

Housing Equity & Building Decarbonization in California

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According to census data, 32% of Californians – over 12 million people – live in low-income households, earning less than 80% of the Area Median Income.

Of these 12 million people, about 77% are considered rent burdened and about 9% are spending more than 20% of their household income on energy expenses.

If building electrification in California is to proceed in an equitable manner, policymakers must first prioritize those households that are most burdened by their housing costs.

This study examines:

The residential conditions of **low-income households in California**, and how these material conditions differ across geography, building type, tenure status, rent burden, and energy expenditure.

With the intention to:

- Direct building electrification incentives toward Californians of greatest need
- Dispel myths about the living conditions of low income households
- Illustrate the magnitude of the decarbonization opportunity in low income residential building electrification

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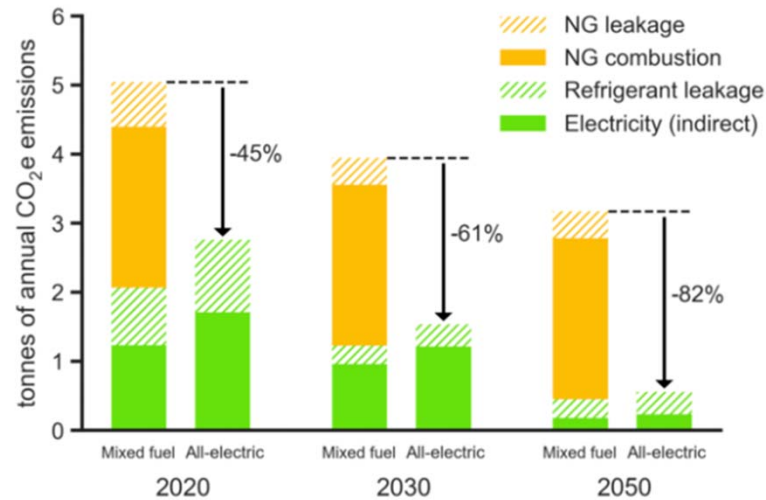
Section I

What We Know



The Benefits of Building Decarbonization

Emissions Reduction Potential



Compared with gas-fueled single-family homes, full electrification would reduce greenhouse gas emissions in single-family homes by about 30 percent to 60 percent as soon as next year. As the carbon intensity of the grid decreases over time, the savings increase to about 80 percent to 90 percent by 2050.

Section I: What We Know

Indoor Air Quality

Consumer Cost Savings

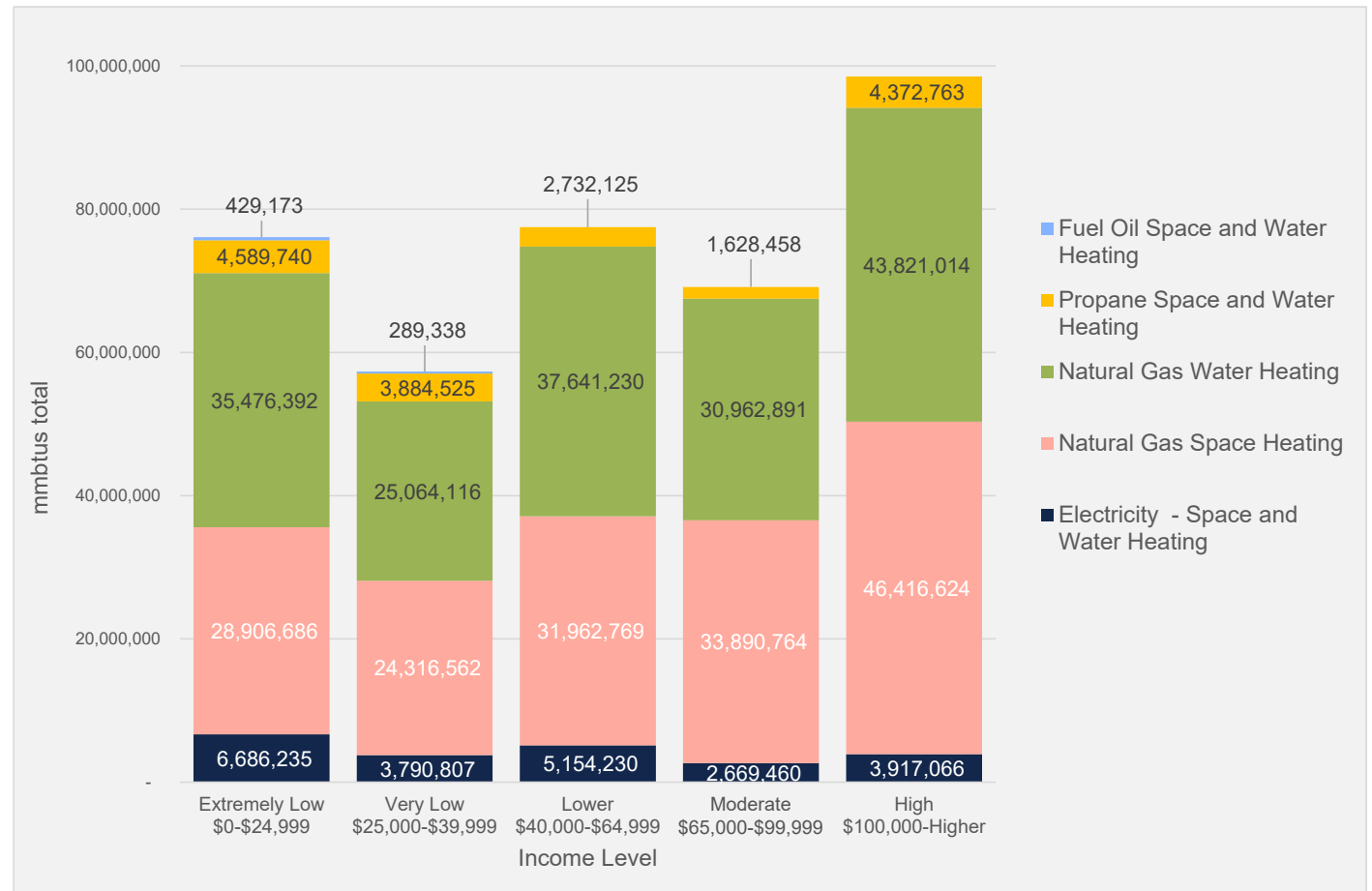
Comfort

Conservation of Liquid Fuel

CA's Electrification Friendly Grid

Gas Use in Low Income Households

- Research by former NRDC researcher Olivia Ashmoore demonstrates the decarbonization potential for low income households in California.
- Extremely Low Income and Very Low Income Californians consume nearly 93 million mmBTUs in the form of natural gas, propane and fuel; this demonstrates the size of the decarbonization opportunity in terms of reduced mmBTUs.



Current Funding for Building Electrification

- While California leads in building decarbonization policy, there remain gaps in the geographies and populations targeted by incentives for building decarbonization.
- There is limited emphasis on and funding for existing buildings beyond rebates.
- Few programs target low income residents, and in particular, low income renters.
- Southern California IOUs have less customer facing electrification rebates/pilots than Northern California counterparts.

CA Governor Signs SB 1477: Incentives for New Low-Emissions Affordable Homes

September 18, 2018

Berkeley first city in California to ban natural gas in new buildings

The city of Berkeley will no longer allow natural gas pipes in many new buildings starting Jan. 1, 2020. It's the first city in California to pass such a law, officials said.

California Invests \$50 million in Healthy All-Electric Homes for San Joaquin Valley Communities

By Rachel Golden December 13, 2018

Comfortable Home Rebates offered by Franklin Energy



Home maintenance and upgrade program focused on air conditioning efficiency and other home comfort upgrades.

Cost varies depending on measures selected, rebates from \$585 to \$3,500 depending on measures selected and CEC Climate Zone.

Heating, cooling, water heating, insulation, duct work, air sealing, lighting, and pool pumps.

PG&E customers using either electric or gas fuels. Rebates are pro-rated depending on which fuels the customer uses (no rebates for propane equipment). Customer residence must be single family or 2-4 unit structure.



MCE Launches Pilot Program for Low-Income Families and Tenants

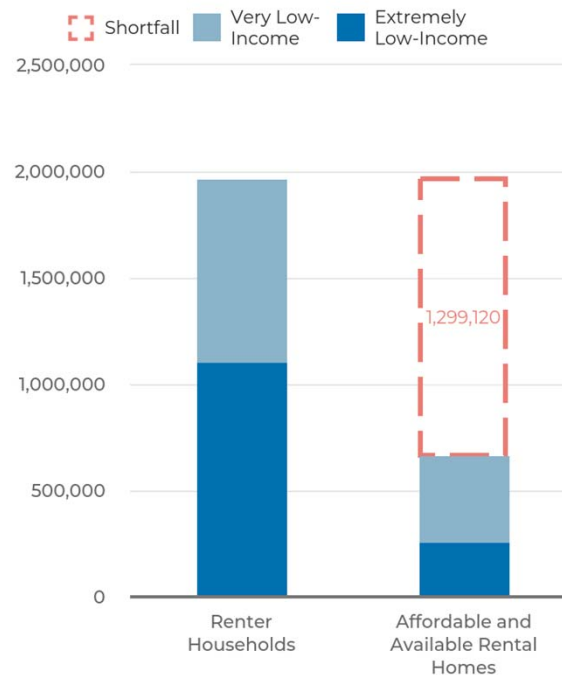
The California Public Utilities Commission (CPUC) has awarded \$3.5 million to MCE to conduct a two-year, Low-Income Family and Tenants (LIFT) [pilot program](#) to better serve income-qualified multifamily communities in MCE's service area.

California's Affordable Rental Housing Shortage

- CHP data demonstrate the severe shortage of affordable rental housing across the state, and on a county-level basis.
- These charts define affordable housing as housing units that are subsidized by the LIHTC, HUD, and USDA programs.
- This study does not incorporate subsidies for low income mortgage payers, or housing that is subsidized by local and municipal subsidies, or Section 8 beneficiaries.

AFFORDABLE HOMES SHORTFALL

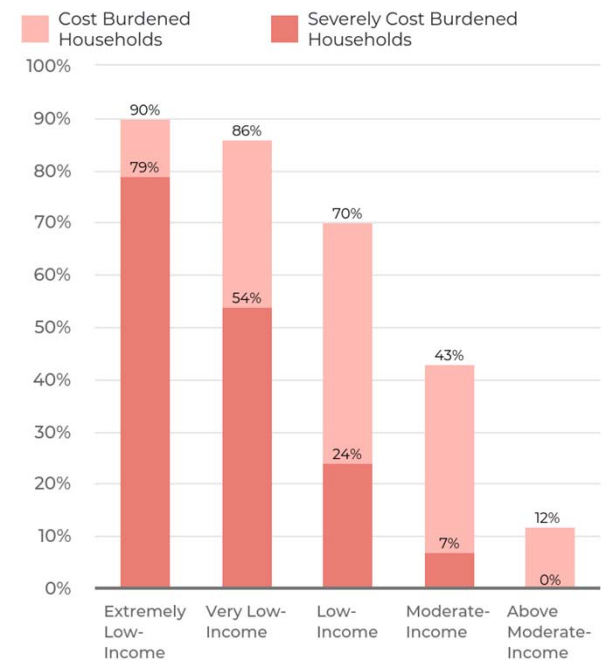
1,299,120 low-income renter households in California do not have access to an affordable home.



California Housing Partnership | chpc.net/housingneeds

COST BURDENED HOUSEHOLDS

79% of ELI households in California are paying more than half of their income on housing costs compared to just 7% of moderate-income households.



California Housing Partnership | chpc.net/housingneeds

*Note that these charts from CHP include only Extremely Low and Very Low Income renters; the rest of this analysis focuses on all low income Californians (up to 80% AMI), and includes owner occupants as well as renters.

County Level Housing Shortage Analysis

- CHP county-level data permits a more granular analysis of local affordable rental housing shortages.
- CHP's analysis only incorporates households earning under 50% of AMI (Very Low Income and Extremely Low Income) in its calculation of the affordable housing need; this analysis includes all households earning under 80% AMI.

COUNTY	SUBSIDIZED UNITS	LOW INCOME HOUSEHOLDS	GAP	FULFILLED HOUSING NEED RATIO
Los Angeles	98,566	938,636	840,070	11%
San Diego	33,405	287,149	253,744	12%
Orange	23,506	238,708	215,202	10%
San Bernardino	13,443	134,505	121,062	10%
Alameda	22,977	141,036	118,059	16%
Santa Clara	29,296	143,419	114,123	20%
Riverside	18,656	132,428	113,772	14%
Sacramento	23,200	130,165	106,965	18%
Rural	17,393	117,277	99,884	15%
San Francisco	25,520	102,901	77,381	25%
Fresno	13,171	86,617	73,446	15%
Kern	9,666	71,330	61,664	14%
Contra Costa	13,820	73,672	59,852	19%
San Joaquin	5,183	56,129	50,946	9%
Ventura	7,212	57,265	50,053	13%
San Mateo	5,044	48,333	43,289	10%
Stanislaus	3,423	40,080	36,657	9%
Sonoma	4,953	39,438	34,485	13%
Santa Barbara	4,567	35,388	30,821	13%
Tulare	5,498	33,282	27,784	17%
Solano	4,953	28,776	23,823	17%
San Luis Obispo	2,527	24,135	21,608	10%
Yolo	4,157	23,917	19,760	17%
Placer	4,334	23,685	19,351	18%
Santa Cruz	3,428	22,060	18,632	16%
Butte	2,501	20,823	18,322	12%
Marin	2,401	19,482	17,081	12%
Merced	2,398	18,673	16,275	13%
Humboldt	1,393	14,917	13,524	9%
Shasta	1,985	12,622	10,637	16%
Napa	1,884	11,018	9,134	17%
Madera	1,712	9,890	8,178	17%
El Dorado	1,812	9,952	8,140	18%
Kings	2,160	9,374	7,214	23%
Imperial	4,242	9,460	5,218	45%
TOTAL	420,386	3,166,542	2,746,156	13%

California is short 2.7 million affordable rental units.

Only 13 percent of California's affordable rental needs are being met by state and federal programs.

Southern California counties including Los Angeles, San Diego, Orange, and San Bernardino experience the most extreme shortages of available affordable housing.

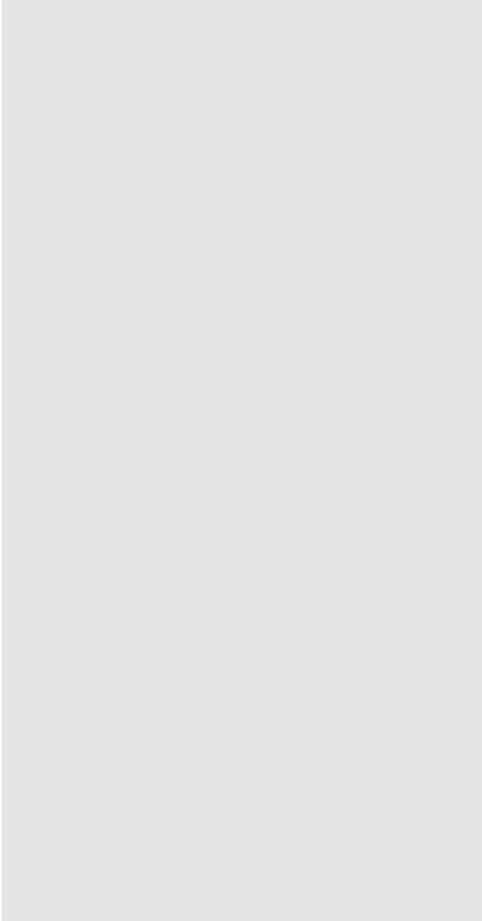
Imperial County represents an exception to the Southern California trend; 45 percent of its affordable housing needs are fulfilled by state & federal programs.

Rural counties are not exempted from the need for affordable rental housing, facing a substantial shortage of nearly 100,000 units.



Section II

Resources & Methods



IPUMS US & data.census.gov

The IPUMS logo consists of the word "IPUMS" in a bold, white, sans-serif font, centered on a dark blue rectangular background.

IPUMS is the Integrated Public Use Microdata Series which provides researchers with access to **disaggregate data** from a range of resources, including the American Community Survey (ACS), the Census, and other national and international surveys.

The United States Census Bureau logo features the words "United States" in a small font above "Census" in a large, bold font, with "Bureau" in a smaller font below it, all in white on a dark blue background.

The US Census Bureau's data portal, data.census.gov, provides access to aggregate ACS and census data, as well as database creation capabilities.

This analysis relies heavily on disaggregate data downloads from the IPUMS web portal. All findings are sourced from variables in the 2018 1-Year ACS.

Aggregate data sourced from the Census Bureau portal was only used in calculating income thresholds for Area Median Incomes.

Please contact rreyef@gmail.com with inquiries about data sources.

