High Bills, Low Bills, Same Income: Unpacking Structural and Behavioral Diversity in Low-Income Energy Consumption

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ABSTRACT

Within California's income-qualified population (households at 200 percent of the Federal Poverty Level), some households consume ten times more energy than others. This study examines why, revealing behavioral, cultural, and structural factors that challenge "one-size-fits-all" program approaches. This research supports program design that accounts for what can be changed (attitudes, equipment, and access) and can help programs to avoid over-promising savings where household constraints make dramatic reductions unachievable.

Using mixed methods (a market characterization electric and gas customers, surveys of 1,103 households, regression analysis, and multi-language focus groups) we compared high-usage (90th percentile) and low-usage (10th percentile) households, stratifying by energy type and climate region to isolate behavioral factors from structural constraints.

Behavioral profiles differ significantly for high and low-using households. Low-using households demonstrate stronger conservation beliefs, more consistent energy-saving practices, and greater willingness to accept discomfort. High-using households prioritize comfort more strongly and are less likely to believe conservation actions yield meaningful savings. Regression analysis controlling for climate found comfort prioritization adds to summer electricity usage.

Structural constraints limit intervention potential. High users predominantly live in larger homes, have more occupants, and reside in extreme climates—factors not addressable by programs but requiring differentiated service approaches.

Cultural context shapes engagement. Multi-language focus groups revealed that language barriers during technical program phases (not just outreach) create incomplete participation.

Effective programs must recognize behavioral diversity, cultural context, and structural constraints. Tailored interventions matching household contexts can improve outcomes for both high users seeking savings and low users practicing extreme conservation.

Introduction

California's Energy Savings Assistance (ESA) program serves income-qualified households through the state's four investor-owned utilities (IOUs): Pacific Gas and Electric (PG&E), Southern California Edison (SCE), Southern California Gas (SoCalGas), and San Diego Gas and Electric (SDG&E). The program provides free energy efficiency measures and services aimed at delivering deep energy savings while enhancing the health, comfort, and safety of low-income customers. As the IOUs have deepened their focus on an energy usage-based approach to program delivery, understanding the factors that drive variation in energy consumption within this population has become increasingly important.

Within the income-qualified population, energy use varies dramatically. Some households consume ten times more energy than others, even after controlling for climate. Yet program offerings are largely uniform, designed around a generalized profile of the "low-income household" that may fit neither the highest nor the lowest users particularly well. High-using households may be receiving measures that do not address their primary consumption drivers, while low-using households may be overlooked despite carrying significant energy burden and, in some cases, making dangerous conservation trade-offs to keep bills low.

The 2025 Low Income Needs Assessment (LINA), conducted by Evergreen Economics for the California IOUs and the California Public Utilities Commission (CPUC), was designed to examine these questions through a comprehensive mixed-methods research effort. The study explored the behavioral, structural, and cultural factors that distinguish high-using from low-using households within the low-income population, and developed recommendations for how programs can more effectively serve each segment.

This paper presents key findings from that research, organized around three cross-cutting themes that emerged from the data: (1) behavioral diversity between high- and low-using households, (2) structural constraints that limit the potential for program-driven change, and (3) the role of cultural context and language access in shaping program engagement. We conclude with implications for program design that account for these distinctions.

Methods

Defining High and Low Usage

The study defined high- and low-using households as those at the 90th and 10th percentiles of annual consumption separately for gas and electricity, respectively, within each of four climate zone groups. The 90th and 10th percentile cut points were chosen to maximize contrast between groups, ensuring households at each extreme represent genuinely distinct usage patterns, while still yielding sufficient sample sizes for subgroup analysis across utility service territories and climate zones. The high using households average annual kWh in a given utility territory with both high heating and cooling needs was 19,171 kWh. In that same region, the low users used an average of 2,869 kWh per year. For high and low *gas* using households, the *highest* average annual therms in a region with high heating needs and low cooling needs was 1,081 therms and average for low using households was 108 therms in the same region.

