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Multifamily Segment Study
Volume 2: Appendices

December 4, 2013

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Appendix A. Decision 12-08-044 References and Multifamily Segment Study Activities

Background

On August 23, 2012 the California Public Utilities Commission approved Decision (D.) 12-08-044 and approved Energy Savings Assistance (ESA) and California Alternate Rates for Energy (CARE) Programs' activities and budgets of the investor-owned utilities (IOUs) for the 2012-2014 program cycle. As detailed in the California Strategic Plan for Energy Efficiency, the Commission's vision is that, by December 31, 2020, all eligible low-income electricity and gas customers are given the opportunity to participate in low-income energy efficiency programs. In Decision 12-08-044, the Commission recognized the need to enhance penetration in the multifamily segment in order to achieve that objective.

The Commission directed the IOUs to begin developing and advancing more long term and comprehensive multifamily segment strategies. As the first prong of a parallel, two-pronged approach, the IOUs were directed to immediately begin improving their penetration of the multifamily segment of the low-income population, with the eight immediate Multifamily Segment Strategies, including additional measure offerings. The second part and complementary part of this parallel, two-pronged approach, the Commission directed the IOUs to contract a consultant to pursue a Multifamily Segment Study.

Multifamily Segment Study Activities

The study's goal was to develop an understanding of the low-income multifamily market to provide data that will help California IOUs develop and advance short- and long-term plans to meet the needs of low-income tenants living in multifamily housing. The ESA Program Multifamily Segment Study envisioned by the Commission in D.12-08-044 and by project administrators includes the following activities.

1. Gather data on the state's multifamily housing stock and ownership profiles, including a statewide demographic and programmatic assessment of California's low-income multifamily housing stock (by each IOU territory and by county).
2. Catalogue multifamily energy-efficiency programs (particularly those for low-income customers), including Commission programs and those administered by other government agencies, utilities and organizations within the state of California, as well as the most successful and/or effective recent and ongoing multifamily energy-efficiency programs benefitting low-income customers administered in other jurisdictions across the country.
3. Evaluate and further examine proposals from parties to the ESA Program proceeding (A.11-05-017 et al.) in the context of previous ESA Program decisions, the current Commission directions (including the Spring 2011 Energy Division staff guidelines for a Multifamily Pilot), and the EE Strategic Plan.
4. Review the Commission's other existing multifamily programs within the overall context of the ESA Program, and recognizing that multiple income levels may reside in any individual building.

5. Review other recently completed multifamily projects and pilots benefitting low-income residents performed under other state programs.
6. Propose (and possibly conduct) field studies, as needed.
7. Review and investigate the cost and budget implications of one or more approaches to low-income multifamily program implementation, including consideration of possible new cost-sharing arrangements and/or financing mechanisms that might be applied.
8. Review and investigate coordination concerns related to any new delivery methods that streamline the ESA Program process with non-IOU financing and energy-efficiency options such as how a single point of contact could be responsible for coordinating a) IOU-administered low-income, energy-efficiency, renewable, incentive, and financing programs, as well as b) non-IOU-administered, external multifamily efficiency, low-income, renewable, and housing improvement incentive or finance programs in California.
9. Identify available low-income and energy-efficiency financing options, and develop a funding and implementation schema utilizing the variety of energy-efficiency programs available for each multifamily housing owner/operator profile.
10. Develop overall recommendations for multifamily strategies looking toward the 2020 vision for the ESA Program of 100% penetration of eligible and willing low-income customers.
11. Hold a minimum of one to three public meetings to obtain, document, review and consider all stakeholders' input.

Decision 12-08-044 References

The following passages in Decision 12-08-044 are frequently referenced throughout this study:

Table 1. Decision 12-08-044 Passages

Page	Text
3	We realize that while the ESA Program is a low-income program that contributes to the quality of life of low-income communities, we confirm that, at its core, it is an energy efficiency program. Thus, the program must be directed, administered and delivered in a manner so as to yield significant energy savings. To achieve optimal energy savings, the ESA Program must be administered cost- effectively to yield maximum energy savings at reasonable costs.
4-5	Particularly in these challenging economic times, we must remain steadfast in our vision and remind ourselves of the vision that the Commission adopted for the low-income communities in our Strategic Plan that "By 2020, 100 percent of eligible and willing customers will have received all cost-effective [Energy Savings Assistance Program] … measures."8 This vision was also echoed and codified by the legislature.9 To realize that vision, Strategic Plan sets these goals for the ESA Program: • By 2020, all eligible customers will be given the opportunity to participate in the ESA Program. • The ESA Program will be an energy resource by delivering increasingly cost-effective and longer-term savings.

Page	Text
19	The ESA Program has also been designed to provide an improved quality of life for the low-income population by delivering no-cost home weatherization services and efficiency measures to low-income households to help: (1) conserve energy; (2) reduce their energy costs; and (3) improve their health, comfort, and safety. Installing no-cost energy efficiency measures helps those customers reduce their energy consumption by delivering energy savings while also producing bill savings and reduced energy consumption.
122	In D.08-11-031,70 the Commission rejected the IOUs' proposal to eliminate the 3MM Rule and instead modified the 3MM Rule by creating an exception in response to those concerns to allow the IOUs to treat home needing less than three measures, "as long as the total energy savings achieved by either measure or measures combined yield(s) energy savings of at least either 125 kilowatt-hours (kWh)/annually or 25 therms/annually." As a result, that 3MM Rule then evolved to what we have come to refer to today as the "modified 3 Measure Minimum" or the modified 3MM Rule.
157	As the first of this parallel, two-pronged approach, the IOUs are directed to immediately roll out the eight Multifamily Segment Strategies described below, including additional approved measure offerings to multifamily households we approve in this decision specifically to enhance penetration of this segment.
164	As the second part of a parallel, two-pronged multifamily segment approach, the IOUs are directed to begin developing and advancing more long- term and comprehensive multifamily segment strategies as outlined below. The IOUs are directed to pursue a Multifamily Segment Study ordered in this decision below.
264-265	The IOUs have proposed increases in their 2012-2014 Applications from 5% to 15% (19% in the case of SoCalGas). Most of the parties oppose the IOUs' proposed increase and support the current 5% unwillingness factor adopted in D.08-11-031 which is consistent with 2007 KEMA report findings. Additional information and evidence is required in order to determine whether the increase proposed by the IOUs is reasonable. The IOUs are directed to track and report customer unwilling/unable percentages during the 2012-2014 budget cycle. In addition, the IOUs are directed to document the reasons why customers are unwilling and/or unable to participate in the program during the 2012-2014 program cycle. This information will be evaluated to determine the reasonableness of the IOU's joint proposal to increase the unwillingness factor for future program cycles. Therefore, the Commission rejects the IOUs proposed increases of the unwillingness factor and require that current 5% unwillingness factor continue be used for 2012-2014.

Eight Multifamily Segment Strategies

The commission directed the IOUs to take a two pronged approach with the multifamily section. The eight strategies discussed in the Decision, page 157 (as referenced in the preceding table) include the following and are provided here for reference. Note that examination of these eight strategies or determining whether the steps were successful in reaching the multifamily segment were outside the scope of the Multifamily Segment Study.

Strategy 1 – Whole Neighborhood Approach

Strategy 2 – Property Owner Waiver Update

Strategy 3 – Updated Marketing Approach to Multifamily Homes

Strategy 4 – EUC/MIDI/MFEER Coordination

Strategy 5 – Single Point of Contact

Strategy 6 – Same Day Enrollment, Assessment, and Installation

Strategy 7 – Streamline Practice and Service Delivery

Strategy 8 – Providing Feasible Measures for Multifamily Segment Including Retention of Certain Measures Proposed for Retirement for Program Cycle 2012-2014

Appendix B. Stakeholder Comments on Decision 12-08-044

The comments, proposed changes, and recommendations on Decision 12-08-044 from parties to the proceedings provided important context for the findings of this study. By understanding the issues and concerns raised by stakeholders, a more robust exploration of the multifamily segment was conducted. This information contributed to the development of key considerations for the study's findings and conclusions.

Table 2. Comments on Decision 12-08-044 Posted by Stakeholders on CPUC Website from 10/31/11 to 1/9/13

Stakeholder Group	Number of Comments
Association of California Community and Energy Services	5
Black Economic Council	3
Brightline Defense Project	1
California Housing Partnership Corporation	2
California Large Energy Consumers Association	1
California Public Utilities Commission, Division of Ratepayer Advocates	3
Center for Accessible Technology	3
Energy Efficiency Council	3
Green For All	2
La Cooperativa de Campesina	4
Latino Business Chamber of Greater Los Angeles	3
Maravilla Foundation	5
National Asian American Coalition	3
National Consumer Law Center	2
National Housing Law Project	1
Natural Resources Defense Council	2
Niagara Conservation Corporation	1
Opower	1
Pacific Gas & Electric Company	4
San Diego Gas & Electric Company	7
Southern California Edison Company	8
Southern California Gas Company	7
The East Los Angeles Community Union (TELACU)	5
The Energy Efficiency Council	1
The Greenlining Institute	3
The Utility Reform Network	4

Table 3. Prevalence of Stakeholder Support for Key Proposals and Strategies from Decision 12-08-044, Section 3.10.1-3.10.5.6

Proposal	Number of Supporters
Establish “Single Point of Contact”	14
Assistance to MF owners for central heat & hot water systems (like HUD-DOE/WAP)	12
Full integration of ESAP with other EE Programs (MIDI/EUC/MFEER)	10
MF segment underserved; barriers to entry in ESA for MF	10
"Expedited Enrollment" or "Categorical Eligibility"	8
Adopt whole house, performance-based approach	8
TELACU multi-phase pilot	8
Updated marketing approach to MF homes	7
Value of housing subsidies not counted as income	6
Model successful low-income MF EE programs in other states	4
Simplify Owner Authorization (Property Owner Waiver) forms; coordinate across IOUs	2
Make ESA Program "Neighborhood Approach" more effective	1
No "carve out" of funds for investors/owners of deed restricted MF	2
Set per unit and per building Caps on ESA program assistance	1

Appendix C. Estimation of the Distribution of Low-Income Multifamily Housing

Methodology

To develop an estimate of the number and distribution of LIMF housing units in California, Cadmus combined two sources of information: American Community Survey (ACS) 5-year summary data and Public Use Microdata Sample (PUMS).

Available as pre-defined tables at the census-tract level, ACS summary data is a compilation of the number of people, housing units, multifamily housing units, and households within a relatively small geographic area for a five-year period. However, these data cannot be used directly to estimate the intersection between low-income households and households that live in multifamily buildings. Tabulating this intersection entails estimating census-tract households using Public Use Microdata Sample (PUMS) proportions.

PUMS data are an aggregation of ACS data over a three-year period. Unlike the five-year census tract data, the three-year PUMS data can be directly manipulated as individual household records. However, these data are identifiable only for a larger geographic area, the Public Use Microdata Area (PUMA). This restriction is imposed to ensure the confidentiality of respondents. (Whereas a census tract may comprise as few as 2,000 residents, a PUMA comprises approximately 100,000 residents.)

For each PUMA, Cadmus calculated the percentage of households that: (1) met the ESA Program low-income criterion of earning less than or equal to 200% of the federal poverty guideline (defined by the U.S. Census Bureau), and (2) resided in buildings with five or more units. Our approach was as follows:

Using poverty thresholds defined by the U.S. Census Bureau, we identified upper-limit incomes for households of different sizes. Households with an income equal to or less than 200% of the value specified in federal poverty guideline were classified as low-income. (This is consistent with the definition used for qualification in the CARE and ESA Programs.) Note that we used 2011 poverty thresholds, because the ACS data we used to estimate the number of low-income multifamily households was for the years 2009 to 2011. The dataset contains a multiplier to allow estimation of dollar amounts in 2011 dollars.

We then counted the number of households meeting both multifamily and low-income criteria for each PUMA. This value was divided by the total number of multifamily households within that PUMA to obtain the percentage of multifamily households at or below 200% of the federal poverty guideline. This percentage represents the conditional probability that a household meets the multifamily criterion, given that it is a multifamily household. We excluded records for group or institutional quarters.

For defining 200% of the federal poverty guideline, Cadmus used the *weighted average* thresholds employed by the Department of Health and Human Services (HHS). As these have one distinct value for each number of residents within a family unit, they are the thresholds we adopted for our research. These are also the thresholds used for the ESA Program. The full set of Census thresholds has different threshold values, depending on the number of householders who are children (see Table 4).

Table 4. Poverty Thresholds for 2011 by Size of Family

Size of Family Unit by Number of Occupants	Weighted Average Thresholds
One person (unrelated individual)	11,484
Two people	14,657
Three people	17,916
Four people	23,021
Five people	27,251
Six people	30,847
Seven people	35,085
Eight people	39,064
Nine people or more	46,572

Source: U.S. Census Bureau

The ACS five-year data summaries provide counts by the number of housing units in a building. There are also summaries of the number of people at each level in the income-to-poverty index. However, because these data are available only in pre-populated summaries, it is not possible to map these counts of people to the counts of households.

For the 2011 U.S. Census data, census tracts are not nested within PUMAs. Cadmus estimated[1] the percentage of each census tract overlapped by a PUMA and used this proportion to adjust the population counts.[2] Next, we multiplied these proportions—and the PUMA-level conditional probabilities—by the census-tract level counts of multifamily households. We also accounted for unoccupied units by deflating the number of units by the ratio of occupied units to total housing units, and we applied a factor to account for the difference between single-family and multifamily occupancy rates. We summed these results for each census tract to obtain the number of low-income, multifamily households within that tract.

For example, consider a census tract that has 100 multifamily households *and* this tract is split in half by two PUMAS. If low-income multifamily households comprise 20% of one PUMA and 10% of the other, then the estimate of low-income multifamily households would be calculated as follows:

[1] Using ArcGIS' "Union" tool. All data were projected to NAD_1983_Calfornia_Teale_Albers.

[2] Assumes uniform distribution of population. Dasymetric mapping was outside the scope of this analysis.

$$(50\%_{area} * 20\%_{low\ income} * 100_{multifamily}) + (50\%_{area} * 10\%_{low\ income} * 100_{multifamily}) = 15_{low\ income\ multifamily\ households}$$

More than 99.9% of low-income multifamily households in California have electric service; however only 87% of low-income multifamily households in California use gas fuel in their home. Where we needed to estimate the number of low-income multifamily *gas customers* we applied an adjustment to the number of low-income multifamily households, based on data from the 2011 AHS. For each census tract within an MSA covered by the AHS, we multiplied the number of low-income multifamily households by the proportion of low-income multifamily households within that MSA who have gas service (excluding bottled gas). For households outside of an MSA, we applied the statewide average.

Distribution by County

Cadmus estimated the distribution of low-income multifamily households by California county as well as additional population statistics that are relevant to this study. We used Census Bureau definitions of housing units and households; the difference in counts between the two primarily reflects the number of unoccupied housing units. Households include both families and unrelated people but households always refer to people in occupied units. Table 5 shows these estimated population statistics. We have also indicated where a county is included within a Metropolitan Statistical Area (MSA). We present findings by MSA in the section "Characteristics of Low-Income Multifamily Housing in California." Statewide, low-income multifamily households comprise 9.4% of all households and 42.3% of multifamily households. Note that the number of households was derived from census data. These will be somewhat different than the number of households receiving services from the IOU in any given county.

Table 5. Estimated Population Statistics for California Counties

County	MSA Reference Number	County Population	Housing Units	Households	Multifamily Households	Low-Income Multifamily Households
Alameda	5775	1,494,876	580,725	536,160	138,813	50,946
Alpine		1,167	1,772	357	126	78
Amador		38,244	17,943	14,283	465	288
Butte		219,309	95,589	85,219	8,891	5,495
Calaveras		45,794	27,823	18,865	385	238
Colusa		21,297	7,850	6,989	542	404
Contra Costa	5775	1,037,817	398,915	370,925	59,442	20,682
Del Norte		28,561	11,150	9,818	718	440
El Dorado	6920	179,878	87,571	68,812	4,184	1,982
Fresno		920,623	313,355	285,338	43,526	26,731
Glenn		28,027	10,764	9,483	490	365
Humboldt		133,585	61,293	53,724	4,998	3,157
Imperial		171,343	55,668	48,117	6,449	4,894

County	MSA Reference Number	County Population	Housing Units	Households	Multifamily Households	Low-Income Multifamily Households
Inyo		18,457	9,457	7,910	462	286
Kern		829,254	282,009	250,999	21,364	13,272
Kings		152,335	43,533	40,716	3,959	2,156
Lake		64,392	35,441	25,654	1,286	896
Lassen		35,001	12,716	10,097	901	552
Los Angeles	4480	9,787,747	3,437,584	3,218,518	1,054,616	460,350
Madera		149,611	49,012	42,032	2,084	1,594
Marin	7360	250,666	110,937	102,832	19,841	6,835
Mariposa		18,290	10,142	7,607	123	76
Mendocino		87,525	40,185	34,102	2,573	1,793
Merced		253,606	83,584	74,079	6,277	4,663
Modoc		9,587	5,174	3,947	120	74
Mono		14,016	13,876	5,416	1,411	873
Monterey		411,385	138,925	125,217	21,937	10,695
Napa		135,377	54,612	49,640	6,083	3,079
Nevada		98,392	52,304	41,561	2,177	1,499
Orange	0360	2,989,948	1,046,323	987,164	238,521	88,527
Placer	6920	343,554	151,245	130,736	14,392	5,966
Plumas		20,192	15,501	9,434	488	336
Riverside	6780	2,154,844	794,478	672,896	75,669	41,218
Sacramento	6920	1,408,480	554,374	510,976	93,095	46,367
San Benito	7400	54,873	17,855	16,785	772	490
San Bernardino	6780	2,023,452	696,776	598,822	78,148	39,476
San Diego	7320	3,060,849	1,160,784	1,064,048	290,378	112,680
San Francisco	7360	797,983	374,919	338,366	146,922	45,268
San Joaquin		680,277	232,843	212,902	25,167	15,094
San Luis Obispo		267,871	116,925	101,993	10,942	6,145
San Mateo	7360	711,622	270,614	256,423	64,867	16,258
Santa Barbara		419,793	152,684	141,635	27,537	13,519
Santa Clara	7400	1,762,754	629,448	599,652	146,472	44,110
Santa Cruz		259,402	104,278	93,834	11,248	5,617
Shasta		177,231	77,092	69,147	6,049	3,994
Sierra		3,277	2,307	1,328	44	30
Siskiyou		44,687	23,886	19,782	1,549	950
Solano		411,620	152,239	139,312	19,204	8,790
Sonoma		478,551	203,847	184,170	23,364	9,977
Stanislaus		512,469	178,850	164,933	16,014	9,917

County	MSA Reference Number	County Population	Housing Units	Households	Multifamily Households	Low-Income Multifamily Households
Sutter		94,192	33,755	31,668	4,106	2,552
Tehama		62,985	26,912	23,810	1,649	1,228
Trinity		13,711	8,650	5,731	139	104
Tulare		436,234	140,519	128,324	8,371	5,861
Tuolumne		55,736	31,157	22,157	1,314	813
Ventura		815,745	280,758	264,982	38,455	15,441
Yolo	6920	198,889	74,639	69,860	14,979	8,804
Yuba		71,817	27,562	23,885	2,214	1,376
Statewide		36,969,200	13,631,129	12,433,172	2,776,312	1,175,301

Comparison With Previous Findings of the 2009 RASS

Cadmus compared the estimates developed for this research to estimates of households (and, specifically to estimates of multifamily households) that were produced for other recent studies, including the 2009 Residential Appliance Saturation Survey (RASS).

When we compared the ACS-based estimates of total population with the estimates developed for the 2009 RASS, we found systematic differences in both the number of households and the number of multifamily households.[3] As RASS is based on a sample of residential electric utility customers, we compared the RASS estimates for three electric utilities to the ACS-based estimates for the same utility territories (see Table 6).

Table 6. Comparison of 2011 ACS to 2009 RASS Estimate of Households and Low-Income Households

Utility	ACS Households	RASS Households	ACS/RASS Households	ACS Multifamily Households	RASS Multifamily Households	ACS/RASS Multifamily Households
PG&E Electric	4,263,939	4,634,081	92%	790,156	728,996	108%
SDG&E Electric	1,169,705	1,230,071	95%	308,055	278,170	111%
SCE Electric	4,115,093	4,371,616	94%	789,022	705,027	112%

Although the ACS-based estimates show from 5% to 8% fewer total households, the estimates also show from 8% to 12% more multifamily households than the RASS. Given the large sample size on which the two estimates are based, these are sizeable differences that cannot be the result of sampling error alone.

[3] Palmgren et al. 2010. "2009 California Residential Appliance Saturation Study." Prepared for the California Energy Commission: Kema, Inc CEC-200-2010-004. http://www.energy.ca.gov/appliances/rass/

As large and sophisticated as the sample was for RASS, the ACS data have a distinct advantage in terms of both sample size and response rate. The RASS is based on a very large mail survey administered to utility customers (see Palmgren et al., 2010, for a complete methodological report on the RASS). The RASS data consist of responses from 25,721 households, and the response rate across all sampling strata was 18%. The RASS methodology employed post-weighting of results, but the weights were applied relative to the utility populations. There is no indication that RASS results were post-weighted to make them consistent with census data.

The 2011 three-year ACS data used in Cadmus' estimate consist of records for 544,878 housing units. The response rate for the ACS survey is greater than 97.5% across the three years in the sample. Thus, the opportunity for non-response bias is much smaller for the ACS data than for the RASS. However, when the numbers for the IOU territories (based on ACS data) are compared with RASS data, the result requires a spatial allocation of households. Thus, where utility territories bisect a census tract, we allocate households based on the proportion of the tract within the utility territory. While this results in some error in our estimates by utility territory, we find no indication that this approach introduces a systematic bias. Our estimates for counties, however, do not include any such source of error because census tracts nest perfectly within county boundaries, so there is no need for proportional allocation.

We conclude from this comparison that the RASS dataset over-estimated the number of single-family households and under-estimated the number of multifamily households.

Comparison With Previous Findings of Athens Research

Cadmus developed an estimate of low-income *multifamily* households within census tracts by projecting the proportion of low-income multifamily households at the PUMA onto the number of multifamily households in each tract. We did not independently estimate for each census tract the number of low-income households across all housing types. Where we needed this information as a point of comparison, we drew upon data from Athens Research (2012) on the proportion of total households that are low-income. Athens' estimates of low-income households derive in much the same way as those of the Cadmus team, based on ACS data. Athens provided the team with estimates for each county, including an estimate of the proportion low-income households among all households and an estimate for each utility's customer base within the county.

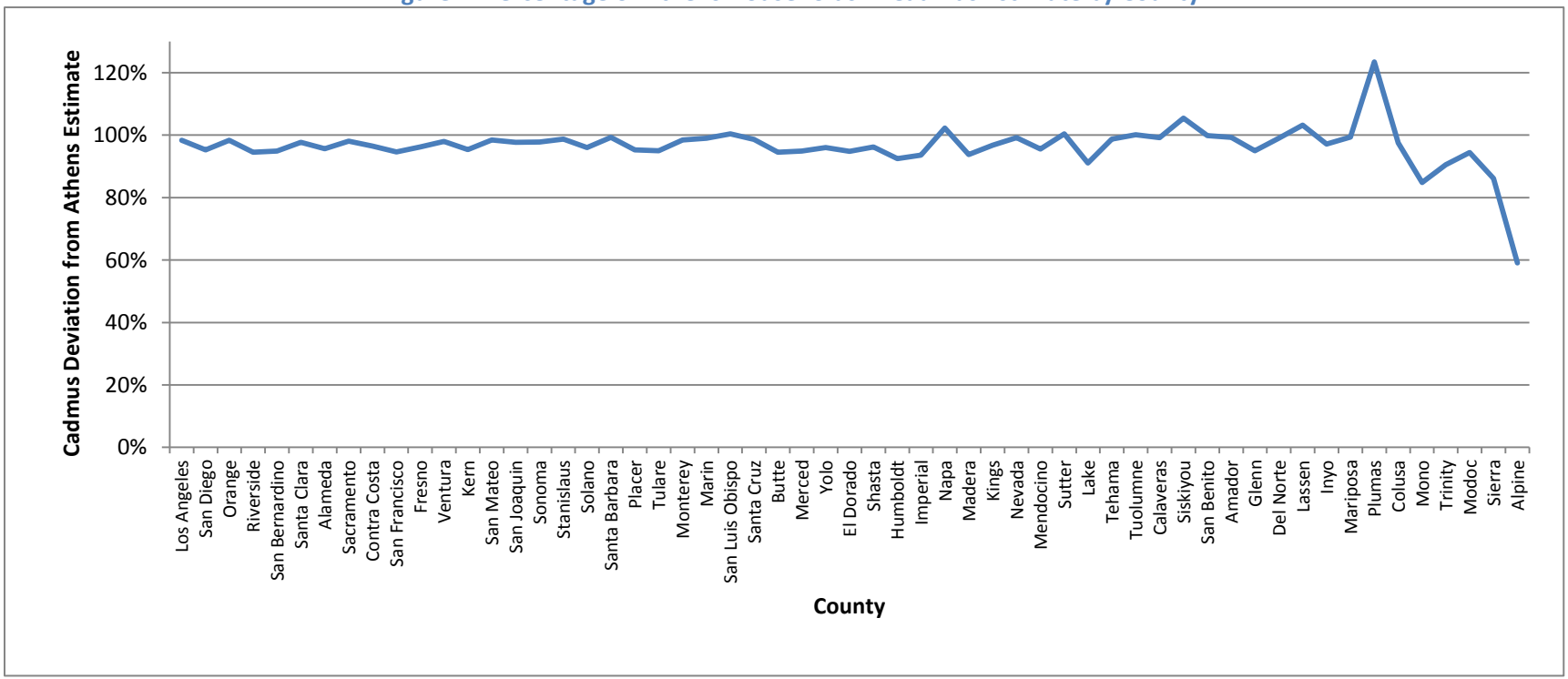
For low-income estimates at the county level we applied Athens percentages to the Cadmus estimate of households. The proportions were multiplied by the number of households within the county to arrive at an estimate of the number of low-income households.