Study Population & Variables

Study Population: Residents of Occupied Units in California

- Analysis does not include unoccupied units
- Analysis does not include individuals living in units classified as “group quarters” which include correctional facilities, military barracks, mental institutions, college dormitories, and living quarters for the elderly, handicapped, and unhoused
- Data encompass 361,905 surveyed individuals from 134,279 households

Income Categories	Tenure	Building Type
Extremely Low Income	Rented	Single Family
Very Low Income	Owned	Small Multifamily (2-4 Units)
Low Income		Large Multifamily (5+ Units)
Moderate Income		Mobile Home
Above Moderate Income		RV/Boat
Rent Burden	Energy Cost Burden	Geography
Extremely Rent Burdened	> 20% of Income	Modified Climate Zones
Rent Burdened	10-20% of Income	Rural vs. Non-Rural
Not Rent Burdened	5-10% of Income	San Joaquin Valley
	0-5% of Income	
	Heating Fuel Cost Ratio	
	> 75% of Energy Costs	
	50-75% of Energy Costs	
	25-50% of Energy Costs	
	0-25% of Energy Costs	

Defining Low-Income & Rent-Burdened Households

Area Median Income (AMI) : Median household income according to the 2018 5-Year ACS

Extremely Low Income	30 Percent AMI or Less
Very Low Income	31-50 Percent AMI
Low Income	51-80 Percent AMI
Moderate Income	81-120 Percent AMI
Above Moderate Income	>120 Percent AMI

Rent Burden: Percentage of income devoted to housing costs (can be applied to owner-occupied units as well as renter-occupied ones)

Rent Burdened	30 Percent Income Spent On Housing Costs
Extremely Rent Burdened	50 Percent or More Spent On Housing Costs

All gross rent and owner cost values include the cost of utilities (water, electricity, and gas) and heating fuels (oil, coal, kerosene, and wood). This allows for comparisons of monthly costs between contract renters and homeowners.

Modified Climate Zones

- This analysis uses a pared-down version of CEC's 16 climate zones -- the 16 zones have been consolidated into 4 larger, contiguous zones, and have been drawn to follow county lines for ease of integration with existing IPUMS data.

Northern Coast

Alameda	San Benito
Del Norte	San Francisco
Humboldt	San Luis Obispo
Lake	San Mateo
Marin	Santa Barbara
Mendocino	Santa Clara
Monterey	Santa Cruz
Napa	Sonoma

Southern Coast

Los Angeles
Orange
San Diego
Ventura

Central Valley

Amador	Nevada
Butte	Placer
Calaveras	Sacramento
Colusa	San Joaquin
Contra Costa	Shasta
El Dorado	Solano
Fresno	Stanislaus
Glenn	Sutter
Kern	Tehama
Kings	Tulare
Madera	Tuolumne
Mariposa	Yolo
Merced	Yuba

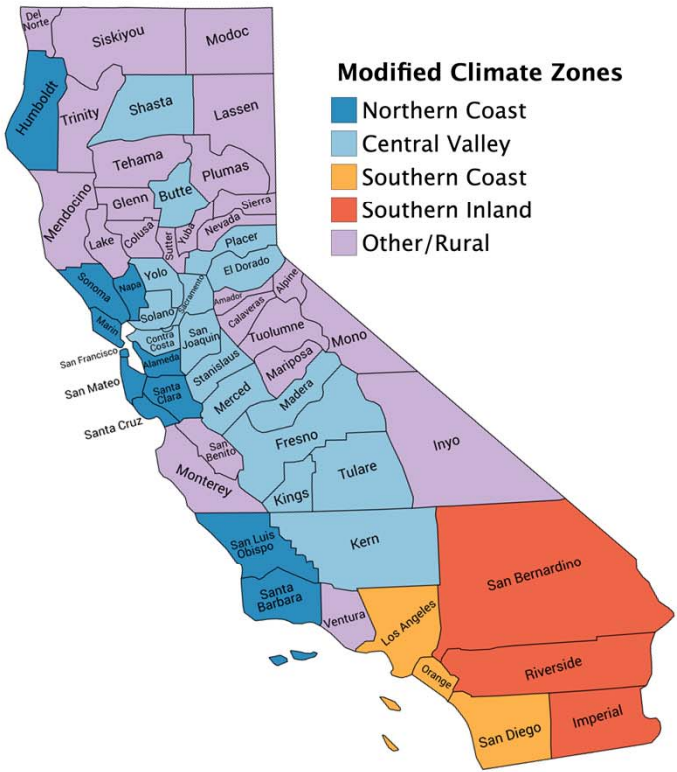
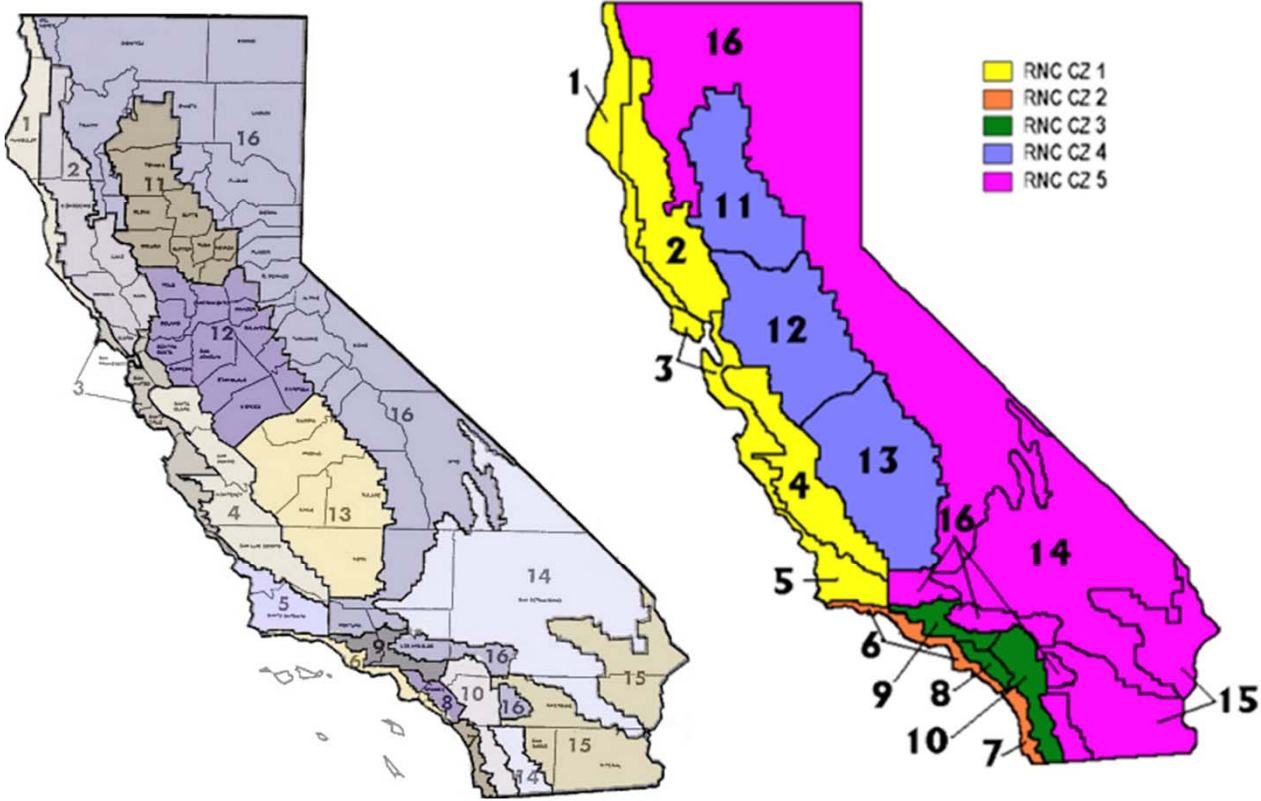
Southern Inland

Imperial
Riverside
San Bernardino

CEC California Climate Zones

CPUC New Construction Climate Zones

Modified Climate Zones



Source Links: <https://www.pge.com/myhome/edusafety/workshopstraining/pec/toolbox/arch/climate/index.shtml>
<http://capabilities.itron.com/WO024/OtherPages/Information.aspx>

Section III

Summary Statistics on Housing in California

California's Housing Stock

- Over 12 million Californians live in low income households, earning <80 percent of AMI.
- The vast majority of Californians live in single family homes.
- 38 percent of Californians are rent burdened or extremely rent burdened.

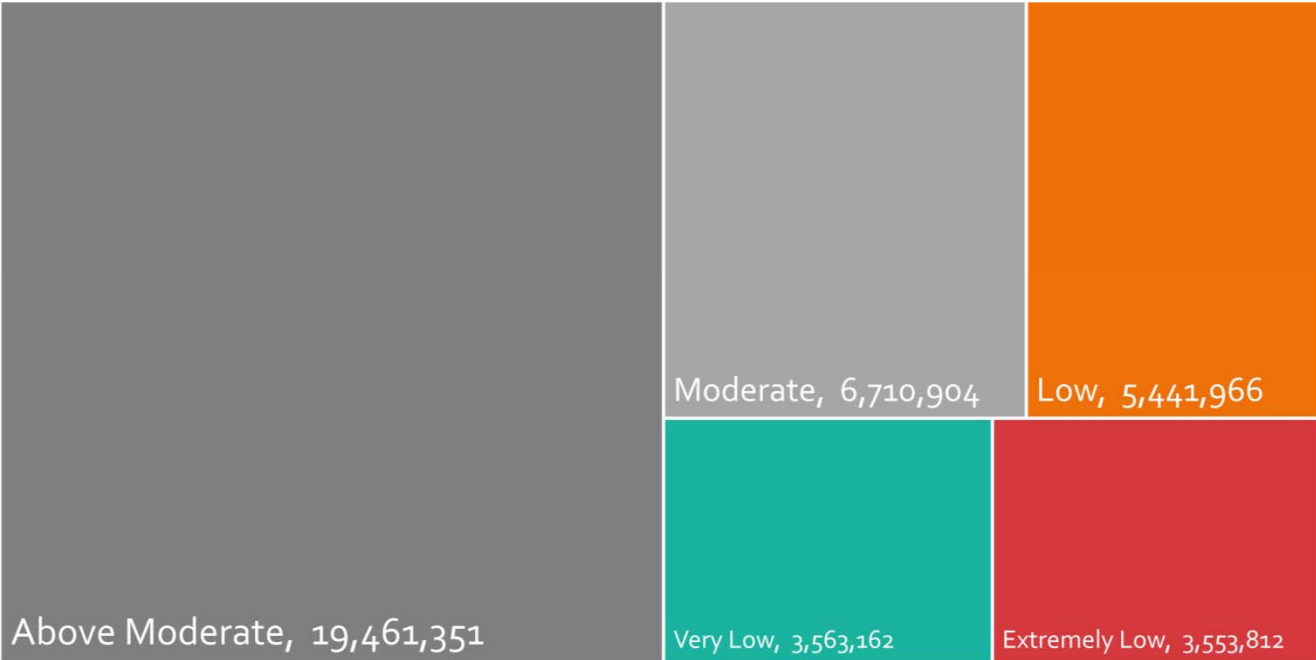
DESCRIPTIVE STATISTICS			
Income Level	Extremely Low Income	3,553,812	9%
	Very Low Income	3,563,162	9%
	Low Income	5,441,966	14%
	Moderate Income	6,710,904	17%
	Above Moderate Income	19,461,351	50%
Building Type	Single Family	27,426,177	71%
	Small Multifamily	2,836,225	7%
	Large Multifamily	7,270,206	19%
	Mobile Home	1,172,630	3%
	RV/Boat	25,957	0.1%
Tenure	Rented	16,980,542	44%
	Owned	21,750,653	56%
Rent Burden	Extremely Rent Burdened	6,427,886	17%
	Rent Burdened	7,897,412	21%
	Not Rent Burdened	24,055,540	63%
Energy Cost Burden	0-5 Percent	31,643,142	85%
	5-10 Percent	4,245,080	11%
	10-20 Percent	1,577,231	4%
	>20 Percent	953,531	2%

Income Breakdown

- Residents of low income households comprise approximately 32 percent of Californians.
- 50 percent of Californians live in households earning over 120 percent AMI.

Fig 1. California Income Level Composition

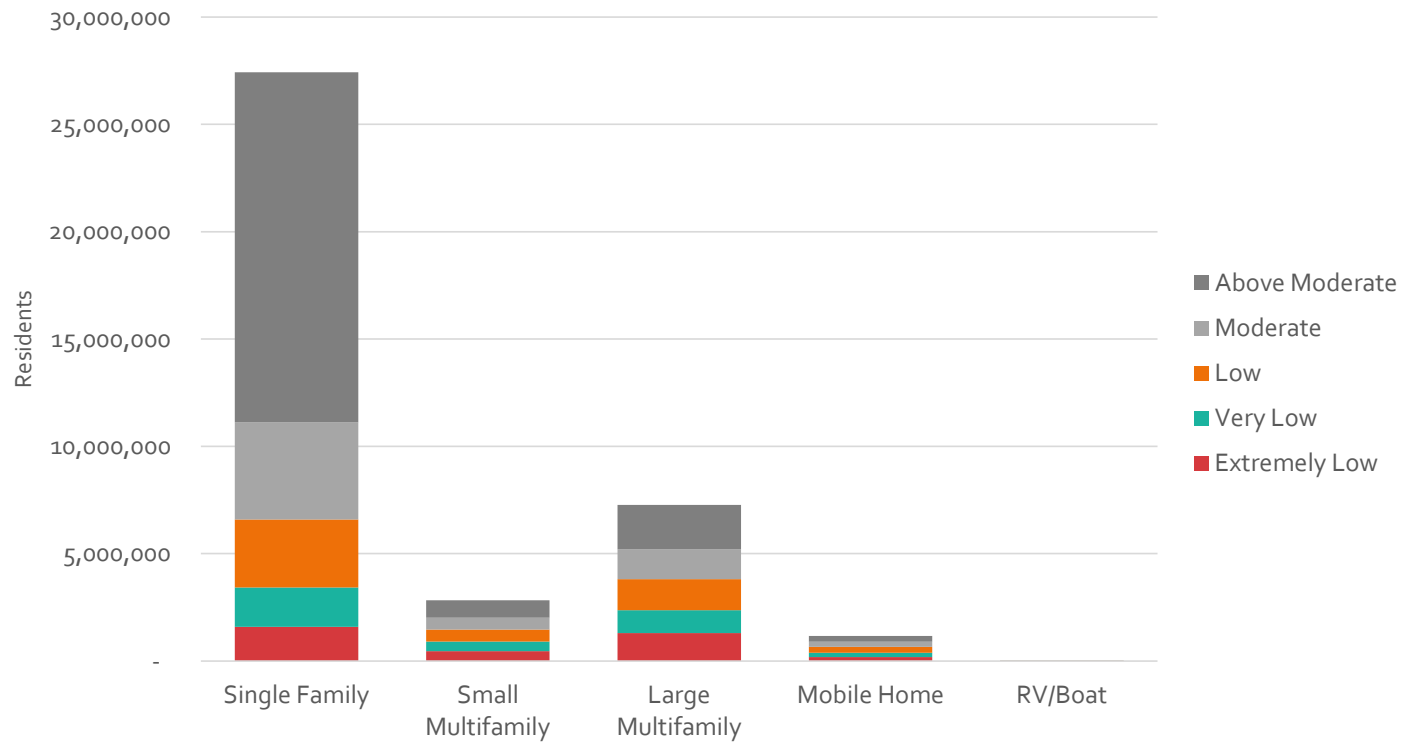
Extremely Low Very Low Low Moderate Above Moderate



Building Type (1/2)

- Low income families disproportionately occupy small and large multifamily buildings, as well as mobile homes, RVs, and boats.