California's sixteen climate zones were mapped to combinations of heating degree days (HDDs) and cooling degree days (CDDs), yielding four groups: high heating/high cooling need, high heating/low cooling need, low heating/high cooling need, and low heating/low cooling need. This climate-stratified definition was chosen to ensure that comparisons between high- and low-using households reflected genuine usage differences rather than climate differences across service territories. Note that separate weighting schemes were developed for each fuel analysis. Behavioral comparisons between fuel types are interpreted with this in mind.

To be included in the high- or low-usage population, households were required to have at least twelve months of billing history, to not be master-metered accounts, to not be net energy metered accounts, and to have non-zero annual consumption for the relevant fuel. All customers qualified as being low-income using 200 percent of Federal Poverty Level which is the eligibility criteria to participate in a program that provides lower energy bills. For a household of four, this

would be for households at or below an annual income of $64,300 in 2026. After applying these filters, the four IOUs identified approximately 196,000 high electricity-using households and 238,000 high gas-using households across the low-income population (Evergreen Economics 2025).

Market Characterization

The market characterization drew on multiple secondary data sources to profile high- and low-using households. Utility billing data provided by each IOU supplied geographic, rate, and demographic characteristics for households. The 2020 Census Public-Use Microdata Samples (PUMS) were used to characterize household composition, income levels, home type and size, energy burden, and language spoken at home. The 2019 California Residential Appliance Saturation Survey (RASS) provided data on heating and cooling equipment. Geographic designations including disadvantaged communities (DACs), rural areas, public safety power shutoff (PSPS) zones, high fire threat districts (HFTDs), and tribal lands were drawn from CalEnviroScreen 4.0, the CPUC Fire Threat Map, and U.S. Census sources.

Customer Survey

Evergreen Economics, with Ewald and Wasserman Research Consultants, conducted a multi-mode survey of 1,103 active CARE and Family Electric Rate Assistance (FERA) program participants between January and February 2025. The survey was administered by web and phone in English (1,031 completions) and Spanish (72 completions), and took approximately fifteen minutes to complete. Respondents received a $25 e-gift card for their participation. Survey contacts were excluded if their address was within fifteen miles of the Eaton and Palisades fire areas, removing approximately 3,000 potential contacts.

The sample was stratified by fuel usage group (high or low electric-using and high or low gas-using), IOU, climate zone group, and home type (single-family versus not single-family). Survey responses were weighted to align with these strata. Separate weighting schemes were developed for gas and electric analyses, given that some respondents appeared in both high electric and high gas categories while others appeared in only one.

The survey collected information on home and appliance characteristics, energy behaviors, motivations and priorities, comfort and bill trade-offs, and health-related energy needs.

Regression Analysis

Two separate linear regression models were estimated to examine predictors of summer electricity consumption (defined as total kWh from June through September) for high-using households (n=311) and low-using households (n=340). The regression models focused only on the high and low *electric* using homes to provide a more consistent and comparable data set and investigate appliance holdings. Predictors included household occupancy, presence of central AC, presence of portable AC units, presence of a clothes dryer, presence of medical equipment, a

comfort priority indicator (whether a desire to be comfortable was rated very or extremely important), and cooling degree days (CDDs). Variables that were considered but found to be statistically insignificant—including cooling equipment age and many attitudinal variables—were excluded from the final models.

Focus Groups

Seven in-person focus groups were conducted in three locations and four languages: English, Spanish, Cantonese, and Vietnamese. Focus group themes were selected based on preliminary survey findings, with priority given to characteristics that differentiated high from low users, that were not well studied in prior research, and that presented actionable program opportunities. Groups explored topics including cooling and heating strategy decision-making, comfort and bill trade-offs in households making unsafe conservation trade-offs, and energy program participation experiences among non-English speaking households. Each session was ninety minutes, with six to eleven participants; participants were compensated $150 for their time.