Figure 1 shows the percent of households identified by Cadmus compared to the Athens estimate, in order of total number of households per county. For counties where the two estimates were exactly equal, the value would be 100%. Where the line falls below the 100% line, Cadmus estimates fewer households than Athens; where it is above 100%, Cadmus estimates more households than Athens. Among populous counties, the line tracks just below the 100% line. In counties below 15,000 households, the ratio of estimated becomes less stable; but since these counties are small, and some

are not even served by the IOUs, the difference in absolute terms is not substantial. Overall, Cadmus identifies a number of California households that is 97% of the Athens estimate.

Cadmus believes at least part of this difference results from a difference in methodology between Cadmus and Athens. Athens factors into their estimate the number of utility accounts based on customer information system data from each utility. If there are any instances of empty units counted in the total of households, or if there are multiple accounts assigned to the same household that have not been completely removed from the CIS data, the Athens estimate will be slightly inflated. Overall, however, we consider a 3% difference in the count of households to be a good rate of consistency between the two estimates.

Figure 1. Percentage of Athens Households in Cadmus Estimate by County



Source: U.S. Census Bureau American Community Survey 2011 and 2012 Athens Research

Appendix D. Estimation of the Characteristics of Low-Income Multifamily Housing

Overview

Cadmus' characterization of low-income multifamily housing in California is derived primarily from the 2011 American Housing Survey (AHS) Public Use File. The AHS is sponsored by the Department of Housing and Urban Development (HUD) and conducted by the U.S. Census Bureau. These data provide much greater detail about housing characteristics than are found in the ACS and, thus, provide a key source of information about the circumstances of our target class of households, LIMF.

The AHS is a longitudinal survey of housing units, with data collected from the same units every two years and augmented by including additional households in the survey and special topics in each cycle. Before 2007, the AHS consisted of two surveys—a national survey and a metropolitan area survey—each of which was conducted in alternating years. In 2007, however, the two surveys were conducted concurrently, although the results were not intended to be combined.

For the 2011 survey, the national and metropolitan samples were combined, with an especially large oversample of households from 29 metropolitan areas. For instance, in 2009, there were 8,432 housing units represented in the 29 metropolitan areas; in the 2011 data, there are 119,593 units, which is a 14-fold increase.

For the 2011 survey, the Census Bureau calculated survey weights based on the 2010 decennial census, in an effort to align the survey responses with the most comprehensive information available. These weights provide a benchmark for estimating the total number of households in the AHS sample. In this report, except where indicated, the percentages and frequencies reflect weighted data.

The data Cadmus used are organized into Metropolitan Statistical Areas (MSAs). These contiguous geographic areas of population and commerce are defined by the Office of Management and Budget. A typical MSA is defined by a single city that wields substantial influence over the region and, while MSAs are often defined by county boundaries, they can include more than one county. The 2011 AHS survey identifies eight MSAs in California: Anaheim, Los Angeles, Oakland, Riverside, Sacramento, San Diego, San Francisco, and San Jose. (See Figure 2 for a map of these MSAs.) Table 7 shows the MSAs used for this analysis and the corresponding counties.

Table 7. California MSAs in the 2011 AHS Data and Corresponding Counties

MSA Name	MSA ID	Counties
Anaheim	0360	Orange
Los Angeles	4480	Los Angeles
Oakland	5775	Alameda, Contra Costa
Sacramento	6920	El Dorado, Placer, Sacramento, Yolo
Riverside	6780	Riverside, San Bernardino
San Diego	7320	San Diego
San Francisco	7360	Marin, San Francisco, San Mateo,
San Jose	7400	San Benito, Santa Clara

The 2011 AHS survey encompasses 26,601 interviews (completed between July and December of 2011) in occupied households in non-institutional settings in California.[4] Because the data—which are grouped by MSA—do not include all customers in the state or of the IOUs, we do not contend that these data reflect either the absolute numbers of all multifamily or the subset of low-income multifamily households. Rather, we consider the relative percentages of low-income multifamily units to be important indicators of the sector as a whole and especially of relatively urban areas.

The MSAs included in the 2011 AHS survey encompass all of the largest metropolitan areas of California and thus include a large proportion of utility customers. Table 8 shows the estimated number and percentage of utility households and low-income households included within the eight AHS MSAs.[5]

Table 8. Estimated IOU Population Included Within AHS MSAs

Utility/Fuel	MSA Households	Total Households	MSA Low-income Households	Total Low-income Households
PG&E Electric	4,263,939	53%	1,175,083	42%
PG&E Gas	4,756,266	61%	1,299,746	51%
PG&E Combined	5,185,236	56%	1,458,581	46%
SCE Electric	4,115,093	87%	1,239,688	87%
SDG&E Electric	1,169,705	100%	302,148	100%
SDG&E Gas	1,064,048	100%	286,965	100%
SDG&E Combined	1,169,705	100%	301,947	100%
SCG Gas	6,167,353	86%	1,980,239	86%

[4] Institutional settings include, for instance, dormitories, barracks, and prisons.

[5] The percentage of total households was estimated using county-level data provided by John Peterson at Athens Research. MSAs are contiguous with county boundaries. Athens provided the number of utility customers in each county and we calculated the proportion of total customers in counties within the MSA boundaries.

Methodology

The criteria for Cadmus' targeted class of respondents are as follows: (1) households living within multifamily buildings, (2) in which there are five or more units, and (3) the households have an income that is at or below 200% of the federally defined poverty level (LIMF households).

For comparison purposes, we have presented many of the findings for the following five other classes of households:

- Low-income households in multifamily buildings having from two to four units;
- Low-income households in single-family buildings, including mobile homes;
- Households with adequate income—that is, households with an income above 200% of the federal poverty guidelines—in multifamily buildings having five or more units;
- Households that have adequate income and that reside in multifamily buildings containing from two to four units; and
- Households with adequate income in single-family buildings, including mobile homes.

In most instances, we report both the percentage of distributions of important AHS survey items for the different household types *and* the distributions for low-income multifamily households across the eight MSAs. In general, the sample size is large enough so that even small differences between one household type and another (or between MSAs) are statistically significant. In this report, we call out the most interesting contrasts we observe.

Sample Size

Table 9 shows the number of interviews completed—organized by household type—for the eight MSAs in the AHS California sample (Table 7). Note that these are raw, unweighted counts of responses.

The response rate for the 2011 AHS survey exceeded 85% of contacted households for all California MSAs. Interviews were completed with 2,888 low-income households in multifamily buildings. This shows the robustness of the survey effort relative to other sources of information about LIMF households

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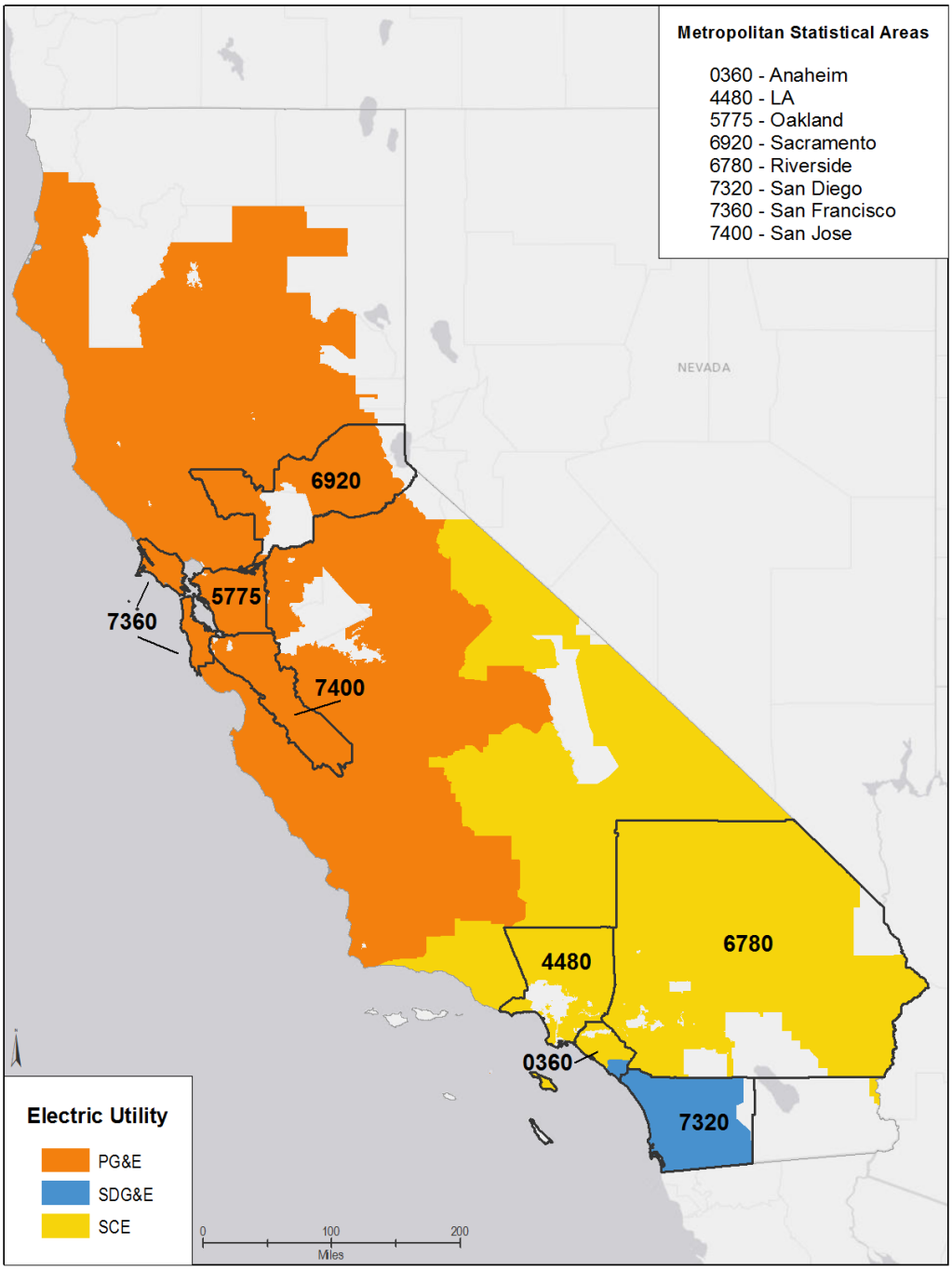
Table 9. HUD American Housing Survey Sample Size by Household Type and MSA

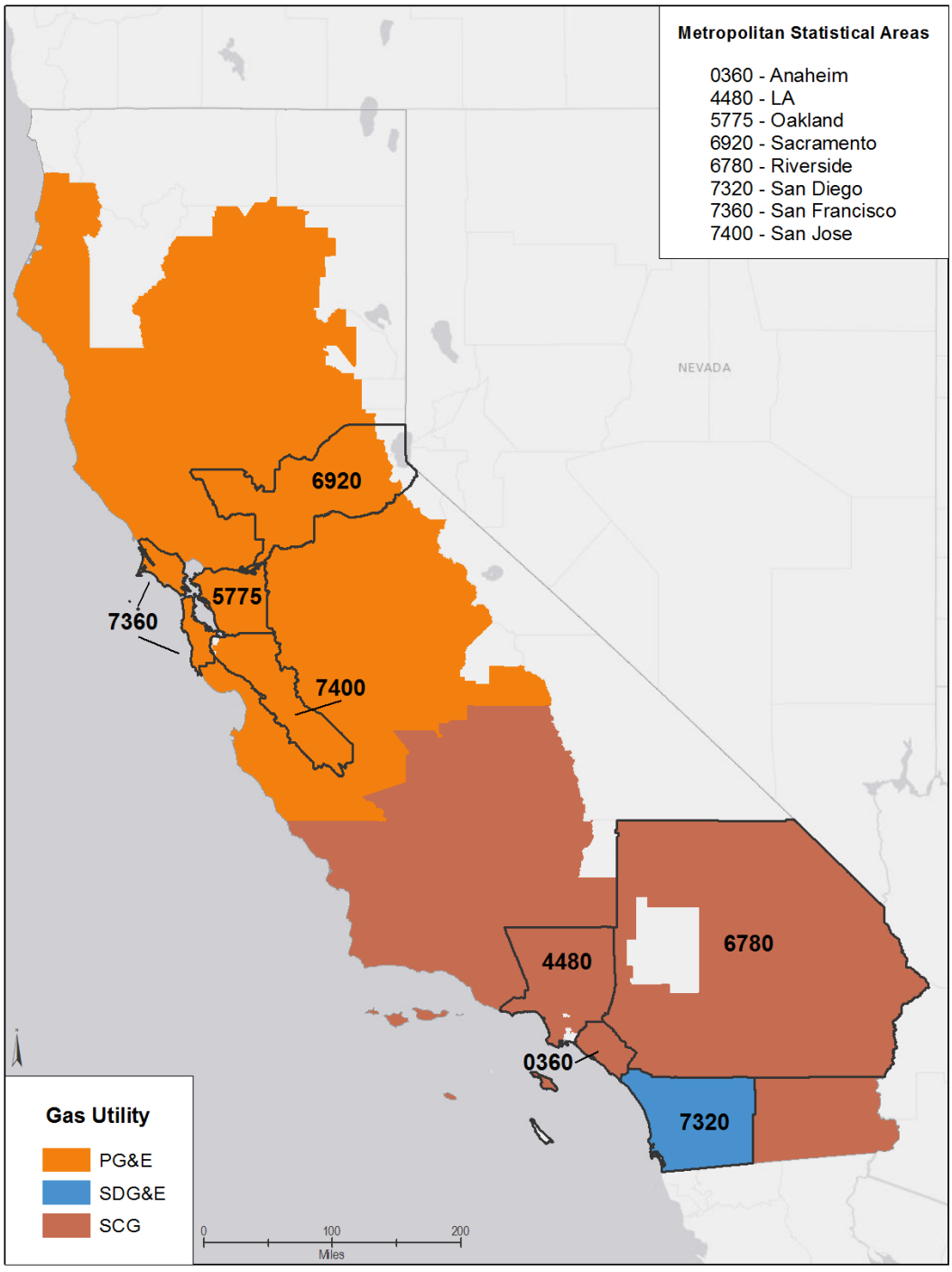
Sector	MSA								
	Anaheim	Los Angeles	Oakland	Riverside	Sacramento	San Diego	San Francisco	San Jose	Total
Low-income Multifamily 5+	336	640	301	204	301	412	393	301	**2,888**
Low-income Multifamily 2-4	184	194	143	162	120	118	108	110	**1,139**
Low-income Single Family	486	707	453	919	613	537	269	475	**4,459**
Adequate Income Multifamily 5+	478	532	359	134	205	479	705	566	**3,458**
Adequate Income Multifamily 2-4	204	140	197	61	88	169	405	161	**1,425**
Adequate Income Single Family	1,792	1,201	1,826	1,559	1,805	1,690	1,410	1,947	**13,230**
Total	**3,480**	**3,414**	**3,279**	**3,039**	**3,132**	**3,405**	**3,290**	**3,560**	**26,599**

Figure 2. California MSAs and Electric Utility Service Territories[6]



[6] Electric and Natural Gas GIS data layers provided by the California Energy Commission. Electric Service Areas updated as of 10/30/2012. Gas Service Areas updated as of 10/29/2012.

Figure 3. California MSAs and Gas Utility Service Territories[7]



[7] Electric and Natural Gas GIS data layers provided by the California Energy Commission. Electric Service Areas updated as of 10/30/2012. Gas Service Areas updated as of 10/29/2012.

Household Types by MSA

Cadmus applied census weights to the HUD AHS survey data to estimate both the number of households in each of California's eight MSA s and the percentage of households of each household type (Table 10).

- The percentages sum to 100% down the columns, showing, for instance, that 9.1% of households in Anaheim are low-income multifamily in buildings having five or more units.
- The percentages in the Total row sum to 100%, showing, for instance, that 10.5% of households in the MSA represented by the survey are in Anaheim.

Comparing the percentages to the *Total* column shows whether an MSA has relatively more or fewer of that type of household than do other MSAs. For instance, in multifamily buildings having five or more units, there are relatively more low-income multifamily households (16.3%) in Los Angeles' MSA than in the MSAs overall (12.1% of households). Moreover, Los Angeles comprises more than one-third of all households in the MSAs covered by the survey and, in fact, contains nearly half of the target households among that set of major MSAs.

Table 10. Estimated Frequency and Percentage of Household Types by Selected MSA*

Sector	Statistic	MSA								
		Anaheim	Los Angeles	Oakland	Riverside	Sacramento	San Diego	San Francisco	San Jose	Total
Low-income Multifamily with 5+ units	Frequency	82,857	506,686	77,770	61,135	64,952	128,620	75,082	49,202	**1,046,303**
	Percentage	9.1%	16.3%	9.3%	6.6%	10.0%	12.9%	11.7%	8.5%	**12.1%**
Low-income Multifamily 2-4	Frequency	49,165	168,994	40,741	45,028	26,491	33,721	19,980	25,468	**409,589**
	Percentage	5.4%	5.4%	4.9%	4.8%	4.1%	3.4%	3.1%	4.4%	**4.7%**
Low-income Single-Family	Frequency	125,842	654,421	114,313	255,608	126,153	157,238	41,412	70,009	**1,544,997**
	Percentage	13.8%	21.1%	13.6%	27.4%	19.4%	15.7%	6.5%	12.1%	**17.9%**
Total Low-income	Frequency	257,864	1,330,101	232,824	361,771	217,596	319,579	136,474	144,679	**3,000,889**
	Percentage	28.3%	42.8%	27.8%	38.8%	33.5%	32.0%	21.3%	25.0%	**34.7%**
Adequate Income Multifamily 5+	Frequency	126,603	502,220	102,696	42,823	49,873	147,571	138,341	87,350	**1,197,477**
	Percentage	13.9%	16.2%	12.2%	4.6%	7.7%	14.8%	21.6%	15.1%	**13.8%**
Adequate Income Multifamily 2-4	Frequency	46,858	130,721	48,805	20,119	15,408	44,352	86,020	23,109	**415,393**
	Percentage	5.1%	4.2%	5.8%	2.2%	2.4%	4.4%	13.4%	4.0%	**4.8%**
Adequate Income Single-Family	Frequency	480,995	1,141,777	455,357	508,087	367,056	487,573	280,266	322,328	**4,043,439**
	Percentage	52.7%	36.8%	54.2%	54.5%	56.5%	48.8%	43.7%	55.8%	**46.7%**
Total Adequate Income	Frequency	654,456	1,774,718	606,858	571,029	432,337	679,496	504,627	432,787	**5,656,309**
	Percentage	71.7%	57.2%	72.2%	61.3%	66.6%	68.0%	78.7%	74.9%	**65.3%**
Total	**Frequency**	**912,320**	**3,104,820**	**839,682**	**932,800**	**649,934**	**999,075**	**641,102**	**577,465**	**8,657,197**
	Percentage	**10.5%**	**35.9%**	**9.7%**	**10.8%**	**7.5%**	**11.5%**	**7.4%**	**6.7%**	**100.0%**

* Percentages sum to 100% down the columns except for the Totals, which sum across to show percentages of households from each MSA living within the surveyed MSAs.

Table 11 shows low-income multifamily households as a proportion of low-income households, multifamily households, and total households, by MSA.

Table 11. Low-income Multifamily as a Percentage of Households, by MSA

Sector	MSA								
	Anaheim	Los Angeles	Oakland	Riverside	Sacramento	San Diego	San Francisco	San Jose	Total
Low-income Multifamily with 5+ units	82,857	506,686	77,770	61,135	64,952	128,620	75,082	49,202	**1,046,303**
Percentage of Low-income Households	32%	38%	33%	17%	30%	40%	55%	34%	**35%**
Percentage of Multifamily Households	40%	50%	43%	59%	57%	47%	35%	36%	**47%**
Percentage of Total Households	9%	16%	9%	7%	10%	13%	12%	9%	**12%**

Appendix E. ESA Program and MFEER Penetration in the Low-Income Multifamily Sector

To understand the penetration of the ESA Program into the low-income multifamily sector, Cadmus conducted a regression analysis of census tract data. If program delivery is uniform across the state, we would expect a simple—and, ideally—linear relationship between the number of eligible multifamily households and the number of participating multifamily households. Significant parameter values on additional predictor variables related to socio-demographics would indicate that these factors either increase or decrease the rate of program penetration.

Regression Model of ESA Program Penetration

Given that the ESA Program serves LIMF household units, we might theorize a statistically significant positive correlation between LIMF and ESA Program participants: that is, in census tracts where there are more LIMF units, there should also be more ESA Program participants, all else being the same.

In a related vein, a tract's median household income should be negatively correlated with ESA Program participation, if correlated at all. Thus, the wealthier a neighborhood is, in general, the lower the ESA Program participation. However, we expect this correlation to be weak because: (1) wealth can be—and often is—concentrated in a small number of households; and (2) the census tracts are large enough that they may contain significant numbers of both high- and low-income households.

In advance of the analysis, we expect no bias towards the racial and ethnic makeup of a census tract: ESA Program participation should be determined without regard to the residents' race or ethnicity. We do know that race and ethnicity are correlated with income. The value of the regression model is that it will control for wealth as it considers the effect of race and ethnicity.

As we noted regarding race and ethnicity, we do not theorize a statistically significant correlation between the proportion of population that speaks English as the primary language and the number of ESA Program participants. Again, the ESA Program should only target the income-eligible housing units, regardless of the residents' other characteristics. If a significant relationship is found, we expect it to be a positive one: the larger the number of English speakers, the greater the ESA Program participation. This would reflect the presence of a language barrier in the implementation of the program.

We do not expect to find a relationship between the number of multifamily households within a census tract and the number of ESA Program participants. To cover the population equally, the program would have to serve LIMF households that are thinly dispersed in the population at the same rate as households that are concentrated. This may be difficult to achieve, however. If we find a relationship, we would predict that high-density areas would have a higher participation rate than low-density areas.

Data

There are 8,057 census tracts in the state of California. Of these, 79 do not contain households, so we excluded them from our dataset. See below for a full list of the variables tested.

In our regression analysis, the dependent variable is the number of units participating in the ESA Program per California census tract. Our explanatory variable of interest is the estimated number of LIMF units per tract. We control for a number of other variables per tract, including socio-economic demographics (such as median income and racial diversity) and the built environment specifications of the tracts (such as the total number of multifamily units). We also control for the IOU that serves the majority of the census tract, so we can determine whether some utilities have higher ESA Program penetration than others.

To control for IOU territories, we created categorical (dummy) variables for each IOU by overlaying the service territories for PG&E, SCE, SCG and SDG&E on top of the census tracts. For each IOU by fuel type, we assigned households to utilities in proportion to the percentage of each census tract that falls within each IOU's territory. We found that of the 7,978 tracts with one or more households, 86 are completely outside of the four IOUs' service territories, leaving 7,892 census tracts in our model. Of these, SCG covers the largest number of tracts at 4,129 and SDG&E covers the smallest at 678.

It is important to note that these IOU dummy variables are not necessarily mutually exclusive. Some gas territories overlap electricity territories within and across the four IOUs. In fact, there are a total of 2,785 tracts where this happens. SCG and SCE have an especially large number of overlapping census tract territories (2,484), considering that the two IOU subsidiaries both cover Southern California.

Because we do not have exact data on the number of LIMF units in each census tract, we undertook a rigorous estimation process. Cadmus fit the census tract data to both log-normal and negative binomial distributions. These are appropriate distributions for data representing counts of entities, such as households, where:

- We expect a high proportion of observations (e.g., census tracts) to have small numbers or zero values, and
- There can be no negative values.

For each distribution, we ran several models to predict the number of ESA Program participants in each census tract, based on a number of control variables. A full discussion of these modeling efforts is presented below.

Findings

Cadmus developed a base regression model using only the predictor variables that our *a priori* assumptions led us to believe should be related to ESA Program participation; that is, (1) the number of low-income multifamily households, and (2) the median income of the census tract. We then fit an expanded model using the additional variables representing possible influencing factors.

Base Model

Table 12 shows the parameter values and fit statistics for an Ordinary Least Squares (OLS) regression on our log-transformed dependent variable, the number of ESA Program participants. Our base model has only two predictor variables:

- The natural log of the number of low-income multifamily households within the census tract, and
- The natural log of the median income (in thousands of dollars) of the census tract.

We estimated the model separately for each IOU service territory and for the combined territories, which encompasses all census tracts with greater-than-zero households served by one of the IOUs. All models and parameter values are significant, and that the percentage of explained variance (R-Squared) is reasonably good, although the SCG model and the overall model are weaker.

Table 12. Parameter Values and Fit Statistics for Base Regression Model

Parameter	PG&E		SCE		SCG		SDG&E		Combined Territories	
	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value
Intercept	6.45423	<.0001	10.02656	<.0001	5.35443	<.0001	13.85773	<.0001	6.09658	<.0001
Log of LIMF	0.50829	<.0001	0.53618	<.0001	0.3429	<.0001	0.41887	<.0001	0.423	<.0001
Log of Median Income	-2.0401	<.0001	-2.70028	<.0001	-1.77568	<.0001	-3.87493	<.0001	-1.95949	<.0001
Obs. Used:	3184		2678		4126		677		7883	
DF	2		2		2		2		2	
F Value	911.05		1430.26		498.94		337.3		1489.63	
Pr > F	<.0001		<.0001		<.0001		<.0001		<.0001	
R-Squared	0.3642		0.5168		0.1949		0.5002		0.2744	

Once variables are log transformed, their coefficient interpretation becomes less intuitive. If both the dependent variable (y) and independent variable (x) of a model have been log-transformed, the parameter value for x becomes the elasticity of y with respect to x, describing the rate of change in y in terms of changes in x. Thus, comparing two census tracts, the relationship predicted by our base model between ESA Program and LIMF for PG&E is as shown below.

$$ESAP_2/ESAP_1 = (LIMF_2/LIMF_1)^{0.5082}$$

Where:

- $ESAP_2/ESAP_1$ = The ratio of difference in the number of ESA Program households between two census tracts
- $LIMF_2/LIMF_1$ = The ratio of difference in the number of LIMF households between two census tracts
- 0.5082 = The estimated value of the coefficient describing the relationship between the two ratios

A difference in the number of LIMF PG&E households, for example, from 100 to 200 households, would be associated with a predicted difference in ESA Program participation of $(200/100)^{0.5082} = 2^{0.5082} = 1.42$. A doubling of LIMF households leads to a 42% increase in ESA Program participation. Thus, the direction of the relationship is as expected, with ESA Program having a higher rate of program penetration where there are more LIMF households. However; the increase in ESA Program participation does not keep up with increases in LIMF, and high concentrations of LIMF tend to be served at a lower rate of penetration than lower concentrations. In other words, ESA Program participation goes up with a rise in the number of LIMF households, but the percentage of LIMF households served tends to go down.