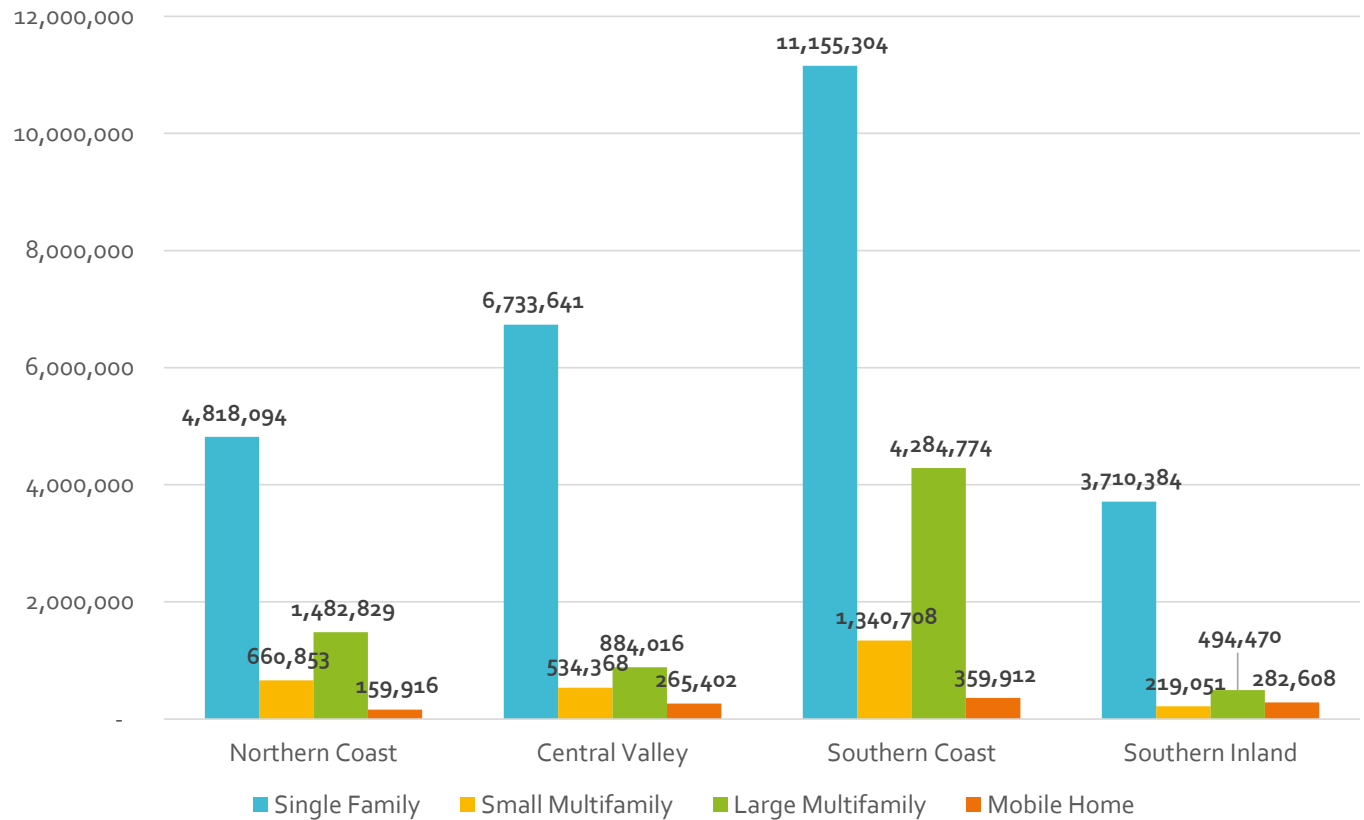
Fig 2. Building Type By Household Income Level



Building Type (2/2)

- Coastal regions tend to have a greater proportion of large multifamily residents than inland regions.
- The Central Valley and Southern Inland regions are heavily populated by residents of single family homes.
- The Southern Inland region is characterized by a notably large proportion of mobile home residents.

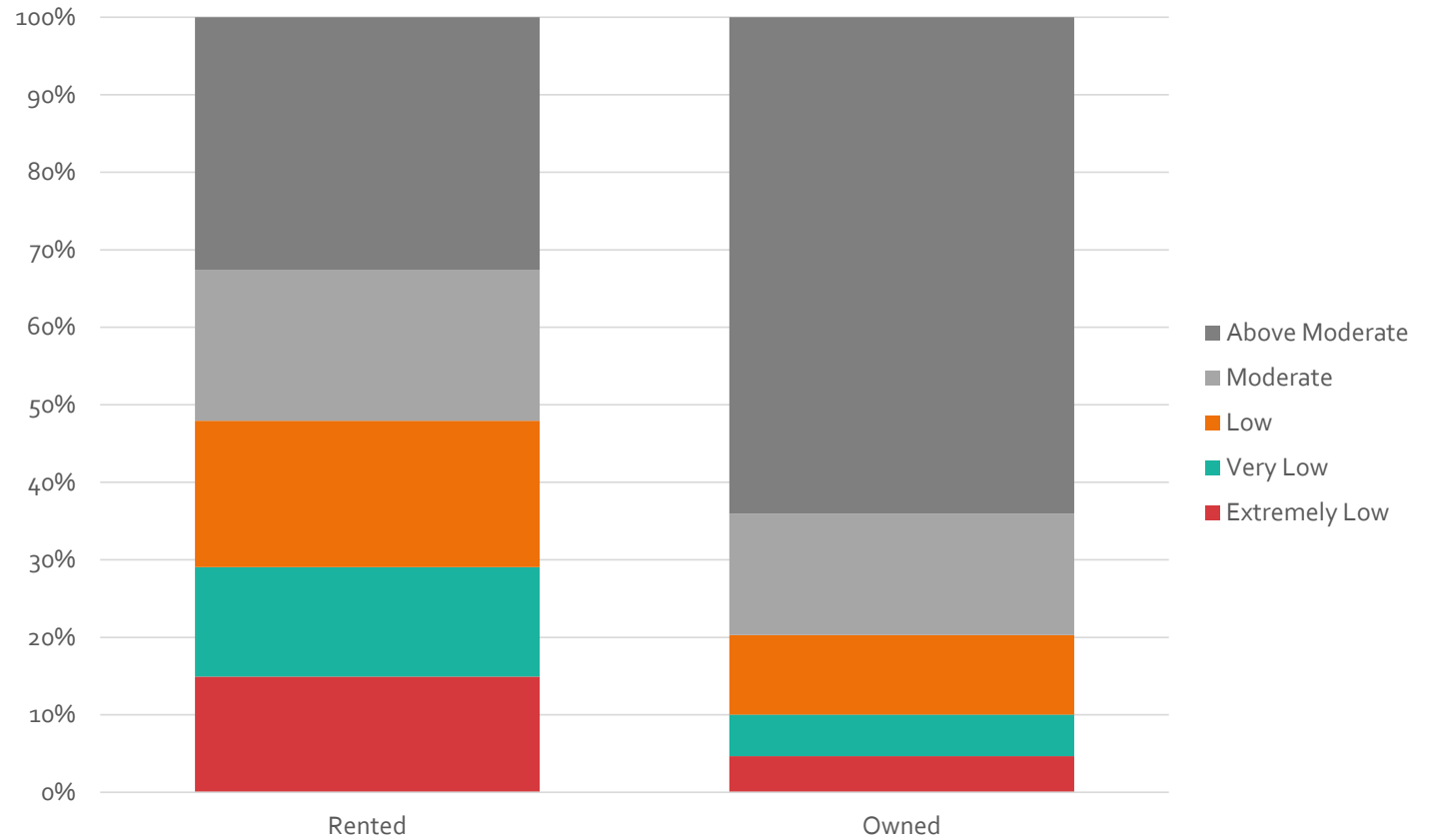
Fig 3. Climate Zone Composition By Building Type



Tenure (1/2)

- Occupancy of rental units is split evenly between moderate/high income household residents, and low income household residents.
- Only 20 percent of owned-unit occupants are low income.

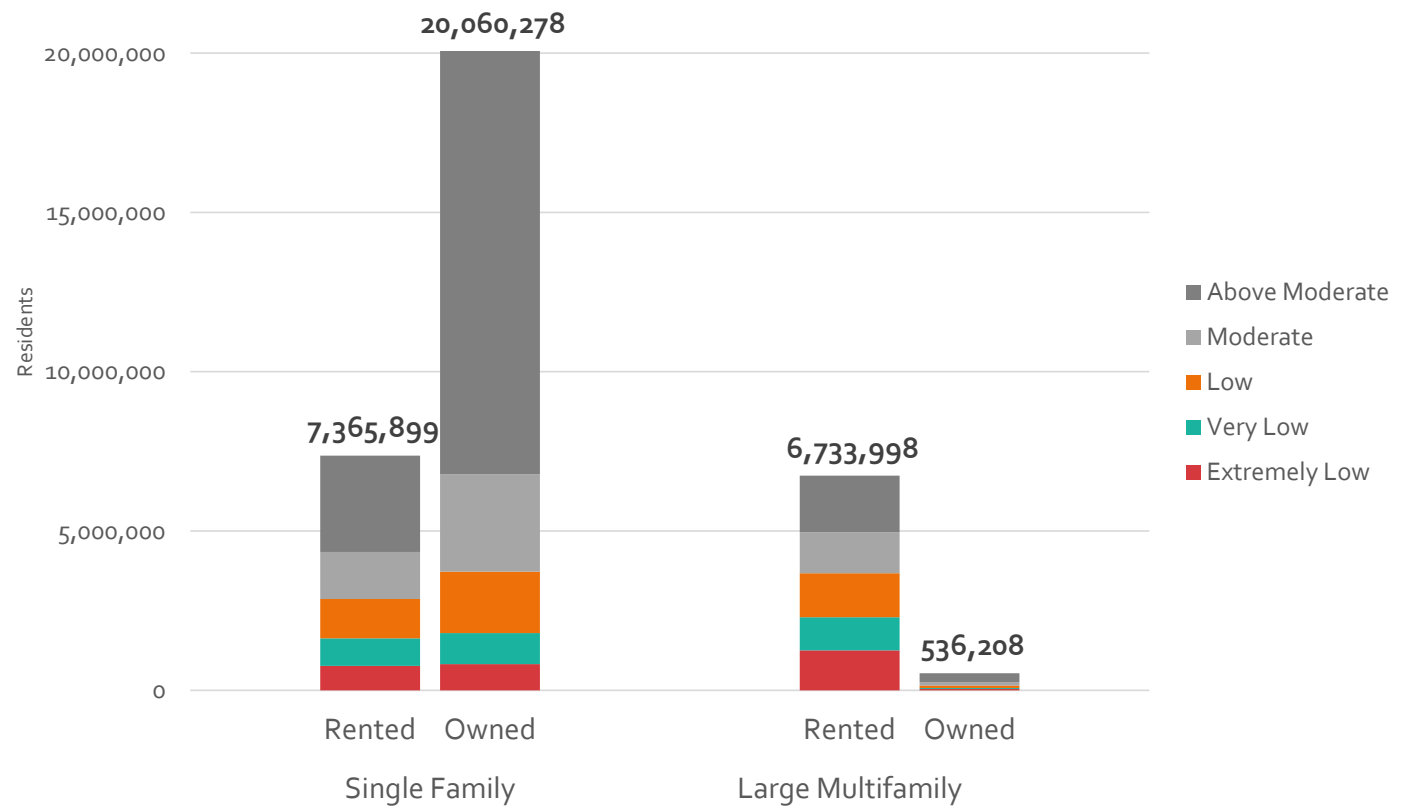
Fig 4. Tenure Status By Income Level



Tenure (2/2)

- Single family occupants across all income levels are likelier to be owners than renters.
- 3.7 million low income Californians are occupants of single family homes that are owned by someone in their household.

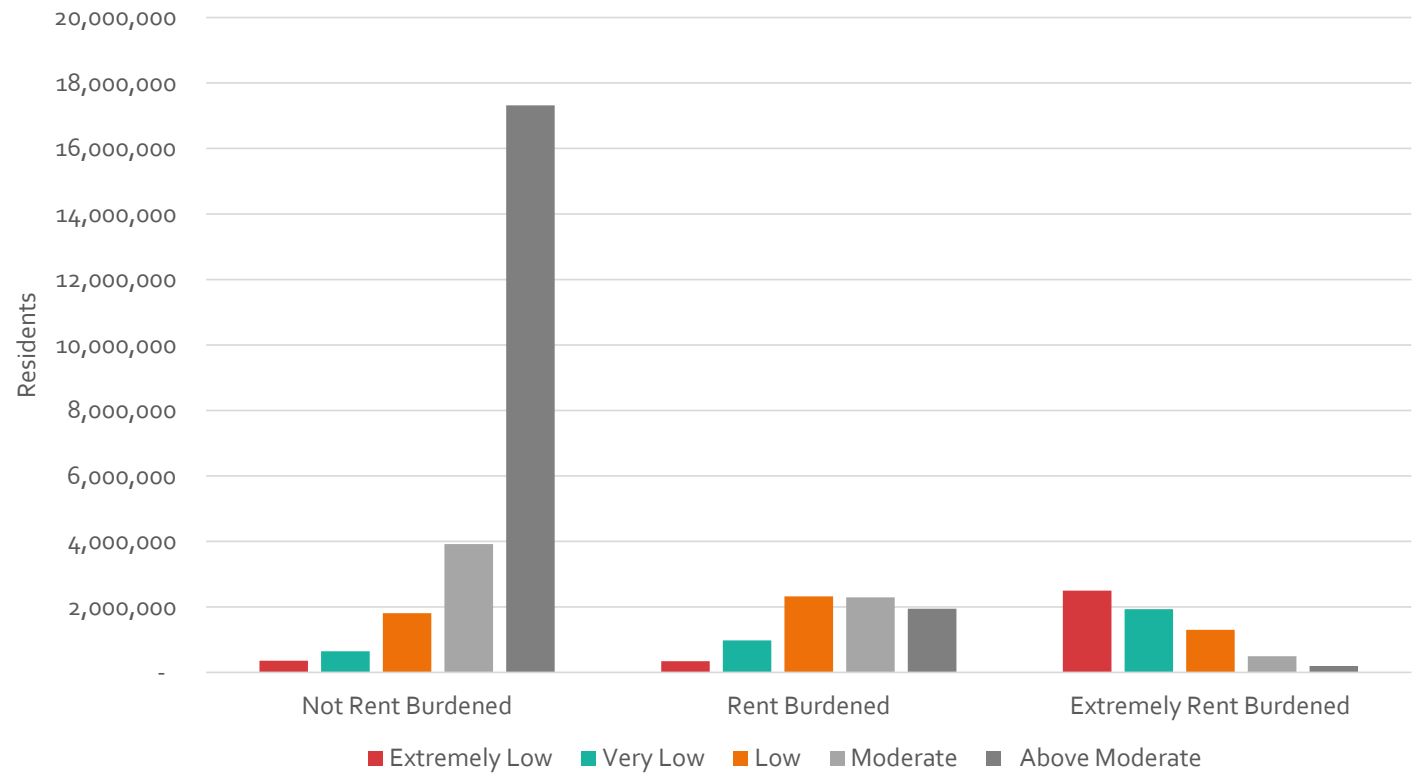
Fig 5. Tenure Status of Single Family & Large Multifamily Occupants



Rent Burden

- The combination of California’s high cost of living and the shortage of affordable housing has contributed to the very high proportion of California residents who are considered rent burdened, devoting over 30 percent of their annual income to rent and owner costs.
- 37 percent of Californians (approx. 14 million people) live in rent burdened and extremely rent burdened households.
- Being low income increases the likelihood of rent burden to 77 percent.

Fig 6. Rent Burden By Income Level



Note: The above statistics on rent burdens do not account for the 350,357 individuals in households with no income.

Energy Costs

- IPUMS data on energy costs provides insight into how Californians' energy expenditures are packaged and distributed.
- The vast majority of Californians pay separate electric and gas bills.
- 19 percent of Californians make gas and utility payments to the same LSE.
- 3 percent of Californians pay their energy expenses through their rent or condo fees

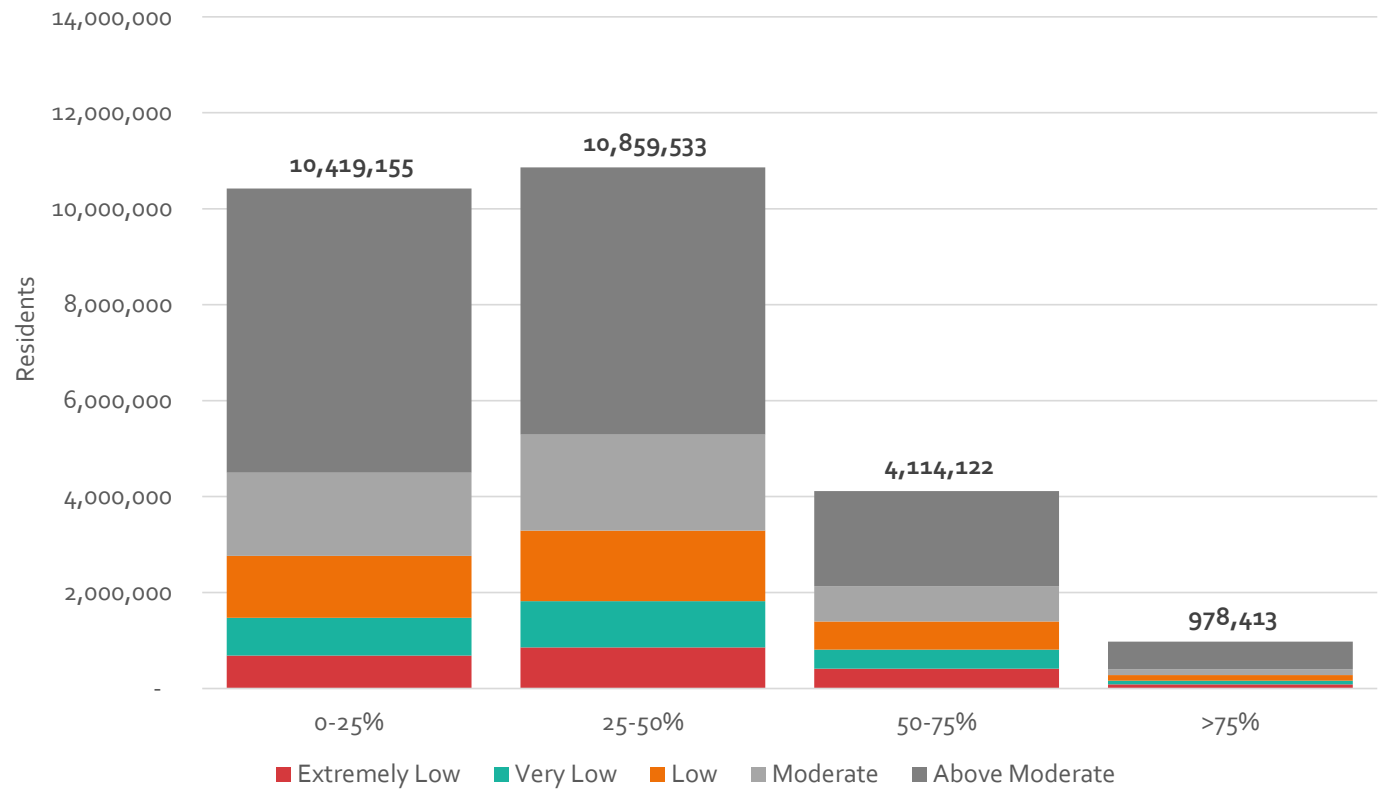
SUMMARY STATISTICS ON ENERGY COSTS

Electricity Costs	Electricity charge included in rent/condo fee	990,134	3%
	Electricity charge paid separately	37,300,818	96%
	No charge/no electricity used	440,243	1%
Gas Costs	Gas included in electricity payment	7,402,253	19%
	Gas charge included in rent/condo fee	1,327,399	3%
	Gas charge paid separately	25,941,251	67%
	No charge/no gas used	4,060,292	10%
Additional Heating Fuel Costs	Fuel charge included in rent/condo fee	138,797	0.4%
	Fuel charge paid separately	1,176,618	3%
	Do not use heating fuels	37,415,780	97%

Heating Fuel Cost Ratio

- Shares of energy costs devoted to heating fuel are fairly equal across household income brackets.
- Nearly 1 million Californians live in households that devote over 75 percent of their energy spending to heating fuels.