High- and Low-Using Household Profiles

Behavioral Characteristics

Behavioral differences between high- and low-using households are consistent and pronounced across both fuel types, though somewhat more dramatic for electricity. Low-using households are more confident in their energy-saving knowledge, more likely to act on conservation practices consistently, and more willing to endure physical discomfort to keep bills low. High-using households are more likely to prioritize comfort, less certain that conservation actions yield meaningful savings, and more likely to use energy-intensive strategies for heating and cooling.

Energy Saving Beliefs and Actions

When asked how much various activities contribute to energy savings, low-using households were more likely than high-using households to believe that turning off lights, adjusting thermostats, running appliances less frequently, and unplugging items when not in use would contribute to bill savings (Figure 1). This pattern of higher belief corresponded with higher reported action: low-using households were consistently more likely than high-using households to report taking each of these actions "always or almost always" (Evergreen Economics 2025).

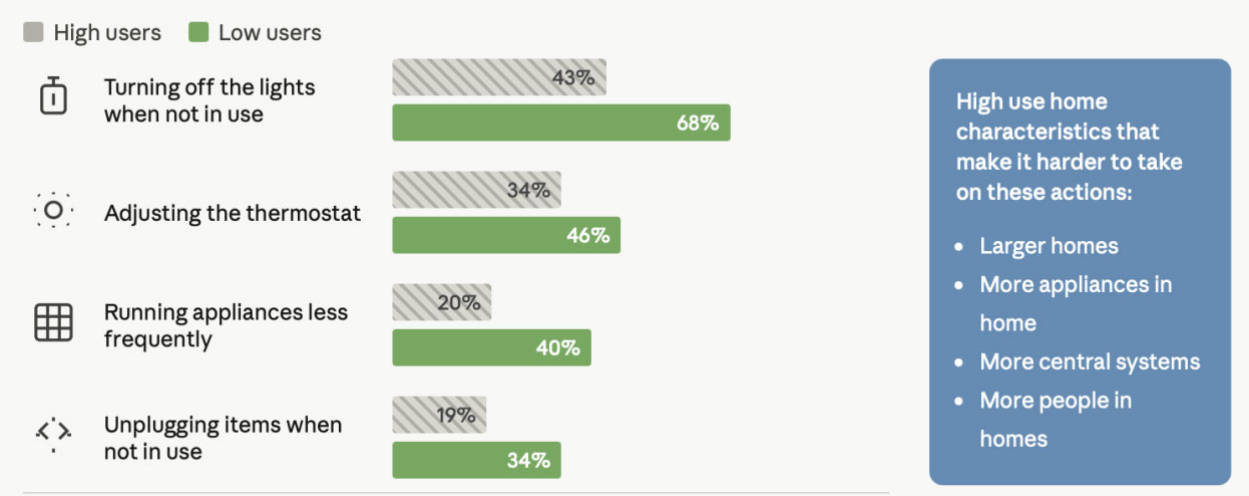

Figure 1. Percent of High- and Low-Using Households who Take Energy Saving Actions Always or Almost Always

Despite these differences in belief and action, both groups reported at similar rates that "there is nothing more we can do to save energy." This finding suggests that a barrier for high-using households is not necessarily a lack of motivation but a mismatch between perceived effort and actual consumption, a dynamic that has important implications for the design of educational interventions.

Focus group participants reinforced these survey findings. Low-using household participants described detailed and vigilant conservation routines. One participant described unplugging lamps immediately after use as a fixed habit. High-using household participants more readily discussed strategies for staying comfortable and were less likely to volunteer extreme conservation tips.

Comfort Priorities

High gas-using customers were significantly more likely than low gas-using customers to rate a desire to be comfortable as "extremely important" (41% vs. 22%) in Figure 2. This difference persisted when controlling for heating and cooling needs, indicating that it reflects genuine attitudinal differences rather than climate-driven necessity.