For income, the negative sign of the coefficient indicates that, as predicted, ESA Program participation goes down as the median income of a census tract goes up. The rate of change among PG&E census tracts is $(200/100)^{-2.0401} = 2^{-2.0401} = 0.24$. This means a doubling of income would yield about a quartering of ESA Program participants. Again, this relationship is in the expected direction and shows the keen sensitivity of ESA Program penetration to income.

Table 13 shows the rate of change of ESA Program participation relative to each predictor variable, assuming the value of the predictor variable doubles. It is important to understand the nature of this change: it is not a change in time but rather a change from one area to another, holding other differences constant. All coefficients are in the expected direction but the relative rates of change are different among the utilities. For LIMF, PG&E and SCE have similar relative rates, but SCG and SDG&E rates are lower. This means a change in the number of ESA Program participants lags further behind a change in the number of low-income multifamily households. For SDG&E, a doubling of eligible households yields a 34% increase in participants; for SCG, a doubling of eligible households yields a 27% increase in participants.

Table 13. Relative Effect of Predictor Variables on ESA Program Participation by Utility

	Change in ESA Program				
	PG&E	SCE	SCG	SDG&E	All Census Tracts
From Doubling of LIMF	1.42	1.45	1.27	1.34	1.34
From Doubling of Median Income ($1,000)	0.24	0.15	0.29	0.07	0.26

Table 13 also shows differences in the effect of income on ESA Program participation. In general, the smaller the number, the stronger the effect of changes in income on reduced ESA Program participation. That is, a doubling of the median income is associated with a reduction in ESA Program participation by about 5/6 in SCE's territory, and a much larger reduction of 13/14 in SDG&E's territory.

Thus, from the base model we conclude that ESA Program is generally performing as expected with respect to income, tending to serve areas with lower-income households more than areas with higher-income households. The rate of penetration does not keep pace with the number of LIMF households, however, suggesting there is more work to be done in the areas with highest concentrations.

Expanded Model

As discussed in the introduction to this section, Cadmus' intent is to examine whether the penetration of the ESA Program is affected by factors that can be identified within the census data. These factors primarily relate to racial and ethnic identification and limited English proficiency (LEP). We also looked at the number of multifamily households as a predictor.

Table 14 shows the parameter values and fit statistics for an expanded OLS regression on our log-transformed dependent variable. This includes predictor variables for the percentage of the population that identifies as black, as Hispanic (these are not mutually exclusive categories), and as other ethnic groups, and for the percentage of the population for whom English is not their first language. We also included a predictor for the number of multifamily households of all income levels. In this table, parameter values in red text are insignificantly related to the dependent variable.

In other models, we tried a variety of other predictors, such as variables for other ethnic groups and for the level of education. These variables were not significantly related to the dependent variable, and we dropped them. Again, we estimated the model separately for each IOU service territory and for the combined territories.

In general, the predictive power of the expanded models, as indicated by the R-squared values, increases compared to the base models. All models are significant overall—meaning the relationship among variables is not random—but some of the new predictor variables in some models are not significantly related to the dependent variable. The coefficients of the parameters used in the base regression model are all still significant, but they have different values. Controlling for race, ethnicity, language, and multifamily households reduces the relative rates of change for both predictors.

Table 14. Parameter Values and Fit Statistics for Expanded Regression Model

	PG&E Territory		SCE Territory		SCG Territory		SDG&E Territory		All Census Tracts	
	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value
Intercept	4.3553	<.0001	5.0449	<0.0001	0.1707	0.7743	10.3679	<.0001	2.7599	<0.0001
Log of LIMF	0.4138	<.0001	0.4530	<0.0001	0.3413	<0.0001	0.3143	<.0001	0.3839	<0.0001
Log of Median Income	-1.6800	<.0001	-1.7797	<0.0001	-0.7875	<0.0001	-3.1988	<.0001	-1.3383	<0.0001
Total Multifamily Households	0.0012	<.0001	0.0007	<0.0001	-0.0001	0.0611	0.0010	<.0001	0.0003	0.0038
Total Black Population	<0.0001	0.9389	0.0004	<0.0001	0.0001	0.1805	0.0001	0.8664	0.0002	0.0383
Total Hispanic Population	<0.0001	0.8508	<0.0001	0.8932	<0.0001	0.0344	0.0005	0.0007	0.0001	0.0052
Total Other Population	0.0007	0.0001	0.0003	0.0005	0.0001	<0.0001	-0.0014	<.0001	0.0003	0.0036
Total English Barrier Population	0.0003	0.0021	0.0008	<0.0001	0.0001	<0.0001	0.0004	0.0816	0.0004	<0.0001
Obs. Used:	3184		2678		4126		677		7883	
DF	7		7		7		7		7	
F Value	296.88		530.50		199.48		114.30		488.53	
Pr > F	<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
R-Squared	0.3955		0.5817		0.2532		0.5446		0.3022	

The new variables in our model are not log-transformed values. For these, the interpretation of coefficients is different than for the transformed variables. The parameter value is interpreted as the percentage of increase in the dependent variable from a one-unit increase in the independent variable. Thus, the parameter value 0.0012 for total multifamily households in the PG&E model means that for every additional household there is 0.12% increase—*twelve-hundredths of a percent*—in ESA Program participation.

That is, for every additional 100 multifamily households in a census tract, we expect a 12% increase in ESA Program participation. Since the average number of ESA Program participants per census tract is about 20, the impact to an otherwise average census tract of an additional 100 multifamily households would be an additional 2.4 participants.

The non-transformed predictor variables can be directly compared to one another to assess their relative strength. It is important to underscore that all of these—except for multifamily households—are defined by numbers of individual people, not by households. For example, in the PG&E model, the relative effect on ESA Program participation of size of the "other" ethic group (0.0007) is approximately half that of multifamily households (0.0012) and a little more than twice the effect of the number of the English barrier population (0.0003).

Table 15 shows the relative effect of the different predictor variables on ESA Program participation. Note that the log-transformed parameters have a different interpretation than the non-transformed parameters—percentage change associated with percentage change rather than unit change associated with percentage change—and, thus, the parameters should not be directly compared in terms of relative effect.

Table 15. Relative Effect of Predictor Variables on ESA Program Participation

	Change in ESA Program				
	PG&E	SCE	SCG	SDG&E	All Census Tracts
From doubling of LIMF	1.33	1.37	1.27	1.24	1.30
From doubling of median income ($1000)	0.31	0.29	0.58	0.11	0.40
From 100 additional multifamily households	0.12	0.07	-0.01	0.10	0.03
From 100 additional black population		0.04			0.02
From 100 additional Hispanic population				0.05	0.01
From 100 additional other population	0.07	0.03	0.01	-0.14	0.03
From 100 additional LEP population	0.03	0.08	0.01	0.04	0.04

Discussion

In this section, Cadmus discusses the implication of each of the parameter values of the model.

Number of Low-Income Multifamily Households

We have already considered the significance of parameter values for the (logged) number of low-income multifamily households. To restate the relationship, as expected, we have evidence that where there are more eligible households, there are more ESA Program participants. The increase in participation, however, is not in the same proportion as the increase in eligible households; rather, participation rises not in step with increases in eligibility but at a lower rate. For instance, in the all-census tracts model, comparing two tracts that are the same except one has twice the number of low-income multifamily households, our model indicates not double but only 30% more ESA Program participants in that tract.

This finding could be a result of the time horizon of our data, since we are considering only three years of ESA Program participation data. (We will discuss this further later in this section.) Another possibility is that an effort on the part of programs to achieve geographic dispersion across a utility's territory has resulted in over-dispersion relative to the concentration of low-income multifamily households.

Median Income

We have little to add to our previous discussion of the effect of income on ESA Program participation. The coefficients all have the correct sign, and the size of the effect does not raise particular issues that we can identify. The fact that some utilities have a stronger decrease in ESA Program participation related to median income could well reflect nothing more than the relative segregation of low-income households within the different territories. If low-income households tend to be more thoroughly mixed in among higher-income households, we would expect a weaker relationship with ESA Program participation. Thus, an increase in median income has a strong suppressive effect on ESA Program participation. This supports a finding of our mapping of penetration, that where LIMF households exist among more-affluent households, they are less likely to be served by the program.

Number of Multifamily Households

We included a predictor variable representing the number of multifamily households to test the assumption that program implementers may use concentrations of multifamily housing as way of efficiently targeting participants. (This would result in households that are in areas with lower density of multifamily housing being less-well served.) For three of the four utilities, we do find an indication that concentration of multifamily housing in a particular area is associated with increased ESA Program participation. It is important to note that the model has already controlled for the number of low-income multifamily households, so this is a separate effect of only the concentration of multifamily units. The exception is SCG, where the relationship runs in the other direction, although the size of the effect is smaller.

Racial and Ethnic Identity

Significant parameter values for the three items relating to race and ethnicity suggest some targeting of ESA Program by these categories—or at least targeting that has the effect of increasing participation by these categories. We might call it over-representation, with the caveat that this is intended only in a statistical sense. We note that the size of the effect tends to be small: an increase in ESA Program participation ranging from 1% to 7% per 100 additional householders who identify with each category. The over-represented identity is also different for the different utilities: blacks for SCE; Hispanics for SCG and SDG&E; and *other* for PG&E, SCE, and SCG. Interestingly, the identity *other* ethnicity is associated with lower ESA Program participation in SDG&E's territory.

Language

We had two contradictory conjectures about LEP households and ESA Program participation.

- Either reduced facility with English could be a barrier to participation, insofar as households would be less aware of the program and less likely to seek out participation, or
- Reduced facility with English could be associated with increased participation, much as race and ethnicity are, if programs make a special effort to engage communities with language barriers.

Because all utilities have positive coefficient values for English barrier, our research suggests the latter scenario. Communities with more people who lack facility with English have a higher rate of participation. Since the model controlled for population, this is a separate language effect.

Additional Details About the Regression Modeling

Variables Tested in the Model

We collected and manipulated many variables at the census tract level that cover a number of neighborhood characteristics (see Table 16). We chose a combination of these parameters to include in our expanded model after determining their meaning, effects on the model, and statistical significance.

Table 16. Parameters Included in Dataset and Descriptions

Variable Name	Description
tot_pop	Total census tract population
total_households	Total number of household units
tot_mf	Total number of multifamily units
tot_limf	(Estimated) Low-income multifamily units
esa_participants	Number of ESA Program participants
pct_mf	Percentage of household units that belong to multifamily buildings
pct_limf	Percentage of household units that are low-income multifamily
pct_esa	Percentage of eligible LIMF households that participated in ESA Program
pct_ed_9gr	Percentage of households with less than 9th grade education
pct_ed_no_dipl	Percentage of population without a high school diploma
pct_ed_hsg	Percentage of population that are high school graduates
pct_ed_somecoll	Percentage of population with some college education

Variable Name	Description
pct_eng	Percentage of population that speaks English "very well"
pct_noeng	Percentage of population that speaks English less than “very well”
tot_eng	Total population that speaks English "very well"
tot_noeng	Total population that speaks English less than “very well”
medinc1000	Median Household Income, in thousands of dollars
pct_white	Percentage of population that is white
pct_bl	Percentage of population that is black or African American
pct_ai	Percentage of population that is American Indian
pct_asian	Percentage of population that is Asian
pct_pi	Percentage of population that is Hawaiian or Pacific Islander
pct_other	Percentage of population that is an "other" race
pct_2races	Percentage of population that is two or more races
pct_hisp	Percentage of population that is Hispanic or Latino
tot_bl	Total population that is black or African American
tot_asian	Total population that is Asian
tot_ai	Total population that is American Indian
tot_hisp	Total population that is Hispanic or Latino
tot_pi	Total population that is Hawaiian or Pacific Islander
tot_other	Total population that is an "other" race
tot_2races	Total population that is two or more races
tot_white	Total population that is white
pge	Categorical variable for PGE territory: 1 is within PGE's territory, 0 not
sce	Categorical variable for SCE territory: 1 is within SCE's territory, 0 not
scg	Categorical variable for SCG territory: 1 is within SCG's territory, 0 not
sdge	Categorical variable for SDGE territory: 1 is within SDGE's territory, 0 not

When we created categorical (dummy) variables for the IOU territories, we found that SCG has the largest presence in California, followed by PG&E, SCE, and then SDG&E. Table 17 shows the number of census tracts in which an IOU’s service territory covers more than 50% of the area.

Table 17. Census Tracts by IOU

IOU	Number of Census Tracts
PG&E	3189
SCE	2681
SCG	4129
SDG&E	678

Many census tracts were counted in more than one IOU territory, and Table 18

Table 18 lists the number of census tracts that are counted by both IOUs.

Table 18. Non-Mutuality of IOU Territory Categorical Variables

	SCE	SCG	SDG&E
PG&E	0	246	0
SCE	--	2484	0
SCG	--	--	55

Summary Statistics of Data

Table 19 lists the central tendencies—divided by demographic category—of all the variables in the models' dataset. Note that some of these values are totals and some are percentages.

Table 19. Descriptive Statistics of Variables Included in the Dataset

			Median	Mean	Std. Deviation
Built Environment and Population Statistics					
Tot_Pop	12	36,880	4,415	4,588.46	1973.06
Total_Households	9	7,914	1,474	1,543.15	666.58
Tot_MF	0	7,132	209	350.16	450.65
Est_LIMF	0	2,045	86.86	148.27	178.16
ESA_Participants	0	567	2	19.57	45.80
pct_mf	0	0.98	0.13	0.21	0.23
pct_limf	0	0.73	0.06	0.09	0.11
pct_esa	0	-	0.03	0.16	0.47
Education and Economic Demographics					
Pct_Ed_9Gr	0	65	6.8	11.07	11.46
Pct_Ed_No_Dipl	0	50.4	7.9	9.12	6.62
Pct_Ed_HSG	0	53.5	21.6	21.21	7.97
Pct_Ed_SomeColl	0	56.8	21.6	21.64	7.22
pct_eng	0.18	1.00	0.844	0.8033	0.1528
pct_noeng	0	0.822	0.156	0.1967	0.1528
tot_eng	12	36,106	3,476.07	3,708.12	1,719.94
tot_noeng	0	8,322	684.7	928.65	830.58
medinc1000	4.08	227.5	60.36	66.47	30.95
Racial Demographics					
Pct_White	0	1.00	0.65	0.62	0.21
pct_bl	0	0.94	0.03	0.06	0.10
pct_ai	0	0.72	0.00	0.01	0.02
Pct_Asian	0	0.95	0.08	0.13	0.15
pct_pi	0	0.21	0.00	0.00	0.01
Pct_Other	0	0.77	0.09	0.14	0.14
pct_2races	0	1.00	0.03	0.04	0.03
pct_hisp	0	1.00	0.29	0.36	0.27

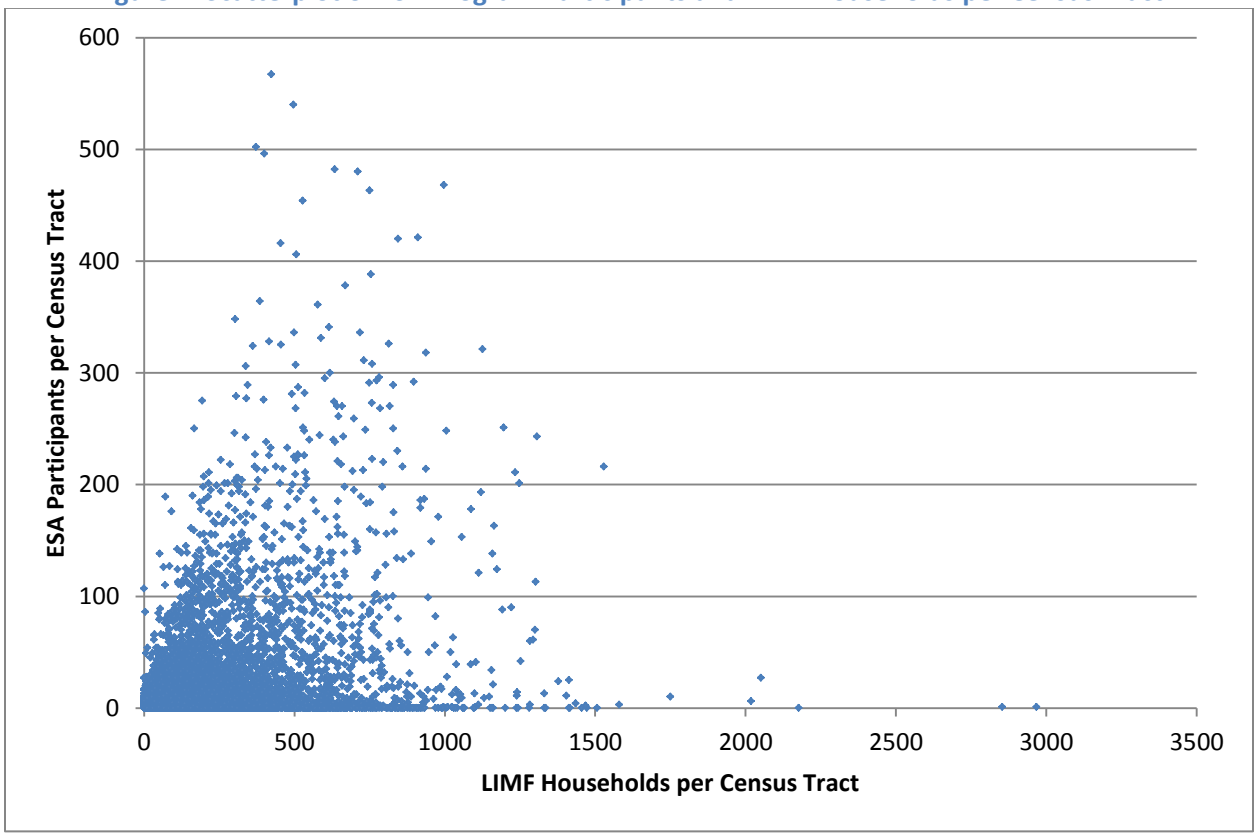
			Median	Mean	Std. Deviation
tot_bl	0	5,773	115.6	281.24	464.79
tot_asian	0	10,439	326.43	608.18	805.87
tot_ai	0	2,119	12.88	35.46	68.82
tot_hisp	0	13,488	1,273.65	1,732.49	1,537.79
tot_pi	0	1,268	0	17.76	54.63
tot_other	0	6,706	401.44	647.54	720.36
tot_2races	0	2,840	150.18	182.81	151.91
tot_white	0	23,050	2,653.66	2,863.81	1,509.52

Graphical Analysis

Figure 4 is a scatterplot showing ESA Program participants and LIMF units per census tract. The majority of tracts have less than 500 LIMF units and less than 100 ESA Program participants.

There appears to be a weakly positive linear correlation. Many tracts lie along the horizontal axis, representing high numbers of LIMF units with very low or zero ESA Program penetration. However, some points are very high outliers at greater than 10 standard deviations. Contrarily, some tracts appear to have near perfect ESA Program penetration, the maximum being 567.

Figure 4. Scatterplot of ESA Program Participants and LIMF Households per Census Tract



Analysis Methods

The original degree of skew in the ESA Program and LIMF may contribute to the violation of the assumption for a normal distribution required to run a normal ordinary least squares (OLS) statistical regression. Because of this, Cadmus tested two possible regression models that address this issue: negative binomial distribution and log-normal distribution.

- ***Negative Binomial Distribution.*** This is appropriate because it is designed to model "count" data that are over-dispersed, using maximum-likelihood estimation as opposed to ordinary least squares. This regression is typically used in analyzing crime data (in which the count number of crimes committed, for example, tends to be small relative to the total population). The negative binomial distribution is based on the Poisson distribution, which has a high left peak and a long right tail, much like our ESA Program data.
- ***Log-Normal Distribution.*** This entails log-transforming our ESA Program participants and LIMF variables and then running an OLS regression. It requires replacing the zero counts with a small positive number to avoid problematic missing data. We chose a value of 0.01 for this value. The log transformation better normalizes the variables, pulling the mean peak in towards the middle of the data.

Comparing the Regression Strategies

To compare the regression strategies, we plotted the respective residuals, which graphically show trends in the predictive error of the models. We found that the log-normal OLS regression was a better fit than the negative binomial, as it more accurately predicted the response variable (that is, with less error in the residuals).

The plot of predicted ESA Program participants to actual ESA Program participants in the negative binomial regression model (Figure 5) shows a number of very large negative outliers. This indicates that the model predicted very high ESA Program participants for a number of census tracts that, in fact, had very low values. The largest over-prediction in the negative-binomial regression is more than 38,000 ESA Program participants for a census tract in which the actual ESA Program participation is 1. More than 200 tracts have predictions that are three standard deviations above the mean ESA Program participation (greater than 156). The model attempts to force the data to the right-skewed distribution.

**Figure 5. Negative Binomial Distribution Regression Model:
Plot of Predicted to Actual ESA Program Participants.**

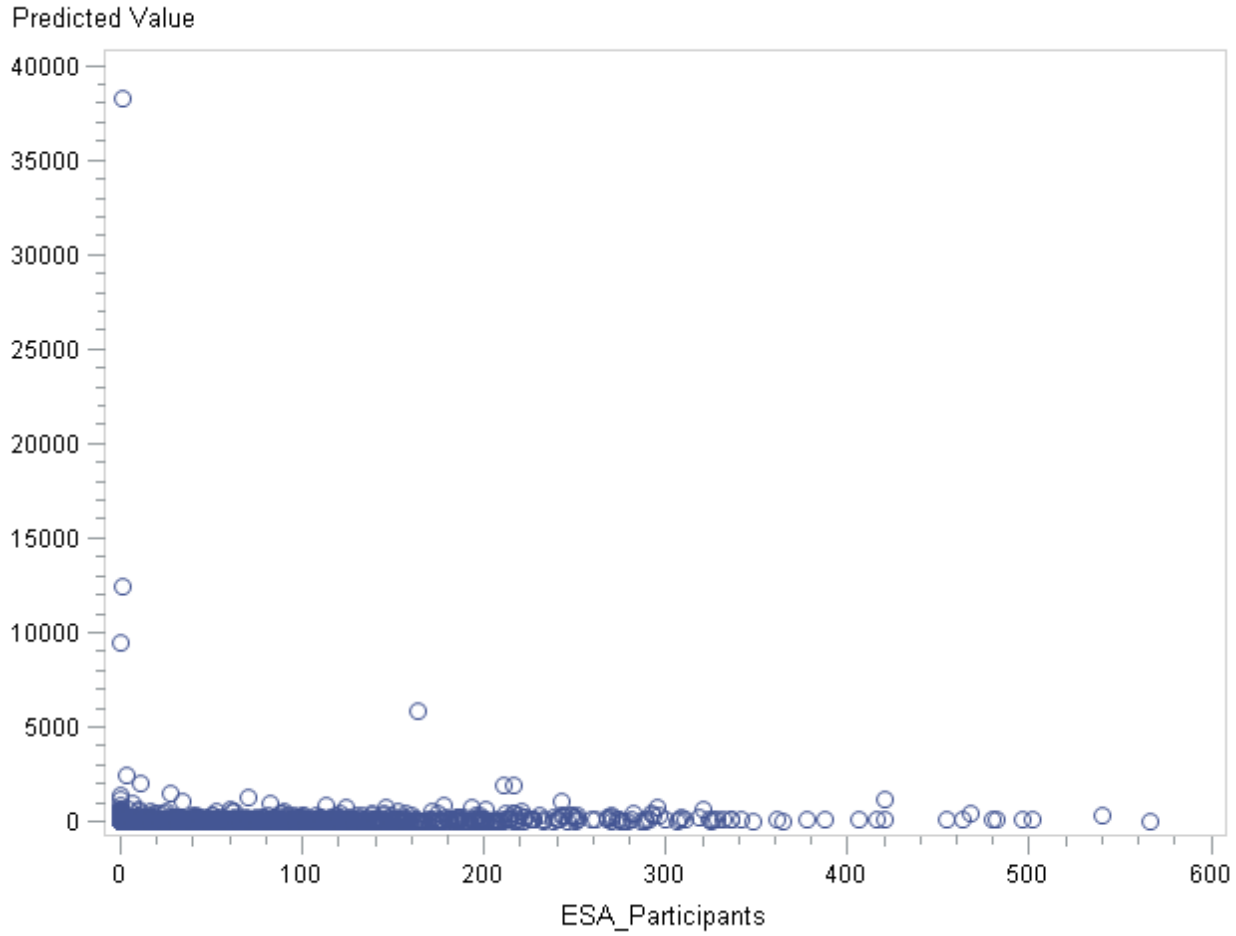
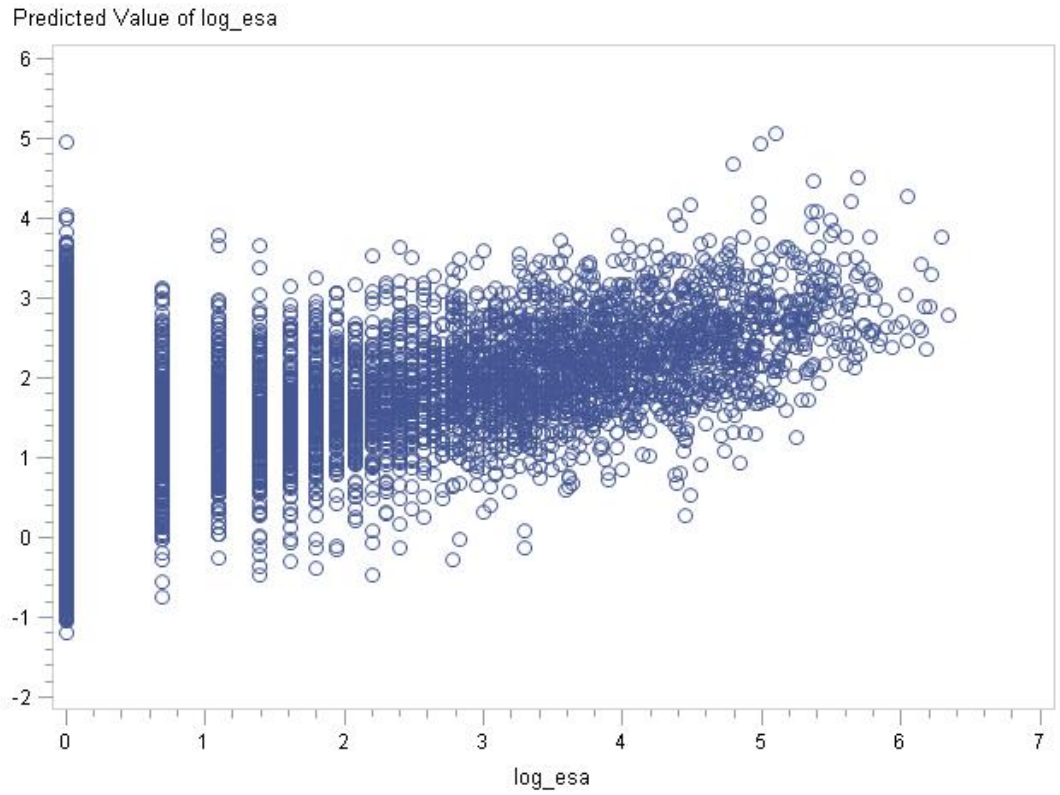


Figure 6 shows the predicted number of participants versus the actual ESA Program participants in the log-normal OLS regression model. A linear trend with a slope of 1:1 would indicate perfect prediction. Our findings show a slight trend toward under-prediction. Despite this, however, the OLS model has fewer outliers than the negative binomial regression model, thus reaffirming our choice to use this model.