Fig 7. Heating Fuel Cost Ratio By Income Level



Note: The above statistics on energy-related cost burdens do not account for households with no energy expenditures, or who pay for their energy through rent/condo fees.

Section IV

A Deeper Dive Into Low Income Households

Low Income Households (1/2)

Low Income Study Population

- This section will examine the household experiences of California's low income population, which refers to those categories under Low Income, Very Low Income, and Extremely Low Income categories.
- There are about **12,558,940 Californians** living in low-income households, which will represent the study population in this section.

Extremely Low Income	30 Percent AMI or Less
Very Low Income	31-50 Percent AMI
Low Income	51-80 Percent AMI
Moderate Income	81-120 Percent AMI
Above Moderate Income	>120 Percent AMI

Low Income Households (2/2)

- Most low income Californians live in single family homes.
- Low income families largely occupy climate zones where space cooling needs (and summer electricity loads) are high.
- A cumulative 77 percent of low income Californians live in rent burdened or extremely rent burdened households.

Fig 8. Low Income Occupancy By Building Type

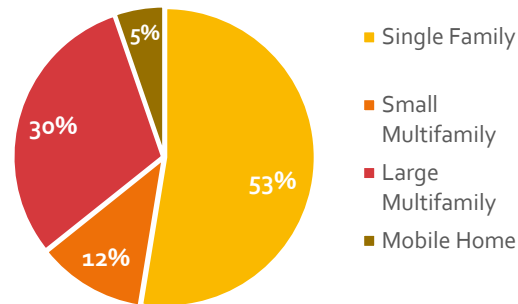


Fig 9. Low Income Occupancy By Climate Zone

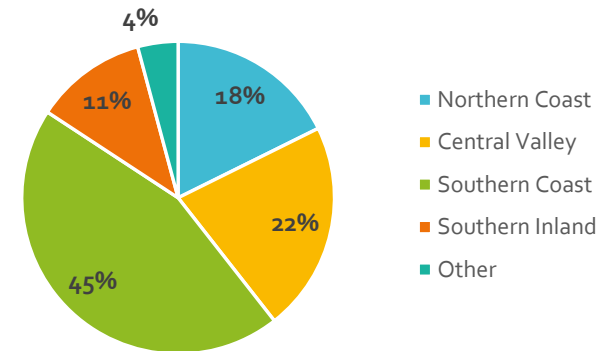


Fig 10. Low Income Occupancy By Tenure Status

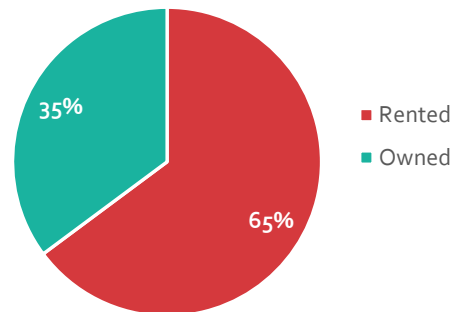
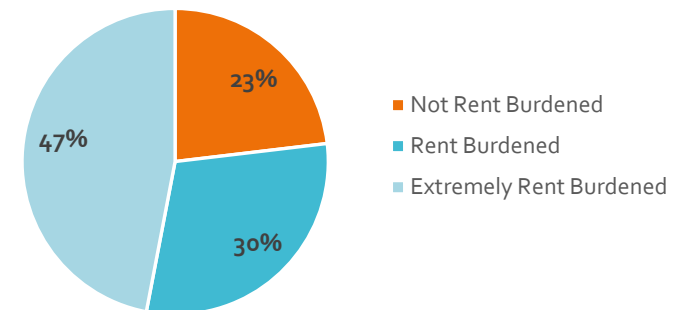


Fig 11. Low Income Occupancy By Rent Burden

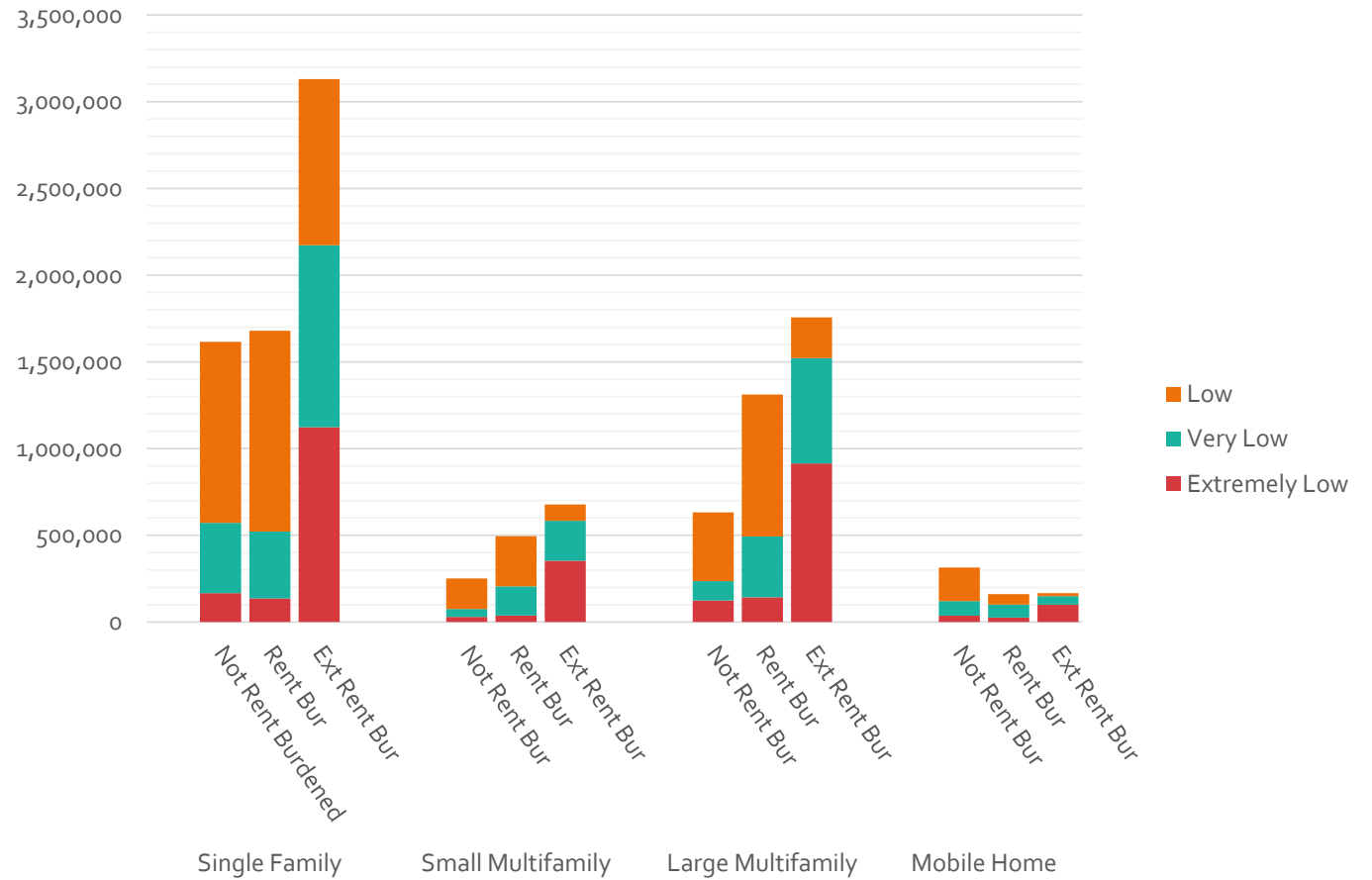


Rent Burden

- Across building types, low income Californians are 3x more likely to live in rent burdened households than in non-rent burdened households.

Rent Burden	LI Residents
Not Rent Burdened	2,813,267
Rent Burdened & Extremely Rent Burdened	9,378,474

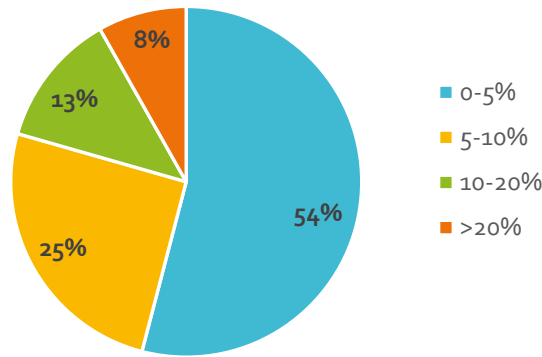
Fig 12. Rent Burdened Low Income Californians Across Building Types



Energy Spending

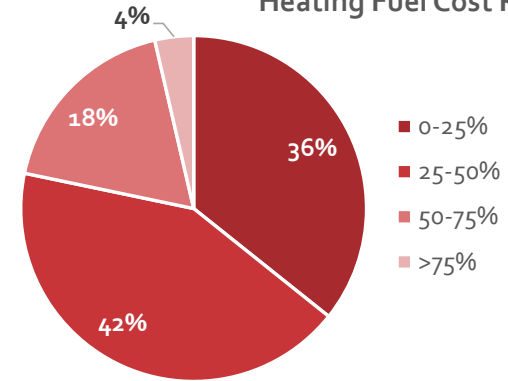
- Low income households largely spend a very small proportion of their income on energy costs.
- Approx. 7 million low income Californians live in households that use heating fuels and pay for them independently of their other housing expenditures.
- Of those 7 million, 22% devote the majority of their energy spending to heating fuels.

Fig 13. Low Income Occupancy By Energy Cost Burden



Low Income Residents & Share of Income Devoted to Energy Costs	
0-5%	6,275,330
5-10%	2,944,388
10-20%	1,437,135
20-30%	950,153

Fig 14. Low Income Occupancy By Heating Fuel Cost Ratio



Low Income Residents & Share of Energy Spending Devoted to Heating Fuels	
0-25%	2,762,176
25-50%	3,291,229
50-75%	1,399,114
>75%	280,370

Note: The above statistics on energy-related cost burdens do not account for the 350,357 individuals in households with no income and the 951,934 individuals whose energy expenditures are either zero or incorporated into their rent/condo fees.

Energy Costs

- Low income Californians do not differ significantly in the nature of their energy expenditures from the overall population.
- Low income households largely pay separate electricity and gas bills, and few use heating fuels such as propane or wood.

LOW INCOME HOUSEHOLD ENERGY COSTS				OVERALL CA %
Electricity Costs	Elec charge included in rent/condo fee	607,469	5%	3%
	Electricity charge paid separately	11,794,574	94%	96%
	No charge/no electricity used	156,897	1%	1%
Gas Costs	Gas included in electricity payment	2,307,340	18%	19%
	Gas charge included in rent/condo fee	735,318	6%	3%
	Gas charge paid separately	7,606,463	61%	67%
	No charge/no gas used	1,909,819	15%	10%
Additional Heating Fuel Costs	Fuel charge included in rent/condo fee	77,618	1%	0.4%
	Fuel charge paid separately	313,075	2%	3%
	Do not use heating fuels	12,168,247	97%	97%

Energy Cost Burden

- Regardless of housing type, most Californians live in households that devote 5 percent or less of household income to energy expenditures.
- As income decreases, likelihood of living in a more energy cost burdened household increases.
- Nearly all households devoting over 20 percent of household income to energy costs are considered Extremely Low Income.

Fig 15. Energy Cost Burden By Building Type & Income Level

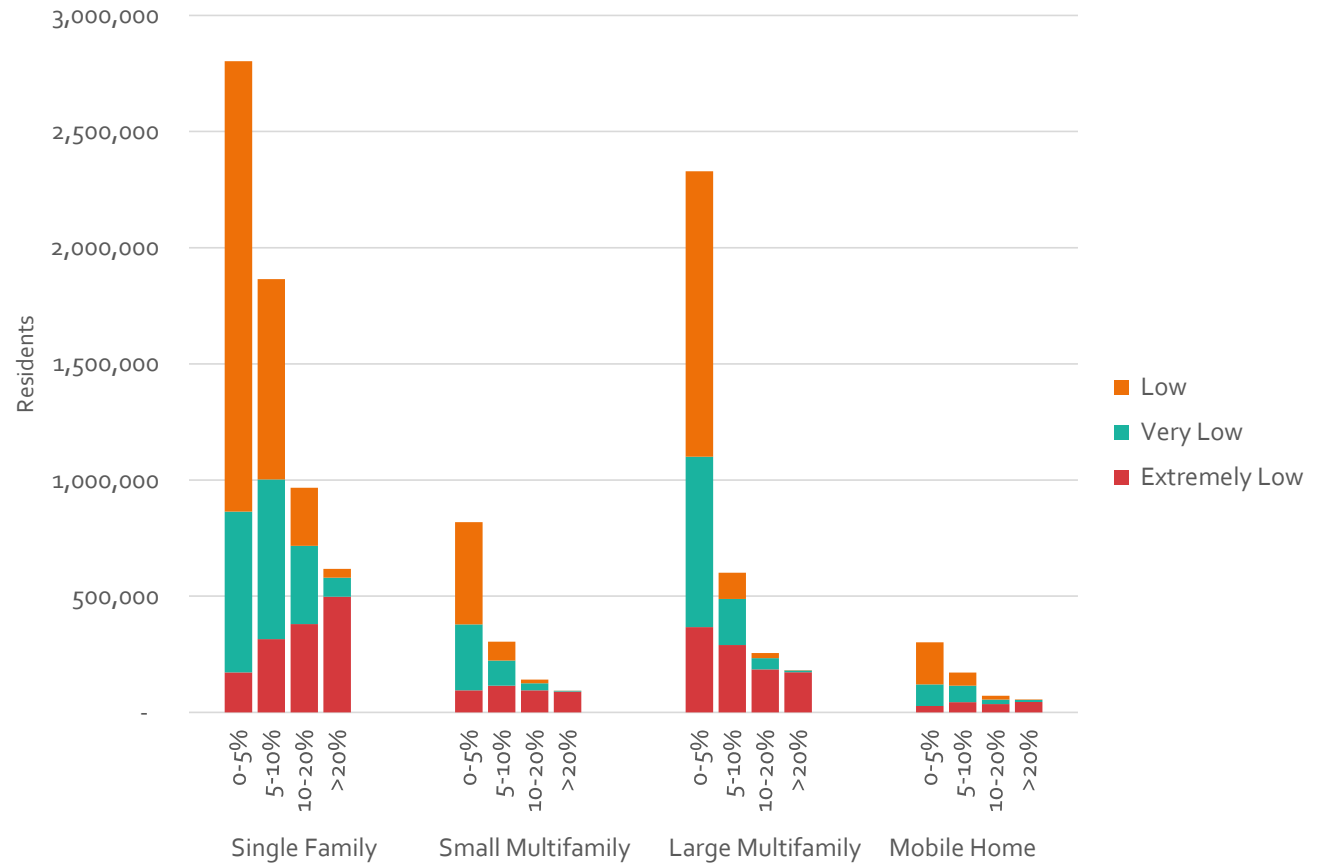
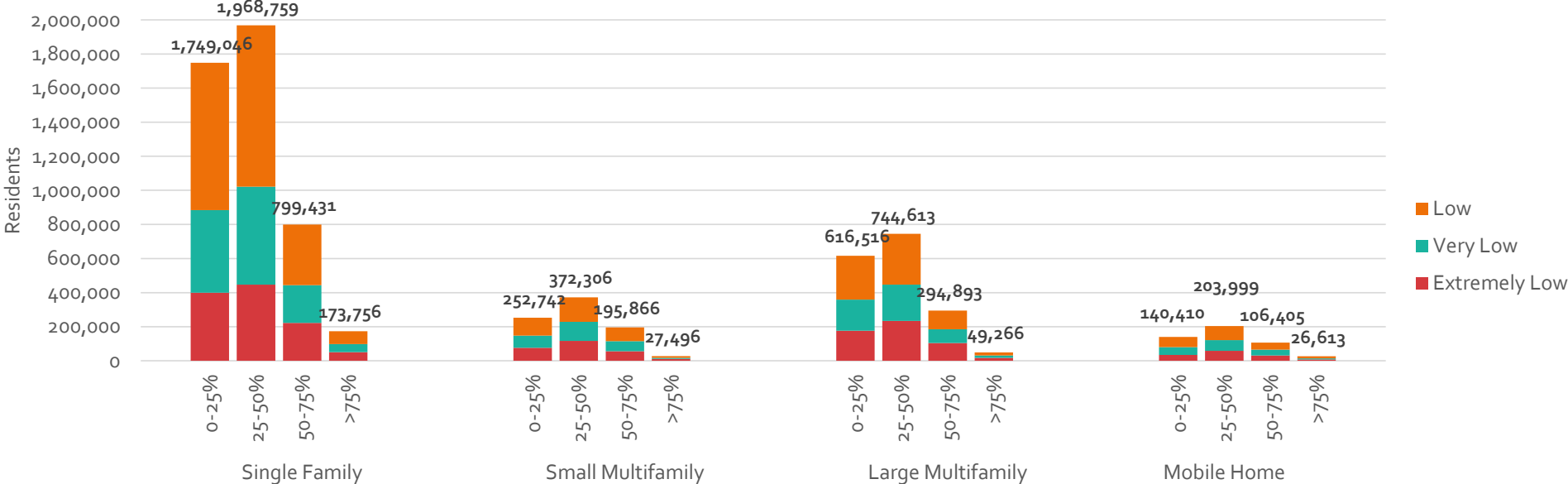


