usage alerts the highest possible rating of interest, compared with only six for smart thermostats.

Interviewees liked the usage alerts primarily because they felt the alerts would help them save energy, and subsequently money, throughout the month.

A third of the interviewees noted that the smart thermostat may not be very helpful for them because they did not use their current thermostat very often and did not think the smart thermostat technology could help them save on their monthly bill. Another third thought that a smart thermostat would be very helpful for them if it could help regulate when they use their heating and help maintain the temperature in their home better than their current thermostat.

Figure 26 shows a detailed breakdown of the perceived usefulness of both the smart thermostats and usage alerts among respondents.

Figure 26: Usefulness of Usage Alerts and Smart Thermostats (2016 Multifamily Tenant Interviews)



5.3 Community-Based Organization Research

The study team identified customers with limited proficiency in English or Spanish[88] and/or undocumented immigration status as two groups of customers that have not been well understood and explored in prior research. To provide additional insights, we tapped the professional expertise and experience of community-based organizations (CBOs) with histories of working with these populations. Before describing our work with CBOs to inform this research, we first introduce these two groups and how they fit into the broader California landscape.

Households with Undocumented Residents

A primary goal of this research was to gain a better understanding of undocumented immigrants and their interactions with low-income programs. Based on qualitative research and anecdotes from the prior Low Income Needs Assessment studies, undocumented immigrants may be more cautious about engaging with programs designed to provide assistance services until they have established trust in the organizations delivering these program. In addition to examining the validity of this

[88] As noted below, households that predominantly speak an Asian language represent the next largest language group in California.

preconception, a second research goal was to understand any challenges that undocumented immigrants may face in providing income documentation when asked for it.

Households with Predominately Asian Cultural Identities

A review of languages spoken by customers in each IOU territory suggests that Asian languages—particularly Chinese, Vietnamese, Korean, and Tagalog—are the most prevalently spoken languages among low-income Californians after English and Spanish. There is already substantial information and program effort to address English and Spanish-speaking customers,[89] but less is known about whether language and cultural differences for Asian language customers create unique needs or program challenges. These customers do have lower participation rates than low-income households in general suggesting the need for more exploration of their needs and opportunities to engage them. Table 37 shows households that speak the language in the home. Looking at the broader group of immigrants in California, 58 percent of Asian American community members are first generation immigrants and 37 percent of Hispanic Americans are first generation immigrants.[90]

Undocumented immigrants are estimated to make up 6 percent of California's population,[91] including immigrants from Mexico (70% of undocumented immigrants), Guatemala (7%) and El Salvador (4%) among other countries.[92] Our selection of CBOs to help us gain insight into this population segment reflects this demographic breakdown.

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[89] The telephone survey for the prior LINA and this current study is conducted with English and Spanish-speaking households only.

[90] Center for Sustainable Energy and Research Into Action, Literature Review: *Housing, Energy Use, Decision-Making among Key Ethnic Groups in California*, February 2016

[91] Public Policy Institute of California, *Just the Facts, Undocumented Immigrants*, September 2016. http://www.ppic.org/main/publication_show.asp?i=818

[92] Migration Policy Institute, *Profile of the Unauthorized Population: California*, September 2016. http://www.migrationpolicy.org/data/unauthorized-immigrant-population/state/CA

Table 37: Language Spoken in Household—
Of California Population That Speaks Language – Percentage that Speaks English Less than "Very Well"

	Percentage of California Population	
	Speaks Language	Speaks English Less than "Very Well"
Chinese	3.3%	57.1%
Vietnamese	1.5%	60.3%
Tagalog	2.3%	34.0%
Persian	0.5%	40.4%
Japanese	0.4%	46.1%
Korean	1.0%	55.2%
Mon-Khmer, Cambodian	0.2%	51.4%

Source: 2015 ACS
This table presents the portion of households that speak each language independent of whether other languages are spoken. This table allows multiple languages to be spoken per household. This table excludes Thai, Laotian and Hmong, which are spoken by less than 0.1% of the population.

Methodology

Evergreen conducted a total of six in-depth interviews with CBOs; we then conducted on-site visits with four of the CBOs we interviewed. All six CBOs serve undocumented immigrants, and four of the six also serve Asian language speaking communities.

A list of CBOs was developed with the study team and included the IOUs, the CPUC, and the Low Income Oversight Board. This list was ranked to cover a range of IOU service territories and types of outreach work. An initial call was conducted with each CBO to assess outreach work and the opportunity to perform on-site observations and interviews.

While working with undocumented immigrants is not the main focus of many of these CBOs, they often come across this population through their work. Four of the six CBOs also work with Asian language speaking community members; we present our observations on that population in Section 5.3.2. Table 38 describes the CBOs based on the groups they serve and their involvement with ESA and CARE.

Table 38: CBOs – Groups Served and ESA and CARE Involvement

	Group Served		IOU Programming	
CBO	**Undocumented Immigrants**	**Asian Language Speaking**	**ESA**	**CARE**
A	X	X	(Recruitment only)	X
B	X	X	(Recruitment only)	X
C	X	X	(Recruitment only)	X
D	X	X	X	
E	X		X	
F	X			X

Table 39 presents the characteristics of the CBOs with which Evergreen completed in-depth interviews. All CBOs offer information or assistance with other programs in addition to CARE and ESA efforts, such as health care access, food services, and education programs. Four of the organizations cross promote the IOU offerings with their other programs (the two that did not attributed the lack of cross promotion to contractual terms and limitations).

Table 39: Characteristics of CBOs Interviewed and/or Visited

CBO	Well Known in Community	Community Center or In-person Location	Non-English Languages Spoken by Staff	Geographic Location
A	X	X	Mandarin, Vietnamese, Cantonese	Bay Area
B	X	X	Primarily Spanish	Orange County
C			Spanish, Vietnamese	Los Angeles
D		X	Chinese, Mandarin, Spanish	Los Angeles, Central Valley
E	X		Spanish	Central Valley
F	X	X	Spanish	San Diego

We also completed site visits with four of the six CBOs for opportunities for additional interaction with staff and observation. Table 40 lists the CBOs Evergreen visited, along with a description of what occurred during each visit.

Table 40: Summary of On-Site Visits with CBOs

CBO	Visit Description
A	Observed class for elderly community members at a community center in San Francisco. Included education about IOU low-income programs in addition to information about the process for achieving citizenship. Interviewed staff who presented energy related offerings to attendees. Class happens weekly, with a new topic covered each week.
B	Visited Mexican consulate with CBO, which conducts weekly visits to share information about ESA and CARE to community members who are waiting to be served at the consulate. Observed interactions with community members as staff member approached them to discuss IOU low-income programs. Spoke with staff person who works with community members in different locations about her experiences.
C	Attended monthly food distribution in Westminster in Southern California. Toured community center with Spark Point OC staff member and observed food distribution which included interaction with and assistance to community members who were signing up for food distribution or who were interested in IOU programs. This event was also the annual sign up day in which community members had to reenroll in the program to continue receiving food distributions.
D	Visited offices in Fresno and listened in to incoming calls regarding ESA services. Spoke with staff who answers calls regularly in addition to implementers who complete initial field visits and education with customers in the Fresno area.

For each of our two target groups—undocumented immigrants and Asian language customers—we present the CBOs' overall assessments of the degree to which these households differ from low-income households in meaningful ways. We also discuss insights from the CBOs on effective outreach strategies and the roles income documentation play in the customer segments' participation in IOU programs with income verification requirements.

5.3.1 Low-Income Households with Undocumented Residents

CBOs that serve undocumented immigrants generally do so in the service of broader populations, such as low-income communities with particular ethnic ties or immigrants generally. CBO staff do not necessarily know when they are serving undocumented immigrants. As such, information they could share about serving undocumented immigrants is based on a general knowledge of the cultures and communities in which

undocumented immigrants live and insights from specific instances when clients reveal that they are undocumented.

Unique Customer Needs

When asked directly whether undocumented immigrants interact with energy programs differently than other low-income community members, CBO staff noted only isolated differences. The general takeaway from these interviews was that CBO staff do not perceive any differences to be very significant.

When encouraged to give the question additional consideration or to note more minor differences, CBOs shared some characteristics they thought may be unique to undocumented immigrants. However, their examples tended to vary among the CBOs, leading to no clear patterns. Examples of differences noted include:

- Lower levels of trust with unknown individuals or institutions and fear of fraudulent activities that may take advantage of households (mentioned by two CBOs);
- Mixed eligibility statuses on accounts serving immigrant households – Income-eligible new immigrants (whether documented or not) may initially live with relatives or share housing with other households. The account holder in these cases may not be CARE eligible or consider applying for CARE even though the immigrant household would qualify on their own. If utility costs are shared, the immigrant household would not benefit from CARE in these cases;
- Various rental-related barriers, including alternative or informal payment structures for utility costs that may be paid through a landlord (who can be a relative) and increased reluctance to approach landlords about program participation or other requests in an effort not to cause any hassles;
- Origin from countries with conflicts – A CBO staff member also reported that some recent immigrants from Guatemala and El Salvador, for example, are afraid to let unknown people into their homes for fear of their own safety. Less drastic fears shared by a larger group of immigrants may include concerns about losing utility connections if one causes difficulties;
- Need to establish trust through a relationship – Undocumented immigrants may wait to ask for assistance until after an organization reaches out multiple times (once better trust with an organization is built);[93] and

[93] A similar concept was presented at the 2015 Behavior, Energy and Climate Change (BECC) conference in which a researcher (Caty Lamadrid) indicated that Hispanic immigrant households tend to build relationships with programs through repeated conversations--even with a call center--before engaging with the program more deeply and participating in its offerings. Lamadrid, Catalina. "Hispanics and Energy: An Insight into Beliefs and Behaviors". Presentation at the Behavior, Energy and Climate Change (BECC) conference, Sacramento, CA, October 20, 2015.

- Competing priorities – Energy is a lower priority for undocumented immigrants among a range of pressing needs, perhaps more so than for low-income households generally, so it may take time for them to consider and act on their energy needs.

Outreach Strategies

CBOs do not target undocumented immigrants per se, so they tended to provide more general strategies they have found to work with the broader populations they serve. They believe that the areas they work in have undocumented residents, based on questions and inquiries from family members or friends that are made on occasion on behalf of an undocumented immigrant.

Nearly all CBOs mentioned that word of mouth is the best way for community members to find out about the services offered by the CBOs. This was encouraged at the Mexican consulate visit in Sacramento, where a CBO staff member asked those consulate visitors who were already participating in low income utility programs if they knew others who could benefit from the programs, and told them to send them to the consulate on the days that the CBO visits so that they could get information from the CBO.

Word of mouth can also work against recruitment. For example, the CBO staff member at the Mexican consulate noted that if one person says they are not interested, it can lead a chain of other people within hearing range to say that they are also not interested. The staff person will often go work in a different part of the room and return when a new set of people waiting for service can be approached (who have not been influenced by others' attitudes).

Two of the six CBOs Evergreen interviewed also mentioned that it helps outreach efforts to have the organization be present in multiple locations (including trusted spots such as schools, libraries, churches, and community centers). One CBO staff member emphasized that a successful outreach effort goes beyond just being present; one also needs to approach people or be seen talking to leaders. They gave an example of conducting outreach at a church and receiving much greater interest from the congregation after being seen talking with the church's pastor.

Two of the six CBOs also noted that it is important to communicate in the same language that the undocumented immigrant speaks. All of the CBOs we spoke with have bilingual staff members.

Evergreen also asked about any literacy issues (literacy in the language of an immigrant's originating country or region), and two CBO staff members at the same CBO shared their approaches to addressing this. They provide a graphics-heavy educational flip chart to teach people about how to save money without using written words. They also pick up on cues that a person may not be literate based on how they hold materials that are handed to them.