**Figure 6. Log-Normal OLS Regression Model:
Plot of Predicted to Actual ESA Program Participants.**



Impact of MFEER Program on the Low-Income Multifamily Sector

The Multifamily Energy Efficiency Rebate (MFEER) program offers incentives to property owners and managers of multifamily buildings when they install energy-efficiency improvements in common areas and tenant units. Where low-income households live in units that benefit from the program, the MFEER program adds to the total set of services provided by utilities to low-income households.

Cadmus assessed the impact of MFEER on the low-income multifamily sector by analyzing three years of program participation data for each of the four IOUs in this study. We undertook two forms of analysis:

- Matches between addresses of MFEER and ESA Program participants, and
- Rate of participation by census tract of MFEER and the ESA Program.

It is important to note that MFEER serves properties, while the ESA Program serves tenants. Thus, a single property could have multiple ESA Program participants. Also, we are reviewing only three years of data for each program. What we seek to capture is the rate of crossover between the programs, not the total effect of MFEER on the low-income multifamily sector.

Method

Cadmus reviewed each utility's MFEER participant table for unique participant identifiers. However, because MFEER participants are defined as properties, not individual units, we needed to link the records for individual units to a single property. The SCE participation data contain batch numbers and project IDs that tie multiple units in the same building together; however, in cases where installation dates vary, multiple batch numbers and project IDs occur.

We consolidated the participant data from all utilities into a single data table and geocoded the records. Because unique street addresses are often associated with single units in multifamily properties—but no unique participant identifiers were provided with the data—we chose to geocode the participants and then use the latitude and longitude coordinates in an attempt to group properties that appeared to have more than one street address.

After some experimentation and review of the data, we determined that rounding the coordinates to three decimal places gave acceptable results. At 35 degrees north latitude, this represents a distance of about 91 meters. However, we observed that there are a number of properties that cover a relatively large geographic area (larger than one block). These properties include many distinct street addresses. In these instances, using the rounded coordinates did not succeed in producing unique identifiers for each property.

Geographically large properties were most prevalent in the SCE program data, where project/batch IDs were provided (although with some multiples due to differing installation dates). We found that by counting the distinct project/ batch IDs from the SCE tables and using the distinct rounded, concatenated latitude and longitude coordinates from the other tables, the results produced the least amount of double counting of properties. We note that this method still results in some degree of counting error; however, we have observed that MFEER participation does not have nearly as wide a distribution amongst census tracts as ESA Program participation (there are more individual ESA Program participants and fewer, more dispersed MFEER participants), so our method can at least be used to identify census tracts where there is some participation, versus none.

Properties Served by Both MFEER and ESA Program

We identified 9,939 distinct addresses that have participated in MFEER within the past three years for all utilities except SDG&E, for which we had only one year of data. Comparing those with the street addresses of ESA Program participants during the same period, we find 654 matched addresses. This suggests that MFEER has combined with ESA Program at about 6.6% of properties. Because of the difficulty in matching addresses for the two programs, we expect that this estimate probably under-represents the total number of combined program properties.

We also looked for latitude and longitude matches between the two programs. As noted, we considered two records matched when they were within 0.001 degrees latitude and longitude of one another. Using this approach we found 2,469 distinct MFEER locations, with 808 matching ESA Program locations, for a rate of 33% of MFEER locations serving ESA Program participants across all utilities.

Table 20 shows the number of MFEER-participating properties by utility (counting unique addresses or unique geographic coordinates) and the number and percentage of MFEER properties that also had ESA Program participants. For example, our data for PG&E MFEER participants contains 387 distinct addresses. Of these, 46 match addresses in the ESA Program participant database, so that 12% of MFEER addresses match an ESA Program address. Using geographic coordinates, we identify 372 MFEER participants, with 92 matching ESA Program coordinates, indicating a 25% match rate. SCE stands out as having a particularly high rate of overlap between MFEER and ESA Program participation, using geographic coordinates to identify matches.

Table 20. Number and Percentage of MFEER Properties Served by ESA Program

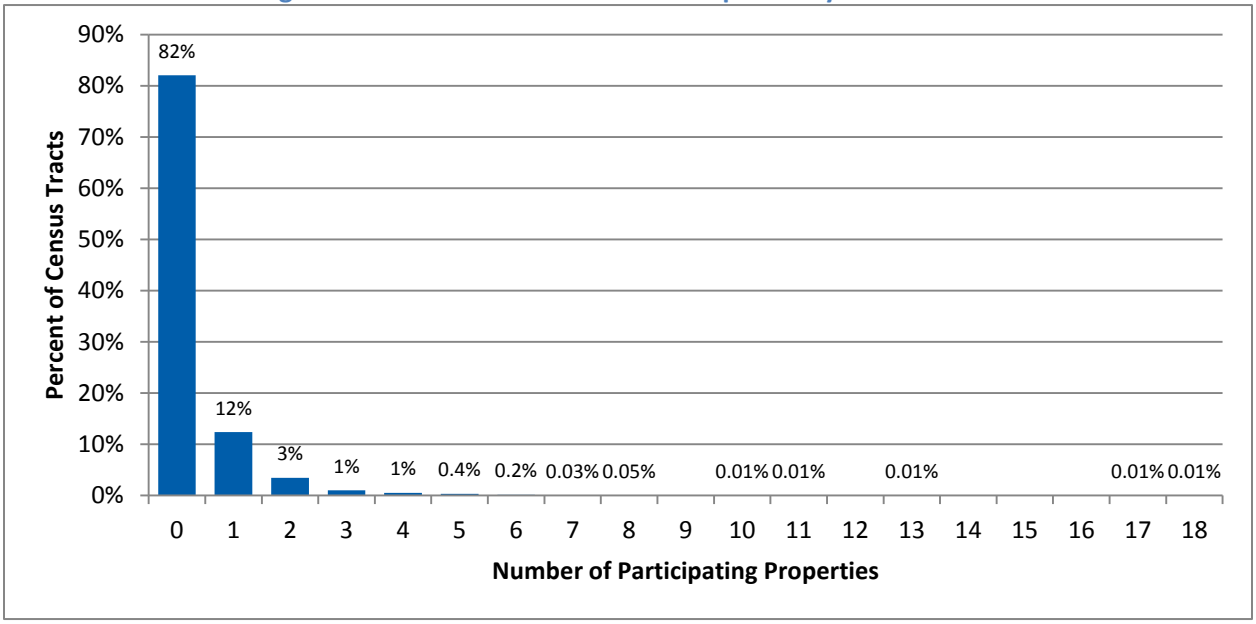
Utility	MFEER Addresses	MFEER & ESA Program Joint Addresses	ESA Program & MFEER Addresses	Unique MFEER Coordinates	Unique MFEER & ESA Program Coordinates	MFEER & ESA Program Coordinates
PG&E	387	46	12%	372	92	25%
SCE	7989	403	5%	946	424	45%
SCG	1120	149	13%	857	208	24%
SDG&E	445	56	13%	305	88	29%

MFEER Impact by Census Tract

Our program participation data suggest MFEER has not penetrated nearly as many areas as the ESA Program. Figure 7 shows the distribution of MFEER participation across all utility census tracts. Among 7,892 census tracts served by the four IOUs:

- 6,473 census tracts (82%) have had no properties participating in MFEER during the past three years, and
- 976 census tracts (12%) have had one participating property during this time.
- Only five census tracts have had 10 or more participating properties during this time.

Figure 7. Distribution of MFEER Participation by Census Tract



Given the small proportion of census tracts that have had any MFEER participation, Cadmus conducted a simple preliminary analysis of the data to assess whether tracts that have had MFEER participation are more likely to have had ESA Program participation. We compared the mean number of ESA Program participants among census tracts that have had some MFEER participation and those that had none. On average, census tracts with no MFEER participants—across all IOUs—had 15 ESA Program participants. However, census tracts that had at least one MFEER participant had more than double that number of ESA Program participants (an average of 39). This pattern persists across each of the IOUs, with a factor of two or three times as many ESA Program participants in census tracts with MFEER participants as in census tracts without MFEER participants. We conclude that MFEER and ESA Program tend to serve the same census tracts (the same geographical areas).

We wanted to rule out the *opportunity* explanation: that is, that more populous census tracts, or census tracts with more multifamily households, or with more low-income multifamily households, are more likely to have participants in both programs simply on the basis of more relevant units that have the opportunity participate.

We estimated a logistic regression model predicting the binary outcome of having MFEER participation within a census tract or not having MFEER participation, with explanatory variables for:

- The number of ESA Program participants,
- The total population of the census tract,
- The total number of multifamily households, and
- The number of low-income multifamily households.

If the relationship between MFEER and ESA Program participation is purely a matter of *opportunity* (that is, the number of available households), the coefficient for ESA Program participation in the model is expected to be non-significant, because all variance will be explained by the other variables in the model.

The model we estimated was:

$$logit(y) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4$$

Where:

- *logit(y)* is the log of the odds that a census tract has any MFEER participation
- α is the odds that a given census tract has any MFEER participation when all other variables in the model are set to zero
- β_n is the expected change in the log of the odds that a census tract has any MFEER participation from a unit change in variable x_n

Table 21 shows the results of our model. In summary:

- For PG&E and SDG&E, the opportunity explanation appears to account for the relationship between ESA Program and MFEER participation by census tract. The coefficients for ESA Program participation in these models are not significant.
- For SCE and SCG—even controlling for total population, the number of multifamily households, and the number of low-income multifamily households—the number of ESA Program participants is positively associated with the probability that at least one property has participated in MFEER.

Thus, the increased opportunity for participation does not appear to be a sufficient explanation for the relationship. We do not have direct evidence for what causes this association, but something in the way the two programs are administered may have created an increased likelihood that the two programs will operate in the same locations. The parameter value for ESA Program participants in both SCE and SCG territories suggests that for each additional ESA Program participant within a census tract, the likelihood that there will be at least one MFEER participant increase by slightly less than 1%.

Table 21. Parameter Values for Logistic Regression Model of MFEER Participation*

	PG&E Territory		SCE Territory		SCG Territory		SDG&E Territory		All Census Tracts	
	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value	Parameter Estimate	p-value
Intercept	-3.2804	<.0001	-2.1724	<.0001	-2.2800	<.0001	-1.8354	<.0001	-2.5285	<.0001
ESA Program Participants	0.0013	0.2646	0.0068	<.0001	0.0076	<.0001	0.0025	0.4215	0.0042	<.0001
Population (000)	0.0868	0.0064	0.0229	0.3841	0.0423	0.0508	-0.0374	0.3454	0.0419	0.0089
Multifamily Households	-0.0006	0.0630	0.0007	0.0398	0.0014	<.0001	0.0004	0.4132	0.0004	0.0236
Low-Income Multifamily	0.0043	<.0001	0.0024	0.0050	0.0005	0.3533	0.0034	0.0063	0.0026	<.0001
Obs. Used:	3189		2681		4129		678		7892	
DF	4		4		4		4		4	
Likelihood Ratio	133.03		410.45		575.87		113.46		853.48	
Pr > ChiSq	<.0001		<.0001		<.0001		<.0001		<.0001	

* Parameter values in red text are insignificantly related to the dependent variable.

Appendix F. Research Methodology and Sampling Plan for Building Owner and Manager Survey

Methodology

A survey with 124 building owners and managers of low-income multifamily buildings included operators of market-rate properties (73 respondents) and rent-assisted properties (51 respondents). The *sector* strata differentiated between market-rate housing and assisted-housing. Respondent groups were further stratified by the *size* of the properties they represented in California (0-25 units, 26-249 units, and 250 or more apartment units owned or managed in California). Survey weights were applied according to the stratum the respondents represented.

Sampling Plan

During the first public workshop held at the onset of this study (March 2013), workshop participants discussed the characteristics of low-income multifamily housing to determine which factors were most important for the survey stratification. The research team, Study Team, and workshop participants hypothesized there might be a difference in decision making practices within properties where tenants or owners received some rent assistance, such as Section 8 housing or other housing vouchers, and, properties that are "market rate" where no subsidies are received. In addition, workshop participants anticipated potential differences in decision making and housing characteristics between housing units of different sizes. The group agreed that differences in decision making would not be related to the IOU service territory in which the property was located. Therefore, sample strata were based on ownership and size of the property management/owner and they were not based on IOU service territories.

The sampling plan for the survey of owners and operators of low-income multifamily properties used a two dimensional design. Two strata were defined by market rate and assisted housing and three strata were defined by the size of the property management company operating a particular property (that is, the number of apartment units owned or managed in California). The sampling plan for these surveys was designed to represent the population. Table 22 shows the sampling plan and the number of surveys completed. Of the 124 surveys completed, 73 were with market rate property managers and 51 with rent-assisted property managers.

Table 22. Overview of the Sampling Plan and Responses Achieved

Sector	Size	Planned Completes	Completed Surveys
Assisted	5 to 25 Units	50	2
	26 to 249 Units	50	14
	250 or More Units	50	35
Market	5 to 25 Units	50	36
	26 to 249 Units	50	26
	250 or More Units	50	11
Total		**300**	**124**

Sector Strata

The *sector* strata differentiate between market rate housing and assisted housing. To target the survey to properties known to serve the limited income residential market, a list of properties that received housing assistance provides certain access to appropriate respondents. Moreover, housing that participated in assistance programs may be systematically different than housing that has not. However, a sizeable portion of the multifamily housing market serving low-income households has not participated in any assistance programs. To capture this sub-sector, a more general sample frame was needed. That was provided by a market rate stratum, i.e. reflecting buildings whose tenants pay the going rate and are not subsidized.

The sampling frame for the rent-assisted housing stratum was a database built from lists of rent-assisted properties. We selected one record for each unique address in the database based on the most current and/or most complete record. For the market rate stratum, the sample frame was composed of information for common area accounts provided by the IOUs. The market rate sampling frame was comprised of contact names from master or common metered accounts in buildings with at least one CARE recipient. Including the CARE criteria provided a sample likely to be composed of buildings with low-income residents.

Size Strata

Decision-making about multifamily properties is closely related to the size of the companies that own and operate the properties. This was in evidence in results from the survey of multifamily property owners and managers conducted for the MFEER program process evaluation.[8] As expected in the MFEER study, larger companies were more difficult to survey and collect information. Yet larger companies manage far more properties than smaller ones. Thus, it was critical that the sample for the Multifamily study capture a cross section of company sizes.

Property owners and managers were screened for the Multifamily Study survey, and asked how many properties were managed by their company. Within each of the sub-sector strata (market rate and rent-assisted), the survey sampling plan included a quota of 50 for each of three size strata, for a total of 150 completes across the three size strata. The size strata captured the smallest 45% of companies, the middle 45% of companies relative to size, and the largest 10% of companies. Based on research conducted for the MFEER evaluation, these three categories represented companies managing no more than 25 units, more than 25 but less than 250 units, and 250 units or more.

[8] Eric Rambo and Linda Dethman. April 15, 2013. "2010-2012 PG&E and SCE Multifamily Energy Efficiency Rebate Program (MFEER) Process Evaluation and Market Characterization Study." CALMAC # PGE301.01, pp. 23-26.

Generalizing to the Population of Low-Income Multifamily Properties

To generalize to the entire population of properties, we used post-weighting of the results to account for the sample design. Weighting the results based on population proportions allows the combined estimate to reflect the relative prevalence of the two sub-sectors. The sector weights are as shown in Table 23.

Table 23. Survey Weights

Sector	Sector Weight	Size (Number of Apartment Units)	Design Weight by Size Strata	Combined Weight
Assisted	0.12	5 to 25 Units	0.45	0.054
		26 to 249 Units	0.45	0.054
		250 or More Units	0.10	0.012
Market	0.88	5 to 25 Units	0.45	0.396
		26 to 249 Units	0.45	0.396
		250 or More Units	0.10	0.088

The weight applied to the data is a multiplier for each response that renders the overall distribution of responses across the strata equal to the distribution in Table 23. For instance, in the assisted sector for respondents owning or operating 5 to 25 units, we completed 2 surveys, which is 1.6% of the total number of completed surveys (124). In the population, however, this group makes up 5.4%. So, the weight for each response in this category is 1.6/5.4 = 3.3.

Uncertainty

The difficulty we had fulfilling the sample plan makes it difficult to estimate the degree of certainty associated with survey results. If we assume the survey represents a simple random sample of 124 building owner and managers, the sampling error associated with an estimated proportion of 0.5 would be +/- 0.073, or a relative precision of about 15%. For the assisted sub-sample, with 51 completed surveys, the sampling error associated with an estimated proportion of 0.5 would be +/- 0.112, or a relative precision of about 22%; for the market rate sub-sample of 73 it would be +/- 0.095, or a relative precision of about 19%. The design would contribute additional uncertainty, especially where the strata had substantially different values on a given item. The degree of uncertainty we cannot estimate results from non-response bias. The difficulty we had completing surveys undermined our effort at randomization, on which rest classical statistical theory and thus the estimates of precision just offered. Thus, while we believe our results are good indicators of central tendency, they should be interpreted with caution and in conjunction with other, supporting information.

Data Sources

Cadmus compiled call lists for surveys with property owners and managers of affordable housing and market rate housing from multiple sources.

Affordable Housing Sources

Cadmus utilized public sources to sample property owners and managers for the survey. These sources included participants in the US Department of Housing and Urban Development's (HUD) Section 8 rental subsidy program. Property owners and managers in the Low-income Housing Tax Credit (LIHTC) program administered by the California Tax Credit Allocation Committee (CTCAC) were included in the sample frame. These lists came from two sources; HUD and CTCAC. Also included was a list from the US Department of Agriculture for participants in the California Rural Development program. California Housing Partnership Corporation provided records with contact information of key decision makers. Cadmus merged the lists for a combined total of 7,598 records. Removing property address duplicates left 2,365 records. The sample call list was randomized before dialing. Following the pre-test, the list was further filtered to select unique management contacts to develop a list of 367 unique contacts. This call list was randomized before dialing in the final round of calls.

Market Rate Sources

IOUs provided customer data to compile a sample of property owners and managers for the market rate sample. To identify building managers or owners, Cadmus used contact information from master or common-area meter accounts in buildings with at least one CARE recipient. To identify this intersection, Cadmus required both individual tenant records with an identifier of CARE status, common area and master-meter account records. The customer data provided varied by IOU. A brief description of each source is outlined below.

- SCG provided a dataset with both individual-unit and master or common-area meters. The dataset included a CARE flag for individual customers.
- PG&E did not provide a full customer dataset but did provide a list of their customers (addresses only) on the CARE rate. Cadmus used data from a 2011 MFEER study as a source for master and common-area meters.
- SCE provided individual customer records, including CARE rate flags. Cadmus used the 2011 MFEER study data as a source for master and common-area meters.
- SDG&E provided data on master metered properties including whether these meters were on a CARE rate. They were not able to provide data on common area meters of multifamily buildings.

To most accurately match individual-unit addresses with building addresses, Cadmus ran every address record through a Graphical Information System (GIS), which returned a "matched address" for each record. This, in effect, stripped unit numbers and formatting differences from the address records, making them as consistent as possible. Using these "matched" addresses, Cadmus identified common-area or master-meter accounts in buildings with at least one CARE participant, and used these records as the dataset from which to sample. Identifying buildings with at least one CARE participant was intended to reduce the total number of records to those more likely to lead to low-income multifamily buildings.

The last steps in generating the market-rate sample involved filtering the remaining records to include only properties in the targeted census tracts (that is, census tracts identified as likely to have a large number of low-income households in multifamily buildings), removing contacts that were included in

the subsidized housing sample (rent-assisted sector), and removing duplicate contacts from the remaining set. This de-duplication of records identified duplicate property addresses. After removing these records, 11,714 records remained. Following the survey's pre-test additional duplicate records were removed. This de-duplication of records was achieved by standardizing the format of the contact phone numbers and randomly selecting one record from each group of distinct phone numbers. Finally, duplicate contact names were removed, first by exact matching and then by a review with human eyes.

The compilation of records from each IOU and the attrition of records as the sample frame was developed are shown in Table 24. The sample frame started with about 88,000 records. Following the pre-test, Cadmus removed properties with the same contact phone numbers and randomly selected one record from each group of distinct phone numbers. This accounted for over half the original sample frame leaving fewer sample records. After removing records as discussed above, about 5,300 market rate records were included in the final sample frame used in the full launch of survey data collection (Table 27).

Table 24. Market Rate Sample

Dataset	Count
Initial Dataset	
SCG common or master meters in buildings with a CARE recipient	3,701
PGE common meters in buildings with a CARE recipient	55,477
SCE common meters in buildings with a CARE recipient	28,243
SDGE CARE-flagged master meters	643
Total	**88,064**
Filters Completed After Pre-test	
Filtering for missing or bad phone numbers	74,155
Filtering out affordable housing properties	71,805
Identify properties within targeted census tracts	8,891
Identify distinct (unique) phone numbers	5,562
Final Sample Frame of unique customer names	**5,377**

Survey Administration Process

The sample frame includes both the market rate and affordable housing samples. The pre-test sample frame included 11,714 market rate records and 2,365 rent-assisted records.

During the pre-test phase, 34% of the 14,079 records were attempted. Some of the records dialed in the pre-test were duplicates and removed from the sample frame before the full launch of the study. Removing duplicates and properties with the same owner or property manager reduced the possibility that the same owner was called for different properties. (For details on the outcome of the records in the sample frame, see Table 95 and Table 97. Table 96 contains details about the convenience sample, described on the next page.)

Table 25. Sample Frame Attrition, Pre-Test

Pre-Test	Sample Frame	Number of Non-Final Records	Number of Records Finalized
Initial Number of Records (Rent-assisted and Market Rate sample, but not including convenience sample)	14,079		
Number of Records Attempted	4,821		
No Answer, Answering Machine, Phone Busy, Callback		3,362	
Non-Working Phones, Not Multifamily Property			635
Refusal and Terminate			537
Ineligible			246
Language Barrier			0
Complete in Pre-Test			41
Not Attempted		9,258	
Duplicates Removed from records dialed and not attempted	7,494		

Convenience Sample

In addition to the sample compiled from the IOU customer data for the market rate housing sector, a convenience sample was compiled. This included additional records of multifamily property owners provided by SCE and records obtained through an internet search of housing associations. This search referenced MSA websites to find market-rate and low-income apartment building owners or managers to survey. The internet search included business licensing pages, MSA Treasury Office pages, rental housing pages, and business directory pages to find market-rate apartment building listings.

The search focused on the low-income and affordable housing pages of each MSA to gather low-income apartment building listings. These lists included low-income and market-rate apartment listings for Anaheim, Fresno, Los Angeles, San Diego, and San Francisco. The surveyors attempted the records from the Anaheim listings and did not complete any survey. A visual inspection of the remaining lists concluded that many of the records contained duplicate entries based on contact information. The survey firm did not attempt any of the additional lists.

Table 26 summarizes the sample frame and final disposition of records included in this convenience sample. Only three completed surveys can be attributed to this sample.

Table 26. Disposition of Convenience Sample

Convenience Sample	Sample Frame	Number of Non-Final Records	Number of Records Finalized
Sample Frame	722		
Removed duplicates / Missing Phone Numbers	606		
Records Sent to Survey Subcontractor	116		
Number of Records Attempted	114		
No Answer, Answering Machine, Phone Busy, Callback		83	
Not Attempted		2	
Non-working Phones, Not Multifamily Property			12
Refusal and Terminate			7
Ineligible			8
Language Barrier			1
Completed Survey			3

Records in the sample frame were randomized before dialing. Table 27 shows the final disposition of records dialed with the sample frame of 6,466 records, including the convenience sample, available for the full survey launch. This total number of records includes 5,377 market rate records, 367 rent-assisted records, and 722 convenience sample records.

Table 27. Sample Frame Attrition, Full Launch

Full Launch (including Convenience Sample)	Sample Frame	Number of Non-Final Records	Number of Records Finalized
Sample Frame	6,466		
Removed duplicates manually	853		
Records Sent to Survey Subcontractor	5,613		
Number of Records Attempted	4,893		
No Answer, Answering Machine, Phone Busy, Callback		3,168	
Not Attempted		604	
Non-working Phones, Not Multifamily Property			980
Refusal and Terminate			231
Ineligible			341
Language Barrier			90
Complete in Full Launch			83
Total Number of Completed Surveys			**124**

The survey process was difficult and experienced several roadblocks that hampered completion of the targeted number of surveys. The first was the large number of duplicates and numbers of properties with the same owner or property management firm. These needed reducing so that the call list included unique phone numbers. Two other issues were pervasive throughout the survey's fielding period. One

was the number of outdated phone numbers. Some phone numbers did not belong to multifamily housing properties or were non-working numbers. This accounted for one-quarter of the remaining records attempted. Another issue was the difficulty reaching respondents. Half of the calls did not result in reaching the intended property manager or owner because they were not available when the call was made and did not call back.