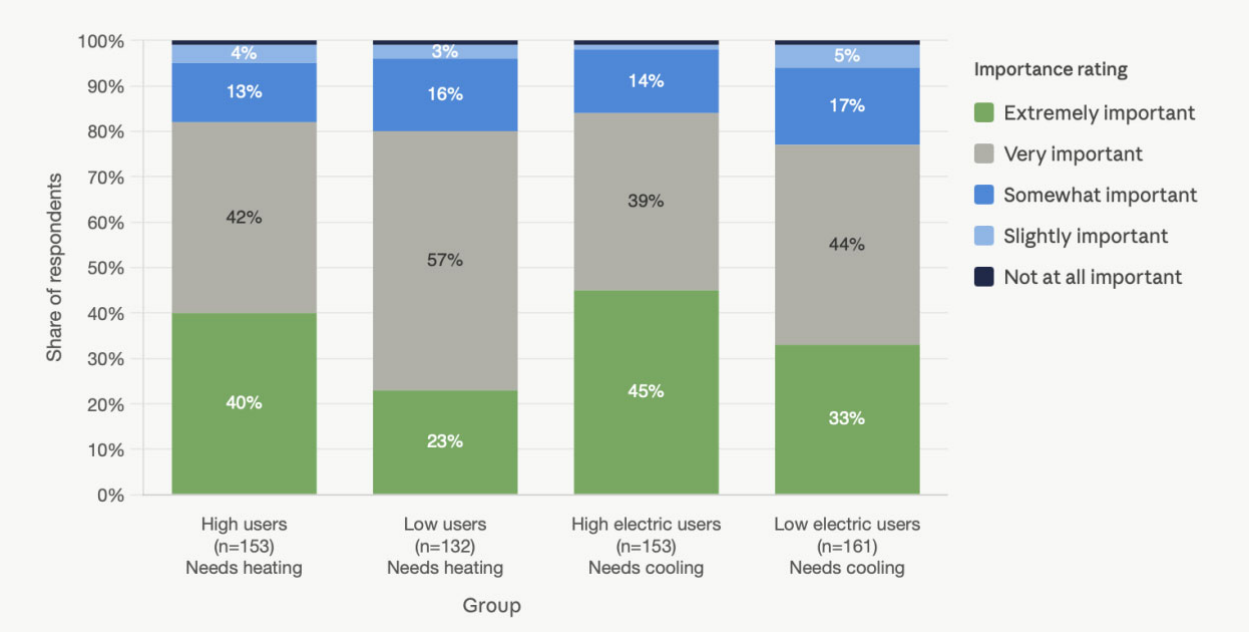

Figure 2: Importance of Being Comfortable by Heatin and Cooling Needs and Usage Type

The finding was incorporated into the regression model and confirmed to be a statistically significant predictor of summer electricity consumption among high-using households.

In focus groups, low-using household participants described making comfort sacrifices as a regular feature of their energy management. Common strategies included "heating the person, not the space" through layering clothing, using electric blankets and heating pads, and creating improvised warming solutions. Several participants described tolerating uncomfortably hot indoor temperatures rather than running air conditioning. A smaller number described potentially dangerous practices, including using kitchen ovens and stoves as supplemental heat sources and turning off pilot lights—practices that may not save as much energy as these households believe and can pose significant safety risks.

Bill Engagement and Environmental Motivation

Both high- and low-using households reported a strong desire to keep energy bills low, and focus group participants across both groups were able to cite specific dollar amounts on their monthly bills and to recall the savings impact of specific program measures. The desire to reduce bills was not a distinguishing factor between groups.

Environmental motivation showed a counterintuitive pattern. Low electricity-using households were more likely than high electricity-using households to rate protecting the environment as very important, while the reverse was true for gas-using households. However, when controlling for heating and cooling needs, these differences disappeared, suggesting that environmental attitudes were not the driver of usage patterns, and that climate-driven comfort needs may explain apparent attitudinal differences (Evergreen Economics 2025).