It was very clear from the on-site visits that program materials are different for every CBO and type of event in which they interact with the community. One CBO suggested that branded grocery bags could be a useful communication tool at the food distribution initiatives they attend, and another mentioned that a banner may help them at events where they have a table.

Additional community outreach strategies mentioned by individual CBOs only include the following:

- Holding a financial literacy course that allows participants to become comfortable discussing financial issues;
- Utilizing community members who have been through similar situations for outreach;
- Including messaging in conversations about undocumented status not being a barrier to participation;
- Pairing IOU outreach with other programs (one CBO mentioned that a water savings program they run was a particularly good fit);
- Utilizing concrete savings numbers when talking about CARE savings; and
- Mentioning the measures that ESA offers was more successful than discussing the monetary value of those items.

Income Documentation and Qualification Misconceptions

As part of this research, we also wanted to understand any challenges that undocumented immigrants may face in providing income documentation when asked for it. The application process for both CARE and ESA requires household income to be stated if the household is not categorically eligible, and CBOs involved in recruitment reported that they let people know that there may be a follow up process with their IOU to verify income. For ESA participation, the implementer requests this information before the installation process can begin (which may occur after a CBO has recruited a possible participant), whereas for CARE enrollment, it may occur after a participant has already received the discount.

The general consensus among the CBOs was that ESA and CARE income documentation requirements are similar to the other programs and services that the CBOs offer. Only one CBO reported hearing back from customers somewhat regularly about providing verification needed to establish income qualification. The rest said they do not get asked about verification letters very often. The CBO that is asked about the letters more frequently offers a service to its community members to sign customers up for in-language bills, so this may be why people are more likely to bring in verification letters. With regards to these income verification letters, one CBO noted that community members will occasionally bring in letters that they do not understand (not in the language they speak) and ask for assistance but that this is not a frequent occurrence.

In terms of recruiting undocumented immigrants for programs, the most common issue the CBOs reported is the fear among undocumented immigrants that accepting services will "be seen as not contributing to society" or that they will be considered "people in need" and that this perception will get in the way of their immigration process or that their immigration status will be discovered. These perceptions were reflected in discussions Evergreen had with three of the CBOs.

Two CBOs reported that undocumented immigrants assume they will not qualify for low-income programs because of their income levels (and are unaware that higher incomes are allowed for large households or categorical enrollment options).

One CBO mentioned that there are some community members who do not want to give out income information and are willing to refuse program services in order to avoid doing so.

A large barrier to participation of undocumented customers is their perception that participation could involve answering questions they would prefer not to answer regarding their documentation status or having their status revealed in the process. This may stop them from inquiring about or seeking out programs that provide assistance. If a person is comfortable enough with a CBO to bring up their documentation status, then the CBO can work to help them see a pathway to participation. One CBO noted that they sometimes ask undocumented persons if there is someone else in their home that may be able to meet the qualification requirements (eligibility may be determined by showing pay stubs or other proof of income, or documentation of participation in one of several public assistance programs). Another CBO reported that household members will sometimes ask a question for an undocumented person so that the undocumented person is not identified as such until they know more about the application process. An implementer explained to customers that they can have them sign an affidavit if they are getting paid cash and do not have pay stubs to prove income.

5.3.2 Low-Income Households with Predominately Asian Cultural Identities and Linguistic Practices

Unique Customer Needs

Two CBOs that are focused on Asian language speaking communities noted that their clients are very loyal to organizations and companies that they trust. One CBO staff member reported that compared to other low-income groups they work with, Asian language speakers who have low incomes feel more confident in asking for assistance from the organizations that serve them, because they have the support of other members of their community. This community support (from individual members of the community rather than the staff at the CBO) was apparent in observing community members helping each other at a monthly food distribution Evergreen attended where other Asian language

speaking community members would help the others in line with how to fill out forms, which lines to be in, and what to provide.

While CBOs are able to help the IOUs reach members of specific communities, they identified an occasional language-related barrier to follow-through in participation by interested customers who do not speak English (or Spanish). One CBO staff member noted that many times Asian language speaking community members will ask why they have not heard from a utility after signing up for ESA. The staff member reported that if Asian language speaking customers answer the phone (such as a call to set up the first visit to do an assessment for ESA) and hear English, they will immediately hang up the phone. In order to facilitate participation with these community members, the IOUs and their implementation contractors would need to continue providing communication in-language beyond a customer's point of contact with the CBO. While IOUs do record customers' language preferences, contractors are not always able to communicate in those languages for scheduling and in-home visits. We also heard from the same CBO that Asian language speaking customers will either ignore letters in English that come to them from a utility, or they will bring the letters to the CBO to have them translated.

Additional characteristics that the CBOs mentioned about Asian language speakers (which may or may not parallel characteristics of other low-income customer segments) include the following:

- Possibly a large number of people in one household;
- High importance placed on jobs (in part because of a Medicare requirement of 10 years of work to qualify for assistance);
- A strong desire to save and not waste in general;
- Prioritization of bills over food budget or children's clothing; and
- Preference for traveling to shop, eat, and meet in places where people speak the same language.

Outreach Strategies

Nearly all of the CBOs Evergreen interviewed mentioned that word of mouth is the best way for community members to find out about the services that the CBO offers. The monthly food distribution event we observed illustrates the mechanics and effect of word-of-mouth communication in this community. We were told by staff that the crowd was much larger than usual, due to the availability of chicken, which had not been advertised. When asked how the community knew about the availability of chicken, the CBO staff reported that they do not advertise which items are available beforehand, and that early morning attendees likely call other people in the community to let them know about the availability of items like the chicken at this distribution.

Another issue regarding word of mouth sharing of information described by one CBO staff person working with Asian language speaking populations is that the name of the program is not always communicated or remembered. This CBO staff member spends time educating recent immigrants on understanding their bills and determining whether they are already on CARE. The staff member suggested that while interest seemed high, very large numbers of clients eventually realize that they are already on the CARE rate. This uncertainly exemplifies the effort necessary from the CBO to identify and enroll the increasingly hard-of-find non-enrollees.

Two CBOs reported that marketing is most effective via in-language media (TV, radio, newspaper) and in public locations (rather than door-to-door outreach). Similar to the undocumented immigrant group, customers who primarily speak Asian languages are more receptive to representatives who speak their language.

Two CBOs mentioned the need to build up trust over time. Building trust allows community members to bring up their need for help once they are ready and in a setting in which they are comfortable (such as after a class). Building trust entails working with the same household multiple times, as some CBOs and many faith-based organizations tend to do. This is a benefit to having a community center or recurring classes. One CBO mentioned that once trust is established, Asian language speaking community members do not hesitate to ask for assistance.

Additional outreach strategies that were suggested by CBOs include:

- Building on CARE enrollment to encourage participation in ESA; and
- Waiting until the community member brings up a subject that may be sensitive, such as financial issues, to discuss programs with them.

To further understand issues relevant to reaching Asian language speakers, we also reviewed literature about Asian Americans. While the information we found speaks to Asian Americans in general (rather than those who primarily speak an Asian language), this information provides important context about the communities in which Asian language speaking Asian Americans live. A report done by the Center for Sustainable Energy[94] reported that "researchers have found that Asian Americans are more responsive to messaging frames that address the collectivist nature of their culture." This fits into the concept found in the Psychological Review[95] where researchers reported that "(m)any Asian cultures have distinct conceptions of individuality that insist on the fundamental relatedness of individuals to each other. The emphasis is on attending to others, fitting in,

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[94] Center for Sustainable Energy and Research Into Action, Literature Review: Housing, Energy Use, Decision-Making among Key Ethnic Groups in California, February 2016

[95] Markus, Hazel (University of Michigan) and Shinobu Kitayama (University of Oregon). 1991. "Culture and the Self: Implications for Cognition, Emotion, and Motivation." *Psychological Review*, 98(2), 224-253

and harmonious interdependence with them." These findings suggests that this community may respond better to messaging about community more so than messaging about saving an individual money.

Income Documentation and Qualification Misconceptions

As with the undocumented immigrant population, the CBOs we spoke with who work with customers who primarily speak Asian languages noted that the requirements for low-income program enrollment and participation are not very different from other programs they offer. Two CBOs reported that Asian language speaking community members often assume that they do not qualify due to income levels (and are unaware that higher incomes are allowed for large households or categorical enrollment options. One CBO reported that people are wary of "free" offers and think they may be charged later.

Similar to what CBOs mentioned about communications barriers among undocumented community members, two CBOs reported that follow up letters (possibly about post enrollment verification or renewal) might be ignored if they are not in the language that the person speaks. On occasions, community members will bring in letters to the CBO to ask for assistance with translation. This underscores the potential for additional coordination between outreach CBOs and the IOUs to take advantage of the utilities' tracking and data on individual households' preferred languages.

5.4 Low-Income Households with Senior or Disabled Residents

This section further characterizes two population segments of interest: low-income households with seniors (aged 65 or older) and those with people who have disabilities. This discussion is intended to share insights relevant for program outreach, needs, and participation from the household telephone surveys from both the 2013 and 2016 Low Income Needs Assessments.

The 2016 telephone survey suggests that as many as half of low-income customers include either a senior or a person with disabilities (or both).[96] There is overlap among these two household types, however, as shown in Table 41.

[96] We found that 48 percent of our (weighted) telephone respondents included either seniors or disabled residents. We were not able to weight for any differences in response rates of disabled individuals, however. These results are limited to the sample frame for this study's telephone survey, which included only zip codes with elevated shares of low-income households. Results are weighted to the population for age, which adjusts for any tendency for older individuals to respond to telephone surveys. Differences in response rates for households with disabled individuals have not been adjusted, however.

Table 41: Distribution of Seniors or Disabled Residents in Low-Income Households (2016 Survey, Low-Income Only)[97]

Household Type	People with Disabilities Present (n=211)	No People with Disabilities Present (n=347)	Total
Seniors present (n=196)	15%	15%	30%
No seniors present (n=362)	18%	52%	70%
Total	33%	66%	100%

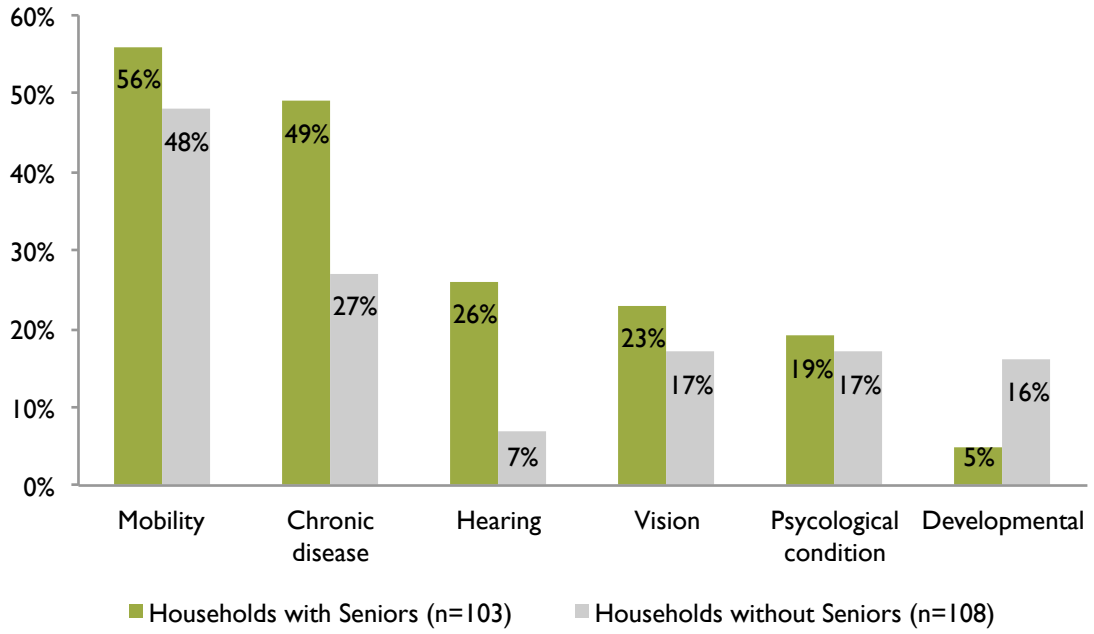
Low-income households with seniors are more likely to have a disabled person in the home and vice versa. Half of the households with a senior present also reported a disability in the home, although the overall rate of disabilities is just 33 percent. Similarly, nearly half of households with a disability include a senior, even though the overall presence of seniors was just 30 percent.[98]

In general, mobility-related disabilities are the most common disability among those surveyed. Households with seniors, however, are more likely than those without a senior to have a chronic disease or hearing issues and are less likely to have developmental disabilities, as shown in Figure 27.