Fig 16. Heating Fuel Cost Ratio Across Building Type & Income Levels



Heating Fuel Cost Ratio

- Most low income Californians spend under 50 percent of their energy budget on heating fuels.
- A cumulative 277,131 low income Californians live in households that dedicate over 75% of their energy budgets on heating fuels.
- This chart largely encompasses residents that pay a gas bill separately from their electric bill.

Climate Zones

- Low income Californians are most concentrated in the Southern Coast climate zone, which is largely served by Southern California Edison.

Fig 17. Distribution of Low Income Californians Across Climate Zones

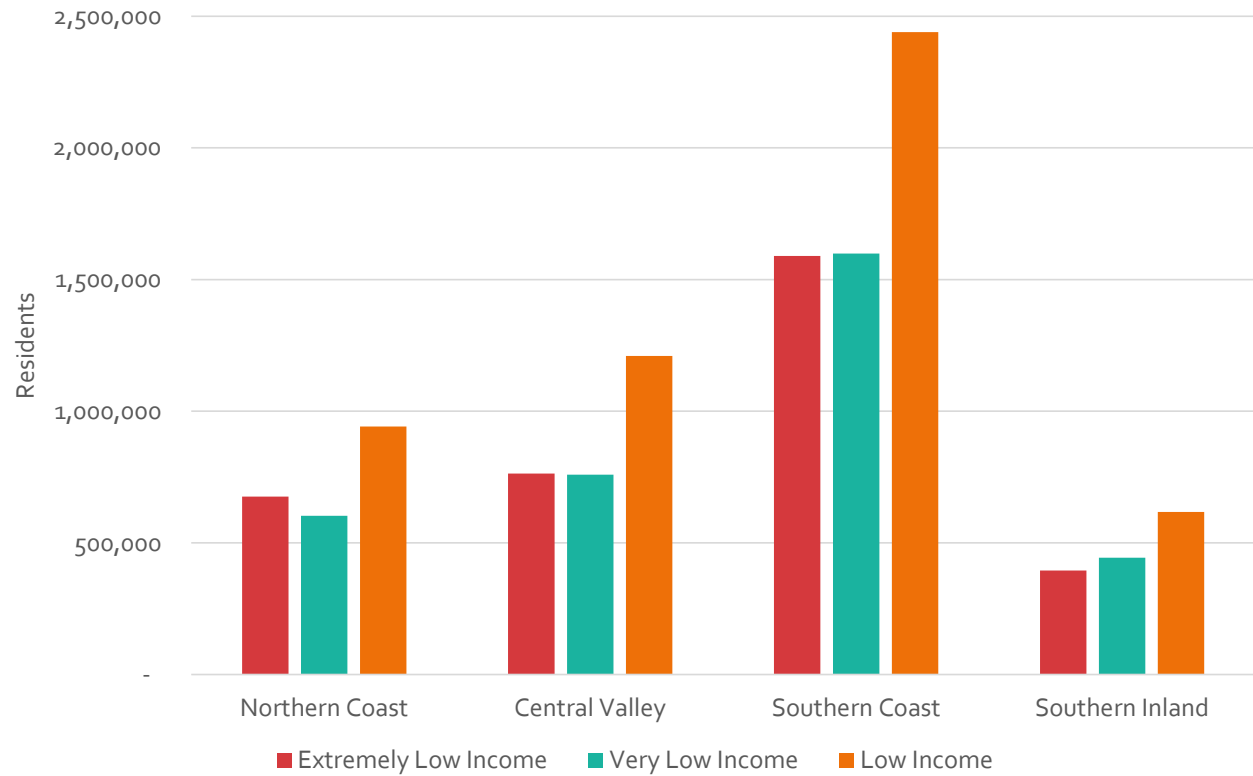
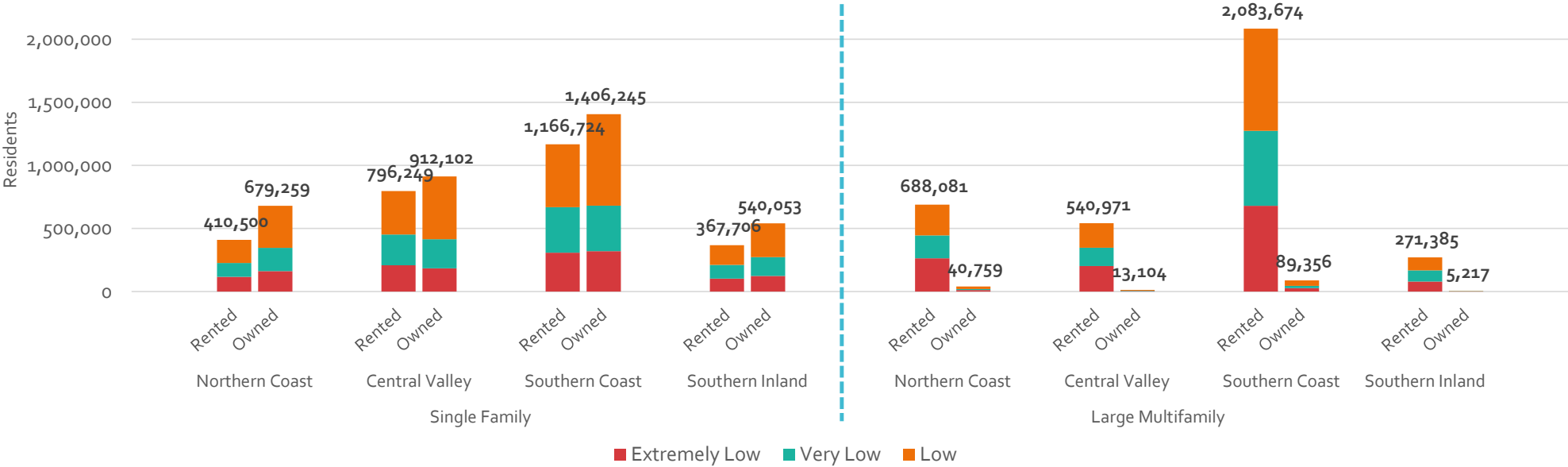


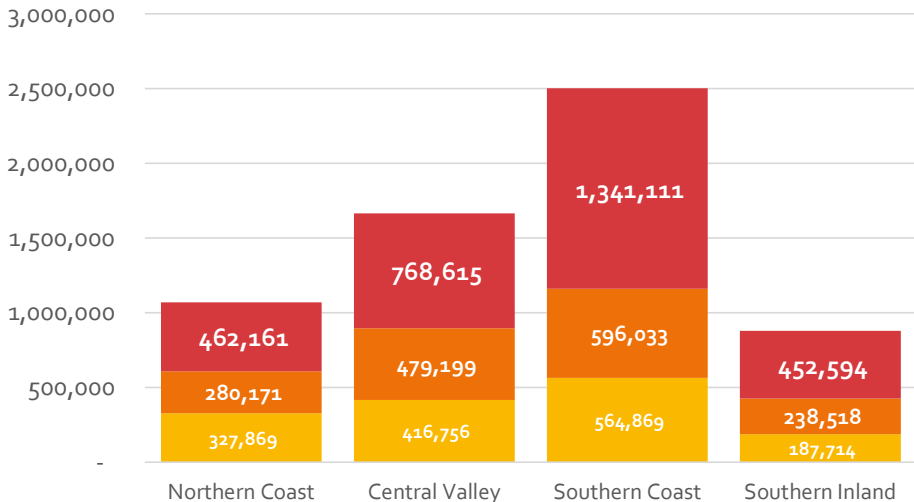
Fig 18. Tenure Status: Low Income Residents of Single Family & Large Multifamily Buildings



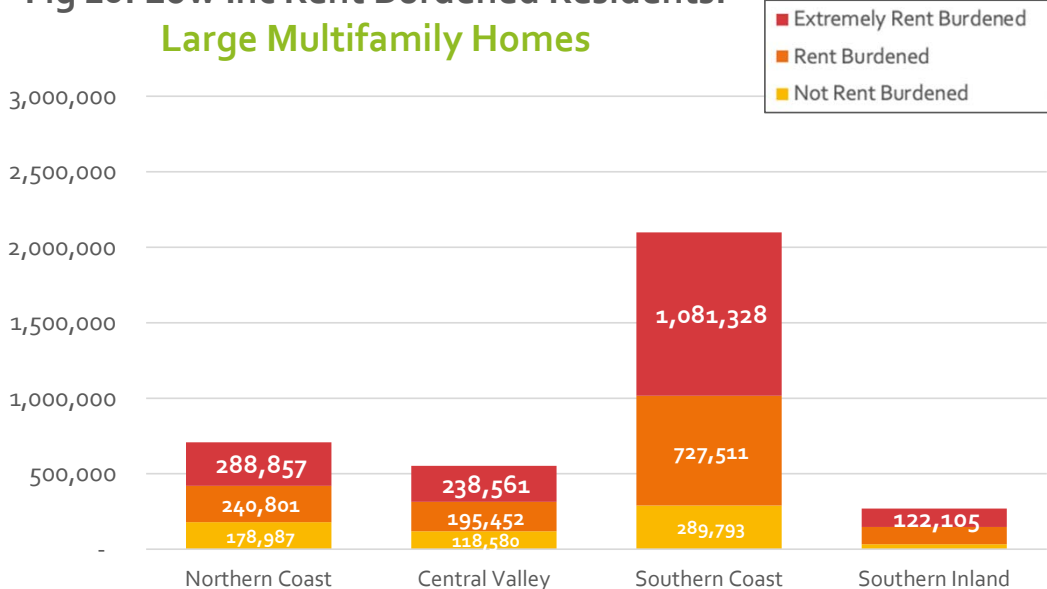
Tenure

- Single family residents in the Northern Coast region appear slightly less likely to be renters than those in other regions.
- Most low income residents of large multifamily buildings are located in the Southern Coast region, and are overwhelmingly renters.

**Fig 19. Low Inc Rent Burdened Residents:
Single Family Homes**



**Fig 20. Low Inc Rent Burdened Residents:
Large Multifamily Homes**



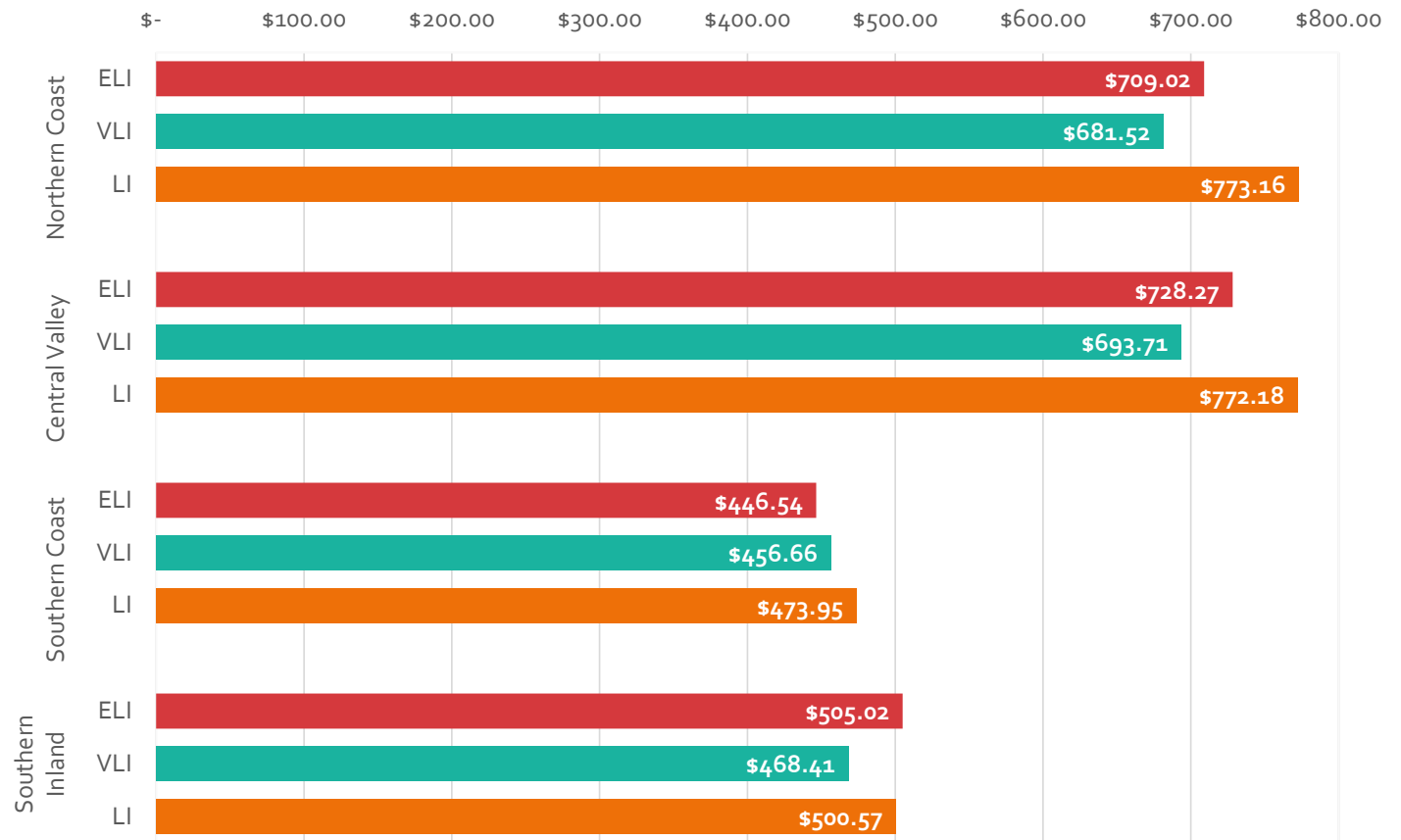
Rent Burden: Single Family vs Large Multifamily

- In the Northern Coast and Central Valley regions, residents of single family and large multifamily households experience approximately equal levels of rent burden.
- In Southern California, however, a slightly greater percentage of large multifamily residents are rent burdened, compared to single family residents.

Average Heating Fuel Spend

- Households in Northern California and the Central Valley spend more, on average, than households in Southern California.

Fig 21. Average Annual Heating Fuel Spend by Climate Zone



Note: The above statistics on average heating fuel spending only account for households that pay their gas bills independently of their electricity bills (as in Southern California Edison's service territory) and/or heat their homes using some other heating fuel (propane, wood, etc).