Structural Characteristics

Many characteristics that distinguish high from low users are not addressable through program interventions, though they are useful for targeting and tailoring program offerings.

Home Size and Type

High-using households (both gas and electric) are significantly more likely to live in single-family homes and in homes larger than 1,000 square feet. Only 11 to 12 percent of high electricity-using households live in multifamily buildings. Large households (six or more members) are almost exclusively high users, while low-using households are typically one- to two-person households. High-using households are more likely to be homeowners, while low-using households are more likely to rent (Evergreen Economics 2025). Consistent with 2022 LINA findings, landlord-tenant dynamics remain a significant barrier, with renters citing fears of rent increases, skepticism about free programs, and minimal landlord communication as ongoing obstacles despite the 2021 creation of separate ESA multifamily programming.

Climate and Geographic Location

Strong correlation exists between electricity usage and cooling demand, with high-usage customers concentrated in high cooling climate zones (34% vs 18% for low users). High-usage households are also more prevalent in PSPS zones, HFTDs, and tribal areas (9% vs 1% for low users). These geographic concentrations provide useful targeting signals for outreach and program delivery.

Energy Burden

The relationship between usage and energy burden is strong for electricity and somewhat weaker for gas. This is in line with nationally focused research that demonstrates that high burdens are disproportionally higher for low income households than the average household (Drehobl, Ariel, Lauren Ross, and Roxana Ayala. 2020). Among electricity customers, 88 percent of high electricity-using households experience high electricity burden (defined as electricity costs representing 6.3 percent or more of income), while 86 percent of low electricity-using households experience low electricity burden. However, 17 percent of low electricity-using households and 38 percent of low gas-using households still experience high total energy burden across all fuels. This finding underscores the risk of directing all program attention toward high users.

Appliance and Equipment Holdings

The gap in appliance ownership between high- and low-using households is substantial and consistent across equipment categories as shown in Table 1. High electricity-using households are dramatically more likely to own clothes dryers (95% vs. 42% of low electricity-using households), dishwashers (77% vs. 38%), second refrigerators (48% vs. 21%), and central air conditioners (40% vs. 21%). Nearly half of low electricity-using households report having no additional equipment beyond what might be considered standard household appliances. High-using households are also more likely to have medical equipment (34% vs. 12%), power tools

(44% vs. 12%), exercise equipment (20% vs. 3%), and a range of other plug loads (Evergreen Economics 2025).

Table 1. Selected Equipment Ownership Rates by Electricity Usage Groups

Equipment	**High electricity-using (n=311)**	**Low electricity-using (n=345)**
Clothes dryer	95%	42%
Clothes washer	97%	47%
Dishwasher	77%	38%
Second refrigerator	48%	21%
Central AC	40%	21%
Medical equipment	34%	12%
Power tools	44%	12%
Exercise equipment	20%	3%
EV charger	16%	1%

High electricity-using households are more likely to have older primary cooling equipment: 29 percent of high electricity-using households reported their single cooling system was between 11 and 20 years old, compared to 10 percent of low electricity-using households. Across all survey respondents, the most commonly cited barrier to saving energy was the "inability to buy more efficient appliances," suggesting strong receptivity to equipment upgrade offerings.

Cooling strategies differ markedly between groups as shown in Table 2. While fewer than 30 percent of respondents rely on a single cooling strategy, high electricity-using households are much more likely to use central AC as their primary cooling method (40% overall, rising to 53% in high-cooling regions), while low electricity-using households are more likely to rely on open windows and portable fans. Even when households primarily use lower-energy methods, they often supplement with higher-consumption equipment.