[97] Column totals may not equal the sum of the individual rows due to rounding.

[98] Overall, 30 percent of low-income households included a senior and 33 percent included someone with a disability. However, among the 30 percent that included a senior, half included a person with a disability. These households are shown by the 15 percent of households with both a senior and a disabled person (or 15/30). In contrast, households without a senior only have a rate of disabilities of 26 percent. These households are shown by the 15 percent of households without a senior who have a disability. As the total proportion of households without a senior is 70 percent, the rate at which disabilities is present among these households is 26 percent (or 15/70). Similar computations lead to a 45 percent rate (15/33) at which seniors are present in households with disabilities, but only a 23 percent rate (15/66) at which seniors are present in households without disabilities.

Figure 27: Types of Disabilities in Households with and without Seniors (2016 Survey, Low-Income Only)



The remainder of this section discusses households with seniors and those with people who have disabilities separately.

5.4.1 Low-Income Households with Seniors

As already noted in Section 4, low-income households that include a senior report relatively higher degrees of energy insecurity (as reflected by struggle to pay energy bills) than low-income households without seniors. On the other hand, this group of customers tends to exhibit less overall economic hardship (as indicated by material hardship metric), fewer payment related issues (e.g., lower disconnect rates and less frequent final notices), and less difficulty paying overall households bills than to other groups of customers. Relatively speaking, low-income seniors reside in households with slightly higher income although they report not having benefited from improving economic conditions in recent years.

Reaching Households with Seniors

The prior LINA study in 2013 revealed that low-income seniors have higher awareness of ESA than households without seniors (74% vs. 62%). They also have high awareness of CARE (79%) (but it should be noted that the sampled population for that year's study was

based on households enrolled in CARE).[99] We build on this context using pertinent results from the 2013 and 2016 studies to provide additional information that may be useful in program outreach to seniors.

The 2016 survey indicates that low-income households with seniors differ from those without seniors in a number of different ways. Those with seniors are:

- Substantially more likely to own their homes (52% compared to 20%);
- More likely to live in a single-family home (61% compared to 45%);
- More likely to speak English as the primary language in their home (70% compared to 59%);[100]
- More likely to receive social security or Supplemental Security Income (27% compared to 12%); and
- Less likely to have access to the Internet (64% compared to 82%).

Newly analyzed responses to the 2013 survey also show that non-digital forms of media are more effective and preferred by households with seniors in terms of overall utility interaction.[101] Specifically:

- Households with senior residents who know of an IOU program are more likely to have learned of the program through a utility mailing or via newspaper, radio, or news media than households without an elderly resident;
- Households with a senior resident are less likely to say they prefer to learn about programs via emails (6%) than households without an elderly resident (13%); and
- Households with a senior resident are more likely to receive a paper bill (88%) than households without an elderly resident (77%).

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[99] Analysis based on a combination of participant responses to the following survey questions: *S17b (If aware of utility programs) What are the names of the programs you are familiar with?* And *S17 (If ESA not mentioned in S17b) One of [utility's] programs, Energy Savings Assistance, provides free home improvements to income-qualified households. It offers information on safety and ways to save energy, energy efficient light bulbs, and sometimes improvements such as refrigerators or attic insulation. Before today, have you heard of the program that I just described?*

[100] Language-related results are limited by the study's implementation, which was open to all sampled households, but implemented only in English and Spanish. Thus, households with limited or no capacity to speak English or Spanish are underrepresented. Consequently, this finding suggests mostly that seniors are more likely to speak English than Spanish, but cannot be extended to other language groups.

[101] Some of these patterns may be changing over time, but they are unlikely to have changed dramatically since the 2013 telephone survey was conducted.

Ability of Household to Control Energy Usage

Households with seniors differ from those without seniors in only modest ways in the various ways the 2013 and 2016 Low Income Needs Assessments investigated respondent's abilities to control their energy usage.

Saving energy generally is not a high priority and not prevented by insurmountable barriers. In response to a question on the 2016 survey, a third of seniors agreed that saving energy is *not* a priority for their household (34% agree compared to 23% of households without a senior). In response to a question on the 2013 survey, more than half said that there is nothing that is making it hard for them to save energy in the home (65%, compared to 51% of households without a senior).

Although households that include a senior are relatively more likely to report that their family's health would suffer if they heated their home less in the winter (50% compared to 39%), this was not the case when it comes to cooling in summer.[102] This result suggests that seniors are more limited in their remaining capacity to reduce heating.

Households with seniors are not different than low-income households in general when it comes to energy-saving practices. Both households with and without seniors reported consistently practicing some basic energy-saving practices at similar rates.[103]

Barriers to Program Participation (2013)

In 2013, low-income households were asked about barriers to participating in ESA. Households with seniors were less likely to report issues regarding their personal availability for in-home visits. Despite this, they are still reluctant to have a contractor visit the house with 35% of these households considering this a key barrier to participation.

5.4.2 Low-Income Households with a Disabled Resident

As already noted in Section 4, relative to the overall low-income population, households with members who have disabilities tend to have:

- More frequent final notices or actual disconnects noted in their utility billing records (especially among those who reported vision, developmental, and psychological conditions);
- Higher burden;
- Higher material hardship; and

[102] 44% of households with seniors agreed that their family's health would suffer if they cooled any less, compared with 48% for households without seniors.

[103] As noted elsewhere, these practices encompassed setting back heating and cooling temperatures when not home, turning off lights and electronics when not in use, and keeping showers short.

- Higher energy insecurity.

low-income households with disabled members also differ from other households in some ways that affect program outreach, needs, and income verification.

Reaching Low-Income Households with Disabled Residents

Based on the 2013 survey data, awareness of CARE[104] and ESA[105] is similar among households with and without a disabled person in the home. Despite similar awareness levels, we note some differences below in key customer characteristics and information sources.

The 2013 Low Income Needs Assessment found that households with a disabled member are more likely than other low-income households to have found out about the ESA program via newspaper/news media or radio.

The 2016 data indicate that households with a disabled resident are:

- More likely to live in a single-family home (57% compared to 45% of households without a disabled resident);
- More likely to speak English as the primary language in their home (78% compared to 56%);[106]
- More likely to receive social security or disability payments (40% compared to 5%).

Additionally, the 2016 data indicate that households with a disabled resident do not access the Internet as frequently as other households (66% access it at least a couple times per week as compared to 82% for other low income homes). Along these lines, the 2013 LINA data show that households with a disabled resident, were less likely to prefer email as an outreach channel in the future (7%) compared to those without a disabled resident (14%). Households with disabled residents were also more likely to get paper bills in 2013, further indicating that households with disabled residents may not benefit as much from digital forms of marketing.

Ability of Household to Control Energy Usage

The 2016 survey explored both attitudes toward energy efficiency and current in-home practices. Households with a disabled resident are more likely to agree that:

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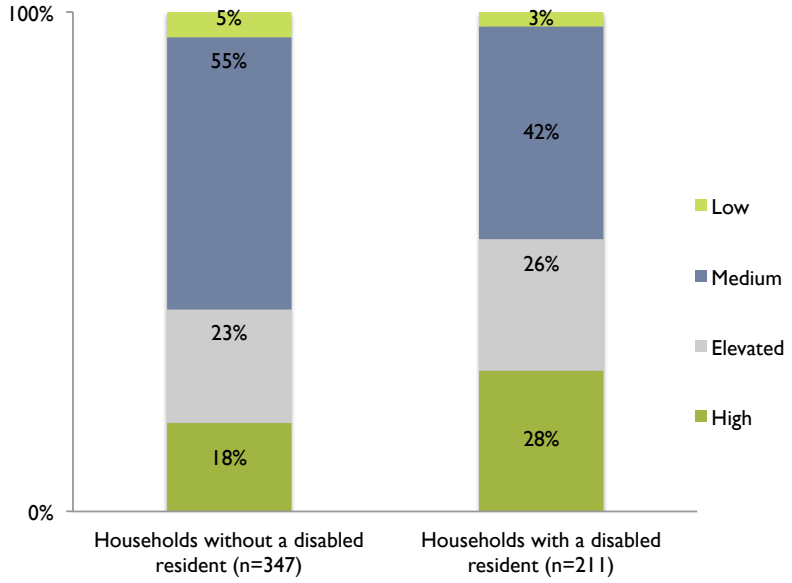
[104] 79% of households with a disabled person in the home were aware of CARE.
[105] 69% of households with a disabled person in the home were aware of ESA.
[106] Language-related results are limited by the study's implementation, which was open to all sampled households, but implemented only in English and Spanish. Thus, households with limited or no capacity to speak with English or Spanish are underrepresented. Consequently, this finding suggests mostly that seniors are more likely to speak English than Spanish, but cannot be extended to other language groups.

- They have to conserve energy at home because they cannot afford to pay utility bills (89% compared to 79% of households without a disabled resident); and
- Their family's health would suffer if they heated their home less in the winter (57% compared to 35% of households without a disabled resident).

In response to a battery of questions on current in-home practices (which we have already presented and defined in Section 4), we explored the degree to which households consistently set back their thermostats, turn off lights and appliances when not in use, and limit shower times. As in Section 4, we classified the degree of energy-saving practices to denote the number and consistency with which respondents said they practice the five energy-conservation practices included in the survey, categorizing them from low to high. Comparisons between responses from households with and without members who have disabilities indicate that households with disabilities are more likely to engage in energy-saving practices consistently (**Figure 28**).

Figure 28: Level of Action in Energy Saving Activities by Households with Disabilities (2016 Survey; Low-Income Only)



Finally, the 2013 surveys inquired whether medical or health conditions make it difficult to save energy. Only 6 percent of respondents from households with members who have disabilities indicated that these conditions pose a challenge for saving energy.

Barriers to Program Participation

Findings from the 2013 survey provide insight on what respondents perceive to be the most difficult part of participating in the ESA program. These barriers should be

considered when designing program outreach and marketing strategies. Differences exist between homes with and without a disabled resident in these perceptions:

- Being home during visits is easier among households with disabled residents (only 24% of households with a disabled resident indicated this as a barrier, compared to 58% of households without a disabled resident);
- Providing income documentation is more likely to be "very hard" for those households with a disabled resident (12% compared to 7% of households without a disabled resident).