To qualify for the survey, screening questions confirmed the property's tenants were low-income, there were at least 5 apartment units in one building (the definition of multifamily), and that the respondent was the person making decisions about building and equipment upgrades to the property and rental units at the property.

This screening identified ineligible records. Some were ineligible to participate because the respondent did not know or did not have low-income tenants living on the property or any other properties in California. Some properties were ineligible for the research because their property did not have a single building with 5 or more units. All types of ineligible properties accounted for about 9% of the sample frame.

Over 10% of the calls ended when the respondent refused the survey. This was due to many reasons but one was that some property owners and managers were uncomfortable discussing the income level of their tenants. This meant it could not be confirmed the respondent met the criteria for the targeted population. Table 28 shows the percentage of calls for each outcome. Together, these issues made it difficult to reach the intended goal for completed surveys.

Table 28. Final Survey Call Outcomes*

	Total Sample Frame (n=14,801)	Attempted Sample Records (n=6,466)
Duplicates Removed From Sample Frame	56%	N/A
No Answer, Answering Machine, Phone Busy, Callback	22%	50%
Non-Working Phones, Not Multifamily Property	11%	25%
Refusal and Terminate	5%	12%
Ineligible	4%	9%
Language Barrier	1%	1%
Complete	1%	2%

* The number of sample records includes all records attempted. Some of the non-final records attempted in the pre-test phase were removed from the sample frame in the full launch of survey data collection because they were duplicates.

Appendix G. Research Methodology for Stakeholder Interviews

Between June and September 2013, the Cadmus team conducted interviews with: (1) low-income stakeholder and advocacy groups working with affordable and market-rate multifamily housing, and (2) multifamily building owners and managers.

Objectives

We collected information about the respondents' constituency, financing considerations for multifamily building improvements, and discussed concerns about participation in the ESA Program. We also asked for suggestions for data sources or others to contact for interviews and surveys, and recommendations for research topics to inform the study. These qualitative interviews represent the perceptions of the respondents and do not denote quantitative research findings.

Methodology

Sample Selection

Interviews included representatives from both the affordable- and market-rate housing sectors to strive for a balance of viewpoints. It is important to note that these qualitative interviews were not designed to represent a statistically accurate sample of the California multifamily market. They represent a diversity of views and highlight the similarities and differences between the various stakeholder and advocacy groups. The respondents' views cannot be classified as belonging solely to affordable- or market-rate housing groups.

Cadmus conducted 16 separate interviews with 18 people from 14 different stakeholder organizations. Of these, eight organizations had attended the Multifamily Segment Study public workshop in March and six had posted comments to Decision 12-08-044.

Stakeholders were chosen through a process of reviewing the following:

- Formal documents designated as "comments" posted to the Commission Decision (D.) 12-08-044 on the Commission website[9]
- Roster of attendees from the Multifamily Segment Study public workshop on March 5, 2013
- Suggestions provided by attendees of the Multifamily Segment Study public workshops on March 5 and September 25, 2013
- Multifamily Executives Magazine's 2013 Top 50 Owners List
- Multifamily housing associations lists
- A.1111-05-017 Service List[10]

[9] CPUC, Filed October 26, 2012, contact list for posting information regarding scheduled hearings.

[10] Ibid

We first interviewed stakeholders who posted comments to the Decision (D.12-08-044) and/or attended the public workshop in March because they were familiar with the ESA Program, the Decision, and the Low-Income Multifamily Segment Study. These stakeholders proactively offered to participate in interviews, provide data, and suggested others for interviews.

We then used search engines to find stakeholders from various California associations to interview. After identifying apartment associations, housing associations, rental property associations, property owner associations, and affordable housing associations within each MSA city or county, we recorded the contact information for each association executive. (In total, we identified 24 unique association executives.) We targeted seven market rate properties from the multifamily housing associations list.

Using the *Multifamily Executives Magazine* list, we targeted nine with market-rate properties and significant presence in California. Scheduling interviews with representatives of market-rate housing proved more challenging than with those representing affordable housing. This was due, in part, to difficulties locating the correct person within an organization to interview. As a result, the interviews do not represent the entire California multifamily market but rather a sub-segment consisting primarily of affordable housing organizations or advocates.

Respondents' constituents reside in or manage affordable housing, market rate housing, or both. Most respondents could speak about both affordable- and market-rate multifamily building issues because they serve both groups. Stakeholder groups interviewed are listed in Table 29 (in alphabetical order).

Table 29. Stakeholder and Advocacy Groups Interviewed

Stakeholder	Rent Categories*
Bridge Housing	Affordable housing; some market rate
California Association of Housing Authorities	Affordable housing
California Housing Partnership Corporation	Affordable housing
Division of Ratepayer Advocates, CPUC	Both
Essex Property Trust	Market rate
Mercy Housing	Affordable housing
National Asian American Coalition	Affordable housing
National Consumer Law Center	Both
National Housing Trust	Affordable housing; some market rate
Riverstone Residential Group	Both
San Diego County Apartment Association	Both
StopWaste	Both
The East Los Angeles Community Union (TELACU)	Affordable housing
US Department of Housing and Urban Development	Affordable housing

* Rent categories specified by interviewee.

All respondents serve clients or manage multifamily properties with five or more units. Respondents reported that they worked with small (25 or fewer units), medium (26 to 249 units), or large (250 units or more) multifamily properties. The majority represent medium-size properties.

Data summarizing the number of properties and number of units owned or managed by respondents were available from only five firms. Table 30 shows the range of the numbers of properties and apartment units within these five.

Table 30. Number of Buildings and Apartment Units Represented Five Interview Respondents

Size of Properties	Number of Properties	Number of Units
Small (25 or fewer units)	34	521
Medium (26-249 units)	242	20,500
Large (250 or more units)	98	20,973
Total	**374**	**41,994**

Appendix H. Eligible Measures for California Programs Targeting the Multifamily Sector

Table 31. ESA Program Eligible Measures

Measure Category	Measure[1]
Heating Systems	Furnaces
Cooling Measures	A/C Replacement - Room
	A/C Replacement – Central
	A/C Tune-up - Central
	A/C Services – Central[2]
	Heat Pump
	Evaporative Coolers
	Evaporative Cooler Maintenance[2]
Infiltration & Space Conditioning	Envelope and Air Sealing Measures
	Duct Test and Sealing
	Attic Insulation
Water Heating Measures	Water Heater Conservation Measures
	Water Heater Replacement - Gas
	Water Heater Replacement – Electric[2]
	Tankless Water Heater – Gas[2]
	Tankless Water Heater – Electric[2]
Lighting Measures	CFLs
	Interior Hard wired CFL fixtures
	Exterior Hard wired CFL fixtures
	Torchiere
Refrigerators	Refrigerators -Primary
	Refrigerators – Secondary[2]
Pool Pumps	Pool Pumps
New Measures	Forced Air Unit Standing Pilot Change Out
	Furnace Clean and Tune
	High Efficiency Clothes Washer
	Microwave
	Thermostatic Shower Valve
	LED Night Lights
	Occupancy Sensor
	Smart Power Strips

Measure Category	Measure[1]
Pilots	A/C Tune-up Central Home[2]
	Interior Hard wired CFL fixtures[2]
	Ceiling Fans[2]
	In-Home Display[2]
	Programmable Controllable Thermostat[2]
	Forced Air Unit[2]
	Microwave
	High Efficiency Clothes Washer[2]

1. Measures listed in Table 2 of IOU ESA Program PY 2012 Annual Reports.
2. Measure not installed in 2012.

Table 32. CSD Program Eligible Measures

Measure Category	Measure
Appliances	Refrigerator Replacement
	Microwave
Building Envelope	Knee-wall Insulation
	Weatherstripping (Other)
	Weatherstripping (Hinged Door)
	Floor Foundation Venting
	Floor Insulation
	Mechanical Ventilation
	Shade screens
	Shutters
	Storm Windows
	Tinted Window Film
	Wall Insulation, Stucco and Wood
	Windows for EE
Heating and Cooling	Thermostat
	Evap Cooler Vent Cover, Interior
	Cooling Replacement for EE
	Heating Replacement for EE
Home Repair	Glass Replacement - Catastrophic leaks
	Minor Envelope Repair
	Minor Home Repair
	Windows - Catastrophic leaks only
Other	Ceiling Fans

Measure Category	Measure
Water Heating	Hot Water Flow Restrictor
	Water Heater Blanket
	Water Heater Pipe Wrap
	Exterior Water Pipe Wrap
	Timer, Electric Water Heater
	Solar Water Heating

Table 33. MFEER Eligible Measures[1]

Measure Type	Measure
Lighting	Screw-in CFL Reflector bulbs (ENERGY STAR® Qualified)
	Interior LED Lamps
	ENERGY STAR® LED Recessed Down Light <= 25 Watt
	Interior CFL Fixtures (ENERGY STAR® Qualified)
	Low Watt T8 or T5 or Lamps w/electronic ballasts
	Exterior CFL fixtures (ENERGY STAR® Qualified)
	Exterior LED lamps
	Exterior LED fixtures
	Occupancy sensors
	Photocells
	Ceiling Fans (ENERGY STAR® Qualified)
	LED Pool and Spa lighting
	Vending Machine Controls
	Exterior Induction Fixture <=400 Watts Base Case
Building Envelope	High Performance Dual-Pane Windows
	Cool Roof
	Attic and/or wall insulation
Water Heating	Electric storage water heaters
	Electric Heat Pump storage water heaters
	Central system natural gas water heaters/boilers
	Natural gas water heater and/or boiler controllers
	Natural gas storage water heaters
	Tankless Water Heaters
	Pool Heaters
	Low Flow Shower Head

Measure Category	Measure
HVAC	Package terminal air conditioners & heat pumps
	Unitary AC Units
	Central Natural Gas Furnaces
	HVAC Quality Maintenance
	Brushless Fan Motor for Central AC
	Evaporative Coolers
	Programmable Thermostats
	Wall Furnaces
Appliances	Refrigerators (ENERGY STAR® Qualified)
	High-efficiency Clothes Washers
	ENERGY STAR® Dishwashers
	Cold Water Clothes Washers
Pumping	Variable Speed Pool Pumps
	Programmable Thermostats (Common Areas only)
	Demand Control for Centralized Water Heater Recirculation Pump

1. The measures listed reflect all measures listed in 2013-2014 MFEER PIPs, some measures vary by IOU.

Table 34. Whole Building Program Eligible Measures[1]

Measure Type	Measure
Domestic Hot Water (Individual and Central)	Boiler or DHW replacement – Must meet current T-20 standard
	Central system natural gas water heaters
	Circulation pump
	Combined space and water heater
	Condensing gas water heater
	Demand Control for Centralized Water Heater Recirculation Pump
	DHW heaters/boilers
	DHW tank insulation
	Electric storage water heaters
	Faucet Aerator
	Heat pump DHW
	Low flow water fixtures
	Natural gas storage water heater
	Pipe insulation
	Tankless/instant DHW
	Water Heater Blanket
	Water heater repair & replacement
HVAC	A/C equipment replacement – Must meet current T-20 standard
	A/C Tune-up (Central AC)
	AC Time Delay
	Bathroom fans

Measure Type	Measure
	Central natural gas furnace
	Chillers
	Cogeneration systems
	Controls optimization (OA reset, zone reset)
	Cooling towers
	Duct insulation
	Duct sealing
	Ducted evaporative cooling
	Ductless air-conditioning for common areas
	Evaporative Coolers
	Evaporative coolers repair & replacement
	High performance rooftop unit
	HRV
	HVAC pipe insulation
	HVAC Quality Maintenance
	HVAC system commissioning
	Natural gas furnace
	Natural gas hydronic heat boiler/space heating hot water boilers/hydronic systems
	Natural gas steam heat boiler/space heating low pressure steam boilers
	Package terminal air conditioner
	Package terminal heat pump
	Package terminal heat pumps
	Premium efficiency motors (ECM included)
	Programmable thermostat
	Refrigerant charge verification
	Room air conditioner
	Space cooling equipment
	Space heating equipment
	System airflow verification
	System fan size/hp
	System fan wattage verification
	Tank insulation
	Thermostatic radiator valves (TRV)
	Unitary AC Units
	Variable refrigerant flow for common areas
	Variable speed motor
	VAV systems
	Ventilation schedules
	VFD controls for CHW, HW, CW pumps
	VFD controls for cooling tower fans
Appliances	Clothes Dryer

Measure Type	Measure
	Clothes washer (in-unit and common area)
	Cold Water Clothes Washers
	Dishwasher (in-unit)
	ENERGY STAR® Refrigerator
	Microwave-(displacing gas or electric oven use)
	Vending Machine Controls
	Advanced HID lighting for site lighting
Lighting	Advanced lighting controls
	Bi-Level lighting
	Ceiling fans
	CFL bulb (screw-in)
	Cold cathode lamps
	Common area lighting fixtures – high efficacy hardwired fixtures
	Daylighting
	De-lamping
	Dwelling unit lighting fixtures – high efficacy hardwired fixtures
	Exterior CFL fixtures (ENERGY STAR® qualified)
	Exterior LED fixtures
	Exterior LED lamps
	Interior CFL fixtures (ENERGY STAR® qualified)
	Interior LED fixtures (ENERGY STAR® qualified)
	Interior LED lamps (ENERGY STAR® qualified)
	Landscape/parking lighting
	LED exit signs
	LED interior lighting
	LED night lights
	LED pool and spa lighting
	LED site lighting
	Lighting controls – Occupancy sensor, photo sensor, or dimmer switch
	Linear fluorescent fixtures and bulbs
	Outdoor lighting retrofits – high efficacy hardwired fixtures
	Photocells
	Screw-in CFL reflector bulbs (ENERGY STAR® qualified)
	T5 or Lamps w/electronic ballasts
	Task lighting
	Timer
	Torchiere

Measure Category	Measure
Building Shell	Air sealing
	Attic insulation (with attic plane sealing)
	Cool roof
	Floor insulation
	High performance dual-pane windows
	Overhangs
	Radiant barrier
	Wall insulation
	Weather-stripping
	Window shading – permanent, non-retractable
	Windows
Swimming Pools	Filtration pump and motor
	Pool booster pump
	Pool and spa heater
Other	Gearless Elevators

1. The measures listed are those included in IOU EUC MF Path and REN PIPs for 2013-2014. This list is not exhaustive: PIPs specify that eligible measures are not limited to those listed.

Appendix I. Financial Solutions Catalog

Table 35. Financial Solutions Catalog

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Green Finance Plus	Fannie Mae	US	Financing	Yes	Not available.	No minimum or maximum loan amount. Loans above $50 million require HUD consent.	Not available.	Green Refinance Plus loans are available for existing properties that are 10 years or older and that will meet MAH income and rent restrictions going forward, nationwide. Borrowers must track energy and water using ENERGY STAR portfolio manager and submit the ENERGY STAR performance report annually	Standard third-party reports – Green Physical Needs Assessment (GPNA), Appraisal, and Phase I Environmental Assessment - are required. The GPNA must contain an assessment of a property's physical needs, an energy audit and identification of cost effective opportunities for increasing energy and water efficiency, and reducing operating and capital costs.	EE/RE	Not available.	The Green Refinance Plus execution for Multifamily Affordable transactions provides additional proceeds to support the green retrofitting and general renovation of existing Affordable properties. 4-5% more proceeds than our regular DUS Affordable preservation execution, to support energy retrofitting and other needed renovations.	https://www.fanniemae.com/content/fact_sheet/grnrefiplus.pdf	Not available.
Green Affordable Housing Preserva-tion Loan Fund	National Housing Trust, Inc.	US	Financing	Yes	Loans provided on a case by case basis	$50,000 - $500,000	The loan will be sized to be repaid by a combination of existing cash flow and anticipated savings produced by the conservation measures.	Existing multi-family affordable housing	Measures designed to reduce energy costs and make properties environmentally sustainable. At least 75% of the units are occupied by residents that are at or below 80% of area median income, **and** either at least 20% of the units are occupied with residents at 50% of area median income; or 40% of the units are occupied at 60% of the area median income.	EE/RE	4 loans funded so far, all for new construction.	Offers subsidized financing for multi-family building owners to incorporate green elements into existing buildings. Financing can be applied to both planning and implementations of projects.	http://www.nhtinc.org/green_loan_fund.php	Not available.

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Rural Development Multi-Family Housing Energy Efficiency Initiative	USDA Rural Development	US (Section 516 funds can be used for off-farm housing for farm workers in urban areas. All other projects must be in non-urban areas, which cover most of CA.*	Financing and grants	No	Varies annually. Initiative applies to Section 515 Rural Rental Housing Program for New Construction, Section 514 Farm Labor Housing Loans and Section 516 Farm Labor Housing Grants for Off-Farm Housing, Section 522 Housing Preservation Grants, and Sections 514, 515 and 516 Multi-Family Housing Revitalization Demonstration Program.	This initiative does not have funds set aside for it, but applicants to several Multi-Family Housing programs receive priority scoring if they incorporate energy efficiency aspects to their projects.	This initiative does not have funds set aside for it, but applicants to several Multi-Family Housing programs receive priority scoring if they incorporate energy efficiency aspects to their projects.	Varies by funding source, but options available for private, non-profit, government, and tribal organizations.	Recognizes green construction, energy conservation, and energy generation measures in new and existing housing structures.	EE	At least 7 projects in CA.	Gives priority to projects applying to other USDA loan or grant programs when they incorporate energy efficiency or conservation in to the project scope.	http://www.rurdev.usda.gov/program_details.html	http://www.rurdev.usda.gov/project_MC.html
Mark-to-Market (M2M) Green Initiative Pilot	HUD	US	Grant/ Loan Restruc-turing; Perform-ance Incentive for having LEED profess-sional involved with property manage-ment	Yes	Not available.	Not available.	Not available.	Existing affordable housing owners currently engaged in M2M (HUD Section 8 portfolio) and those taking out new M2M loans	EE and water-saving measures	EE	Not available.	Program provides favorably termed loans to finance cost of EE and water saving measures in existing affordable multifamily housing.	http://www.hud.gov/offices/hsg/omhar/pages/green/greenini.pdf	Not available.

* Non-urban area map: http://eligibility.sc.egov.usda.gov/eligibility/welcomeAction.do)

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Business Energy Invest-ment Tax Credit	IRS	US	Tax Credit (Federal Corporat e Tax)	No	10-30% of installation expenditure	10-30% of installation expenditure	Not available.	Commercial property	Installation of renewable energy generation equipment	RE (includi ng CHP)	Not available.	Corporations installing new renewable energy generation equipment are eligible for the credit. 30% credit for solar, fuel cells, small wind, and technologies eligible for the Production Tax Credit; 10% credit for geothermal, CHP and microturbines. Must be in service by 2016 to qualify.	http://ener gy.gov/savi ngs/busine ss-energy-investment -tax-credit-itc	Not available.
California FIRST (PACE)	Californi aFIRST	Over 100 cities and counties throughout the state, as well as statewide	Financing	No	$50,000+ per loan, "hundreds of millions" in available capital	$50,000+ per loan, "hundreds of millions" in available capital	100% upfront financing for qualified energy upgrades	Multifamily with 5+ units; ASHRAE level 2 audit	Energy and water improvements that protect against rising utility costs	EE/RE	Not available.	100% financing for energy retrofits to commercial properties, where the financing payment is made as an assessment to the property and paid back on the tax bill.	https://cali forniafirst. org/proper ty_owners_ overview	Not available.
CalHFA Preserva-tion Loan Program	CalHFA	State of California	Financing	Yes	Unknown; loans in excess of $10 million may require additional levels of affordability	Minimum 115% for debt service coverage ratio	Lesser of 90% of restricted value or 80% of development costs	Available to for-profit, non-profit, and public agency sponsors	A Green Physical Needs Assessment is required, but financing can apply to acquisition and general building retrofit.	EE	New program started in April, 2013. No projects have been completed yet under this new program. Over the past 30 years, CalHFA's Multifamily division has invested more than $2 billion for the construction and preservation of 36,000 affordable rental housing units assisting low-income Californians.	Financing to support rehabilitation of low-income multi-family housing. Credit-enhanced loans through FHA also available.	http://ww w.calhfa.ca .gov/multif amily/finan cing/terms heets/inde x.htm	Not available.

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Multi-family Portfolio Loan Prepay-ment Program	CalHFA	State of California	Financing Prepayment	Yes	Unknown; loans in excess of $10 million may require additional levels of affordability	Loans in excess of $10 million may require additional levels of affordability	Not available.	Borrowers through a CalHFA program	Considers "green rehabilitation" as a favorable qualification. A Green Physical Needs Assessment is required.	EE	New program started in April, 2013. No projects have been completed yet under this new program. Over the past 30 years, CalHFA's Multifamily division has invested more than $2 billion for the construction and preservation of 36,000 affordable rental housing units assisting low-income Californians.	Allows for early re-payment of CalHFA multi-family portfolio loans for rehabilitation of low-income multi-family housing.	http://www.calhfa.ca.gov/multifamily/financing/termsheets/index.htm	Not available.
Property Tax Incentive	State of Califor-nia	State of California	Tax Exclusion (State Property Tax)	No	100% of system value (75% for dual-use systems)	100% of system value (75% for dual-use systems)	Not available.	Any property	Solar technologies only	RE	Not available.	The State of California allows a property tax exclusion for certain types of solar energy equipment installed between 1999 and 2016.	http://www.boe.ca.gov/proptaxes/gase.htm	Not available.
Multi-family Affordable Solar Housing (MASH)	State of Califor-nia	State of California	Rebate	No	$108 million through 2015, now fully subscribed. Individual incentives range from $1.90 - $2.80 per watt depending on whether common area load or tenant load is offset.	Individual incentives range from $1.90 - $2.80 per watt depending on whether common area load or tenant load is offset.	Not available.	Multi-family	Solar PV only	RE	6,200 tenant units participating in Virtual Net Metering thanks to the MASH program.	**NOTE: Incentives have been fully subscribed for all three program administrators and waitlists have been established.** Provides fixed rebates for solar PV system installed on multi-family properties, based on the size and expected performance of the solar PV system installed.	http://www.cpuc.ca.gov/PUC/energy/Solar/mash.htm	Not available.

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Bay Area Multi-family Retrofit Loan Fund	LIIF	San Francisco Bay Area	Financing	Yes	Total program size is $4,000,000; the program had a 1 year origination period and an 11.5 year term	Maximum of $500,000	25% funded by Bay Area Multifamily Retrofit Loan Fund, 25% funded by their partners, Enterprise Community Partners	Affordable housing developers and owners in the nine-county Bay Area seeking to retrofit existing buildings to make them greener, more efficient and less costly are eligible.	Measures should be identified through the Bay Area Multifamily Fund's free audit	EE	5 properties financed through BAM, for a total of 429 units retrofitted	Offers audit services and customized financing for energy efficiency upgrades to affordable multi-family housing.	http://www.liifund.org/products/community-capital/capital-for-affordable-housing/bay-area-multifamily-fund/	Not available.
LEED Incentive Program	Burbank Water & Power	Burbank, CA	Rebates	No	Up to $30,000 depending on LEED level	Up to $30,000 depending on LEED level	Not specified.	Commercial, Nonprofit, Multi-Family Residential	Not available.	EE/RE	Not available.	Provides rebates up to $30,000 provided by Burbank Water & Power for LEED certification levels of Certified or better.	http://www.burbankwaterandpower.com/incentives-for-businesses/leed-incentive-program	Not available.
Energy Solutions	Burbank Water & Power	Burbank, CA	Rebates	No	25% of measure cost, up to $100,000 per building	25% of measure cost, up to $100,000 per building	Up to 25% of the installed cost of the measure.	Commercial	Not available.	EE/RE	Not available.	Provides rebates up to 25% of the cost of the measures installed for businesses that conduct a whole-building energy audit.	http://www.burbankwaterandpower.com/incentives-for-businesses/energy-solutions-business-rebate-programs	Not available.

Name of Program/ Product	Sponsor	Region	Type	Targets Low-Income	Program Size	Individual Project Amount	% of Project Fundable	Eligibility	Restrictions on Measures (if Applicable)	EE or RE	# Projects Complete	Description	Website	Representative Project
Energy Upgrade California Multi-family Program, Bay Area	BayREN/ StopWaste	Bay Area, CA	Rebates and free technical assist-ance	No	$7.3 million per proposed decision approving 13/14 EE budgets (application 12-07-001)	$750 rebate per unit upgraded up to a maximum of $300,000. Also, free energy project consultation of a value up to $5,000.	20 – 40%	5 or more attached dwelling units. Located in 9-county Bay Area. Affordable housing, market rate rentals, condominiums, other ownership configurations are eligible. Program services and funds available to eligible participants on a first-come, first-served basis. The program runs from July 2013 through December 2014.	The program assists in planning energy saving improvements designed to save a minimum of 10% of a building's energy usage.	EE/RE	Not available.	Energy Upgrade California in the Bay Area offers free energy planning assistance and cash rebates for multifamily properties that undertake energy and green upgrades.	https://multifamily.energyupgradeca.org/local#bayarea	https://multifamily.energyupgradeca.org/#case_studies_tab
Energy Upgrade California Multi-family Program, Los Angeles County	SoCal REN	Los Angeles County, CA	Rebates and free technical assist-ance	No	$9.5 million per proposed decision approving 13/14 EE budgets	Free consultation: $5,000 valueAssessment incentive: $5,000 for 5-20 unit building, $10,000 for 21-50 unit building, >50 units $20/addtl. unit Improvement incentive: $200-$1,200 per unit based on improvement in building performance.	Improvement Incentive max: the lesser of $100,000 or 60% of the net construction costs of the energy efficiency measures.	Property must be served by both Southern California Edison and Southern California Gas Company. All existing multifamily properties (minimum of 5 attached dwelling units) are eligible, including both market rate and affordable housing.	Energy upgrades must be completed by November 30, 2014. Energy upgrades must result in achieving a minimum of 10% improvement over the baseline building conditions. Project must include at least three energy-efficiency measures to meet the performance measure. Project must work with an approved Rater.	EE	Not available.	The program provides free technical assistance to identify cost-effective upgrade measures. Is also offers incentives for comprehensive energy audits, and retrofit work.	https://multifamily.energyupgradeca.org/local#los_angeles	https://multifamily.energyupgradeca.org/#case_studies_tab
Energy Upgrade California Multi-family Program, Marin	Marin Energy Authority	Marin County, CA	Financing	No	Not available.	Not available.	5% interest on 5-10 year term. Loan charge placed on utility bill.	Must be Marin Clean Energy (MCE) customer. Open to multi-family and commercial accounts.	Scope of Work must be recommended through MCE Energy Efficiency Program. Must be a MCE customer. Credit is subject to lender's approval.	EE	Not available.	On-Bill Repayment Plan to help multi-family and commercial accounts finance energy efficiency upgrades.	https://multifamily.energyupgradeca.org/local#marin	Not available.