Table 2. Primary Cooling Equipment of High and Low Electricity-Using Homes by Climate

	Irrespective of Climate		Needs Cooling	
	High Electricity - Using Homes (n=311)	Low Electricity - Using Homes (n=345)	High Electricity-Using Homes (n=154)	Low Electricity-Using Homes (n=164)
Central AC	40%	21%	53%	34%
Open windows	20%	35%	11%	17%
Ceiling fan(s)	13%	6%	14%	7%
Portable fan(s)	8%	21%	4%	15%
Window AC	7%	6%	8%	11%
Swamp cooler	6%	6%	5%	9%

Portable AC	4%	1%	3%	2%
Mini-split/ductless heat pump	2%	2%	2%	3%
No cooling equipment	2%	2%	1%	2%
Ducted/central heat pump	1%	0%	1%	

For heating, furnaces are the most common primary equipment among high-using households (used by 40% of high electricity-using and 39% of high gas-using households), while low-using households more commonly rely on portable space heaters and wall heaters. These decisions come with their own set of risks with some households having concerns with fire risks with space heater usage (Carley, Sanya, Michelle Graff, David M. Konisky, and Trevor Memmott. 2022). High-using households are more likely to supplement their primary heating system with secondary equipment, regardless of climate zone, suggesting potential inefficiencies in primary system performance (Evergreen Economics 2025).

Household Composition and Health Needs

High-using households are significantly more likely to have children in the home. Among electricity high and low-using households, 53 percent of high electricity-using households have children compared to 23 percent of low electricity-using households; among gas customers, the gap is 51 versus 32 percent.

Prior research has shown an interplay between physical conditions and energy-related coping strategies (Hernández, Diana. 2016). High electricity-using households are also more likely to have health conditions requiring additional heating or cooling (35% vs. 20% of low electricity-using households). Relatedly, 34 percent of high electricity-using households have medical equipment in the home, compared to 12 percent of low electricity-using households. CPAP machines are the most common type of medical equipment (present in 21% of high electricity-using households), followed by nebulizers and oxygen concentrators. Despite this high prevalence, rates of Medical Baseline rate enrollment are lower than rates of medical equipment ownership, suggesting under-enrollment that programs could address.

Cultural Context and Language Access

Given the diverse makeup of California, research was conducted in multiple languages to avoid biasing responses to only English-speaking households. Language and cultural factors emerged as a significant dimension of program equity, particularly for low-using households. Market characterization data found that between 10 and 21 percent of high and low energy-using households speak Vietnamese or Chinese (Mandarin or Cantonese) as a non-English, non-Spanish language at home. Survey data found that low electricity-using households with both English and Spanish speakers are more likely than their high-using counterparts to primarily speak Spanish at home (Evergreen Economics 2025).

Focus groups conducted in Cantonese illuminated cascading barriers to program participation that extend well beyond initial outreach. Cantonese-speaking participants were

unaware that utility bills could be requested in-language or that translated utility websites existed, leading many to rely on word-of-mouth and translation apps to understand their rates and programs. Translation apps frequently caused participants to miss important program requirements and details. One participant described a failed refrigerator installation—the technician arrived with the appliance, but a grounding wire issue in her apartment made installation impossible. Language-mediated communication gaps had prevented her from understanding and addressing the electrical requirements before the visit, requiring her to reapply for the program entirely.

Vietnamese-speaking focus group participants had lower overall program awareness. Only one participant in that group had heard of ESA, and the group identified Vietnamese-language radio and local gathering places such as Vietnamese sandwich shops as more effective outreach channels than standard utility communications.

These findings echo those of the 2016 LINA, which found that in-language support was essential not only at initial contact but throughout customers' participation (Evergreen Economics 2016). The 2025 research extends this finding by documenting that the assessment and installation phases—where contractors must convey technical requirements accurately—are particularly vulnerable points for language-related breakdowns.

Regression Results

The regression models clarify which factors are the strongest correlates of summer electricity use, controlling for other characteristics simultaneously (Table 3).