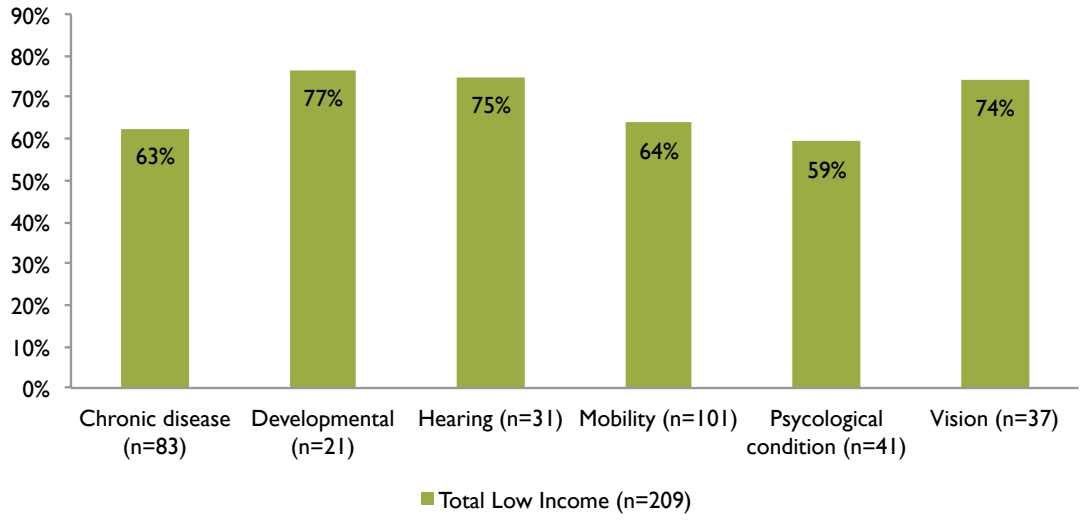
Energy Need for Low-Income Households with Disabled Residents

A review of potentially disability-related energy needs revealed using data from the 2016 survey indicates that:

- 60 percent of low-income households with disabilities reported needing more heating or cooling than their counterparts without disabilities (60% vs. 10%);
- Only 10 percent of low-income households with disabilities reported using medical equipment that requires electricity.

Figure 29 shows the different disability types in terms of need for additional heating or cooling in the home. In the future, it may be valuable to explore different definitions of disability related to additional energy usage needed or in terms of additional heating and cooling needs. Because respondents may fall into one or more of the disability categories shown in **Figure 29** statistical significance was not evaluated.

Figure 29: Self-Reported Need for Additional Heating or Cooling Due to Disabilities by Type of Disability (Low-Income Households)



5.5 Implications for Program Design, Implementation, and Policy

In this subsection, we share the insights gleaned from our in-depth interviews and applicable survey analysis that contribute to an understanding of the needs of multifamily tenants, Asian language and undocumented immigrant households, and households with seniors and disabled residents. We also present specific implications for utility services and interactions with these segments.

5.5.1 Multifamily Tenants

This study's more detailed exploration of multifamily tenants' perspectives was intended, in part, to provide an initial introduction to this customer segment's perceptions and complement existing information about broader multifamily sector issues. As such, we include in our discussion below *insights* that contribute to a broader consideration of multifamily needs and opportunities. These insights are based on several sources including a small number of respondents and as such are not necessarily representative of the larger multifamily market and cannot be interpreted or understood in the context of a building 's size and other market characterizations for this sector. That said, the available data on this market and perspectives of tenants are helpful to understand as part of this inquiry.

Insights

- Energy usage and bills at the household level are comparatively low for multifamily renters (compared to low-income households in single-family homes), which may limit opportunities for further energy related reductions based on potential. (Technical studies of energy saving potential are needed to demonstrate the extent of savings opportunities among this sector.)
- The energy burden (which is a function of income and bills) for multifamily renters is higher than for low-income single-family renters and owners because multifamily renters have lower incomes than those in single-family homes. The lower income more than offsets their lower energy usage. However, when energy burden is computed with an adjustment for non-cash benefits that reduce recipient households' costs for basic needs, multifamily renters' modified energy burdens are lower than those of households in single-family homes.
- The qualitative research reveals that some tenants feel that their landlords are slow to replace equipment that is aging or failing, which prompts interest in rebate programs to spur faster equipment replacement.
- The qualitative interviews also reveal that in some cases, when landlords replace common area building equipment, tenants sense increased comfort and satisfaction in their buildings, but generally do not notice changes in their bills or effects on their rents.[107]

Implications

- As a group, multifamily tenants tended to mention the appropriate energy-saving steps they can take in their units to save on energy consumption and cost, but their understanding of what most affects their bills (and to what relative degree they do) varied widely. These findings complement other indications that there are opportunities for further energy education for multifamily renters, or residential consumers overall, to inform them what steps they can take and what energy uses matter the most.
- Multifamily renters are generally aware of (and appreciate) utility programs that reduce their bills (or help them make payments), but they are less aware of programs that improve the efficiency of their units or buildings. (Utilities are a primary source of information about these offerings.) IOUs could continue to couple ESA outreach with existing energy education.

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[107] Actual bill impacts or changes in rent were not directly measured or analyzed; this observation is based purely on tenants' perceptions and ability to assess changes. It is possible that actual impacts were not sufficient to be noticeable to tenants.

- There is very high interest in usage alerts among multifamily renters (and seemingly low awareness among renters whose utilities already offer them). More outreach about existing usage alerts and expansion of utility services to include them (where not already available) would be well received. Multifamily tenants believe usage alerts have the potential to save them energy and money by spurring them to take action during the month.

5.5.2 Asian Language Households and Undocumented Immigrants

Discussions and observations with a small number of community-based organizations did not reveal substantially different characteristics for either Asian language households or undocumented immigrants. However, discussions with CBOs provided additional information and insights on practices and opportunities that may improve outreach with both of these customer segments.

For both Asian language households and undocumented immigrants

- Providing communications in customers' languages is essential for subsets of both of these customer segments, not only in initial contacts, but throughout the customer's participation. Follow-up communications and visits by contractors may not always facilitate communication in the customer's language—especially for Asian language customers—which can lead customers to drop their pursuit of ESA program services.
- Word of mouth is a key and much-used communication tool for both of these customer segments. Communication between members of the communities may be better utilized and facilitated as an outreach strategy by encouraging program participants to "tell your friends and neighbors" and by creating talking points or materials that can easily be used by participants. Community-based organizations could also seek to use testimonials and case studies from the neighborhood to encourage participation.
- Income verification requirements for IOU resemble those for other need-based programs and were not seen by CBOs as particularly problematic.

For Asian language customers only

- The collectivist nature of Asian culture suggests that messaging that promotes community, neighborhood, or society would resonate more than messages emphasizing monetary savings for an individual alone. Program outreach in Asian languages could feature these themes.

For undocumented immigrants only

- Trust is an important prerequisite before households from some Spanish-speaking countries in the Americas will engage with an organization. This tendency may be amplified for undocumented immigrants. Building relationships forms the trust, but takes time and repeated contacts. A visible presence in the community can be a useful way to develop those relationships through repeated contacts with individual households.
- Community leaders—such as priests and community center staff—have influence over households in these communities. Active or passive encouragement from these community leaders demonstrates to households that a particular service provider or program is safe and potentially beneficial. Active encouragement could involve promotion by the community leaders in their contacts with households; passive encouragement could be as simple as being seen with the community leaders and similar visual cues.

5.5.3 Households with Seniors and Disabled Residents

Given the relatively high program awareness and participation of households with seniors and households with disabled residents, existing outreach methods appear to be effective. Both customer segments share many characteristics that are useful to keep in mind when reaching out to them:

- Seniors and households with disabled residents may be easier to reach door-to-door because they are more likely to live in single-family homes (and probably are home more).
- Communications coupled with existing outreach targeting social security or supplemental security income recipients will reach seniors and households with disabled residents in greater numbers.
- Internet-based outreach will not reach seniors or households with disabled residents as effectively as other households and generally is not a preferred medium for this customer segment.

Households with disabled residents vary in their energy-related needs. A majority of low-income households with disabled residents report having a greater need for heating and cooling to maintain comfort, and a small share of these households have unique energy-related needs due to energy-using medical equipment. Other low-income households with disabled residents do not seem to distinguish themselves from low-income households generally, however. Further research and analysis to distinguish among households with disabled residents would allow greater distinction between those with and without unique energy-related needs.

6 Results: Beneficial Energy Efficiency (and Other) Measures

6.1 Introduction and Background

This section presents research findings on beneficial measures that show potential for addressing the energy-related efficiency, health, comfort, and safety needs of California's low-income households. The goal is to provide general insights on how low-income customers perceive and reported their needs, but not to provide a comprehensive assessment of measures needs based on technical reviews. In exploring beneficial measures, we draw on newly analyzed survey responses from the 2013 needs assessment study, a limited number of questions added to the 2016 survey, and qualitative interviews with multifamily renters and staff of community-based organizations (CBOs).

Specific population segments discussed in this section are: multifamily renters, undocumented immigrants, Asian language customers, seniors, and households with disabled residents. In addition, we also comment on findings relevant to ESA-eligible households overall and present comparisons across different climate zones to better understand climate-dependent measures.

This investigation is limited to households that are currently eligible for the ESA Program (i.e., those at or below 200 percent of the federal poverty level (FPL) and categorically eligible households). This study did not investigate the technical feasibility or cost-effectiveness of measures. Those considerations would need to be taken into account separately in determining whether—or how—new measures or modifications to existing measures could be incorporated into each IOU's design for its ESA program.

6.2 Cross-Cutting Results

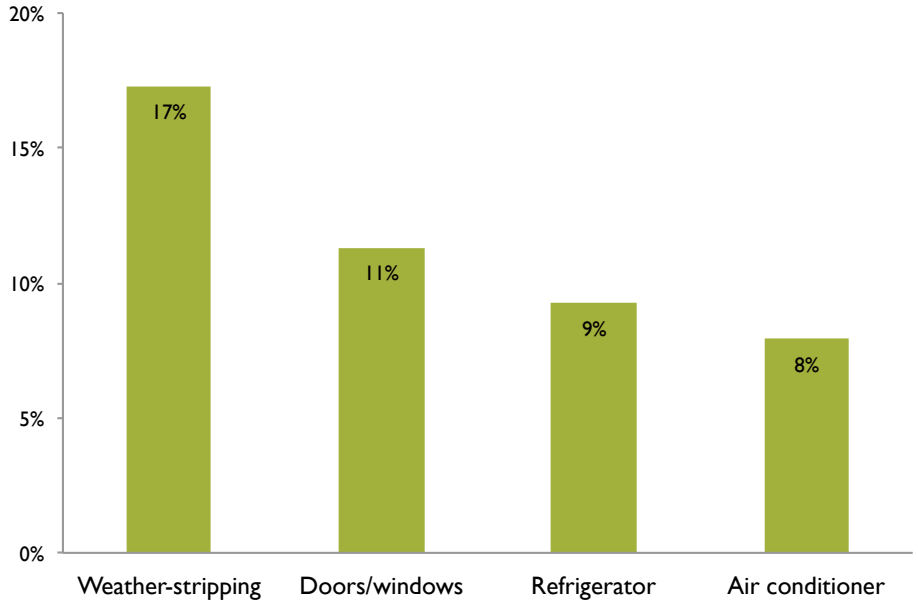
Before covering each of the specific population segments, we remind the reader of relevant findings regarding beneficial measures from the 2013 phone survey. Here, we draw on self-reports by telephone survey respondents on their perception of the value of various measures available through the ESA programs and their reports on the state of their energy-using equipment.

As shown in Figure 30, households across all segments said weather-stripping (17%), doors and windows (11%), refrigerators (9%), and air conditioners (8%) were perceived as the most helpful ESA program measures in terms of improving their household condition and safety.[108] Other measures that households said would be most helpful included bill

[108] Analysis based on the following survey question: *Of the energy savings assistance you got from [utility], what was or would be the most helpful in helping to control your energy bills and improve the comfort and safety of your home?*

assistance, CFLs, and furnaces. These measures are all currently offered by the IOUs' ESA programs, although availability of air conditioning is geographically limited.