Appendix J. Measures Installed Through ESA 2010-2012

Methodology

The IOUs provided tracking data for multifamily (5+ units) participants in the ESA Program for the years 2010 to 2012, which included information about the number of measures installed. Table 36 shows the detailed category information provided by each utility, indicating the range of measures installed. The level of detail provided varies by utility.

Table 36. Measures Provided Through the ESA Program by Utility

Utility	Measure	Measure Subtype	Measure Category
PG&E	AC - Central		
PG&E	AC - Central - Assessment		
PG&E	AC - Central - Tune Up (<20%)		
PG&E	AC - Central - Tune Up (>=20%)		
PG&E	AC - Central - Tune Up (Test Only)		
PG&E	AC - Central - Tune Up (Trip Charge)		
PG&E	AC >10-15K BTU		
PG&E	AC >10-15K BTU CoPay		
PG&E	AC >15K BTU		
PG&E	AC >15K BTU CoPay		
PG&E	AC >6-10K BTU		
PG&E	AC >6-10K BTU CoPay		
PG&E	Attic Access Install		
PG&E	Attic Access Wthrstr		
PG&E	Attic Insulation		
PG&E	Attic Venting		
PG&E	C-10 Certificate		
PG&E	Caulking, MUD (flat fee)		
PG&E	Ceiling Repair		
PG&E	CFL		
PG&E	CFL$ - High		
PG&E	CFL$ - Low		
PG&E	CFL$ - Medium		
PG&E	Clothes Washing Machine		
PG&E	Cover Plates Repl		
PG&E	CVA		
PG&E	Direct Costs - MF		
PG&E	Direct Costs - Timely Completion		
PG&E	Door Jambs		
PG&E	Door Patch/Plate		
PG&E	Door Repl $'s (Mat.)		

Utility	Measure	Measure Subtype	Measure Category
PG&E	Door Replacement - Louvered		
PG&E	Doors Repl		
PG&E	Doors Wthrstrp		
PG&E	Duct Assessment - Electric		
PG&E	Duct Assessment - Gas		
PG&E	Duct Test - Electric		
PG&E	Duct Test - Gas		
PG&E	Energy Education - Leverage Adjustment		
PG&E	Energy Education - MUD		
PG&E	Evap Cooler Cover		
PG&E	Exhaust Fan Vent $'s		
PG&E	Exhaust Fan Vent Repair-Attic		
PG&E	Exhaust Fan Vent Repair-Dryer		
PG&E	Faucet Aerators - Electric		
PG&E	Faucet Aerators - Gas		
PG&E	Floor Repair		
PG&E	Foam Wall Patch		
PG&E	Furnace Repair - Gas		
PG&E	Furnace Replace - Gas		
PG&E	Furnace Venting (R&R)		
PG&E	Gas Surcharge - EEM		
PG&E	Gas Surcharge - Refrigerator		
PG&E	Glass Repl		
PG&E	Glazing Compound		
PG&E	Home Grounding Fee		
PG&E	Home Grounding Trip Charge		
PG&E	HWD Lights Exterior		
PG&E	HWD Lights Interior		
PG&E	Lock Set		
PG&E	Lock Set $'s (Mat.)		
PG&E	Marketing & Assessment		
PG&E	MHR Shop Fee		
PG&E	Microwave - Elect		
PG&E	Microwave - Gas		
PG&E	NGAT $		
PG&E	NGAT R&R		
PG&E	Obsolete HWD Light Interior		
PG&E	Occupancy Sensor		

Utility	Measure	Measure Subtype	Measure Category
PG&E	Pipe Insulation - Electric		
PG&E	Pipe Insulation - Gas		
PG&E	Refrigerator - Large		
PG&E	Refrigerator - Medium		
PG&E	Refrigerator - Medium CoPay		
PG&E	Refrigerator - Small		
PG&E	Refrigerator - Small CoPay		
PG&E	Refrigerator - X Large		
PG&E	Refrigerator - X Large CoPay		
PG&E	Refrigerator BFM - Large		
PG&E	Refrigerator SXS - Large		
PG&E	Service Call R&R		
PG&E	Showerheads - Electric		
PG&E	Showerheads - Gas		
PG&E	Specialty Glass $'s		
PG&E	Thermostatic Valve - Gas		
PG&E	Thermostatic Valve - Elec		
PG&E	Thresholds Installed		
PG&E	Torchiere		
PG&E	Utility Gaskets		
PG&E	Vent Alignment		
PG&E	Vent Material $ - AWH		
PG&E	Vent Material $ - Heater		
PG&E	Vent Repair - AWH		
PG&E	Vent Repair - Heater		
PG&E	Wall Repair - Exterior		
PG&E	Wall Repair - Interior		
PG&E	Water Heater (Repair) - Gas		
PG&E	Water Heater (Replacement) - Electric		
PG&E	Water Heater (Replacement) - Gas		
PG&E	Water Heater Blanket - Electric		
PG&E	Water Heater Blanket - Gas		
PG&E	Water Heater Venting (R&R)		
PG&E	Weed and Seed		
PG&E	Window Assembly Replace <12 Sq. Ft per window		
PG&E	Window Assembly Replace > 12 Sq. Ft. per window		
PG&E	Window Sash Repair		

Utility	Measure	Measure Subtype	Measure Category
SCE	Assessment		
SCE	Central AC		
SCE	Central Heat Pump		
SCE	CFL		
SCE	Duct Test and Seal		
SCE	Energy Education		
SCE	Enrollment		
SCE	Maintain Central A/C		
SCE	Maintain Evaporative Cooler		
SCE	Permit Fee		
SCE	Refrigerant		
SCE	Refrigerator		
SCE	Room Air Conditioner		
SCE	Thermostat		
SCE	Title 24 Fee		
SCE	Torchiere		
SCE	Trip Charge		
SCE	Weatherization		
SCG	A/C Cover (Window/Wall)	MF	Envelope & Air Sealing
SCG	Appliance Dr Foam Tape/VStrip	MF	Envelope & Air Sealing
SCG	Attic Barrier - R11		Attic Insulation
SCG	Casing including Caulking	Door	Envelope & Air Sealing
SCG	Caulking	Window	Envelope & Air Sealing
SCG	Caulking (maximum 100')	Wall-MF	Envelope & Air Sealing
SCG	Clothes Washer HE	Frigidaire FAFW3577K	HE Clothes Washer
SCG	CVA Repair	Waterheater-MF	Envelope & Air Sealing
SCG	CVA - Repair	Water Heater	Envelope & Air Sealing
SCG	Door - Hinges Locking Pin		Envelope & Air Sealing
SCG	Door - Jambs including Caulking		Envelope & Air Sealing
SCG	Door - Specialty	Other	Envelope & Air Sealing
SCG	Door - Stop including Caulking		Envelope & Air Sealing
SCG	Door - Striker Plate, Safety or Mag type		Envelope & Air Sealing
SCG	Door - Threshold		Envelope & Air Sealing
SCG	Door Deadbolt	MF	Envelope & Air Sealing
SCG	Door Lockset Brace	MF	Envelope & Air Sealing
SCG	Door Threshold	MF	Envelope & Air Sealing
SCG	Door-Handle		Envelope & Air Sealing
SCG	Dryer Vent	Only MF	Envelope & Air Sealing
SCG	Furnace Filter		Furnace Clean&Tune

Utility	Measure	Measure Subtype	Measure Category
SCG	Glass Replacement	Tempered	Envelope & Air Sealing
SCG	Low Flow Showerhead	Regular	WH Conservation
SCG	Seal FAU Base	MF	Envelope & Air Sealing
SCG	Window Glass Louvered	MF	Envelope & Air Sealing
SCG	Attic Access Cover		Envelope & Air Sealing
SCG	Attic Access New		Envelope & Air Sealing
SCG	Attic Insulation	R-19	Attic Insulation
SCG	CVA Repair	Furnace-MF	Envelope & Air Sealing
SCG	Door - Hinge Spring		Envelope & Air Sealing
SCG	Door - Hinges Loose Pin		Envelope & Air Sealing
SCG	Door - Lockset		Envelope & Air Sealing
SCG	Door - Lockset Brace		Envelope & Air Sealing
SCG	Door - Replacement	Solid Core	Envelope & Air Sealing
SCG	Door Handle	MF	Envelope & Air Sealing
SCG	Door Jambs and Caulking	MF	Envelope & Air Sealing
SCG	Door Lockset	MF	Envelope & Air Sealing
SCG	Door Repl	24-28-30-32-34-36 Solid Core HL MF	Envelope & Air Sealing
SCG	Door Repl	34-42 Solid Core MF	Envelope & Air Sealing
SCG	Door Repl	Louver MF	Envelope & Air Sealing
SCG	Door Striker Plate, Safety or Mag type	MF	Envelope & Air Sealing
SCG	Glass Repl	DS MF	Envelope & Air Sealing
SCG	Glass Repl	SS MF	Envelope & Air Sealing
SCG	Glass Replacement	Specialty	Envelope & Air Sealing
SCG	Glazing Compound Sash/Sash		Envelope & Air Sealing
SCG	Shower Adapter		WH Conservation
SCG	Shower Diverter		WH Conservation
SCG	Silicone Clking (crack/bb hole)	MF	Envelope & Air Sealing
SCG	Standing Pilot Retrofit	Hard Pipe-FAU	FAU StandPilot/ChangeOut
SCG	Switch/Outlet Gaskets & Cover	SF	Envelope & Air Sealing
SCG	Thermostatic Shower Valve		WH Conservation
SCG	Water Heater Pipe Insulation		WH Conservation
SCG	Weatherstripping	Appliance Closet (Foam Tape)	Envelope & Air Sealing
SCG	Weatherstrippng	Attic Access MF	Envelope & Air Sealing
SCG	Air Conditioner Cover (Window/Wall)		Envelope & Air Sealing
SCG	Appliance Dr Rigid Gasket	MF	Envelope & Air Sealing
SCG	Attic Insulation		Attic Insulation
SCG	Caulking (maximum 100')	Door-MF	Envelope & Air Sealing
SCG	Caulking (maximum 100')	Window-MF	Envelope & Air Sealing

Utility	Measure	Measure Subtype	Measure Category
SCG	Door - Deadbolt		Envelope & Air Sealing
SCG	Door - Double Door Slide Bolt		Envelope & Air Sealing
SCG	Door - Replacement	Solid Core - HL	Envelope & Air Sealing
SCG	Door - Shoe		Envelope & Air Sealing
SCG	Door Hinges Loose Pin	MF	Envelope & Air Sealing
SCG	Door Hinges Springs	MF	Envelope & Air Sealing
SCG	Door Repl	24-28-30-32-36 Solid Core MF	Envelope & Air Sealing
SCG	Door Shoe	MF	Envelope & Air Sealing
SCG	Door Striker Plate	MF	Envelope & Air Sealing
SCG	Door Sweep	MF	Envelope & Air Sealing
SCG	Dryer Venting	Vent Only	Envelope & Air Sealing
SCG	Faucet Aerator		WH Conservation
SCG	Faucet Aerator Adaptor		WH Conservation
SCG	Glass Replacement	DS Glass	Envelope & Air Sealing
SCG	Glzing Compound Sash/Sash	MF	Envelope & Air Sealing
SCG	Low Flow Showerhead	Hand Held	WH Conservation
SCG	Silicone Caulking (crack/bb hole)		Envelope & Air Sealing
SCG	Standing Pilot Retrofit	Line Valve	FAU StandPilot/ChangeOut
SCG	Switch/Outlet Gaskets & Cover	MF	Envelope & Air Sealing
SCG	Wall Rpr	Plaster MF	Envelope & Air Sealing
SCG	Wall Rpr	Stucco MF	Envelope & Air Sealing
SCG	Wall Rpr	UT Pen (foam tape) MF	Envelope & Air Sealing
SCG	Water Heater Blanket	Central	WH Conservation
SCG	Water Heater Blanket	Individual	WH Conservation
SCG	Weatherstripping	Door (Rigid Gasket)	Envelope & Air Sealing
SCG	Weatherstripping	Foam Tape V Strip	Envelope & Air Sealing
SCG	Weatherstrippng	Door (Rigid Gasket) MF	Envelope & Air Sealing
SCG	Weatherstrippng	Door (V-Strip) MF	Envelope & Air Sealing
SCG	Window Assembly	MF	Envelope & Air Sealing
SCG	Window Set Assembly		Envelope & Air Sealing
SCG	Attic Insulation	R-30	Attic Insulation
SCG	Casing and Caulking	Door-MF	Envelope & Air Sealing
SCG	Caulking	Door	Envelope & Air Sealing
SCG	Caulking	Walls	Envelope & Air Sealing
SCG	Door Stop and Caulking	MF	Envelope & Air Sealing
SCG	Door - Striker Plate		Envelope & Air Sealing
SCG	Door Hinges Lking Pin	MF	Envelope & Air Sealing
SCG	Evap Cooler Register Cover	MF	Envelope & Air Sealing
SCG	Evaporative Cooler Register Cover		Envelope & Air Sealing

Utility	Measure	Measure Subtype	Measure Category
SCG	FAU Closet Door Latch		Envelope & Air Sealing
SCG	FAU Closet Dr Latch	MF	Envelope & Air Sealing
SCG	Furnace Clean-Tune	MF	Furnace Clean&Tune
SCG	Glass Repl	Polycarbonte MF	Envelope & Air Sealing
SCG	Glass Repl	Tempered MF	Envelope & Air Sealing
SCG	Glass Replacement	Polycarbonate	Envelope & Air Sealing
SCG	Glass Replacement	SS Glass	Envelope & Air Sealing
SCG	Roof	Mastic	Envelope & Air Sealing
SCG	Roof Mastic	MF	Envelope & Air Sealing
SCG	Seal FAU Platform		Furnaces
SCG	Standing Pilot Retrofit	Flex Connector	FAU StandPilot/ChangeOut
SCG	Standing Pilot Retrofit	Kit	FAU StandPilot/ChangeOut
SCG	Vents	Dormer	Envelope & Air Sealing
SCG	Wall Repair	Plaster - Interior	Envelope & Air Sealing
SCG	Wall Repair	Stucco - Exterior	Envelope & Air Sealing
SCG	Wall Repair	UT Pen (Foam/Tape)	Envelope & Air Sealing
SCG	Weatherstripping	Attic Access	Envelope & Air Sealing
SDG&E	Air Sealing		
SDG&E	Attic Insulation		
SDG&E	Compact Fluorescent Lights (CFLs)		
SDG&E	Duct Testing and Sealing		
SDG&E	Exterior Hard wired CFL fixtures		
SDG&E	FAU Standing Pilot Light Conversion		
SDG&E	Faucet Aerator		
SDG&E	Furnace Repair/Replacement		
SDG&E	In-Home Education		
SDG&E	Interior Hard wired CFL fixtures		
SDG&E	LED Night Lights		
SDG&E	Low Flow Showerhead		
SDG&E	Microwaves		
SDG&E	NGAT		
SDG&E	Outreach & Assessment		
SDG&E	Refrigerators		
SDG&E	Room A/C Replacement		
SDG&E	Thermostatic Shower Valve		
SDG&E	Torchiere		
SDG&E	Water Heater Blanket		
SDG&E	Water Heater Pipe Insulation		
SDG&E	Water Heater Repair/Replacement		

Appendix K. Bibliography

Advice Letter 2448-E/2167-G. San Diego Gas & Electric Company. January 2013. Available at http://www.sdge.com/tm2/pdf/2448-E.pdf

American Community Survey. U.S. Census Bureau. 2011.

Annual Report Activity of San Diego Gas & Electric Company (U 902 M) on Low-income Assistance Programs for 2011. San Diego Gas & Electric Company. May 2012.

Annual Report Activity of Southern California Gas Company (U 904 G) on Low-income Assistance Programs for 2011. Southern California Gas Company. May 2012.

Application for San Diego Gas and Electric Company for Approval of Low-income Assistance Programs and Budgets for Program Years 2012-2014. San Diego Gas and Electric Company. May 16, 2011.

Application for Southern California Gas Company for Approval of Low-income Assistance Programs and Budgets for Program Years 2012-2014. Southern California Gas Company. May 16, 2011.

ARRA Proposed Award: The Affordable Multifamily Retrofit Initiative (the Initiative). The California Energy Commission. January 2011. Available at http://www.energy.ca.gov/ab758/documents/ARRA-Programs/summaries/SF_MOH_Initiative_Summary.pdf

Burbank Water and Power (2013). Energy Solutions. *Burbank Water and Power – Always There for You!* Retrieved from http://www.burbankwaterandpower.com/incentives-for-businesses/energy-solutions-business-rebate-programs

Burbank Water and Power (2013). LEED Incentive Program. *Burbank Water and Power – Always There for You!* Retrieved from http://www.burbankwaterandpower.com/incentives-for-businesses/leed-incentive-program

Cadmus. 2010-2012 PG&E and SCE Multifamily Energy Efficiency Rebate Program (MFEER) Process Evaluation and Market Characterization Study. Pacific Gas & Electric Company and Southern California Edison. 2013.

Cadmus. "Task 5 ESA Program Design Components." 2013. *Microsoft Excel* file.

California Community Services & Development Department (2011). Find Services in Your Area. *California Department of Community Services and Development*. Retrieved from http://www.csd.ca.gov/Services/FindServicesinYourArea.aspx

California Community Services & Development Department (2011). Low-Income Home Energy Assistance Program (LIHEAP). *California Department of Community Services & Development*. Retrieved from http://www.csd.ca.gov/Services/HelpPayingUtilityBills.aspx

California Department of Community Services & Development (2011). Weatherization Assistance Program (WAP). *California Department of Community Services & Development*. Retrieved from http://www.csd.ca.gov/Services/ResidentialEnergyEfficiencyServices.aspx

California Energy Commission (2013). ARRA Programs – AB 758 Pilots. *California Energy Commission.* Retrieved from http://www.energy.ca.gov/ab758/pilot-programs.html

California Energy Commission (2013). Case Studies. *Energy Upgrade California Multifamily Program*. Retrieved from https://multifamily.energyupgradeca.org/#case_studies_tab

California Energy Commission (2013). Energy Updates Improve Your Bottom Line. *Energy Upgrade California Multifamily Program*. Retrieved from https://multifamily.energyupgradeca.org/

California Energy Commission (2013). Marin. *Energy Upgrade California Multifamily Program*. Retrieved from https://multifamily.energyupgradeca.org/local#marin

California Energy Commission and California Public Utilities Commission (2013). About Go Solar California. *Go Solar California*. Retrieved from http://www.gosolarcalifornia.ca.gov/about/index.php

California Energy Commission and California Public Utilities Commission (2013). California Utility Allowance Calculator (CUAC) for the New Solar Homes Partnership. *Go Solar California*. Retrieved from http://www.gosolarcalifornia.ca.gov/affordable/cuac/index.php

California Energy Commission and California Public Utilities Commission (2013). Multifamily Affordable Solar Housing (MASH). *Go Solar California*. Retrieved from http://www.gosolarcalifornia.ca.gov/affordable/mash.php

California Housing Finance Agency (2013). Program Termsheets. *CalHFA*. Retrieved from http://www.calhfa.ca.gov/multifamily/financing/termsheets/index.htm

California Public Utilities Commission (2013, January 11). Federal Low-Income Programs Administered by the Department of Community Services and Development (CSD). *California Public Utilities Commission*. Retrieved from http://www.cpuc.ca.gov/PUC/energy/Low+Income/fedcsd.htm

California Public Utilities Commission (2013, May 15). California Alternate Rates for Energy (CARE). *California Public Utilities Commission*. Retrieved from http://www.cpuc.ca.gov/PUC/energy/Low+Income/care.htm

California Public Utilities Commission (2013, May 15). Family Electric Rater Assistance Program (FERA). *California Public Utilities Commission*. Retrieved from http://www.cpuc.ca.gov/PUC/energy/Low+Income/fera.htm

California Public Utilities Commission (2013, May 29). Energy Savings Assistance Program. *California Public Utilities Commission*. Retrieved from http://www.cpuc.ca.gov/PUC/energy/Low+Income/liee.htm

California Public Utilities Commission (2013, August 6). CSI Multifamily Affordable Solar Housing (MASH) Program. California Public Utilities Commission. Retrieved from http://www.cpuc.ca.gov/PUC/energy/Solar/mash.htm

California Solar Initiative - Thermal - Program Handbook. California Public Utilities Commission. July 2013. Available at http://www.gosolarcalifornia.org/documents/CSI-Thermal_Handbook.pdf

California Statewide Communities Development Authority. Save Money While Increasing Property Value. *CSCDA CaliforniaFIRST*. Retrieved from https://californiafirst.org/property_owners_overview

California Tax Credit Allocation Committee (2013). Project Mapping. *California State Treasurer Bill Lockyer*. Retrieved from http://www.treasurer.ca.gov/ctcac/projects.asp

Campaign for Home Energy Assistance. California LIHEAP Facts. Campaign for Home Energy Assistance LIHEAP Action Center. 2012. Available at http://www.liheap.org/assets/fact_sheets/California_LIHEAP_Fact_Sheet_2012.pdf

City of Oakland (2013). Multifamily Housing Weatherization Program. *City of Oakland California*. Retrieved from http://www2.oaklandnet.com/Government/o/hcd/s/AffordableHousing/OAK022227

Customer Energy Efficiency and Solar Division Program Implementation Plans 2013-2014. Southern California Edison. 2013.

Decision Approving 2013-2014 Energy Efficiency Programs and Budgets. California Public Utilities Commission. November 2012. Available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M034/K299/34299795.PDF

Decision on Large Investor-Owned Utilities' 2012-2014 Energy Savings Assistance (ESA) (Formerly Referred to as Low-income Energy Efficiency or LIEE) and California Alternate Rates for Energy (CARE) Applications. California Public Utilities Commission. August 2012. Available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M026/K217/26217743.PDF

Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach. California Public Utilities Commission. May 2012. Available at http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF

Department of Energy Weatherization Program Notice 13-2. U.S Department of Energy. June 2013. Available at http://waptac.org/data/files/website_docs/government/guidance/2013/wpn-13-2.pdf

DSIRE (2012, November 27). California Solar Initiative - Multifamily Affordable Solar Housing (MASH) Program. *DSIRE – Database of State Incentives for Renewables & Efficiency*. Retrieved from http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA186F&re=0&ee=0

Energy Savings Assistance (ESA) Program and California Alternate Rates for Energy (CARE) Program Annual Report for Program Year 2011. Pacific Gas & Electric Company. May 2012.

Energy Upgrade California. Energy Upgrade California Multifamily Programs. *Heschong Mahone Group*. April 2012. Available at http://www.h-m-g.com/multifamily/HCA2012/EUC_CaseStudies_04-10-2012.pdf

Energy Upgrade California (2013). Local Assistance Overview. *Energy Upgrade California Multifamily Program*. Retrieved from https://multifamily.energyupgradeca.org/local#overview

Energy Upgrade California in San Diego County Final Report. County of San Diego. June 2012. Available at http://www.energy.ca.gov/ab758/documents/ARRA-Programs/final_reports/Energy_Upgrade_CA_in_San_Diego_County-Final_Report_2012-06-25.pdf

ESA Program Cost-Effectiveness White Paper. Energy Savings Assistance (ESA) Program Cost-Effectiveness Working Group. February 2013.

Evergreen Economics. SCG 2010-2011 Residential Program Process Evaluation. March 2013. Southern California Gas. 2013.

Evergreen Economics. SDG&E 2010-2011 Residential Program Process Evaluation. San Diego Gas & Electric. March 2013.

Evergreen Economics, CIC Research, EMI, J. Stevenson, Research Into Action Inc., and Wirtschafter Associates. SDG&E 2010-2011 Residential Program Process Evaluation Final Report. Evergreen Economics. March 2012. Available at http://www.calmac.org/publications/SDGE_Res_Process_Eval_Draft_FINAL.pdf

Fannie Mae (2013). Market Rate Small Loan Lenders. *Fannie Mae*. Retrieved from https://www.fanniemae.com/multifamily/small-loan-lenders

Improving California's Multifamily Buildings: Opportunities and Recommendations for Green Retrofit & Rehab Programs. Multifamily Subcommittee of the California Home Energy Retrofit Coordinating Committee. April 2011.

Introduction to Multifamily Affordable Solar Housing. Center for Sustainable Energy. 2012.

Low-income Investment Fund (2011). *LIIF – Capital for Healthy Families & Communities*. Retrieved from http://www.liifund.org/

Low-income Investment Fund (2011). Bay Area Multifamily Fund. *LIIF – Capital for Healthy Families & Communities.* Retrieved from http://www.liifund.org/products/community-capital/capital-for-affordable-housing/bay-area-multifamily-fund/

M2M Green Initiative – The Greening of the M2M Portfolio. U.S. Department of Housing and Urban Development Office of Affordable Housing Preservation. July 2007. Available at http://www.hud.gov/offices/hsg/omhar/paes/green/greenini.pdf

Marin Energy Authority Energy Efficiency Program for 2013-2014. Marin Energy Authority. July 2012. Available at http://www.marinenergyauthority.org/PDF/03A_Clean_Copy_of_MEA_PIP_Corrected.pdf

McKibbin, Anne, A. Evens, S. Nadel, and E. Mackres. "Engaging as Partners in Energy Efficiency: Multifamily Housing and Utilities." *ACEEE*, Report No. A122. January 2012.

Mid-Cycle Working Group Final Report. San Diego Gas & Electric Company. July 2013. Available at from https://www.pge.com/regulation/LowIncomeProgramPY12-14/Pleadings/Joint-CDE/2013/LowIncomeProgramPY12-14_Plea_Joint-CDE_20130715_281462.pdf

Multifamily Affordable Solar Housing Semi-Annual Progress Report. Go Solar California, PG&E, Southern California Edison, Center for Sustainable Energy – California, State of California Public Utilities Commission, and Go Solar California. February 2011. Available at http://www.gosolarcalifornia.ca.gov/affordable/MASHSemi-AnnualProgressReport_Feb_2011.pdf

Multifamily Home Energy Retrofit Coordinating Committee. February 20, 2013. Webinar presentation.