Heating Fuel in SoCal Households

- Residents of the Southern Coast and Southern Inland regions spend \$2.9B annually on heating fuels, which combine gas utility expenses and other heating fuels like propane and wood.

Southern Coast Households: 5.8 Million

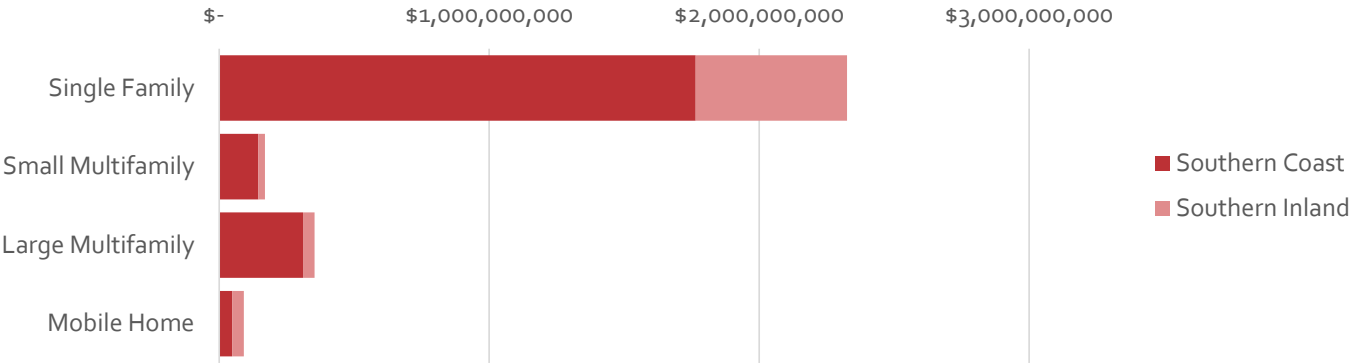
Southern Inland Households: 1.4 Million

Southern California Households:
7.2 Million

Fig 22. Net Annual Southern CA Heating Fuel Spend



Fig 23. Southern CA Heating Fuel Spend By Building Type



Note: The above statistics on heating fuel spending only account for households that pay their gas bills independently of their electricity bills (as in Southern California Edison's service territory) and/or heat their homes using some other heating fuel (propane, wood, etc).

Heating Fuel in Low Income SoCal Households (1/2)

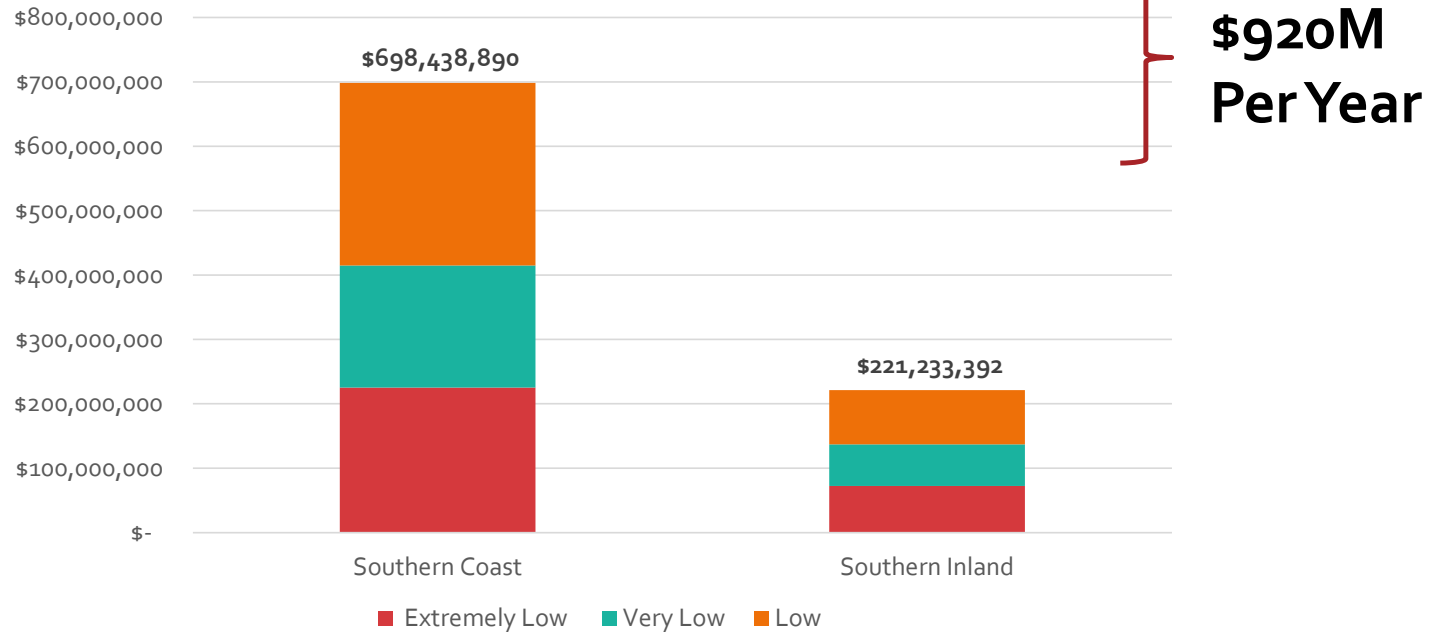
- Low income households of the Southern Coast and Southern Inland regions spend \$920M annually on heating fuels.
- Although low income households comprise about 39% of the total population of Southern California, they only comprise about 31% of the region's aggregate spending on heating fuels.

Low Income Southern Coast Households: 2.3M

Low Income Southern Inland Households: 0.5M

Low Income SoCal Households:
2.8 Million

Fig 24. Annual Low Income Southern CA Heating Fuel Spend



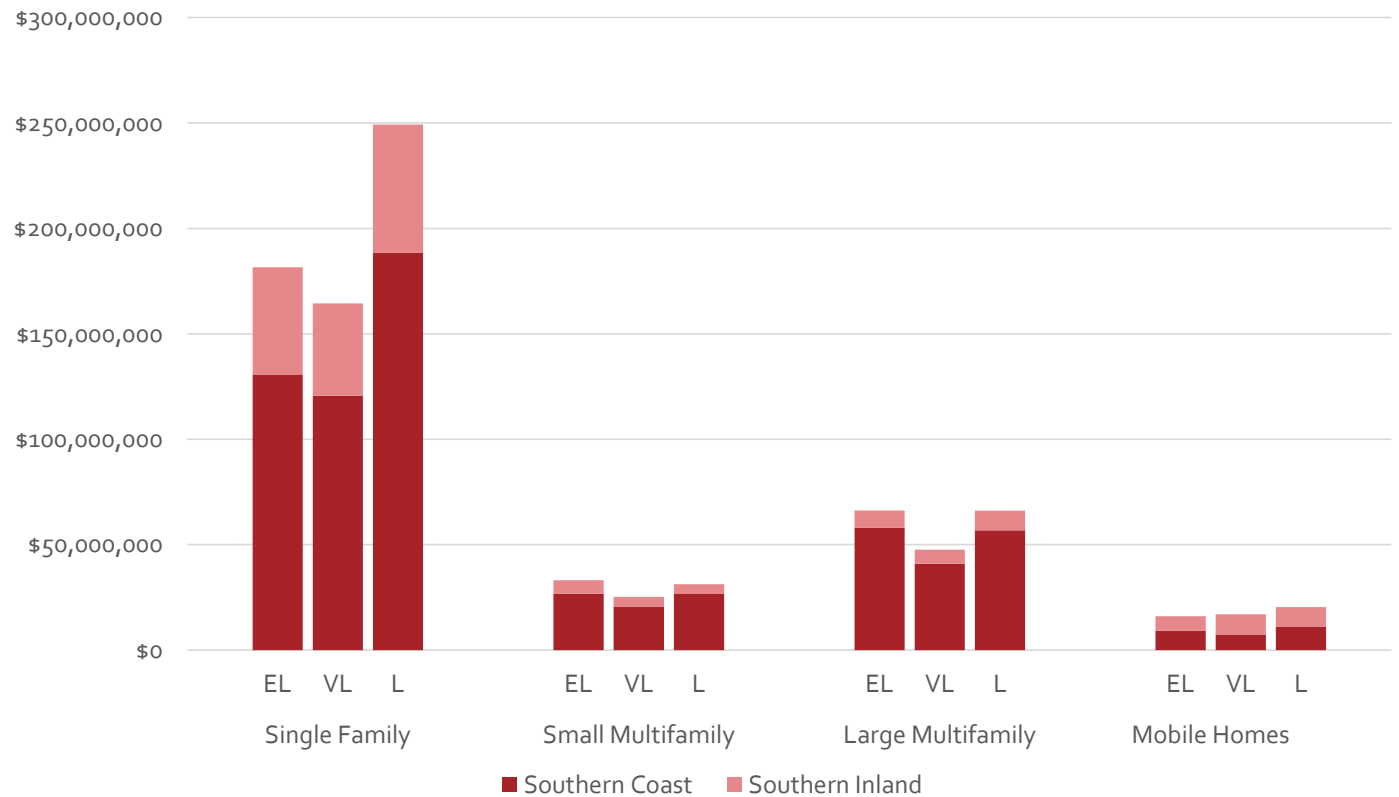
Note: The above statistics on heating fuel spending only account for households that pay their gas bills independently of their electricity bills (as in Southern California Edison's service territory) and/or heat their homes using some other heating fuel (propane, wood, etc).

Heating Fuel in Low Income SoCal Households (2/2)

- Of the \$920M annually spent on heating fuels by low income households in Southern California, most spending comes from households in single family homes.

Building Type	Total Annual Spend
Single Family	\$ 2,325,585,358
Small Multifamily	\$ 169,220,362
Large Multifamily	\$ 353,386,158
Mobile Home	\$ 91,468,334

Fig 25. Annual Low Income Southern CA Heating Fuel Spend By Building Type



Building electrification efforts in California can **center low income residents** by directly addressing their material conditions and housing needs, with major potential impacts.

OPPORTUNITY	IMPACT
Extremely low income, extremely rent burdened Californians	2.5 Million People
Low income multifamily renters in Southern California	2.3 Million People
Low income single family homeowners in Southern California	1.9 Million People
Low income households spending >50% of their energy expenditures on heating fuel	1.7 Million People
Households spending >20% of income on energy expenses	1 Million People
Low income single family homeowners in the Central Valley	0.9 Million People

Opportunities at the Intersection of Affordable Housing & Building Decarb

Thank You

Olivia Ashmoore

Eva Lyubich

Lindsay Rosenfeld

Srinidhi Sampath

Eddie Sun

William Wilcox

IPUMS CITATION

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Extremely Low Income & Extremely Rent Burdened in California: A Brief Portrait

Data on Californians in Precarious Housing

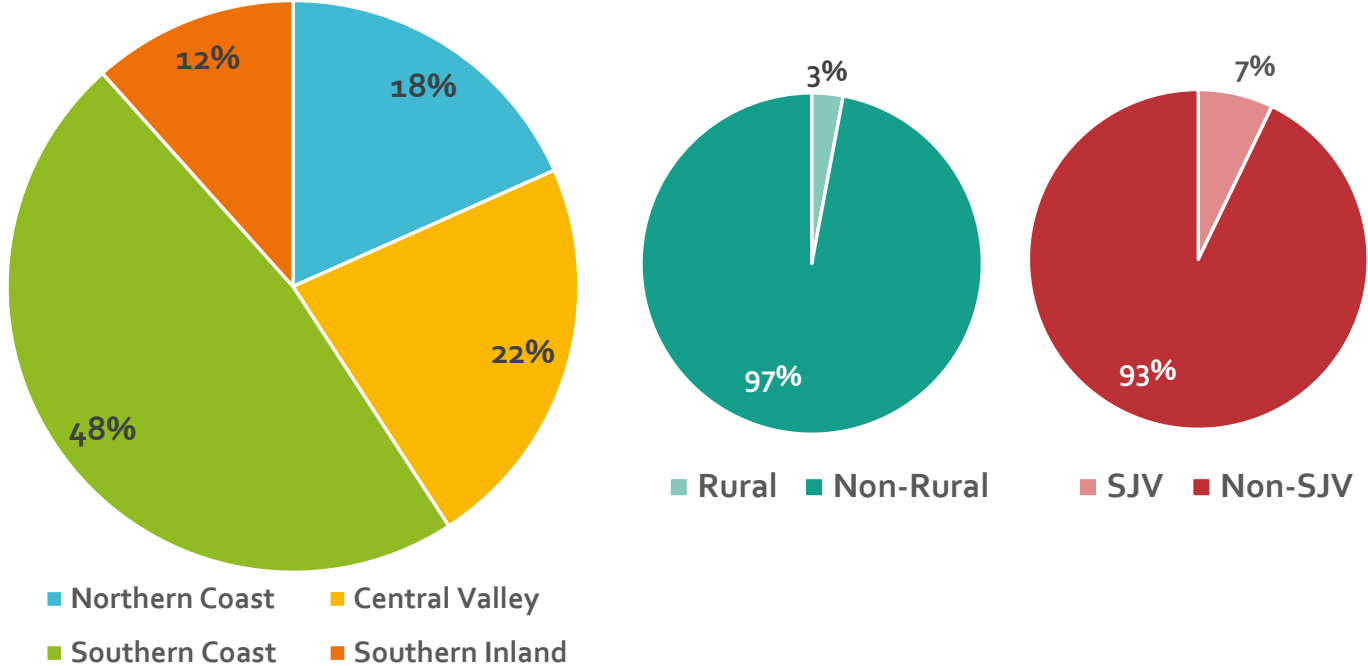
- Household Income = Less Than 20% Area Median Income
- At Least 50% of Household Income Devoted to Rent

Extremely Low Income & Extremely Rent Burdened Californians (1/3)

- Nearly half of ELI & ERB household residents are located in the Southern Coastal counties of Los Angeles, Orange, San Diego, and Ventura.
- ELI & ERB residents are heavily concentrated in Southern and Inland regions, where air conditioning needs tend to be higher.

Approximately **2.5 million Californians** live in **Extremely Low Income** households that dedicate **at least 50 percent** of annual household income to housing expenses.

Where are these households located?



Extremely Low Income & Extremely Rent Burdened Californians (2/3)

- ELI & ERB residents are approximately evenly split among single family and multifamily buildings.
- While the vast majority of ELI & ERB residents live in rented homes, over 600,000 live in owner-occupied homes.

Fig 26. ELI & ERB Occupancy By Building Type

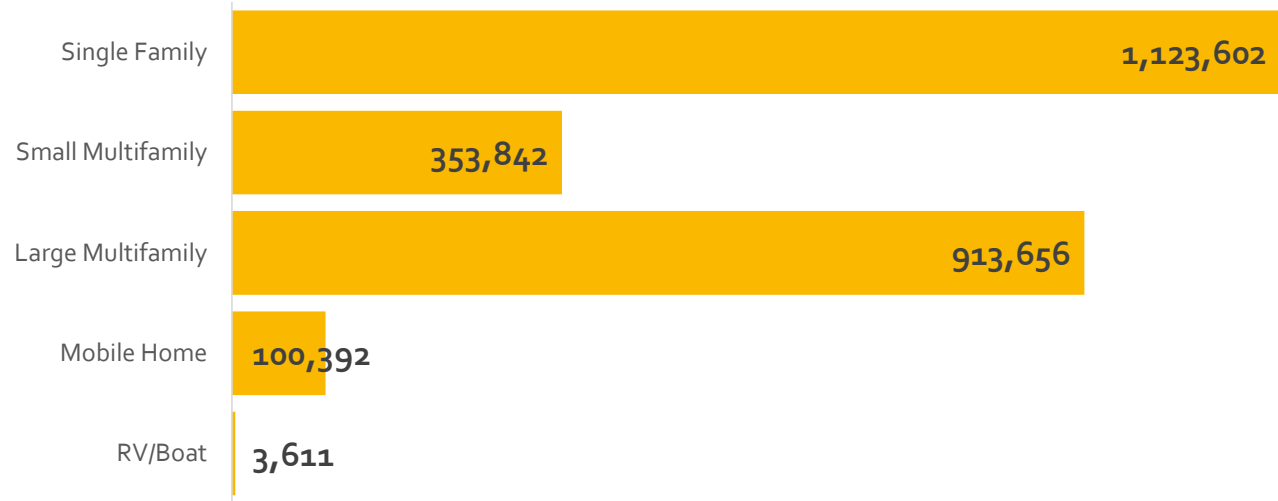
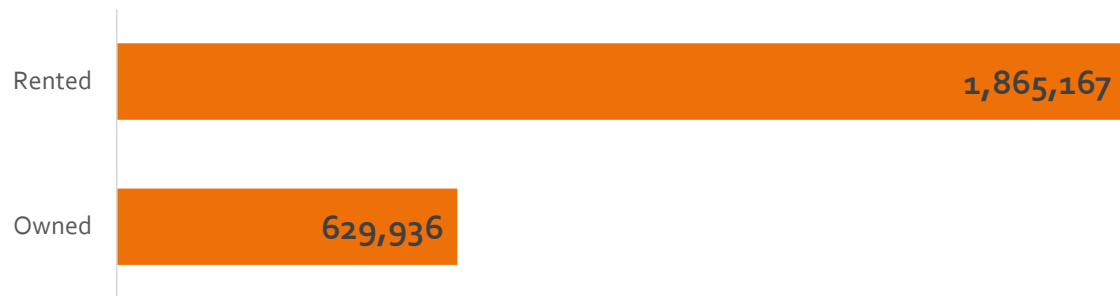


Fig 27. ELI & ERB Occupancy By Tenure



Extremely Low Income & Extremely Rent Burdened Californians (3/3)

- Over 700,000 ELI & ERB Californians live in households that dedicate over 20% of income to energy costs.
- For nearly 350,000 ELI & ERB Californians, heating fuels (including gas, propane, and wood) account for more than half of energy costs.