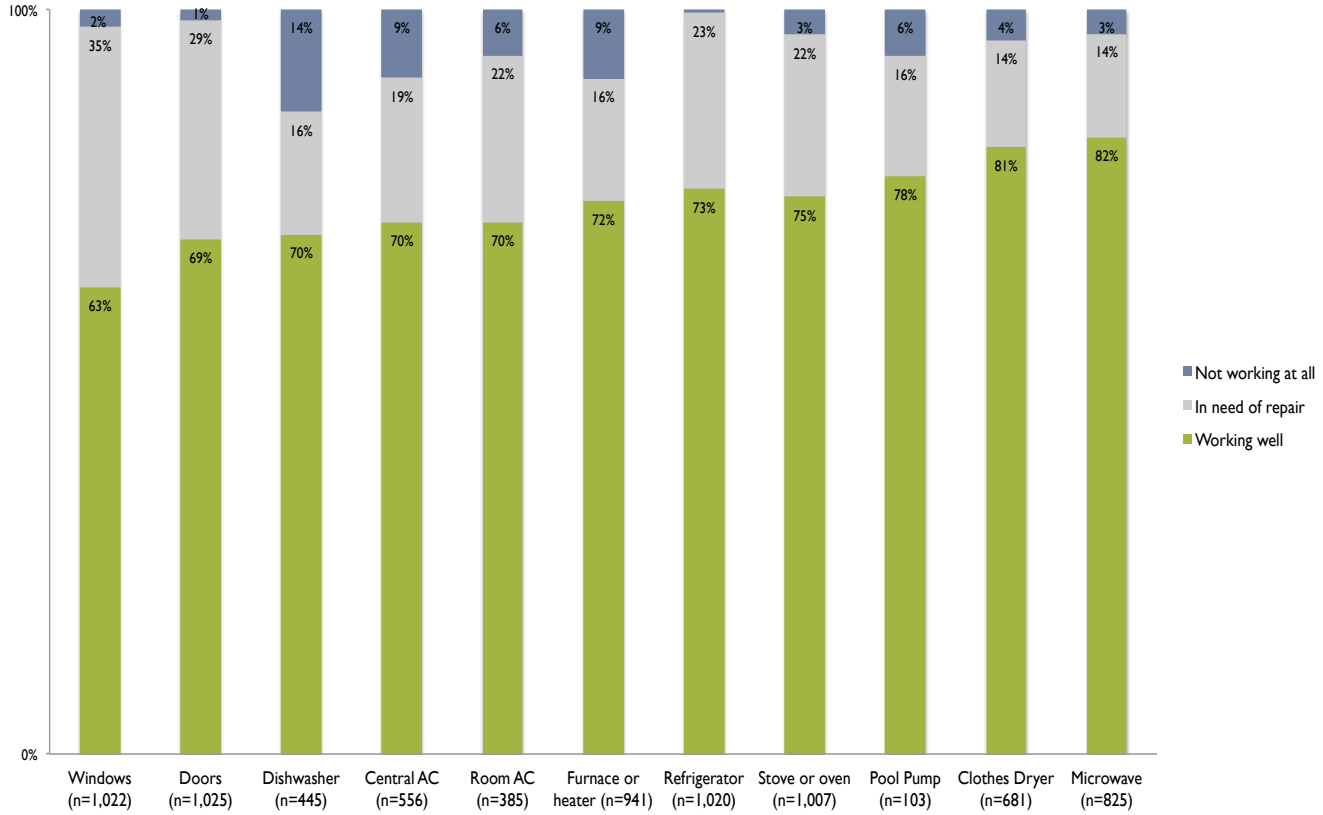
Figure 30: Most Helpful ESA Program Measures (2013 Survey; Low-Income Only; n=1,028)



In general, there were no statistically significant differences between ESA participants and non-participants in the measures households believed to be useful. The one exception was for water saving showerheads and faucet restrictors. Households that remembered participating in ESA and received water-saving showerheads or faucet restrictors were significantly more likely to find these items "very helpful" than did non-participating households and ESA participating households that did not receive water saving measures.

Survey participants also indicated that windows, doors, and dishwashers were the most common home features that were not working properly in their homes. As shown in Figure 31, over a third of the households said their windows were either not working at all or in need of repair, while 14 percent of household said their current dishwasher was not working at all. Furthermore, over half of all households said their furnace or heater was over 10 years old, and approximately one-third of households said their water heaters were over 10 years old.

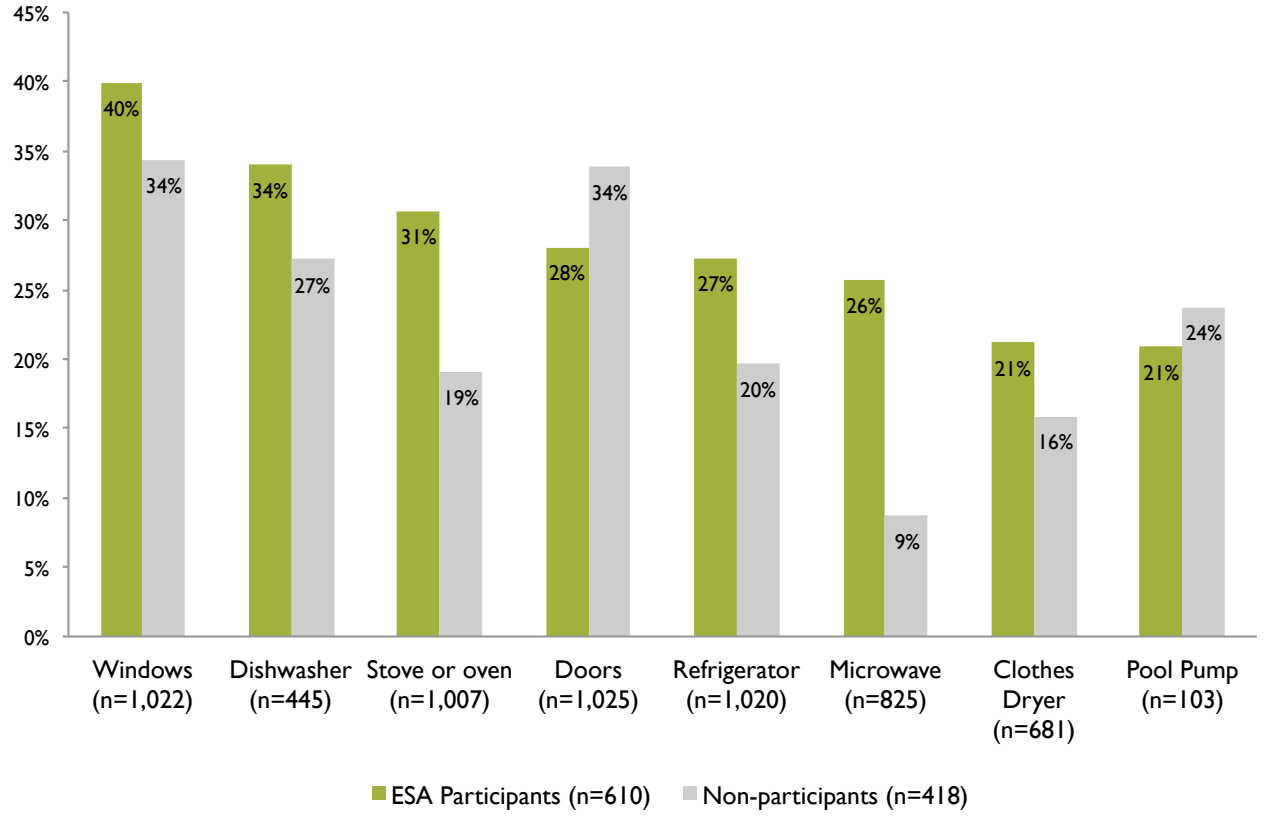
Figure 31: Working Condition of Household Appliances[109]
(2013 Survey; Low-Income Only)



Additionally, past ESA participants were significantly more likely to have equipment that was not working at all or in need of repair compared to non-participants for all equipment types except doors and pool pumps. As shown in Figure 32, ESA participants were especially more likely to have non-functioning stoves or ovens, microwaves, dishwashers, and refrigerators compared to non-participating households. Note that not all of these items are offered by the ESA Program.

[109] Analysis based on the following survey question: *Please tell me if each of the following appliances in your home is working well, in need of repair, not working at all, or if you do not have one. [read list of appliances]*

Figure 32: Improperly Functioning Household Appliances by ESA Participation (2013 Survey; Low-Income Only)[110]



The remainder of this section discusses similar results for selected customer segments. Table 42 provides an overview of results discussed in text form in the subsections that follow.

[110] Analysis based on the following survey question: *Please tell me if each of the following appliances in your home is working well, in need of repair, not working at all or if you do not have one.*

Table 42: Beneficial Measures Identified by Customers by Segment (2013 Survey and 2016 Qualitative Research; Low-Income Only)

Customer Segment	Measures Identified by Customers as Particularly Useful (2013)	Equipment Identified by Customers as in Disrepair (2013)*	Supplemental Results (2016)
Multifamily renters	Weather-stripping, doors and windows, and refrigerators	Stoves or ovens	Interviewed households indicated a perceived need for refrigerators, stoves, air-conditioners and dishwashers upgrades; reported interest in monthly usage alerts
Households with undocumented immigrants	n/a	n/a	CBO informants reported a perceived need for doors, windows, water heaters, furnaces and refrigerators
Asian language customers	n/a	n/a	CBO informants reported a perceived need for refrigerators and microwaves
Households with seniors	Weather-stripping, doors and windows, refrigerators, and air-conditioning	Less repair needs for all equipment types	n/a
Households with disabilities	Weather-stripping, refrigerators, air-conditioning, doors and windows	Stove or oven, windows	n/a
Climate zones with particular needs	Weather-stripping across all climates except desert, doors and windows in Mountain region, air-conditioners in warmer climates (Central Valley, Desert and South Inland), furnaces in colder climates (Mountain, North Coast and South Coast)	North Coast, South Coast and South Inland: stoves or ovens Mountain region: windows	n/a

* Compared to all other respondents.

6.3 Renters in Multifamily Properties

In general, low-income multifamily households who responded to the 2013 telephone survey reported having fewer issues than those in other housing types with the majority of their household appliances, including dishwashers, refrigerators, clothes dryers, and microwaves. One exception to this was stoves or ovens; more multifamily households indicated that their stove or oven was in need of repair than did respondents from single-family households. Additionally, a smaller percentage of equipment in multifamily households was older than 10 years old compared to the equipment in single-family households.

When asked about the usefulness of particular ESA measures in improving their household's condition and safety, multifamily and single-family household preferences were almost the same. The measures that multifamily households said would be most useful to receive through the ESA Program included weather-stripping (16%), doors and windows (11%), and refrigerators (10%).[111]

Additionally, as summarized in Section 5 above, multifamily renters that participated in the 2016 study's 20 in-depth interviews also addressed various needs. Specifically, participants mentioned that upgrades for refrigerators (5 interviewees), stoves (4), air-conditioners (2) and dishwashers (2) would be beneficial for their household because their current equipment was not working properly. Often, they felt that their landlords were not maintaining or replacing these appliances as early as may be warranted.

Most of the common area upgrades recalled by multifamily residents interviewed included water heaters, lighting and window replacements. The nine interviewees who reported building systems upgrades tended to think this work increased overall comfort.

Multifamily tenants were also asked about "usage alerts" that the IOUs could provide via email or to customers' telephones[112] to gauge interest in technology and behavioral strategies that may assist customers with managing their energy usage. Over half of the interviewees indicated that monthly usage alerts from their utility would be very helpful for their household in managing their utility bills.