Multifamily Properties Program Energy Efficiency Rebate Catalog. Pacific Gas & Electric Company. January 2013. Available at http://www.pge.com/includes/docs/pdfs/myhome/saveenergymoney/rebates/property/multifamily_catalog.pdf

National Housing Trust (2013). Green Affordable Housing Preservation Loan Fund. *National Housing Trust.* Retrieved from http://www.nhtinc.org/green_loan_fund.php

Oak Ridge National Laboratory. National Retrospective of the Weatherization Assistance Program (WAP). *Oak Ridge National Laboratory Weatherization and SEP Support Program*. Retrieved from http://weatherization.ornl.gov/evaluation_nr.shtml

Oak Ridge National Laboratory. WAP ARRA-Period Evaluation. *Oak Ridge National Laboratory Weatherization and SEP Support Program*. Retrieved from http://weatherization.ornl.gov/evaluation_period.shtml

Pacific Gas & Electric Company (2013). Refrigerator and Freezer Recycling. *Pacific Gas & Electric Company*. Retrieved from http://www.pge.com/en/myhome/saveenergymoney/rebates/recycling/index.page

Pacific Gas & Electric Company 2013-2014 Energy Efficiency Portfolio - Statewide Program Implementation Plan - Residential Program PG&E 2100. Pacific Gas & Electric Company. 2013.

Palmgren et al. "2009 California Residential Appliance Saturation Study." Prepared for the California Energy Commission: Kema, Inc. CEC-200-2010-004. 2010.

Peterson, John. April 5, 2013. "Athens Research Eligibility Estimates Documentation: Memo to the Joint Utilities Working Group." Athens Research.

Research Into Action Inc. Low-Income Energy Efficiency Program Evaluation 2009-2010 Process Evaluation. California Public Utilities Commission. June 2011. Available at http://www.calmac.org/publications/LIEEFinal_Report_w_study_number.pdf \

Research Into Action Inc. Weatherization Program Notice 09-1. U.S. Department of Energy. November 2008. Available at http://waptac.org/data/files/website_docs/government/guidance/2009/wpn%2009-1%20-%20final%2011.17.08.pdf

Sacramento Municipal Utility District. SMUD Home Performance Program Final Report. The California Energy Commission. April 2012. Available at http://www.energy.ca.gov/ab758/documents/ARRA-Programs/final_reports/Home_Performance_Program-SMUD-Final_Report_04-2012.pdf

San Diego Gas and Electric Company. Application for San Diego Gas and Electric Company for Approval of Low Income Assistance Programs and Budgets for Program Years 2012-2014. May 16, 2011.

San Diego Gas & Electric Company. "3211 Local CALS - Middle Income Direct Install (MIDI) SDG&E Compliance." 2013. *Microsoft Excel* file.

San Diego Gas & Electric Company (2013). Free Recycling. Free Pick Up. Cool Savings. *SDGE Connected*. Retrieved from http://www.sdge.com/free-recycling-free-pick-cool-savings

San Diego Gas & Electric Company (2013). On-Bill Financing. *SDGE Connected*. Retrieved from http://www.sdge.com/bill-financing

SMUD Home Performance Program - Multifamily (HPP-MF) Program Guidelines and Procedures. Sacramento Municipal Utility District. 2013. Available at https://www.smud.org/en/residential/save-energy/rebates-incentives-financing/documents/HPP-MF-guidelines.pdf

Southern California Edison (2013). Refrigerator Recycling. *Southern California Edison*. Retrieved from https://www.sce.com/wps/portal/home/residential/rebates-savings/rebates/refrigerator-recycling/!ut/p/b1/hc9BC4JAFATgn7Sjm6t7XEnWZ6aYZraX8BCxkdoh-v1tUIeI7N0GvmF4zLCOmbG_21N_s9PYX57ZiIMXaZVSDcKqBSheipyKBmsJB_YO4Mcp_OvvmPkkOgmUI5BNkAu-DcU8qDz-BTahD8raJC9jz0fkv4DUSNKsdKCpOIhXKGqlOPCemPmiSKfhyK5DB0vnxQOxmrSG/dl4/d5/L2dBISEvZ0FBIS9nQSEh/?from=pickup?from=/residential/rebates-savings/appliance/fridge-freezer-recycling.htm?from=pickup

Southern California Gas Company. "Advice No. 4449: SoCalGas' 2013-2014 Energy Efficiency Compliance Filing." 2013. *Microsoft Word* file.

Southern California Gas Company. Application for Southern California Gas Company for Approval of Low Income Assistance Programs and Budgets for Program Years 2012-2014. May 16, 2011.

Southern California Gas Company (2011, June). Multifamily Solar Pool Heating Incentive Program. *Southern California Gas Company*. Retrieved from http://www.socalgas.com/for-your-business/energy-efficiency-programs/solar-pool-heating.shtml

Southern California Gas Company (2013). Multifamily Direct Installation Programs. *Southern California Gas Company*. Retrieved from http://www.socalgas.com/for-your-business/energy-efficiency-programs/direct-install.shtml

Southern California Gas Company (2013). On-Demand Efficiency (Re-circulation Loops for Central Domestic Water Heaters). *Southern California Gas Company*. Retrieved from http://www.socalgas.com/for-your-business/energy-efficiency-programs/on-demand.shtml

Southern California Gas Company (2013, June). Energy-Efficiency Contractor Programs. *Southern California Gas Company*. Retrieved from https://www.socalgas.com/for-your-business/energy-efficiency-programs/

Staples & Associates Company. PG&E Middle Income Direct Install Program. *Staples Energy – Innovative Savings Solutions*. Retrieved from http://staplesenergy.com/master-list/residential/pge-middle-income-direct-install-program/

State of California (2012). Documents and Reports. *State of California Energy Efficiency Groupware Application.* Retrieved from http://eega.cpuc.ca.gov/Documents.aspx

State of California (2013). Guidelines for Active Solar Energy Systems New Construction Exclusion. *California State Board of Equalization*. Retrieved from http://www.boe.ca.gov/proptaxes/gase.htm

Statewide Low-income Energy Efficiency Program Policy and Procedures Manual. California Public Utilities Commission. August 2010.

Stopwaste.org. "Funding Finder Program List Details." 2013. *Microsoft Excel* file.

Summary Profile Report. Best Practices Benchmarking for Energy Efficiency Programs. Available at http://www.eebestpractices.com/pdf/SummaryProfileReport_NR63.PDF

Table of Appendices and Description. California Public Utilities Commission. August 2012. Available at http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M026/K218/26218200.pdf

Testimony in Support of Application for the 2012, 2013, and 2014 Energy Savings Assistance Program and The California Alternate rates for Energy Program. Pacific Gas and Electric Company. May 16, 2011.

Testimony of Southern California Edison Company in Support of Its Application for Approval of Its California Alternate Rates for Energy (CARE), Energy Savings Assistance, and Cool Center Programs and Budgets for 2012-2014. Southern California Edison Company. May 2011.

U.S. Department of Agriculture (2012, September 28). Featured Developments: Montgomery Crossing. *USDA Rural Development.* Retrieved from http://www.rurdev.usda.gov/project_MC.html

U.S. Department of Agriculture. February 2013. Retrieved from Lorna Lorea, MFH State Technician Rural Development.

U.S. Department of Commerce (2013, June 20). American Housing Survey (AHS). *United States Census Bureau*. Retrieved from http://www.census.gov/housing/ahs/

U.S. Department of Commerce (2013, June 20). Zip Code Tabulation Areas (ZCTAs). *United States Census Bureau*. Retrieved from http://www.census.gov/geo/reference/zctas.html

U.S. Department of Energy. Business Energy Investment Tax Credit (ITC). *Energy.Gov*. Retrieved from http://energy.gov/savings/business-energy-investment-tax-credit-itc

U.S. Department of Energy (2009). California Weatherization Assistance Program. *U.S. Department of Energy - Energy Efficiency & Renewable Energy*. Retrieved from http://www1.eere.energy.gov/wip/project_map/project_details_new.aspx?pid=61

U.S. Department of Housing and Urban Development (2013, September 9). Download the Multifamily Assistance and Section 8 Contracts Database. *HUD.GOV*. Retrieved from http://portal.hud.gov/hudportal/HUD?src=/program_offices/housing/mfh/exp/mfhdiscl

U.S. Department of Housing & Urban Development, Office of Policy Development & Research. "Codebook for the American Housing Survey, Public Use File: 1997-2011." March 2013.

U.S. Department of Housing and Urban Development and U.S. Census Bureau. "2011 American Housing Survey (AHS)." 2011. Public Use file.

U.S. Department of Housing and Urban Development (2013, September 15). Low-Income Housing Tax Credits. *HUD.GOV*. Retrieved from http://www.huduser.org/portal/datasets/lihtc.html

U.S. Energy Information Administration (2009). Residential Energy Consumption Survey (RECS).*EIA.* Retrieved from http://www.eia.gov/consumption/residential/

Weatherization Assistance Program for Low-Income Persons: 2012 State Plan and Application to the U.S. Department of Energy. California Department of Community Services and Development. May 2012. Available at http://www.csd.ca.gov/Portals/0/Documents/State%20Plans/2012%20DOE%20State%20Plan%20FINAL.pdf

Appendix L. ESA Program Interview Guides and Survey

Property Owner and Manager Interview Guide

Introduction

Hello, my name is [INTERVIEWER NAME] from Cadmus and I'm calling on behalf of the California Public Utility Commission and the utilities. We are conducting a statewide study that will guide California's energy efficiency services for multifamily property owners and managers.

I would like to ask you a few questions that will help with this study. Do you have about 15 minutes now, or could I schedule another time this week that works better for you?

Study overview

The objective of the research is to characterize the low-income multifamily market segment and use the information to investigate strategies the utilities could use to serve these customers through the Energy Savings Assistance (ESA) Program. The commission's vision is to provide cost-effective measures to 100% of eligible and willing customers by 2020. The research will inform our recommendations that enhance program design and delivery to meet the 2020 targets.

PROPERTY CHARACTERISTICS [Ask only if we are unable to get this information through web research. Try to get number of properties and number of units for a. and b. If they don't have numbers, ask for "what proportion"]

1. First, I would like to get information about your properties in general.

Properties by Size

Size of Properties	No. of Properties	No. of Units	Percentage of Properties (ONLY if numbers are not available)	Percentage of Units (ONLY if numbers are not available)
Small (25 or fewer units)				
Medium (26-249 units)				
Large (250 or more units)				

Properties by Category

Category of Properties	No. of Properties	Percentage of Properties (ONLY if numbers are not available)
Subsidized housing		
Market rate housing		
Market rate housing that includes low-income tenants		

a. Are there any differences in the way you manage market rate properties and affordable or subsidized properties?

DECISIONS ON ENERGY EFFICIENCY UPGRADES

Now we'd like to talk with you about how your company makes decisions about improvements or upgrades to any of your properties. We are talking about improvements such as installing a central heating or cooling system not landscaping.

2. When your company makes decisions about improvements or purchasing new equipment for any of your properties, who makes these decisions? We are looking for titles or positions, not names.

3. How does your company's decision making process change if you are making fairly major improvements to a new building versus making major improvements to an older building?

4. When your company decides to spend money on making fairly major improvements like installing a heating or cooling system do you plan for it or decide when it breaks?

5. How far in advance do you plan for something like a new heating or cooling system?
   a. (Less than 1 year before the project begins)
   b. (1 year to 2 years)
   c. (3 years to 4 years)
   d. (5 years or more)

DECISION DRIVERS

6. When you replace or update old or broken equipment, what factors influence your decision to select the equipment you install?
   a. (Energy efficiency)-- top
   b. (Cost/cost savings)—cost isn't that much different, most stores
   c. (Availability of equipment)
   d. (Size of upgrades/improvements)

7. Do any of these factors make it difficult to make energy efficiency upgrades?
   a. Lack of capital
   b. Lack of access to financing
   c. Lack of attractive financing terms
   d. Coordinating funding with opportunities to make upgrades or improvements

PAYING FOR PROPERTY IMPROVEMENTS

8. Do property owners or tenants typically pay the cost of improvements that may be made to units for things like lighting, room air conditioners, or appliances?

9. Within the individual units, what if any, appliances do tenants own?
   a. (Refrigerators)
   b. (Clothes washers)
   c. (Room/window AC units)
   d. (Small appliances such as toaster ovens or microwaves, etc.)

UTILITY REBATE PROGRAMS

10. Do you know if your company has taken advantage of any rebate programs offered by your gas or electric utility to help any of your properties be more energy efficient?
   a. Can you tell me the program names or a description of the programs?
   b. If not, do you know why not?

11. What could utilities and other agencies do to encourage your company to participate in rebate programs or to use financing options offered to assist property owners in making energy efficient upgrades to their properties? [DO NOT READ LIST. RECORD ALL THAT APPLY.]
   a. (Provide more information about the programs)
   b. (Simplify the information)
   c. (Provide upgrades at no cost)
   d. (Higher incentives/more money for rebate)
   e. (Allow us to choose our own contractor to do the work)
   f. (Provide on-bill financing)

ESA PROGRAM PARTICIPATION

12. Have you ever heard of a program offered by the utilities which provides income qualified households with free equipment and services such as energy efficient lighting or appliances to help customers save energy and money on their energy bills? [This is also known as the Energy Savings Assistance Program]

13. Do you know if any of your tenants at this location have taken advantage of this program?

14. This program requires you as property owners and managers to complete paperwork and allow contractors not hired by your company access to your property to make changes. How does your company handle this process?

FINANCING

15. We have some questions about financing and how multifamily property owners pay for large capital improvements. Is financing something you know about?
   a. No: skip to Question 6

b. If Yes to Question 2, ask:

16. How do you pay for large capital improvements to your properties?
   a. Do you usually layer multiple sources of funding (such as rebates, tax credits, loans, cash) or use just one source?

17. Are there certain financial solutions only available in certain locations or situations? *(grants, loans, tax incentives)*
   a. Please explain

18. Where do you see the main gaps in helping owners pay for energy-saving improvements to their properties?

Research Topics

[This question offers the participant an opportunity to identify particular areas of interest.]

19. Are there topics or issues you think are important to include in this this research in general?

We appreciate your time and contribution to this study. During the course of the analysis, we may come up with follow-up questions for you. Is it okay to call/email you with follow up questions, if we have them? Y/N and record any preferences/notes

Stakeholder Interview Guide

Introduction

Hello my name is _____ calling from The Cadmus Group. We are conducting a study for the California PUC and the utilities that focuses on the low income multifamily market segment. I'm calling community stakeholders working with this market to ask a few questions that will help with this study. Do you have about 15 minutes now, or could I schedule another time this week that works better for you? *(Interviewer: or next week if needed)*

Study overview

The objective of the Multifamily Segment Study is to characterize the low income market segment and use the information to investigate strategies the utilities could use to serve these customers through the Energy Savings Assistance (ESA) Program. The commission's vision is to provide cost-effective measures to 100% of eligible and willing customers by 2020. The research will inform our recommendations that enhance program design and delivery to meet the 2020 targets.

Do not read next section in italics; use only as reference if needed

The primary activities in this Study are designed to meet the CPUC ALJ Decision's (D.12-08-044) research objectives. These activities and areas of focus are:

- *Gather California Multifamily Housing Data Relevant for Low income Customer Programs (ongoing; analyze census data, HUD data, AHS data, IOU data etc)*
- *Catalog Existing Multifamily Energy Efficiency Programs Relevant for Low Income Customers (cataloged 41 programs in 28 states on 77 different data points covering the following major areas*
    a. *Program context*
    b. *Cost and cost effectiveness*
    c. *Eligible measures*
    d. *Implementation approaches)*
- *Review and Evaluate Multifamily Programs and Research Relevant for Low Income Customers (identified top 3 states from prior catalog – NY (NYSERDA), MA, CO)*

Low-Income Multifamily Weatherization	Energy Outreach Colorado	CO
Low Income Multifamily Retrofit program	MA Gas & Electric IOUs & Dept. of Housing and Community Development	MA
Multifamily Performance Program (MPP)	NYSERDA	NY

- *Identify and Assess Alternative Program Designs and Delivery Strategies (conducting background research)*
- *Identify Financing and Funding Options (ongoing)*

- *Conduct Public Workshops (first in March, next in Dec after draft report reviewed by Study Team)*

Constituency

[This section asks about the people represented by the stakeholder group. We will use this information to ensure we have reached all applicable populations.]

[INSTRUCTIONS FOR INTERVIEWER: research attendance at workshop and set up your contact list accordingly. If they did not attend the workshop, do not read this phrase in italics in question 1]

1. *We see that you attended the public workshop held in March. We appreciate your interest and* we would like to talk about the constituency your organization represents.
   a. Can you tell me about your constituency? (What groups/constituents do you represent?)
   b. How would you characterize your clients? (Affordable rent/market rate, large/small, etc.)

2. We are conducting a survey with about 300 MF property owners and managers. We are gathering information that will be used to make recommendations for ESA program enhancements. The survey asks about the multifamily buildings, ownership structures, the energy related needs of the tenants, and decision making processes purchasing energy efficient equipment. We want to be sure we include both market rate housing and subsidized housing. We compiled our sample from publicly available lists of subsidized housing. We also used the utility data to identify multifamily buildings that are likely to be market rate.
[INTERVIEWER: FOR YOUR REFERENCE, ADD THE LIST OF SUBSIDIZED HOUSING USED TO COMPILE CALL LISTS]

   a) What other groups *[landlord associations, property management companies, advocacy groups]* should we reach out to for connecting with property managers and owners that are not represented in the HUD or utility data sources? [*Probe: get the most complete information as possible]*
   b) [*If the current call list is missing their constituency, ask]* do you have a database with contact information that you could share with us?

3. The commission and utilities would like us to include apartments or condominiums that are owned by low income residents.
   a) Does your constituency fit this description?
   b) Do you have an information source or reference that can help us identify low-income condo or apartment owners? *[Probe: Try to get the most complete information as possible.]*
   c) Do you know of other advocacy groups that might represent this population*? [If yes, ask for organization name and contact information]*

Research Topics

[This question offers the stakeholder an opportunity to identify particular areas of interest.]

4. Are there topics or issues you think are important to include in this survey or in this research in general?

Financing

[This section collects information about financing options and potential financial barriers experienced by their constituents. Data will inform our recommendations about possible program strategies to reach the target market.]

5. We have some questions about financing and how multifamily property owners pay for large capital improvements. Is financing something you know about?
    a) No: skip to Question 10

If Yes to Question 5, ask

6. How do multifamily property owners pay for large capital improvements?
    a) Do they usually layer multiple sources of funding (such as grants, tax credits, financing, cash) or use just one source?

7. What types of financial solutions are available statewide to all your clients or constituency? (tax credits, grants, loans, etc.

8. Are there certain financial solutions only available to certain types of owners? *(grants, loans, tax incentives)*
    a) Or only in certain locations or situations? Please explain.

9. Where do you see the main gaps in helping owners pay for energy-saving improvements to their properties?

Other Stakeholders and Information Sources

[This section provides another opportunity for the stakeholder to provide input to the study and to reach the target market.]

10. Are there other stakeholders you recommend that we talk to?

11. Are there information sources about low income multifamily buildings that we should explore? *: get the most complete contact information as possible.]*

We appreciate your time and contribution to this study. During the course of the analysis, we may come up with follow-up questions for you. Is it okay to call/email you with follow up questions, if we have them? Y/N and record any preferences/notes

Building Owner and Manager Survey Script

Audience: This survey is for property owners and managers of low income multifamily properties in California.

Researchable Questions		Item
What are the characteristics of the low-income multifamily properties?	Building location, building age, number of units at property, buildings per complex, floors per building, size of apartment	**Error! Reference source not found.**- **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**- **Error! Reference source not found.**
	Total number of low income multifamily units managed by company	**Error! Reference source not found.**, **Error! Reference source not found.**
	System type, fuel type, and age of heating, cooling, and water heating equipment in units	**Error! Reference source not found.**- **Error! Reference source not found.**
	System type, fuel type and age of heating, cooling, and water heating equipment in common areas	**Error! Reference source not found.**- **Error! Reference source not found.**
	Type of property	**Error! Reference source not found.**
	Bedroom characteristics	**Error! Reference source not found.**- **Error! Reference source not found.**

Researchable Questions		Item
	Appliances in units	8
	Ownership and management structure	**Error! Reference source not found.**-**Error! Reference source not found.**
	Decision making structure	**Error! Reference source not found.**-4
	Improvements financing	**Error! Reference source not found.**-7
	Number of units managed in this property, How long they have owned or managed this property	**Error! Reference source not found.**, **Error! Reference source not found.**
	Relationship of respondent to property	**Error! Reference source not found.**
	Who pays for utilities?	**Error! Reference source not found.**-**Error! Reference source not found.**, **Error! Reference source not found.**
	Per-unit rent, rent subsidization, deed-restriction, or affordable housing structure,	**Error! Reference source not found.**, **Error! Reference source not found.**-**Error! Reference source not found.**
	Percentage of low income units in CA	**Error! Reference source not found.**,**Error! Reference source not found.**

Researchable Questions		Item
	Socioeconomic characteristics of tenant	**Error! Reference source not found.**- **Error! Reference source not found.**
	Amount of rent and fees	**Error! Reference source not found.**- **Error! Reference source not found.**
	What equipment is upgraded, who made the decisions, was it upgraded with standard or high efficiency equipment, and who pays for it?	**Error! Reference source not found.**, **Error! Reference source not found.**-8
	Tenant participation in ESA	**Error! Reference source not found.**- **Error! Reference source not found.**
	Reasons for energy efficiency upgrades in properties and units?	**Error! Reference source not found.**
Energy efficiency upgrades	Benefits for making energy efficiency upgrades in common areas	**Error! Reference source not found.**- **Error! Reference source not found.**
	Property owner programs	**Error! Reference source not found.**
Program Awareness	Tenant programs	**Error! Reference source not found.**- **Error! Reference source not found.**
	Property owner programs (MFEER and others)	**Error! Reference source not found.**- **Error! Reference source not found.**
Program Participation	Tenant programs (ESAP) and owner	**Error! Reference**

Researchable Questions		Item
	programs	**source not found.**, **Error! Reference source not found.**
	Barriers to energy efficiency	**Error! Reference source not found.**, **Error! Reference source not found.**, 14
What do the multifamily properties need to improve energy efficiency?	Ways to increase participation among property owners	11
What will enhance the ESA program and delivery structure so the program can serve more tenants?	Additional equipment needed in programs	
What are the gaps in equipment and the program?	Respondent perspectives about tenant and building needs	

Response options in ( ) are not read.

Items in boxes are not to be read.

Interviewer instructions are in green.

CATI programming instructions are in red.

[Variables from sample]

[ADDRESS] – Original address from sample

[UTILITY]

*MFEEER Survey questions are identified by the leading asterisk

Survey Quotas

The survey includes screening questions that will be used to develop quotas described in the sampling plan. We will complete surveys for each of three size strata until we have reached a quota of 50, for a total of 150 completes across the three size strata for (1) assisted housing, and (2) market rate housing. We will define the size strata to capture the smallest 45% of companies, the middle 45% of companies relative to size, and the largest 10% of companies. Based on research conducted for the MFEER process evaluation, and subject to additional refinement, these three categories represent companies (1) managing no more than 25 units; (2) more than 25 but no more than 250 units; and, (3) 250 units or more.

Sample List	Size	Target	Definition
Assisted Housing (based on sample)	1. Small	50	**Error! Reference source not found.**+**Error! Reference source not found.**=25 or fewer units
	2. Medium	50	**Error! Reference source not found.**+**Error! Reference source not found.**=26-249 units
	3. Large	50	**Error! Reference source not found.**+**Error! Reference source not found.**=250+ units
Subtotal		**150**	
Market Rate (based on sample)	4. Small	50	**Error! Reference source not found.**+**Error! Reference source not found.**=25 or fewer units
	5. Medium	50	**Error! Reference source not found.**+**Error! Reference source not found.**=26-249 units
	6. Large	50	**Error! Reference source not found.**+**Error! Reference source not found.**=250+ units
Subtotal		**150**	
TOTAL		300	

A. Introduction/Screening

A1. Hello, my name is [INTERVIEWER NAME] from [FIRM] and I'm calling on behalf of [UTILITY], your local electric utility. [UTILITY] is conducting an important statewide study that will guide the energy efficiency services they offer in the multifamily rental market. May I speak with the person who makes decisions about building and equipment upgrades to the property and rental units at [ADDRESS]?

1. (Yes, speaking to the decision maker)
2. (Yes, call transferred to someone else [READ INTRO AGAIN])
3. (Yes, but at a different number [CALL NEW NUMBER AND BEGIN AGAIN])
99. (Refused) [THANK AND TERMINATE]

Back-up information, not to be programmed:
[If "No – Not a convenient time," ask if would like to arrange a more convenient time for us to call them
back or if you can leave a message for that person.]

[IF RESPONDENT ASKS HOW LONG, SAY: "Approximately 20 minutes."]
[IF NEEDED:] This statewide study will guide the design of California's energy efficiency services for multifamily owners and property managers. We would appreciate your help today and would like to talk with you about your company's rental properties. Your participation is important to our research and because of this we will email a copy of the report to all qualified survey participants once it is available
to the public.

[**Only if asked** for a contact to verify the survey authenticity, offer Mary O-Drain 415.973.2317 or Tori Francisco 415.703.2743]

A2. About how many units are there on the [ADDRESS OR C_ADDRESS] property? [IF DON'T KNOW ASK FOR BEST GUESS]

1. [ENTER ANSWER_____] [RANGE: 1-99999]
98. (Don't know) [ASK TO SPEAK WITH SOMEONE ELSE AND BEGIN AGAIN.]
99. (Refused) [THANK AND TERMINATE]

A3. How many buildings are at [ADDRESS or C_ADDRESS]? [IF DON'T KNOW ASK FOR BEST GUESS]

1. [ENTER ANSWER_____] [RANGE: 1-9999]
98. (Don't know)
99. (Refused) [THANK AND TERMINATE]

A4. Are there at least five units in one of the buildings? [IF DON'T KNOW ASK FOR BEST GUESS]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused) [THANK AND TERMINATE]

[ASK IF A4= NO OR DON'T KNOW]

A5. Do you have another California property with 5 or more units serving low income tenants?