Fig 28. ELI & ERB Energy Cost Burden

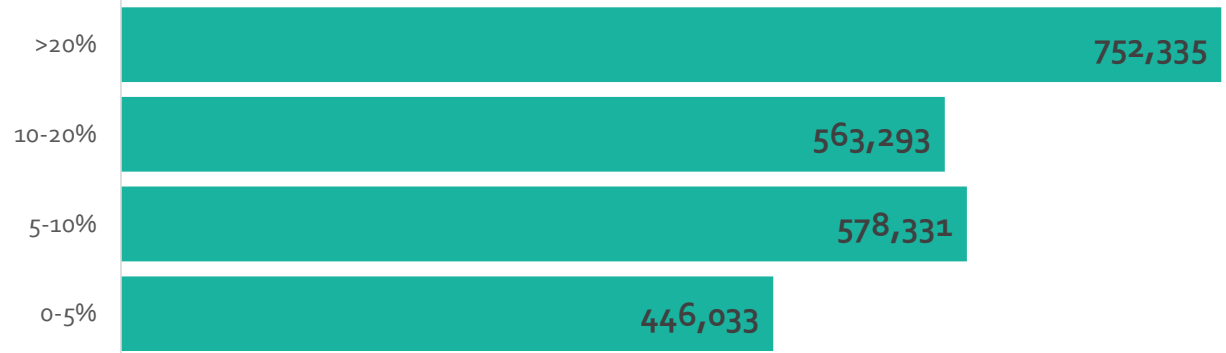
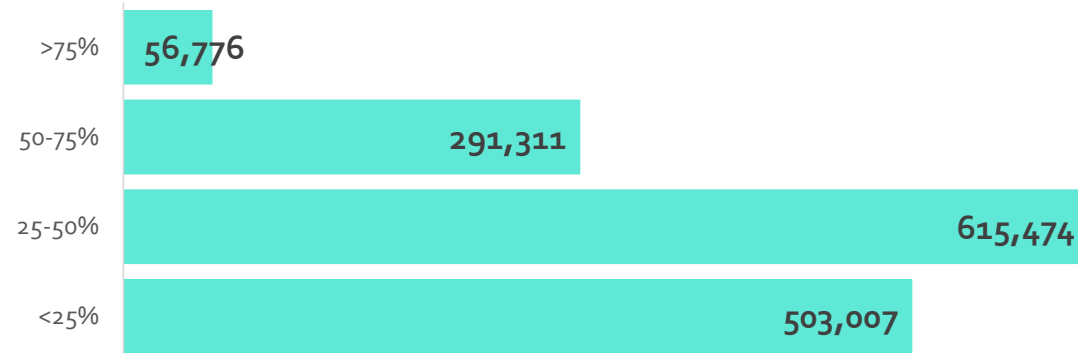


Fig 29. ELI & ERB Heating Fuel Cost Ratio



Affordable Housing in the San Joaquin Valley

San Joaquin Valley Counties

San Joaquin

Kings

Stanislaus

Merced

Fresno

Madera

Tulare

Kern

The San Joaquin Valley's Housing Stock

- There are approximately **2.8 million people** living in the counties encompassed by the San Joaquin Valley, amounting to **7 percent of California's population**.
- SJV residents are more likely than the average Californian to live in a single family home.
- SJV residents devote a larger portion of their incomes to energy expenditures than the average Californian.

SJV: DESCRIPTIVE STATISTICS				OVERALL CA %
Income Level	Extremely Low Income	249,691	9%	9%
	Very Low Income	277,870	10%	9%
	Low Income	415,605	15%	14%
	Moderate Income	478,773	17%	17%
	Above Moderate Income	1,412,646	50%	50%
Building Type	Single Family	2,271,326	80%	71%
	Small Multifamily	201,876	7%	7%
	Large Multifamily	266,842	9%	19%
	Mobile Home	92,491	3%	3%
	RV/Boat	2,050	0.1%	0.1%
Tenure	Rented	1,292,725	46%	44%
	Owned	1,541,860	54%	56%
Rent Burden	Extremely Rent Burdened	1,839,805	16%	17%
	Rent Burdened	525,448	19%	21%
	Not Rent Burdened	445,381	65%	63%
Energy Cost Burden	0-5 Percent	1,871,197	68%	85%
	5-10 Percent	529,718	19%	11%
	10-20 Percent	246,940	9%	4%
	>20 Percent	51,916	4%	2%

SJV Low Income Households

- Most low income residents of the San Joaquin Valley live in single family homes.
- A cumulative 75 percent of low income SJV residents are rent burdened or extremely rent burdened.

Fig 30. SJV Low Income Occupancy By Building Type

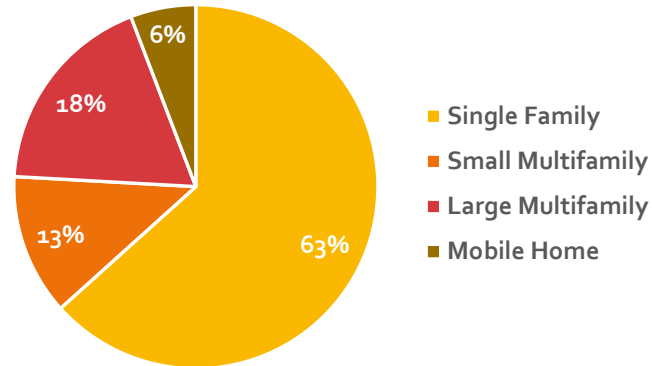


Fig 31. SJV Low Income Occupancy By Tenure

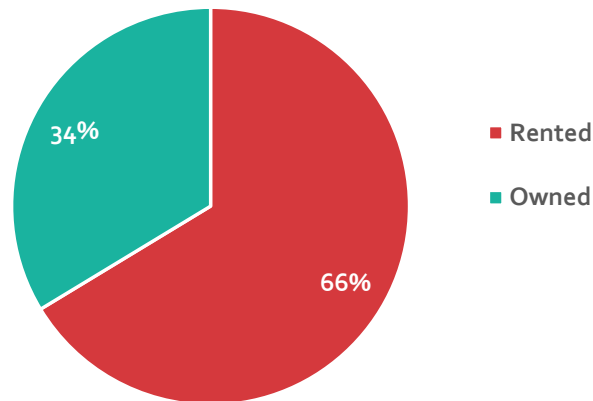
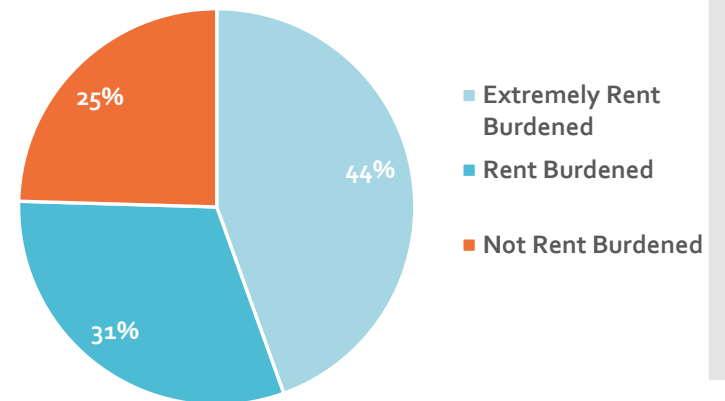


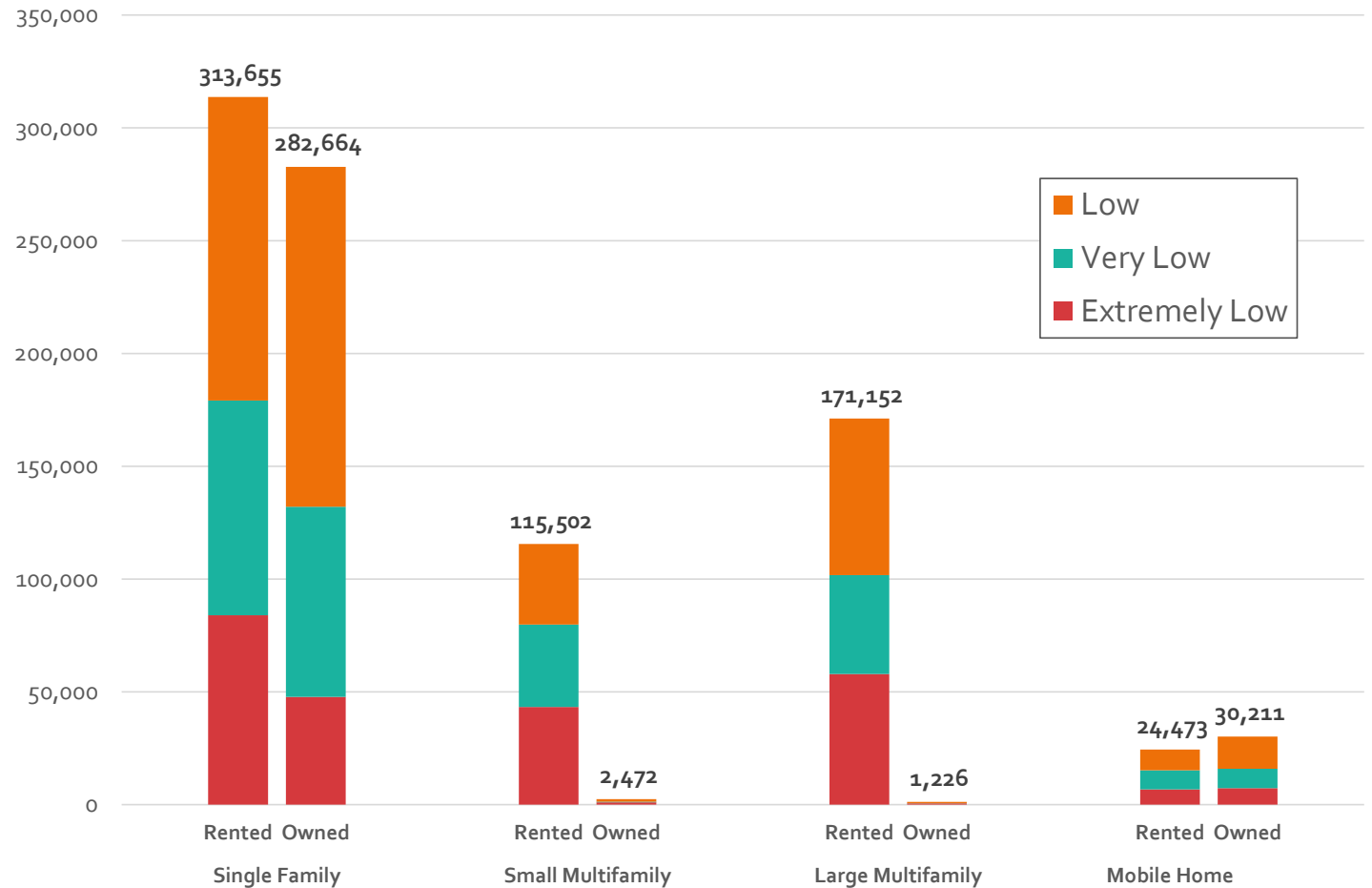
Fig 32. SJV Low Inc By Rent Burden



SJV: Building Type & Tenure

- Low income residents of single family homes in the San Joaquin Valley are nearly evenly split among renters and owners.
- Low income occupants of small and large multifamily buildings in the San Joaquin Valley are overwhelmingly renters, amounting to nearly 300,000 people.

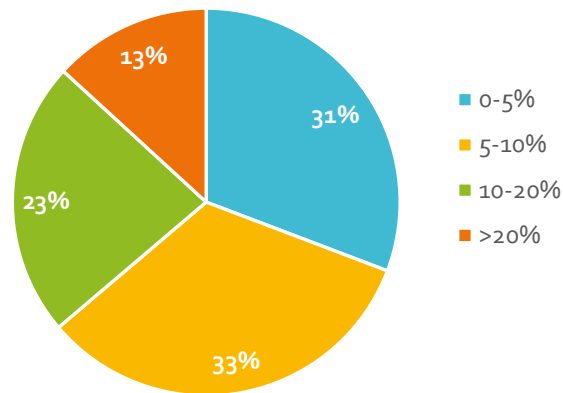
Fig 33. SJV Low Income Tenure & Housing Type



SJV Energy & Heating Fuel Costs

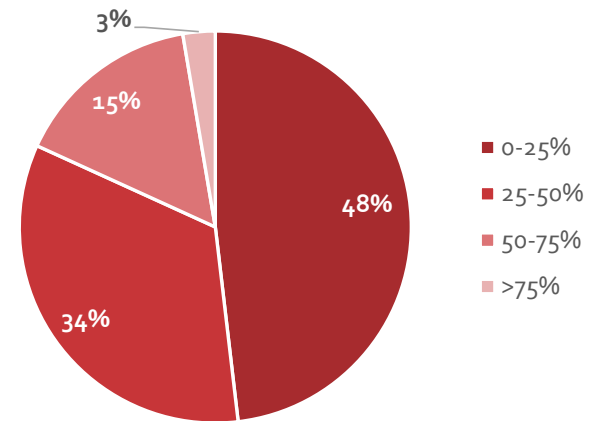
- 13 percent of low income SJV residents spend at least 20 percent of their income on energy costs.
- For most low income SJV residents, heating fuel costs account for a very small portion of household energy spending.

Fig 34. SJV Low Income Occupancy By Energy Cost Burden



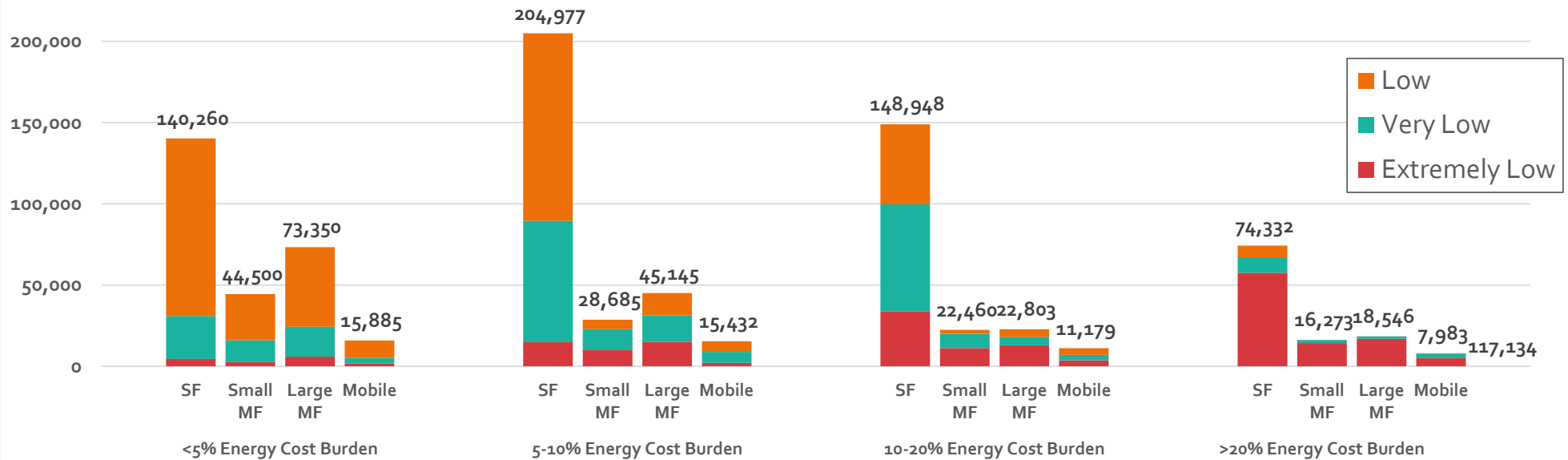
SJV Low Income Residents & Share of Income Devoted to Energy Costs	
0-5%	274,558
5-10%	294,565
10-20%	205,390
20-30%	117,684

Fig 35. SJV Low Income Occupancy By Heating Fuel Cost Ratio



SJV Low Income Residents & Share of Energy Spending Devoted to Heating Fuels	
0-25%	220,028
25-50%	153,967
50-75%	71,002
>75%	12,156

Fig 36. SJV Low Income Energy Cost Burden



SJV: Energy Cost Burden & Building Type

- Over 115,000 people in the San Joaquin Valley live in low income households that dedicate more than 20 percent of income to energy costs, including heating fuels.
- Residents of multifamily buildings are not exempted from high energy cost burdens; over 18,000 large multifamily residents in this subpopulation also spend more than 20 percent of income on energy costs.