Table 3. Linear Regression Model Results (Electricity Use in Summer, kWh)

Variable	High-Using Household Model	Low-Using Household Model
Household Occupancy	92 †	26 *
Central AC	1,192 **	175 **
Portable AC		111 *
Medical Equipment	845 **	-
CDD	0.9**	0.2**
Clothes Dryer1	998 *	-
Desire for Comfort	447 †	-

Note: †p<0.1; *p<0.05; **p<0.01 (a dash means the variable was not included in the model.) A full list of variables tested but found to be not-significant (including home size, second refrigerators, etc.) are included in the final report.

[1] We are uncertain about the accuracy of the reported fuel of the clothes dryers. While we did ask survey respondents about the fuel used, for clothes dryers in particular, information on the self-reported fuel is unreliable, and electric billing data do not report any indication of fuel.

Central AC is the strongest predictor of summer electricity consumption in both models, but with dramatically different magnitudes. High-using households with central AC consume, on average, 1,192 additional kWh over the summer compared to high-using households without it. For low-using households, the same comparison yields only 175 additional kWh. This finding suggests that while central AC increases consumption in both groups, its effect is disproportionately large in high-electricity-using households likely reflecting more frequent and intensive use, older equipment, or a combination of both.

Climate sensitivity also differs substantially between groups. Each additional 100 CDDs increases summer consumption by an average of 90 kWh for high-using households, compared to only 20 kWh for low-using households. Notably, the average CDDs for high- and low-using households in the survey sample were nearly identical (1,123 and 1,181, respectively), confirming that this difference reflects behavioral and equipment differences, not a difference in climate exposure.

Among high-using households, the presence of a clothes dryer adds an estimated 998 kWh over the summer, medical equipment adds 845 kWh, and a stated desire for comfort adds 447 kWh. Each additional household occupant adds 92 kWh for high-using households and 26 kWh for low-using households. The comfort variable was not a statistically significant predictor for low-using households, nor was the clothes dryer, consistent with the finding that low-using households are less likely to own dryers.

For low-using households, the presence of portable AC adds 111 kWh over the summer. This is a modest impact compared to the central AC effect for high-using households, but notable given the low overall consumption levels in this group.

Implications for Serving High and Low-Using Low-Income Households

Together, these regression results and the behavioral and structural survey results indicate that high-using households' consumption is driven by a combination of equipment ownership, health needs, household size, and comfort priorities—while low-using households' consumption patterns are more stable and less responsive to the same factors. This distinction has direct implications for targeting: the same intervention will have different effects depending on which group it reaches.

The findings support a set of program strategies differentiated by usage group and household context. These are organized into three categories: equipment offerings, behavioral interventions, and targeted outreach.

Equipment Offerings

For high-using households, the priority equipment interventions align closely with the regression findings. Replacing older central AC systems in high-cooling regions addresses the largest single driver of summer electricity consumption identified in the models. The study found that 29 percent of high electricity-using households have cooling systems between 11 and 20 years old, compared to 10 percent of low electricity-using households, and that inability to purchase more efficient equipment was the most commonly cited barrier to saving energy. Central AC replacement is already included in ESA program offerings; the research supports continued emphasis on this measure for high-using households.

For households without central AC in hot regions, ESA contractors could assess whether secondary cooling equipment is in good condition and being used efficiently, and provide education on optimizing multiple cooling strategies. The current program does not permit providing AC for households without an existing central system, which limits the scope of this intervention.

Dishwasher and clothes dryer upgrades represent a gap in current program offerings. High electricity-using households are much more likely to have these appliances, and the presence of a clothes dryer was a significant predictor of additional summer electricity use in the regression model. Programs could consider adding these upgrades for households with older or inefficient equipment, with targeting tied to minimum occupancy levels to improve cost-effectiveness.