1. (Yes) [GO BACK TO A2 AND ENTER THIS ADDRESS (C_AADDRESS) IN AND PROCEED WITH STUDY.]
2. (No) [THANK AND TERMINATE]
98. (Don't know) [THANK AND TERMINATE]
99. (Refused) [THANK AND TERMINATE]

[TERMINATE SCRIPT]

Thank you for your time today. We are interested in talking with owners and managers of multifamily buildings with 5 or more units that house low income tenants. It seems that your company does not fit this description. Have a good day.

THE NEXT QUESTIONS PROVIDE DATA TO HELP CHARACTERIZE LOW INCOME MULTIFAMILY HOUSING IN CA. THESE QUESTIONS ARE ALSO USED (A6) TO BIN RESPONDENTS BY SIZE FOR THE SAMPLE STRATA. ONCE THE STRATA ARE FILLED, WE WILL THANK AND TERMINATE

A6. In addition to the [INSERT ANSWER FROM A2] units you mentioned, roughly how many **additional** units would you say that your company owns or manages in the rest of its properties in California?

1. [ENTER ANSWER_____] [RANGE: 1-9999]
98. (Don't know)
99. (Refused)

[ASK IF A6=98 OR 99]

A7. Are there … [READ LIST] [ASK FOR BEST GUESS]

1. 4 or fewer units
2. 5 to 25 units
3. 26 to 249 units
4. 250 or more units

98. (Don't know)
99. (Refused)

[BUCKET THESE AS DON'T KNOW/REFUSE UNIT SIZE AND SEND THE DETAILS OF THESE EACH DAY AND WE WILL DETERMINE WHICH QUOTA TO PLACE THEM IN.]

A8. *Is the [ADDRESS OR C_ADDRESS] property a rental property where the tenants pay rent, or is the property a condominium, where the tenants own their units?

1. Rental property [CONTINUE]
2. Condominium [CONTINUE]
3. (Neither) [CONTINUE]

98. (Don't know) [CONTINUE]
99. (Refused) [CONTINUE]

B. Ownership

THESE QUESTIONS WILL HELP IDENTIFY THE OWNERSHIP STRUCTURE AND RESPONDENT RESPONSIBILITY AT THE SELECTED PROPERTY.

READ: Now I'd like to know a little more about you and your company.

B1. *Does your company own, manage, or both own and manage the property? [RECORD SINGLE RESPONSE]

1. (Owns only – does not manage)
2. (Manages only – does not own)
3. (Owns and manages properties)
4. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

B2. Is the property owned by an individual, a corporation, or something else? [RECORD SINGLE RESPONSE; READ LIST IF NECESSARY]

1. (Individual)
2. (Corporation or partnership, LLC, limited partnership)
3. (Private institution)
4. (Non-profit institution)
5. (Public institution)
6. (Or something else) [SPECIFY:_____]

98. (Don't know)
99. (Refused)

B3. *How long has your company managed or owned this property? [RECORD MONTHS IF RESPOND IN MONTHS] [RANGE 1-99] [RECORD YEARS IF RESPOND IN YEARS] [RANGE 0-99]

B4. *What is the best way to describe your role at your company? Are you the. . .? **[READ LIST]**

1. Property owner
2. Property manager
3. Both property owner and manager
4. Maintenance or facilities supervisor
5. Or something else [PLEASE SPECIFY:_____]

98. (Don't know)
99. (Refused)

C. Utilities

READ: Now we'd like to talk about the heating and cooling systems at [ADDRESS OR C_ADDRESS**]..**

THESE QUESTIONS IDENTIFY THE HEATING SYSTEM, FUEL TYPE, AND AGE OF SYSTEM.

C1. Are the units heated by a central system or individual systems?

1. (Central system)
2. (Individual systems)
3. (Other [SPECIFY:_____])
4. (No heat)

98. (Don't know)
99. (Refused)

C2. *What is the primary fuel used to heat the units at this address? [READ LIST IF NECESSARY]

1. (Electricity)
2. (Gas)
3. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

C3. What is the primary type of heating system used in the units? [READ LIST –PROMPT--IF NECESSARY]

1. (Boiler)
2. (Gas or electric wall unit)
3. (Furnace)
4. (Heat pump)
5. (Rooftop unit)
6. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

C4. Has the heating system been replaced or is it original with the building?

1. (Replaced)
2. (Original)
98. (Don't know)
99. (Refused)

THESE QUESTIONS IDENTIFY THE COOLING SYSTEM, FUEL TYPE, AND AGE OF SYSTEM.

C5. Does the building use central cooling, room or window air conditioners, or have no air conditioning?

1. (Central)
2. (Room/window) [SKIP TO C7]
3. (No AC) [SKIP TO C8]
98. (Don't know) [SKIP TO C8]
99. (Refused) [SKIP TO C8]

[ASK IF C5 = 1]

C6. Has the central cooling system been replaced or is it original with the building?

1. (Replaced)
2. (Original)
98. (Don't know)
99. (Refused)

[ASK IF C5 = 2]

C7. When you replace window or room air conditioners, do you replace them all at once or as they break or need repairs?

1. (All at once)
2. (When they break)
98. (Don't know)
99. (Refused)

THESE QUESTIONS IDENTIFY WHETHER THEY USE A CENTRAL WATER HEATING SYSTEM, THE FUEL TYPE, AND AGE OF SYSTEM.

C8. Does the building use a central water heating system or are there individual water heaters for each unit?

1. (Central water heating system)
2. (Individual water heaters for each unit)
3. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

C9. What is the primary fuel used to heat water in the individual units or the central water heating system? [READ LIST IF NECESSARY]

1. (Electricity)
2. (Natural gas)

3. (Propane)
4. (Solar)
5. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

C10. Has the water heating system been replaced or is it original with the building?

1. (Replaced)
2. (Original)
98. (Don't know)
99. (Refused)

READ: Now I'd like to talk about how the common areas are heated and cooled for the location we have been talking about. By common areas, we are referring to hallways, laundry rooms, or other areas that are open to all tenants.

THESE QUESTIONS IDENTIFY WHETHER THEY HAVE COMMON AREAS AND WHETHER THE COOLING AND/OR HEATING SYSTEMS ARE THE SAME AS THOSE USED IN THE UNITS.

C11. Does this property have common areas such as laundry rooms, hallways, or other areas that are open to all tenants?

1. (Yes)
2. (No) [SKIP TO D1]
98. (Don't know) [SKIP TO D1]
99. (Refused) [SKIP TO D1]

C12. Are the common areas **heated** the same way as the units?

1. (Yes)
2. (No)
3. (No heating)
98. (Don't know)
99. (Refused)

C13. Are the common areas **cooled** in the same way as the units?

1. (Yes)
2. (No)
3. (No cooling)
98. (Don't know)
99. (Refused)

THESE QUESTIONS IDENTIFY THE TYPE OF HEATING SYSTEM, FUEL TYPE, AND AGE OF HEATING SYSTEM USED IN THE COMMON AREAS

[ASK IF C12= NO]

C14. What type of system is used to heat the **common areas** at this location? [IF NEEDED: Common areas include hallways, laundry areas, and other areas open to all tenants. READ LIST ONLY IF NECESSARY]

1. (No heating system) [SKIP TO INSTRUCTION BEFORE C17]
2. (Boiler)
3. (Furnace)
4. (Heat pump)
5. (Rooftop unit)
6. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

[ASK IF C12 = NO]

C15. What is the primary fuel used to heat the common areas at this location? [READ LIST IF NECESSARY]

1. (Electricity)
2. (Gas)
3. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

[ASK IF C12= NO]

C16. Has the heating system in the common areas been replaced or is it original with the building?

1. (Replaced)
2. (Original)

98. (Don't know)
99. (Refused)

THE NEXT QUESTIONS ARE ABOUT THE COOLING SYSTEM USED IN THE COMMON AREAS AND ITS AGE.

[ASK IF C13 = NO]

C17. What type of system cools the **common areas** at this location? [MARK ALL THAT APPY. READ LIST IF NECESSARY]

1. (No cooling system) [SKIP TO D1]
2. (Central A/C)
3. (Room A/C or window units)
4. (Swamp cooler)
5. (Evaporative cooler)
6. (Ceiling fans)
7. (Stand- alone fans)
8. (Other [SPECIFY:_____])

98. (Don't know)
99. (Refused)

[ASK IF C13= NO]

C18. Has the central cooling system been replaced or is it original with the building?

1. (Replaced)
2. (Original)
98. (Don't know)
98. (Refused)

D. Decision Making

THESE QUESTIONS IDENTIFY WHO MAKES DECISIONS REGARDING ENERGY EFFICIENCY UPGRADES.

Now we'd like to talk with you about how your company makes decisions about improvements or upgrades to any of your properties, not just the one we've been discussing. We are talking about improvements such as installing a central heating or cooling system not landscaping.

D1. When your company makes decisions about improvements or purchasing new equipment for any of your properties, who makes these decisions? We are looking for titles or positions, not names. [ALLOW MULTIPLE RESPONSES; IF MULTIPLE PEOPLE FIND OUT WHO MAKES THE FINAL DECISION]

1. [SPECIFY:_____]
98. (Don't know)
99. (Refused)

THESE QUESTIONS WILL TELL US WHETHER THEY ONLY UPGRADE SYSTEMS WHEN THEY BREAK OR IF THEY PLAN AHEAD FOR IMPROVEMENTS OR UPGRADES AND HOW FAR IN ADVANCE THEY PLAN FOR THESE TYPES OF IMPROVEMENTS.

D2. How does your company's decision making process change if you are making fairly major improvements to a new building versus making major improvements to an older building?

1. [RECORD ANSWER]
2. (Our decision making process doesn't change)
98. (Don't know)
99. (Refused)

D3. Does your company usually make decisions one building at a time, or for the whole portfolio at the same time?

1. (The whole portfolio)
2. (Each building)
3. (It depends [SPECIFY:_____])
98. (Don't know)
99. (Refused)

D4. When your company decides to spend money on making fairly major improvements like installing a heating or cooling system do you plan for it or decide when it breaks? [RECORD ONE ANSWER]

1. (Plan for it)
2. (When it breaks)
3. (Both)

98. (Don't know)
99. (Refused)

[ASK IF D4=1 or 3]

D5. How far in advance do you plan for something like a new heating or cooling system? [READ LIST IF NEEDED]

1. (Less than 1 year before the project begins)
2. (1 year to 2 years)
3. (3 years to 4 years)
4. (5 years or more)
5. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

THE NEXT QUESTIONS FOCUS ON HOW THE COMPANY PAYS FOR BROKEN OR REPLACEMENT EQUIPMENT.

D6. When equipment like heating systems or water heaters are broken and can't be repaired, does your company take out a loan, charge the expenses, or use savings for the replacements? [RECORD ALL THAT APPLY; READ LIST IF NEEDED]

1. (Take out a new loan)
2. (Credit Card)
3. (Savings)
4. (Reserve account)
5. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

D7. How about if you are replacing or upgrading old equipment that may still work? Does your company take out a loan, charge the expenses, or use savings for the replacements? [RECORD ALL THAT APPLY; READ LIST IF NEEDED]

1. (Take out a new loan)
2. (Credit Card)
3. (Savings)
4. (Reserve account)
5. (Other [SPECIFY:_____])
6. (Never do this)
98. (Don't know)
99. (Refused)

THIS QUESTION ASKS ABOUT FINANCTING OPTIONS FOR IMPROVEMENTS.

D8. Are you aware of any financing options that may assist you with these expenses?

1. (Yes) [ASK: What options are you aware of?] [DON'T READ LIST; RECORD ALL THAT APPLY]
    1. (Tax credits)

2. (Loans)
3. (Grants)
4. (On-bill payment)
5. (Utility rebates/incentives)
6. (Other [SPECIFY:_]

2. (No)
98. (Don't know)
99. (Refused)

THIS QUESTION TELLS US THE DECISION DRIVERS.

[ASK EVERYONE]

D9. When you replace or update old or broken equipment, what factors influence your decision to select the equipment you install? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Energy efficiency)
2. (Cost/cost savings)
3. (Availability of equipment)
4. (Size of upgrades/improvements)
5. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

D10. Do any of these factors make it difficult to make energy efficiency upgrades? [READ EACH AND GET A YES OR NO FOR EACH. RECORD 1 FOR YES, 2 FOR NO, 98 FOR DON'T KNOW, AND 99 FOR REFUSED]

1. Lack of capital
2. Lack of access to financing
3. Lack of attractive financing terms
4. Coordinating funding with opportunities to make upgrades or improvements

E. Equipment Replacement & Maintenance

READ: Now we want to ask about past energy savings activities your company may have taken. We would like you to answer these questions for [ADDRESS OR C_ADDRESS] we've been discussing.

THIS SET OF QUESTIONS WILL DETERMINE WHAT EQUIPMENT HAS BEEN REPLACED RECENTLY, WHY IT WAS REPLACED, WHO DECIDED TO REPLACE IT, WHETHER IT WAS REPLACED WITH ENERGY EFFICIENT EQUIPMENT AND WHY IT WASN'T REPLACED WITH EE EQUIPMENT.

E1. *For each of the following types of equipment, has your company replaced the equipment in the past couple of years? Let's start with…[RECORD 1 FOR YES, 2 FOR NO, 96 FOR LEASE EQUIPMENT,
97 FOR NOT APPLICABLE, 98 FOR DON'T KNOW, 99 FOR REFUSED] [INTERVIEWER NOTE: IF THEY LEASE THEIR CLOTHES WASHERS OR DRYERS CODE AS 96 FOR LEASE EQUIPMENT]

E1a. Lighting in hallways or parking lots

E1b. Air conditioning system
E1c. Heating system
E1d. Clothes washers or dryers in shared laundry rooms [IF LEASE, CODE AS 96]
E1e. Appliances in tenant units
E1f. Lighting in tenant units
E1g. Swimming pool pumps

[ASK E1-E4 FOR EACH YES RESPONSE IN E1 BEFORE MOVING TO THE NEXT "YES" RESPONSE] E2.Why was [INSERT YES ANSWER FROM E1] replaced? [READ LIST IF NECESSARY]

1. (It was broken or failed)
2. (It was old but not broken)
3. (Upgraded/renovated)
4. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

E3. Who decided to replace the [INSERT YES ANSWER FROM E1]? [READ LIST IF NECESSARY; RECORD ALL THAT APPLY]

1. (Property owner)
2. (Property manager)
3. (Maintenance manager)
4. (Other [SPECIFY:_____])
5. (Tenant)
98. (Don't know)
99. (Refused)

E4. Was the [INSERT YES ANSWER FROM E1] replaced with standard energy efficiency or high energy efficiency equipment?

1. (Standard efficiency)
2. (High efficiency)
98. (Don't know)
99. (Refused)

[ASK IF ANY "STANDARD EFFICIENCY" RESPONSE IN E4]

E5. For the equipment your company did not replace with more energy efficient equipment, can you tell me why your company did not make those improvements with more energy efficient equipment? [PROBE FOR MULTIPLE RESPONSES AND GET CLEAR DETAILS]

1. [RECORD ANSWER:_____]
98. (Don't know)
99. (Refused)

READ: Let's talk about who pays for replacement equipment in individual units.

THIS QUESTION INDICATES WHO PAYS FOR IMPROVEMENTS.

E6. Do property owners or tenants typically pay the cost of improvements that may be made to units for things like lighting, room air conditioners, or appliances?

1. (Property owners)
2. (Tenants)
3. (Both, or It depends)

E9a. [SPECIFY: Who pays for what?_____]

98. (Don't know)
99. (Refused)

THESE QUESTIONS ARE ABOUT WHO OWNS APPLIANCES AND WHERE THE APPLIANCES ARE PURCHASED.

E7. Within the individual units, what if any, appliances do tenants own? [RECORD ALL THAT APPLY; DON'T READ LIST UNLESS NECESSARY]

1. (Refrigerators)
2. (Clothes washers)
3. (Room/window AC units)
4. (Small appliances such as toaster ovens or microwaves, etc.)
5. (Other [SPECIFY:_____])
6. (None)

98. (Don't know)
98. (Refused)

F. Awareness

READ: Now I'd like to find out more about your experiences with energy efficiency programs.

THESE QUESTIONS WILL TELL US ABOUT WHETHER THEY HAVE USED UTILITY REBATE PROGRAMS AND IF THEY HAVEN'T WHY NOT.

F1. Do you know if your company has taken advantage of any rebate programs offered by your gas or electric utility to help any of your properties be more energy efficient? [IF NEEDED: This would include rebate programs to install high efficiency appliances, install high efficiency heating or cooling systems, or install energy efficient lighting.]

1. (Yes)
2. (No)

98. (Don't know)
99. (Refused)

[ASK IF F1=1]

F2. Please provide the program names if you know them or a brief description of the program. [PROBE FOR MULTIPLE ANSWERS AND CLARIFY PROGRAM DETAILS, NAMES OF PROGRAMS,

AND WHO SPONSORS OR ADMINISTERS THE PROGRAMS, SUCH AS THE UTILITY OR AGENCY NAME. IF THEY DON'T KNOW, STOP PROBING.]

1. [RECORD ANSWER]
2. (Don't know)
3. (Refused)

[ASK IF F1=2, 98, or 99]

F3. Why hasn't your company taken advantage of any rebates offered by utilities for improving energy efficiency at your properties?[RECORD VERBATIM. PROBE FOR MULTIPLE ANSWERS AND DETAILS]

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

F4. What could utilities and other agencies do to encourage your company to participate in rebate programs or to use financing options offered to assist property owners in making energy efficient upgrades to their properties? [DO NOT READ LIST. RECORD ALL THAT APPLY.]

1. (Provide more information about the programs)
2. (Simplify the information)
3. (Provide upgrades at no cost)
4. (Higher incentives/more money for rebate)
5. (Allow us to choose our own contractor to do the work)
6. (Provide on-bill financing)
7. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

G. ESAP Program Participation

THESE QUESTIONS WILL INFORM ABOUT AWARENESS AND USAGE OF THE ESAP PROGRAM.

G1. Have you ever heard of a program offered by the utilities which provides income qualified households with free equipment and services such as energy efficient lighting or appliances to help customers save energy and money on their energy bills? [IF NEEDED: This is also known as the Energy Savings Assistance Program (ESA).]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF G1=1]

G2. Do you know if any of your tenants at this location have taken advantage of this program?

1. (Yes)

2. (No)
98. (Don't know)
99. (Refused)

G3. This program requires you as property owners and managers to complete paperwork and allow contractors not hired by your company access to your property to make changes. Would you be supportive of tenants if they wanted to participate in the program?

1. (Yes)
2. (No)
3. (It depends [SPECIFY:_____])
98. (Don't know)
99. (Refused)

THESE QUESTIONS TELL US IF RESPONDENTS THINK THERE ARE BENEFITS TO UPGRADING WITH ENERGY EFFICIENT EQUIPMENT AND WHAT THE BENEFITS ARE.

[ASK IF C11=1]

G4. In what ways do you think energy efficiency upgrades that cut down on energy use in common areas such as hallways or laundry rooms benefit property owners? [RECORD ALL THAT APPLY; DON'T READ LIST]

1. (No benefit to property owners)
2. (Save money for owners/reduce costs for owners/reduce operating costs)
3. (Improve cash flow)
4. (More money for capital expenses)
5. (Increase property value)
6. (Nicer building/more comfortable)
7. (Good for environment, reduce greenhouse gases)
8. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

[ASK IF C11=1]

G5. And in what ways do you think your tenants benefit from having more energy efficient equipment that serves the common areas such as hallways or laundry rooms? [RECORD ALL THAT APPLY; DON'T READ LIST]

1. (No benefit to tenants)
2. (Save money for tenants)
3. (Lower rent)
4. (Not raise rent)
5. (Nicer building/more comfortable)
6. (Good for environment, reduce greenhouse gases, greener)
7. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

H. Building Characteristics

THESE QUESTIONS WILL PROVIDE INFORMATON ABOUT THE CHARACTERISTICS OF THE BUILDINGS AND UNITS.

Read: The next few questions are about the buildings and the units at the property we've been talking about.

H1. Earlier you said that there were [INSERT RESPONSE FROM A3] buildings at the [ADDRESS OR C_ADDRESS] property. How many floors are in a typical building at this location?

1. [RECORD NUMBER OF FLOORS:_____] [RANGE 1-9999]
98. (Don't know)
99. (Refused)

H2. How old are the buildings at [ADDRESS OR C_ADDRESS]?

1. [ENTER AGE IN YEARS:_____]
98. (Don't know) [ASK]
    H2a. Were they built before 1970?
    1. (Yes)
    2. (No)
    3. (Don't know)
99. (Refused)

H3. Are there two bedroom units at this property?

1. (Yes) [SKIP TO H5]
2. (No) [CONTINUE]
98. (Don't know) [CONTINUE]
98. (Refused) [CONTINUE]

H4. How many bedrooms are in the typical apartment? [READ LIST IF NEEDED]

1. (Mostly studios/SRO's (single room occupancy))
2. (Mostly one bedroom)
3. (Mostly 2 bedrooms)
4. (Mostly 3 bedrooms)
5. (Half studio/half 1 bedroom)
6. (Half one bedroom/half two bedroom)
7. (Mix of 1, 2 and 3 bedrooms)
8. (Other, [record answer _____]
98. (Don't know)
99. (Refused) [ASK EVERYONE]

H5. What is the average size of the [insert "2 bedroom" if H3 = Yes, OR, insert answer from H4] units at this location? [READ LIST IF NECESSARY]

1. (Less than 500 square feet)
2. (500 to less than 1,000 square feet)
3. (1,000 to less than 1,500 square feet)
4. (1,500 to less than 2,000 square feet)

5. (2,000 or more square feet)
98. (Don't know)
99. (Refused)

I. Typical Rent

THESE QUESTIONS TELL US ABOUT THE AVERAGE RENT AND WHO PAYS UTILITIES.

I1. What is the typical monthly rent for most [insert "2 bedroom" if H3= Yes, OR, insert answer from H4] bedroom units at [ADDRESS OR C_ADDRESS]? [ASK FOR BEST GUESS]

1. [RECORD ANSWER]
98. (Don't know)
99. (Refused)

I2. Are some or all of the utilities included in the rent? By utilities I mean, electricity, gas, water, sewer, and garbage.

1. (Some)
2. (All)
3. (None)
98. (Don't know)
99. (Refused)

[IF I2= 1 (SOME) OR 2 (ALL), ASK WHICH ONES]

I3. Which utilities are included? [READ LIST IF NECESSARY; RECORD ALL THAT APPLY]

1. (Electricity)
2. (Gas)
3. (Water)
4. (Sewer)
5. (Garbage)
98. (Don't know)
99. (Refused)

[ASK IF I2 = 3 (NONE)]

I4. Just to confirm, tenants are responsible for paying all utility bills, correct?

1. (No) [GO BACK TO I3 AND ASK WHICH ONES ARE INCLUDE IN THE RENT]
2. (Correct/yes, tenants pay the bill)
3. (Other [SPECIFY:_____])
98. (Don't know)
99. (Refused)

I5. Are there any other fees included in the rent?

1. (Yes)
   I5a. [ASK: What are the fees?_____]
2. (No)
98. (Don't know)
99. (Refused)

[ASK EVERYONE]

I6. Is the electricity at the property master metered, with one electricity meter for all the apartments in a building? Or, is each apartment individually metered for electricity?

1. Master metered
2. Individually metered
98. (Don't know)
99. (Refused)

I7. Roughly what percentage of your units at [ADDRESS OR C_ADDRESS] are occupied by low-income tenants? [IF NEEDED: Cost being a dominant consideration, possibly needing Section 8 housing or other low income housing assistance such as HUD funded programs.][INTERVIEWER NOTE: Low income can be considered 80% of area median income (AMI).]

1. [ENTER PERCENTAGE:_____]
98. (Don't know)
99. (Refused)

I8. Roughly what percentage of the properties you own or manage in California are subsidized by local, state, or federal housing assistance programs such as Section 8 vouchers?

1. [ENTER PERCENTAGE:_____]
98. (Don't know)
99. (Refused)

I9. And about what percentage of <u>all of the units you own or manage in California</u> would you say are occupied by low-income tenants? [IF NEEDED: "Cost is a dominant consideration for their housing and the tenants rely on assistance programs for their daily living and/or income."]

1. [RECORD PERCENTAGE:_____] [RANGE 0-100%]
98. (Don't know) [CONTINUE]
99. (Refused) [CONTINUE]

THESE QUESTIONS OUTLINE WHETHER THERE ARE RENT RESTRICTIONS, WHAT THEY ARE, AND WHETHER THEY RECEIVE TAX BENEFITS.

I10. Are there any restrictions around what can be charged for rent or are you charging market rate at [ADDRESS OR C_ADDRESS]? [DO NOT READ LIST AND RECORD ALL THAT APPLY]

1. (Restrictions) [ASK I11]
2. (Market rate) [SKIP TO I12]
3. (Other [SPECIFY:_____]) [ASK I11]
98. (Don't know) [SKIP TO I12]
99. (Refused) [SKIP TO I12]

[ASK IF I10= 1 OR 3]

I11. Please tell me about the restrictions.

[RECORD ANSWER and mark if they say "rent control" ENTER ALL THAT APPLY]

1. [ENTER ANSWER_____]
2. (Rent Control)
98. (Don't know) [CONTINUE]
99. (Refused) [CONTINUE]

[ASK IF I11 NOT MARKED "RENT CONTROL"] I12.Is this a rent controlled property?

1. (Yes)
2. (No
98. (Don't know) [CONTINUE]
99. (Refused) [CONTINUE]

[ASK EVERYONE]

I13. Does your company, get annual income tax benefits for providing subsidized rents?

1. (Yes)
2. (No)
3. (Non-profit/parent company gets tax benefits but we don't)
4. (Other [SPECIFY:_____])
98. (Don't know) [CONTINUE]
99. (Refused) [CONTINUE]

J. Closing

THIS QUESTION IS TO GET EMAIL ADDRESS FOR PEOPLE INTERESTERD IN SEEING THE FINAL REPORT.

J1. These are all my questions. Would you like to see the final report once it is public?

1. (Yes [ASK: Can I get your email address?_____])
2. (No)
98. (Don't know)
99. (Refused)

READ: Thank you for your taking the time to give us your views. Your opinions are extremely important to the California utilities and to this research about low income multifamily housing.