6.4 Households with Asian Language Customers and Undocumented Immigrants

Qualitative inquiries with a limited number of CBO staff that serve immigrant populations suggested that this population lives in generally similar housing stock with similar needs

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[111] (n=360)

[112] The interview question framed the alerts as a tool that would enable customers to establish a goal for their monthly spending and let the customer know where they were compared to the goal.

as other low-income populations that these CBOs serve. Based on observations and interactions with these households, this small set of CBO staff suggested that immigrants show the greatest interest in receiving assistance with the following building issues and appliances:

- Doors (mentioned in 3 of 6 CBO staff interviews)
- Windows (2)
- Water heaters (2)
- Furnaces (2)
- Refrigerators (2)
- Dryers (1)
- Microwaves (1)
- Air conditioning (1)

When asked specifically about Asian language speaking households, the CBOs reported that refrigerator and microwave replacements were seen as valuable to customers. One CBO mentioned that there might be a need for more than one refrigerator in a home due to large household size or the existence of basement apartments.

6.5 Seniors

In responses to the 2013 LINA telephone survey, low-income households with seniors indicated they were more likely than younger low-income respondents to be homeowners and reside in homes that were older on average. Any differences noted in households with seniors may be more of a reflection of the housing stock rather than the fact that seniors are in the home.

Given this, it is not surprising that the equipment in their homes is more likely to be older, although differences are only statistically significant for furnaces and heaters. The majority of furnaces (61%) in households with senior residents are over 10 years old. Furnaces have lifespans in the 15 to 30 year range,[113] however, so the fact that seniors' furnaces are older does not necessarily mean that they are close to the end of their expected equipment lifespans.

Despite having older equipment, households with a senior resident were more likely (than non-seniors) to report that their equipment is working well, though differences were statistically significant only for doors and refrigerators.

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[113] U.S. Department of Energy. "Energy Saver 101: Everything You Need to Know About Home Heating." http://energy.gov/sites/prod/files/2014/01/f6/homeHeating.pdf (Accessed Nov 2, 2016). A broader Internet search revealed that some sources cite lifespans of 15 to 20 years, while others extend the range to as far as 15 to 30 years.

When reacting to various measures that could help them improve the condition or safety of the home, households with seniors expressed interest and perceived value from the same measures as households without seniors. The top-rated measures of interest in households with a senior resident were weather-stripping and efforts to reduce leaks or drafts (17%), doors/windows (10%), refrigerators (8%), and air conditioning units (8%).[114]

We remind the reader that in our 2016 results (Section 5.4.1), we found that seniors may be more limited in their remaining capacity to reduce heating—either because they already limit heating or have lower tolerance for cold conditions.

6.6 Households with Disabled Residents

In responses to the 2013 LINA telephone survey, low-income households with disabled residents described similar equipment conditions and measure needs as the low-income population overall.

Nevertheless, households with a disabled resident are more likely to have a window or room air conditioner that is more than 10 years old (44 percent of households with a disabled resident compared to 32 percent of households without disabled residents) and are more likely to have an older (more than 10 years old) refrigerator (45% of households with a disabled resident compared to 34% of households without a disabled resident).[115]

When households with disabled residents were asked about measures that may be useful to help them improve household conditions or safety, the top measures were weather-stripping and efforts to reduce leaks or drafts (17%), refrigerators (9%), air conditioning units (8%), and doors/windows (4%).[116]

As noted in Section 5.4.2, the 2016 survey data suggests that disabled residents may be less able than most other households to reduce heating further—either because they already limit heating or have lower tolerance for cold conditions. However, relatively few households in this segment reported that their disabilities would make it difficult to save energy (six percent, 2013 survey) or that they have medical equipment that uses energy (ten percent, 2016 survey).

6.7 Climate Zones

In addition to examining customer segments of interest, we looked at geographic differences based on climate zones. Weather or climate based differences are likely to result in different needs with respect to comfort and safety, how much of the energy bills

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[114] (n=564)

[115] For window or room air conditioners n=187 (with disabled resident) and n=132 (without disabled resident); for refrigerators n=547 (with disabled resident) and n=323 (without disabled resident).

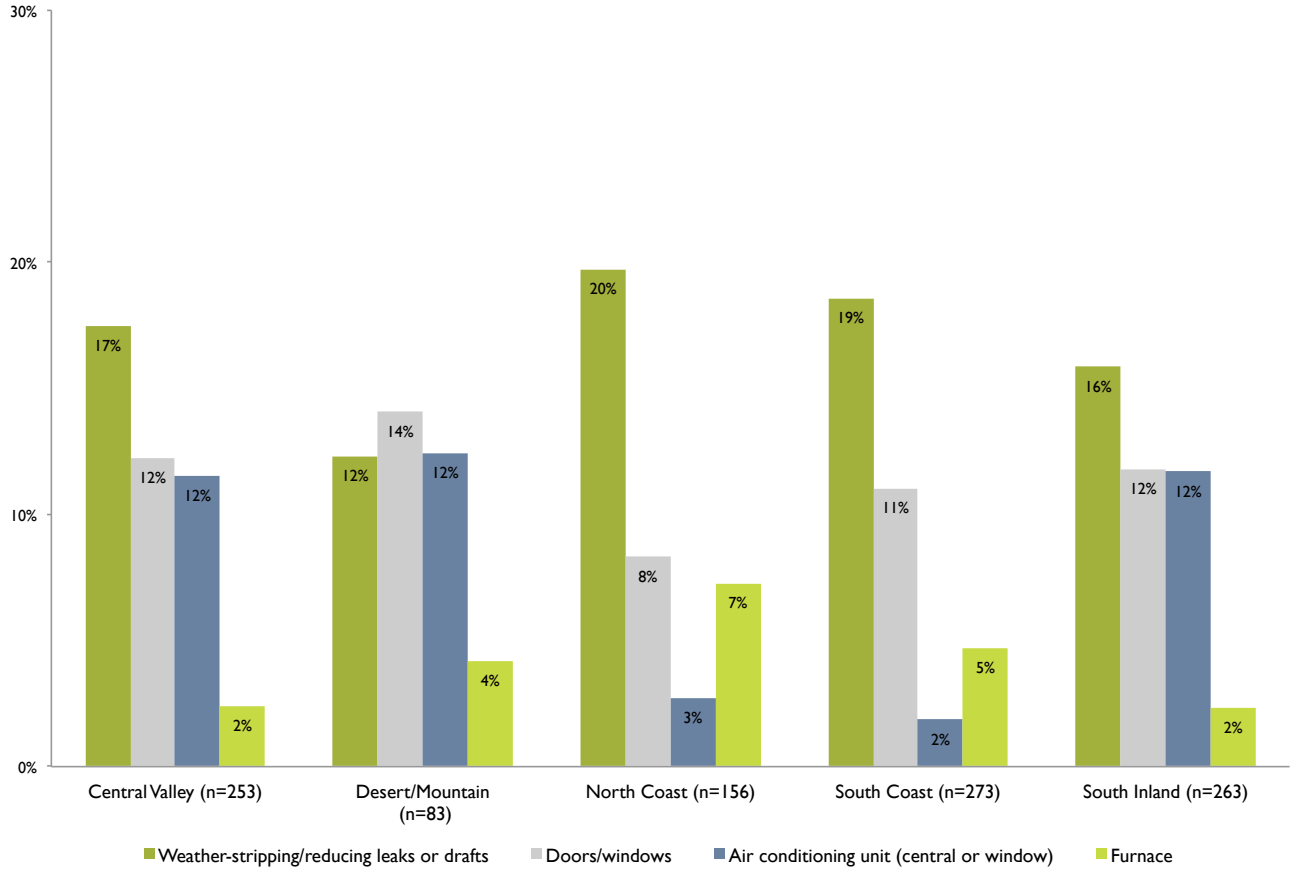
[116] (n=652)

are spent on heating and cooling, and as well as potential with respect to efficiency opportunities. The ESA Program already customizes measure offerings based on climate for some measures, such as air conditioner replacements.

Further examination of the 2013 data suggest that, on average, homes in the Central Valley, Desert, and Mountain climate regions were newer than homes in other climate regions, with a higher ownership rate in the Central Valley and Mountain climate regions. Similarly, customers in these regions tended to have newer air conditioners, furnaces, and heaters—than those in the North Coast, South Coast, and South Inland climate regions.

Figure 33 suggests that there is some consistency across climate zones in terms of what measures are helpful for improving a home's condition or safety by low-income households. At the same time, we also recognize some geographic differences. For example, a greater proportion of households in the Desert/Mountain region said doors and windows would be the most useful measure compared to other regions. Not surprisingly, households in the warmer climate zones, including the South Inland and Central Valley zones, were more likely to identify air conditioners as a particularly useful measure.

Figure 33: Most Helpful ESA Program Measures by Climate Zone (2013 Survey; Low-Income Only)[117]



In general, households across all regions reported their equipment and appliances were working similarly well.

6.8 Summary / Implications

Generally speaking, differences among household-identified needs and opportunities for beneficial energy efficiency measures are driven by climate and housing stock, not by demographic household characteristics. Needs identified by customers tend to emphasize those that will increase comfort or replace old equipment.

This review did not take into account cost-effectiveness or technical savings potential of the measures identified.

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[117] Analysis comes from responses to the following survey question: *Of the energy savings assistance you got from [utility], what was most helpful to your household in helping to control your energy bills and improve the comfort and safety of your home?*

It is not clear whether customers considered energy-related safety concerns in their survey responses, but we do note that only very small shares of households reported using kitchen appliances to heat their homes, which can be a potential safety concern. (See also Section 4 and the appendices.)

7 Conclusions

This section links this study's findings to the research questions and presents selected overall observations and suggestions for consideration by the California investor-owned utilities (IOUs) and the California Public Utilities Commission (CPUC). As outlined in the scope of work and articulated in AB327, the study was expected to examine the extent to which CARE and ESA address low-income customers' needs with respect to their energy expenditures, hardship, language needs, and economic burdens. Conclusions are organized along four themes and address specific research questions identified for this study in consultation with interested stakeholders.[118]

7.1 Energy Burdens and Needs

The study's investigation of energy-related household burdens was driven by two overall objectives:

1. To assess and understand the level of difficulty customers have managing their energy bills given their energy burden.
2. To determine the relative economic burden of low-income customers due to energy burden or energy insecurity.

We present and discuss results organized by nine specific research questions identified—either individually or for groups of research questions.

Research Question:

1. *What is the extent of the energy burden and energy insecurity among eligible low-income customers and relative to non-low-income customers?*

The 2016 LINA telephone survey and utility billing data suggest that the California IOUs' low-income customers faced energy bills that, on average, amounted to 5.6 percent of their self-reported income. This metric is typically referred to as ***energy burden.*** The median energy burden was 3.9 percent, while the range was 0 to 41 percent.[119] The 2013 data demonstrated a mean burden of 8.0 percent for low-income customers suggesting that overall burden on this metric is less than was experienced in prior years.

[118] A final version of the 2016 LINA research plan was published on February 26, 2016, which incorporated written and verbal input from interested stakeholders following a public workshop held on January 28, 2016 at the CPUC.

[119] These energy burden values and other burden-related metrics are based on self-reports from survey respondents of their 2015 incomes, other current and recent household parameters, and utility billing data for these same households from 2014 and 2015.

Energy burden decreases as incomes increase, in large part because energy burden is based on energy costs and household income. Households below 100 percent of the federal poverty level (FPL) face average energy burdens of 8.2 percent, while households between 101 and 200 percent of the FPL have average energy burdens of 3.5 percent. Households in the moderate income ranges have even lower average energy burdens of 2.8 percent for those between 201 and 300 percent of FPL and 1.4 percent for those between 301 and 400 percent of FPL.