High-using households are also significantly more likely to have pools, pumps, and hot tub equipment. Expanding pump program offerings beyond pool pumps to include efficient well, irrigation, and hot water circulation pumps could reach a portion of high-using households with these end uses.

For low-using households living in multifamily buildings with steam radiators—a smaller but particularly vulnerable segment—retrofitting thermostatic radiator valve controls and improving boiler management represent an opportunity to address comfort deprivation to avoid residents considering dangerous supplemental heating methods.

Behavioral Interventions

For high-using households, educational approaches should acknowledge the structural realities of larger homes, more occupants, and more appliances, while identifying the specific actions that are most likely to yield savings in these contexts. Case study materials using matched high/low user profiles—showing households with similar structural characteristics but different usage patterns—could make conservation goals feel achievable rather than abstract. Education at site visits should aim to include as many household members as possible, and should address the specific energy costs of child-oriented electronics in households with children. Post-program follow-up comparing pre- and post-treatment usage could reinforce educational messages and identify households that would benefit from more intensive support.

High-using households with medical equipment represent a distinct educational opportunity. Rates of Medical Baseline enrollment are lower than rates of medical equipment ownership, suggesting that many eligible households are not receiving the bill reduction they qualify for. Targeted outreach explaining Medical Baseline eligibility and enrollment could lower bills for these households without requiring changes in usage.

For low-using households, the priority educational need is safety. Focus groups documented a range of potentially dangerous conservation practices: using ovens and stoves for heating, turning off pilot lights, and enduring indoor temperatures at extremes that pose health risks. Educational materials designed for low-using households should clearly flag dangerous practices, explain their actual energy savings (often less than these households expect), and offer safer alternatives that still support bill management. These materials should be positioned as supportive rather than corrective, acknowledging the genuine commitment to conservation that low-using households demonstrate.

Targeted Outreach

Language access is a program equity issue that extends throughout the program process, not only at initial outreach. The research supports strengthening in-language support at assessment and installation phases, where technical requirements must be communicated accurately. This could include in-language contractor training or translation services for site visits, translated technical materials and safety information, and coordination with local community-based organizations (CBOs) for ongoing language support and follow-up.

For Spanish-speaking low-using households, outreach materials should recognize that this population may have different conservation motivations and communication preferences than high-using households. The CHANGES program—authorized by the CPUC under Decision 15-12-047—offers a potential coordination mechanism for reaching customers with in-language case managers. For non-English, non-Spanish speakers, outreach through culturally specific community channels (Vietnamese-language radio, local gathering places) may be more effective than standard utility communications. For high electricity-using households on tribal lands, community outreach through tribal partners is warranted by the disproportionate concentration of high users in these areas.

Conclusions

The variation in energy consumption within California's income-qualified population is not random and not simply a function of the state's varied climate. It reflects systematic differences in household composition, and self-reported home characteristics, equipment holdings, comfort priorities, and conservation behaviors, as well as structural and cultural factors that shape how households engage with the energy system and with assistance programs. Excluding the unique climates of California, many of the findings about home composition, conservation behaviors, and equipment holdings likely reflect low-income households across the US.

Low-using households are not simply successful energy savers. Many are practicing extreme conservation, and some are making choices that create genuine safety risks. This finding mirrors past research that documents underconsumption for certain households.

High-using households, often face structural conditions (high occupancy, medical needs, older equipment, hot climates) that constrain their ability to reduce usage regardless of effort or motivation. Effective program design should distinguish between drivers of high use that are addressable (equipment, behaviors, knowledge) and those that are not (home size, household composition, climate), and should set realistic expectations for savings outcomes accordingly.

The regression analysis provides a concrete illustration of why differentiation matters: a central AC system adds 1,192 kWh over the summer for a high-using household and only 175 kWh for a low-using household. The same intervention will have different effects depending on who receives it.

The cultural context findings reinforce that equity in program delivery requires attention to the full program process, not just enrollment.

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