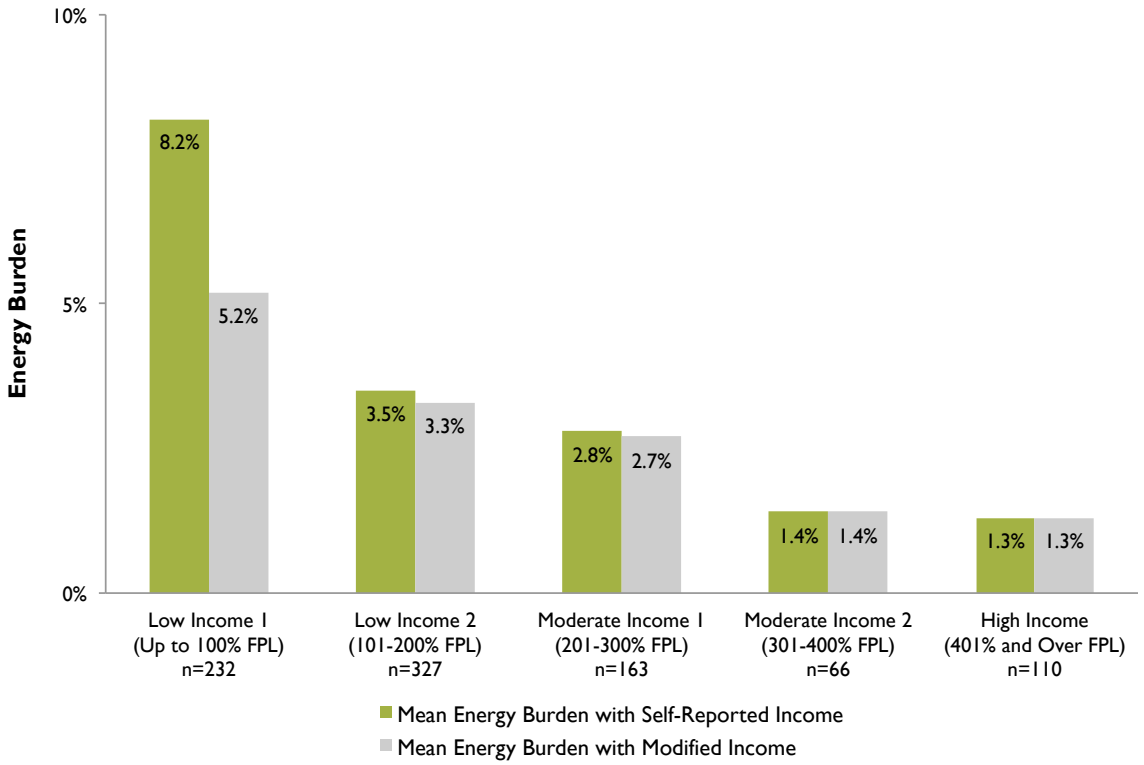
However, the availability of bill discounts for households enrolled in CARE may result in flat or potentially even inverted energy burdens for those just below and above the 200 percent of FPL income threshold. This study found that average energy burdens among those at FPLs of 175 to 200 percent were lower, yet statistically indistinguishable at our sample sizes, than energy burdens of those with FPLs of 201 to 225 percent (3.2 versus 3.7 percent, respectively).

The study also developed a ***modified energy burden*** metric that accounts for resources that are practically equivalent to income and available to households to offset their basic living costs, but that are not accounted for by the standard definition of energy burden. When such non-cash benefits as housing subsidies, medical assistance, and food stamps are included as resources available to households, the average energy burden of low-income households drops to 4.1 percent, almost exclusively due to lowered computed burdens among households at or below 100 percent of the FPL. The modified energy burden for these households drops to 5.2 percent (from 8.2 percent), while other income groups' burdens remain essentially unchanged. This adjustment helps us understand how the take home pay required to pay basic bills (e.g., food, shelter, healthcare) may be offset for these customers at the lowest poverty levels, making other essential bills such as the energy bill relatively more affordable than they are for households with more reported income but who may lack those sources of assistance.

Figure 34 illustrates traditional and modified energy burdens by poverty level.[120]

[120] It should be noted that the sample used for the survey on which these metrics are based was designed to provide robust coverage of low-income and moderate income households. Data for higher income households are limited to those respondents who live in zip codes with elevated saturation of lower income households.

Figure 34: Conventional and Modified Energy Burden by Income Group



Energy insecurity is one metric that does not rely on reported income as a driver of the metric itself, but rather draws upon a customer's self-reported struggle to pay the energy bill. For the current Low Income Needs Assessment, this metric was refined from prior questions that inquired about trade-offs to a set of questions about the degree of difficulty households have in paying the energy bill, their energy-saving practices, and whether they are conserving to the point of discomfort or potentially unsafe in-home conditions.

The 2016 Low Income Needs Assessment indicates that approximately a quarter of low-income households surveyed face high energy insecurity and another quarter face moderate energy insecurity.

Households with incomes all along the distribution up to 300 percent of the FPL (which includes all low-income households and extends half way through the moderate-income range) reported similarly elevated struggles paying their energy bills.

Among the low-income households, 30 percent of survey respondents indicated struggling with energy bills either often or constantly. Among these households, 43 percent reported that they already consistently follow basic no-cost energy conservation practices of setting back heating and cooling temperatures, turning off lights and electronic equipment when not in use, and limiting shower lengths. The other 57 percent had at least some additional

opportunity to safely reduce their own costs further through no-cost efforts, but were not yet doing so.

Conversely, about half of the households struggling with energy bills feel that they are already cutting back their heating or cooling to a degree that additional conservation would impact their households' health. Fifty-seven percent of households struggling with energy bills indicated that they would not be able to heat any less without impacting their household's health, and 55 percent said they could not cool less. A small share of these households—fewer than 2 percent of low-income households surveyed overall—reported heating practices that could be unsafe depending on how customers engage in the practice.[121]

These findings point to an opportunity to promote customer-driven reductions in their own energy costs through additional conservation, as well as a need to ensure that customers do not conserve or shift energy usage in ways that are unsafe or harmful to their health. Energy education can promote both of these objectives, while additional efforts targeted at the small number of households engaged in unsafe heating or cooling practices could seek to provide information, referrals, or emergency assistance, as needed.

Finally, ***material hardship*** is considered in context with these other metrics to understand overall financial challenges for low-income households. Study results suggest that financial struggles decrease with higher incomes, in part because the metric relies on a household's FPL level as an input. However, when we examined households' self-reports of how challenging they find it to pay for basic living expenses such as food and housing, we found that households through 300 percent of the FPL face noticeably higher challenges than those with higher incomes. About a third of these households reported having not been able to pay bills and cover basic living expenses at some point in the prior three years, while about 10 percent face this challenge regularly or always.

Rates of payment delinquencies that lead to final notices or disconnections are fairly consistent and highest among households up to 300 percent of the FPL. Households over 300 percent of the FPL have significantly lower rates of disconnections.

Households led by working-age adults, especially those with dependents, tend to report higher degrees of challenges covering basic living expenses, which stands in contrast to the finding that seniors tend to report higher degrees of challenges with energy bills specifically.

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[121] These practices include using a kitchen oven or stove to heat their home. Using such kitchen appliances for space heating can cause fire and carbon monoxide risks, but do not necessarily impose increased risk if respondents meant that they rely on normal cooking to also increase the temperature in their space.

Research Questions:

2. *Are there certain groups or sub-groups (based on demographic/psychographic or other variables for the eligible customers) that are especially impacted by energy burden?*
3. *Similarly, are there certain groups or subgroups of the eligible population that are more energy insecure or have relatively high energy burden? And to what extend do these groups overlap?*

Throughout the study, several customer segments presented themselves as having higher energy burdens or energy insecurity than others. For example, geographic locations, housing characteristics, income levels, energy usage, and demographic factors (such as age) were all associated with variations in energy burden, energy insecurity, or other burden-related metrics.

The study revealed that each of the metrics allow us to understand hardship and burden in different ways. Overall, however, households with the following characteristics tended to have more hardships with respect to our characterization of burden:

Very low-income households—Those with annual incomes below 50 percent of the FPL had particularly high energy burdens, while households below 300 percent of the FPL shared generally high levels of energy insecurity.

Households in the desert or mountain regions—Households in these regions faced both higher energy burden and energy insecurity than those in all other regions. Households in the Central Valley faced equally high levels of modified energy burden as those in desert and mountain regions. Households along the South Coast exhibited slightly higher energy insecurity (due mostly to higher degrees of self-reported challenges paying bills).

Households with disabilities—Households with a member who has a disability faced slightly higher levels of all burden metrics. While their elevated burden levels were consistently higher for energy burden, modified energy burden, energy insecurity, and material hardship, the degree of elevated burden, on average, was moderate.

Income levels and energy usage—Given how the metrics are defined, households with higher energy usage (resulting in energy costs of $1,000 or more per year) and renters in multifamily buildings (who reported substantially lower incomes) had higher energy burdens than other low-income households. However, their average energy usage was lower than single-family residents, both renters and owners.[122] With non-cash benefits

[122] In the prior Needs Assessment study, multifamily tenants also had lower incomes and lower energy usage than single-family renters; however, the difference in energy usage was greater than that of income, so the net difference resulted in single-family renters having higher energy burden.

taken into account, multifamily renters' modified energy burdens dropped below those of single-family renters and owners.

Other Demographics—Households that include seniors (either as head of household or as a household member) and owners of single-family homes showed higher levels of energy insecurity.

Research Questions:

4. *How do ESA and CARE program participants differ from the CARE-eligible non-participant population and sub-populations in terms of burden and energy insecurity?*
5. *Are there program measures/services that may alleviate such burden or insecurity for specific subgroups?*
6. *Are there particular program measures or needs that might reduce energy burden or insecurity among those with particularly high energy burden or high energy insecurity?*

The study examined existing and potential IOU interventions that may alleviate energy burden and energy insecurity in four different ways.

First, although CARE customers receive bill discounts, study results suggest that CARE customers and their income-eligible non-CARE counterparts have a similar degree of energy burden. On average, however, the (income-eligible) households not enrolled on CARE tend to have slightly higher incomes and higher energy costs.[123]

Second, subsequent reviews of data from the 2013 Low Income Needs Assessment telephone survey provided information on the energy-saving measures that low-income households think would be useful to them. We note that this analysis did not include any examination of the actual energy-saving potential of these measures in homes and their ability to reduce burden. Nevertheless, household survey responses indicate that customers perceive a need for shell-based interventions that reduce air leaks, particularly in regions with the highest heating and cooling loads, such as the mountain and desert regions.

Thirdly, separate small-scale qualitative research with low-income households with high energy burdens and with renters in multifamily buildings demonstrated customer interest in usage alerts that will help them mitigate overall bill costs via monitoring and management of household energy use (and thereby energy burdens). Although several IOUs already offer such alerts, there appears to be low awareness of these tools, providing marketing and education opportunities for the utilities to encourage behaviors that can contribute to reduced usage among this customer group.

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[123] These two factors offset to result in similar energy burdens.

Fourth, the qualitative research with low-income households with high energy burdens also indicated a desire for more customized energy education[124] to help them more effectively regulate their own energy usage. These—and other low-income households—reported already making some efforts to employ basic energy conservation in the quantitative telephone survey, but only about half of these households consistently set back temperatures and turn off lights and electricity-using equipment when not in use. Customized energy education can help pinpoint opportunities for any given household. Providing energy education over a span of time rather than as a "one-time measure" may be worthwhile as it leverages the existing utility-customer relationship, builds on trust customers already have in the information IOUs provide, and reinforces the ways households can reduce their own energy bills.

Research Question:

7. *What, if anything, can and have customers with different burden/insecurity levels done to mitigate burden/insecurity?*

As noted, according to the 2016 telephone survey, low-income households already have implemented some desirable energy conservation practices. Approximately half of the 900 households surveyed reported consistent use of the basic energy-saving strategies of setting back thermostats, turning off lights and electricity-using equipment when not in use, and, to a lesser extent, taking short showers. The degree to which these practices are employed appears similar between those households with high energy burdens and those with lower energy burdens; this suggests that there remain some behavioral and educational opportunities for many low-income households.

This study's qualitative research suggests that households with high energy burdens focus on juggling payments and keeping costs reasonable within constraints imposed by the need for comfort. They focus on ways to keep costs down, finding resources to help them pay their bills, and making payment arrangements. Efforts to keep costs low seem to focus more on conservation practices than on improving the energy efficiency of their homes through programs like ESA.

A review of actual payment practices data from utility records show that some households manage to make payments consistently even at very low income levels and high energy burdens, while others face final notices and disconnections due to lack of payments. Households with more consistent efforts to practice basic energy conservation had fewer payment issues (which we defined as final notices and disconnections for this study).

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[124] Customized energy education was also identified and recommended in the 2013 LINA and ESA Energy Education Studies, and the IOUs have made some adjustments to their educational materials in response to prior study recommendations.

Research Questions:

8. *Are there alternative, better ways to understand burden and insecurity than what have been used in the past? (for example, are we asking the right questions or have the right approach to such data collection)*

9. *Are there multiple ways to "measure" these issues to get more reliable and valid data? (i.e.., are we using the right methods and assumptions in the analyses?)*

Energy burden and energy insecurity are the most established metrics, but there are multiple ways to measure energy-related household burdens and hardships. As noted above, this study used four different metrics (also shown in Table 23) to investigate different dimensions of household burden and hardship. Together, these metrics provide a more holistic perspective than any one single metric.

Table 43: Measures of Energy and Household Burden

Measure	What it Measures	Key Inputs
Energy burden	Actual home energy costs as a percentage of household income	Household energy costs and income
Modified energy burden	Actual home energy costs plus valuation of medical, housing, and food stamp assistance as a percentage of self-reported gross household income	Household energy costs, income, and valuation of non-cash assistance
Energy insecurity	Household challenges regarding affordability of energy bills and monthly trade-offs between meeting energy needs and bill payments	Self-reported difficulty paying energy bills, household disposition and motivation to save energy, heating/cooling system sufficiency
Material hardship	Household challenges regarding broader affordability of basic necessities such as food, shelter, and energy, etc.	Household income, household size, and self-reported difficulty paying household bills and basic living expenses (not limited to energy)

It is important to note that these metrics differ in several key parameters, including:

- How much they rely on income or self-reported household struggles with costs to measure burden;
- What kinds of income or other resources available to households are included; and

- Whether they focus primarily on energy or a broader set of household needs and expenses.

Furthermore, only energy burden is well-established as a metric. The other metrics are still evolving and could be refined further:

- Energy insecurity has evolved over the course of the last three Needs Assessment studies. It could be revised further by incorporating a measure of actual payment practices, such as disconnections and arrearages, to reduce measurement inconsistency posed by self-reports.
- Modified energy burden was newly developed for this study and could be further refined by including a greater range of non-cash assistance from formal programs and possibly also other resources available to households to meet their basic needs. More sophisticated variations could also draw upon informal support and existing assets, but their inclusion requires data that are challenging to obtain.
- Material hardship could be revised to rely less on income and more on self-reports of the household's ability to meet the full range of basic needs to a sufficient degree. These basic needs include shelter, food, clothing, medical care, transportation, and utilities.

To highlight the variation that different burden metrics provide, we remind the reader of selected findings presented in the previous sections. This study found that, on average, customers in desert and mountain regions of the state and households with disabilities showed higher burden and hardship than other customer segments on multiple metrics. Conversely, seniors indicated a greater challenge paying their energy bills while working-age adults with dependents expressed more difficulty making ends meet with respect to overall bills for everyday expenses (a key input for the measure of material hardship used for this study). These differences highlight how needs vary by customer segment.

7.2 Unique Customer Needs

The study's investigation of unique customer needs was driven by a desire to better understand several selected population groups that prior studies have not been able to investigate in depth given sampling and methodological limitations. These population segments are: Asian language customers, undocumented immigrants, households with seniors, households with members who have disabilities, and multifamily renters.[125]

The study's investigation for these household segments was guided by three overall objectives:

[125] The initial research scope had not singled out multifamily renters, but this group was added to the research during the planning process.

- Identifying what, if any, unique needs (outreach, enrollment, measures) of selected subpopulations may be addressed with some kind of alternative approach;
- Understanding enrollment challenges and potential solutions for the targeted population groups; and
- Understanding particular needs of the targeted population groups and useful measure solutions.

We present and discuss study results and implications organized by target customer group. Wherever warranted—due to overlap in research methodology and results—we discuss some of these population groups together.

7.2.1 Asian Language Customers and Undocumented Immigrants

In the estimation of community-based organizations (CBOs) that serve these populations, neither low-income Asian language customers nor undocumented immigrants differ fundamentally from other low-income households in their energy-related needs or circumstances. This population may benefit from more customized marketing and outreach, however, that are sensitive to language and cultural concerns.

Specifically, our research suggests that both low-income Asian language customers and undocumented immigrants share information about programs and resources informally within their communities, so word-of-mouth information sharing should be recognized and possibly facilitated in IOU outreach strategies. Similarly, Asian language customers may respond more positively to marketing that stresses collective benefits over personal savings and gain. Furthermore, Asian language customers with limited English capability may face communication challenges during the scheduling and implementation phases of the ESA program due to language barriers despite the in-language marketing offered by IOUs. It appears that these households sometimes initiate participation in ESA, but then become unresponsive when contractors who only speak English (or English and Spanish) contact them to deliver program services. Overcoming this barrier may require either expanded language capabilities during service delivery, the availability of interpretation services, or a suggestion in in-language marketing materials that households have English-speaking family members or neighbors available when contractors call and visit.

7.2.2 Seniors and Disabled Residents

Households that include a senior aged 65 or older and/or disabled person tend to reflect similar energy related interests and needs. These households have high awareness of both ESA and CARE[126] and seem to be well served by existing marketing approaches, although they tend to use electronic communication less than most other low-income households.

[126] Based on the 2013 Needs Assessment customer telephone survey.

These households also reported needing more heating and cooling to stay comfortable, although few indicated having energy-using medical equipment.

Low-income households that include a member with a disability exhibit moderate energy-related burden across the metrics, while households with seniors exhibited less overall burden but more energy insecurity as indicated by challenges associated with paying energy bills.

This study used a fairly broad definition of 'disability', which included different types of disabilities. Given there are likely differences among households' energy use and payment practices based on the members' type of disability, additional analyses may be useful to better understand the relevance of specific disabilities associated with energy-related needs or constraints.

7.2.3 Multifamily Tenants

Low-income tenants in multifamily buildings have higher energy burdens largely due to their lower incomes. Their energy usage is lower than that of low-income households in single-family homes, pointing to potentially fewer energy savings opportunities. While some tenants we interviewed expressed interest in (or need for) equipment replacements, it was not possible to discern whether the identified needs reflected inadequate maintenance practices by landlords or energy-saving opportunities.

7.3 Beneficial Energy Efficiency Measures

The study's investigation of beneficial energy efficiency measures was driven by three overall objectives:

- Obtain CBO perspectives on customer benefits (especially for health and safety) among existing measures and other potential measures;
- Identify how measure eligibility screening contributes to—and limits—the benefits provided to customers (e.g., central AC measure eligibility based on customer climate zone); and
- Determine needs and benefits of measures from the customer point of view.

Assessments of household energy burdens and unique customer needs (which are summarized above) complemented new analysis of responses to the 2013 Low Income Needs Assessment's telephone survey. Together, findings from these research tasks suggest that:

- Low-income households perceived a need for envelope measures in most areas of the state; households in the Central Valley and much of Southern California also expressed a desire for air conditioning measures. This finding is based on 2013

telephone survey data, which was conducted with a large sample of low-income customers.

- Customers reported an interest in usage alerts to help them manage day-to-day energy choices as they manage monthly costs. Both the high burden energy focus group attendees and multifamily tenants we interviewed were interested in getting these types of alerts from their utility.

7.4 Income Documentation

The overall objective of the study's investigation of income documentation was to:

- Determine the extent to which providing income documentation for CARE and ESA is a barrier to eligible customers participating in the programs and why.

Consistent with results from the 2013 Low Income Needs Assessment, our limited qualitative exploration of income verification suggests that providing income documentation is not likely a major stumbling block to CARE enrollment or ESA/FERA program participation for households that are income-qualified and motivated to participate. While these observations are based on limited evidence, the CBOs we spoke to pointed to similarities between income verification procedures for IOU programs and other means-tested programs. These similarities suggest that changes to the current methods and practices of enrolling customers are not necessarily warranted. In fact, the IOUs' efforts may already be more accommodating and proactive than many means-tested programs by identifying and seeking out eligible households for enrollment and limiting income verification to households that cannot be vetted independently.

7.5 Observations and Recommendations

Energy burden and affordability. The expanded metrics developed for this study are useful tools to better understand the complexities that contribute to variations in low-income households' energy burden and affordability. Comparisons of low-income households at varying income levels below and above the income-qualifying threshold for program eligibility provide additional valuable insights.

- We recommend that the IOUs and the CPUC continue supporting the development and use of multiple metrics in order to both better serve the unique needs of low-income households and make the most efficient use of program resources. Future needs assessments should continue to examine households above and below the income threshold for income-based program eligibility.

Unique customer needs. The study's qualitative research suggests that Asian language customers and undocumented immigrants do not have different energy-related needs than other low-income customers, suggesting that the ESA Program's current measure offerings are applicable to these segments. Community-based organizations (CBOs) indicated that

existing in-language outreach by the IOUs is an important factor in getting these segments to participate in programs. However, the availability of in-language interaction with customers during the ESA scheduling, assessment, and education visits could be expanded, especially for customers who do not speak English or Spanish.

- We recommend that the IOUs explore the opportunities and costs associated with expanding in-language program services or otherwise overcoming language barriers during ESA scheduling and in-home visits.

Beneficial energy measures. Focus group attendees from low-income households with high energy burdens were highly interested in receiving information from their utility in real time and customized to their household. The study's quantitative survey results also found that many low-income households are practicing no-cost conservation measures that could help them reduce their bill only inconsistently. There may be value in on-going engagement with low-income customers that extends beyond one-time transactions to enroll them in CARE, treat them through ESA, and provide energy education on a single visit. Approaching low-income programs as part of a continuing and coordinated customer-utility relationship can enhance energy education efforts and encourage customer-driven conservation efforts. This relationship could include participation in CARE and ESA and interactions concerning payment arrangements.

- We recommend that the IOUs explore the benefits and costs associated with engaging with low-income customers (particularly high burden customers) on an ongoing basis to deliver customized energy education and usage alerts.

Income documentation. ESA and CARE are in line with—and, in some cases, go above and beyond—what other means-tested programs require to prove income eligibility. Qualitative research with CBOs serving undocumented immigrants indicated that program requirements are not a barrier to participation, suggesting that the programs' current requirements are appropriate and are not a barrier to participation. The 2013 LINA study reached a similar conclusion.

- We recommend that the IOUs maintain their current income verification processes, as they have not been found to be a substantial barrier to participation.

Finally, we offer a number of suggestions and opportunities for future study in Appendix G.