Housing Equity & Building Decarbonization in California

Reem Rayef

If building electrification in California is to proceed in an equitable manner, policymakers must first prioritize those households that are most burdened by their housing costs.

This study examines:

The residential conditions of **low-income households in California**, and how these material conditions differ across geography, building type, tenure status, rent burden, and energy expenditure.

With the intention to:

- Direct building electrification incentives toward Californians of greatest need
- Dispel myths about the living conditions of low income households
- Illustrate the magnitude of the decarbonization opportunity in low income residential building electrification

California's Housing Stock

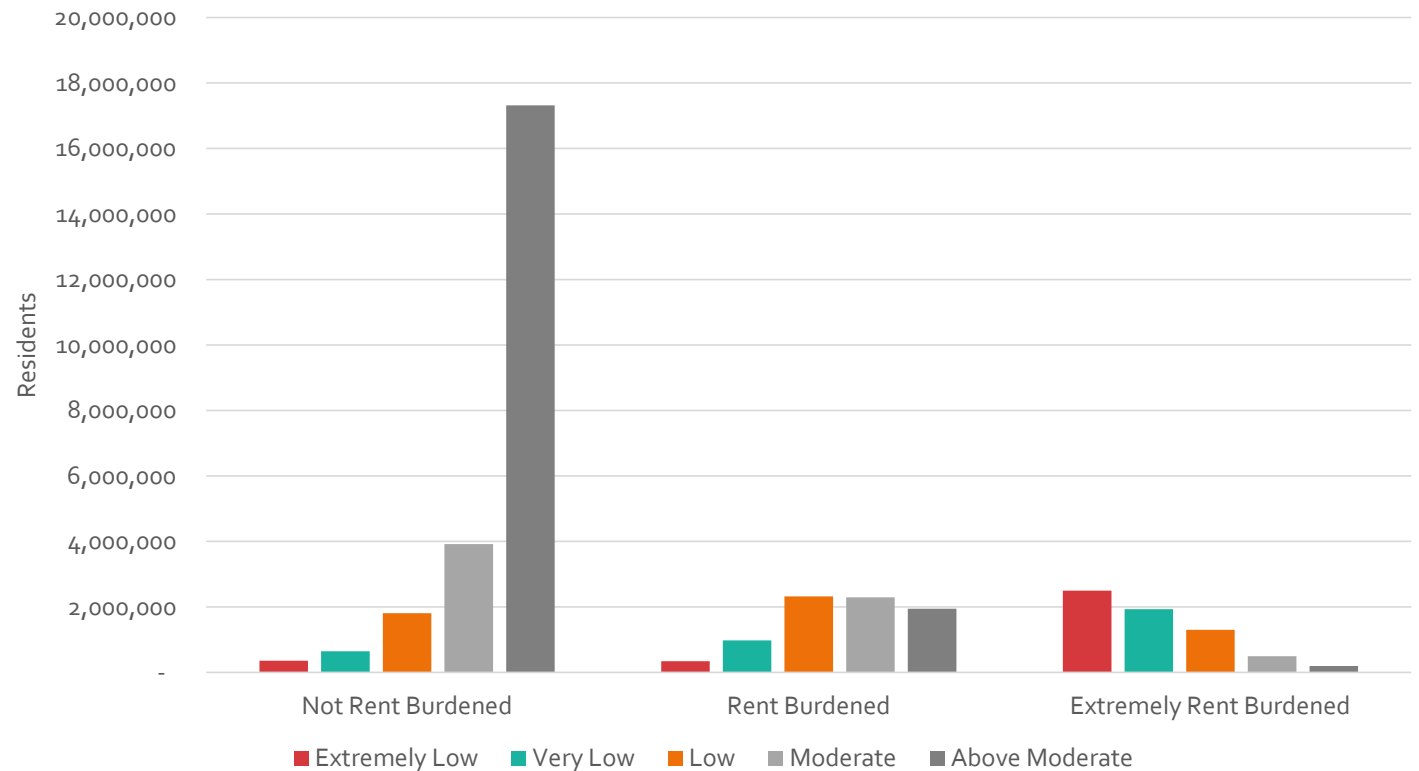
- Over 12 million Californians live in low income households, earning <80 percent of AML.
- The vast majority of Californians live in single family homes.
- 38 percent of Californians are rent burdened or extremely rent burdened.

DESCRIPTIVE STATISTICS			
Income Level	Extremely Low Income	3,553,812	9%
	Very Low Income	3,563,162	9%
	Low Income	5,441,966	14%
	Moderate Income	6,710,904	17%
	Above Moderate Income	19,461,351	50%
Building Type	Single Family	27,426,177	71%
	Small Multifamily	2,836,225	7%
	Large Multifamily	7,270,206	19%
	Mobile Home	1,172,630	3%
	RV/Boat	25,957	0%
Tenure	Rented	16,980,542	44%
	Owned	21,750,653	56%
Rent Burden	Extremely Rent Burdened	6,427,886	17%
	Rent Burdened	7,897,412	21%
	Not Rent Burdened	24,055,540	63%
Energy Cost Burden	0-5 Percent	31,643,142	82%
	5-10 Percent	4,245,080	11%
	10-20 Percent	1,577,231	4%
	>20 Percent	953,531	2%

Rent Burden

- The combination of California’s high cost of living and the shortage of affordable housing has contributed to the very high proportion of California residents who are considered rent burdened, devoting over 30 percent of their annual income to rent and owner costs.
- 37 percent of Californians (approx. 14 million people) live in rent burdened and extremely rent burdened households.
- Being low income increases the likelihood of rent burden to 77 percent.

Fig 6. Rent Burden By Income Level

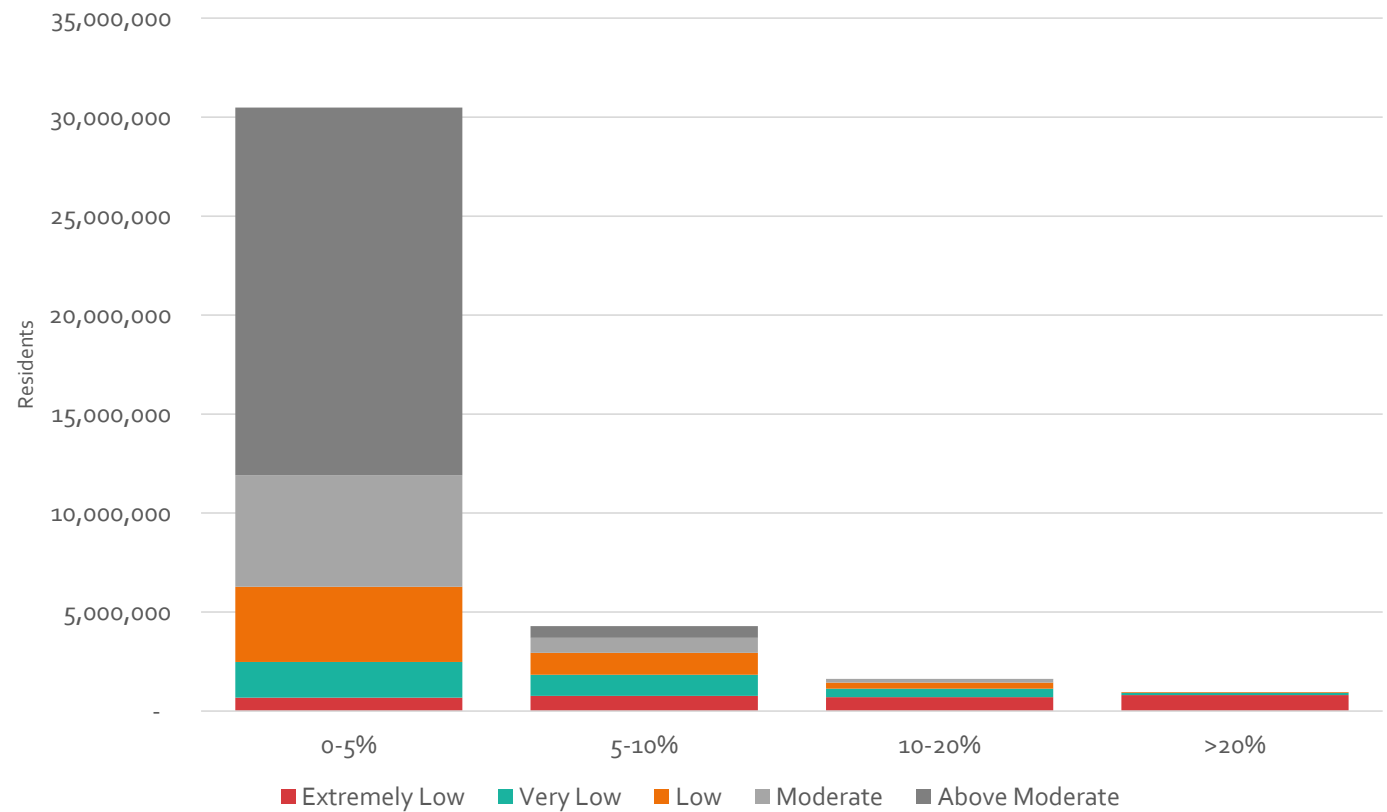


Note: The above statistics on rent burdens do not account for the 350,357 individuals in households with no income.

Energy Cost Burden

- Average annual household spending on energy is \$1,897.
- Over 950,000 Californians live in households that spend greater than 20 percent of income on energy expenses.

Fig 7. Energy Cost Burden Residents by Income Level



Note: The above statistics on energy-related cost burdens do not account for the 350,357 individuals in households with no income.

Low Income Households (2/2)

- Most low income Californians live in single family homes.
- Low income families largely occupy climate zones where space cooling needs (and summer electricity loads) are high.
- A cumulative 77 percent of low income Californians live in rent burdened or extremely rent burdened households.

Fig 9. Low Income Occupancy By Building Type

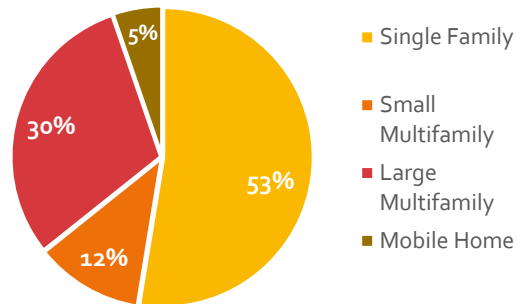


Fig 10. Low Income Occupancy By Climate Zone

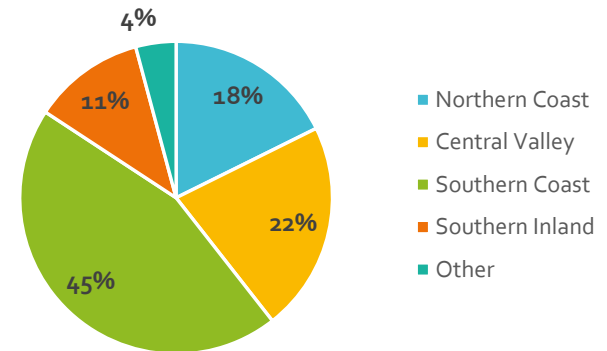


Fig 11. Low Income Occupancy By Tenure Status

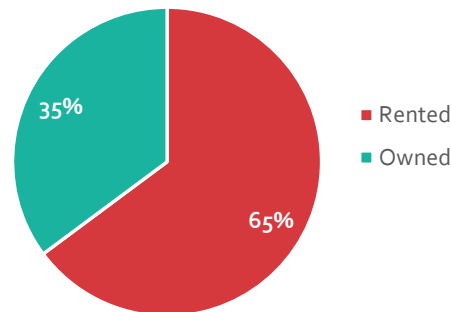
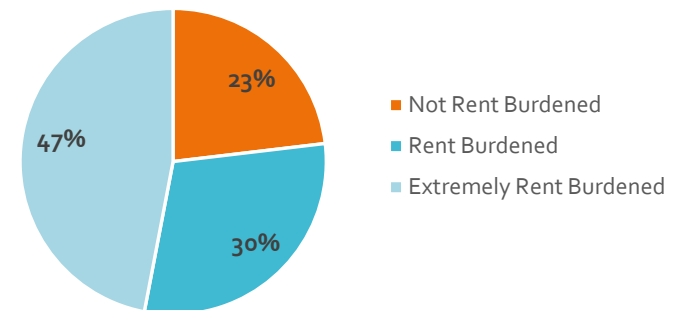


Fig 12. Low Income Occupancy By Rent Burden



Tenure

- Low income residents of single family and mobile homes are more likely to be owners than renters.
- Low income residents of small and large multifamily buildings are more likely to be renters.

Fig 13. Building Type & Tenure Status By Income Level

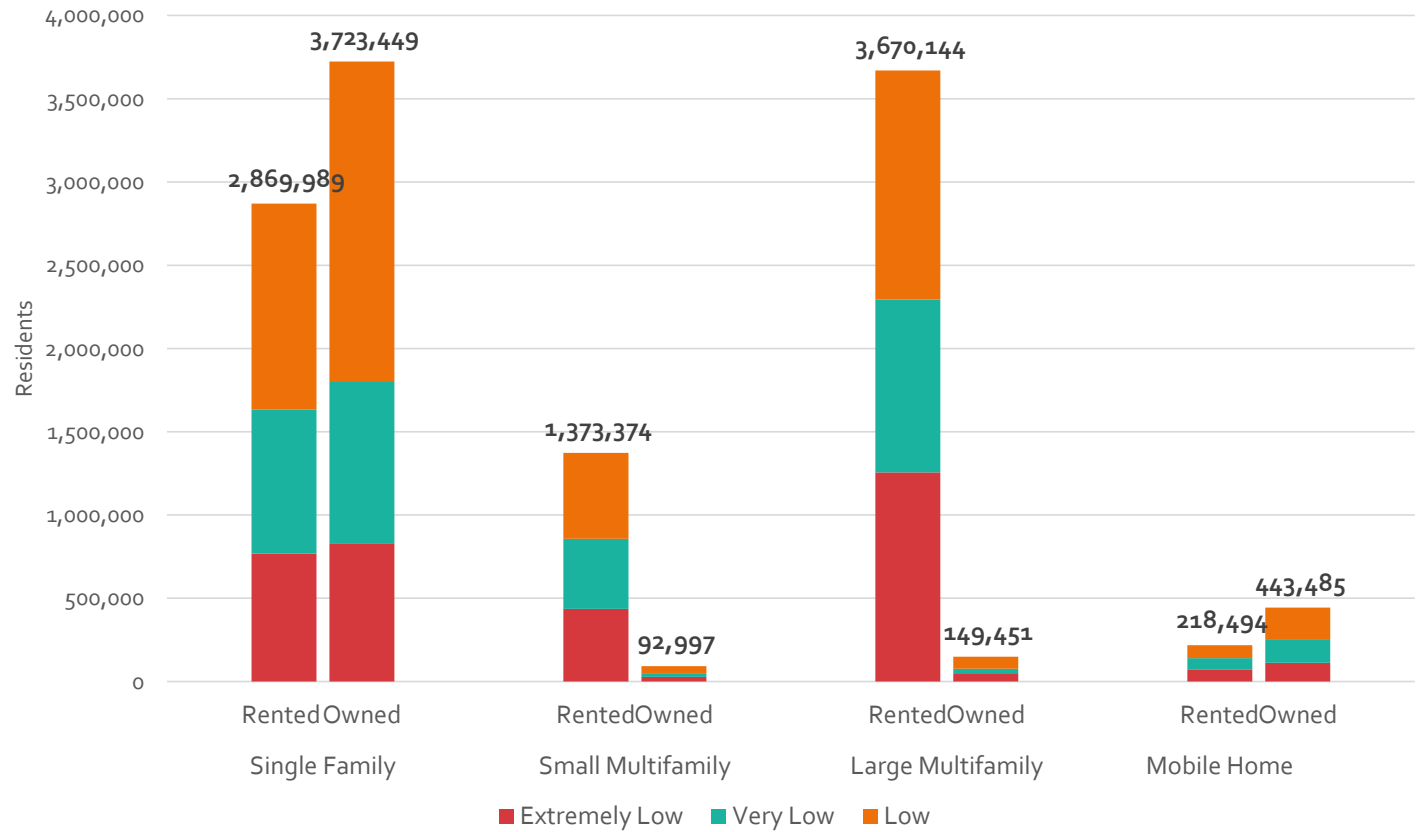
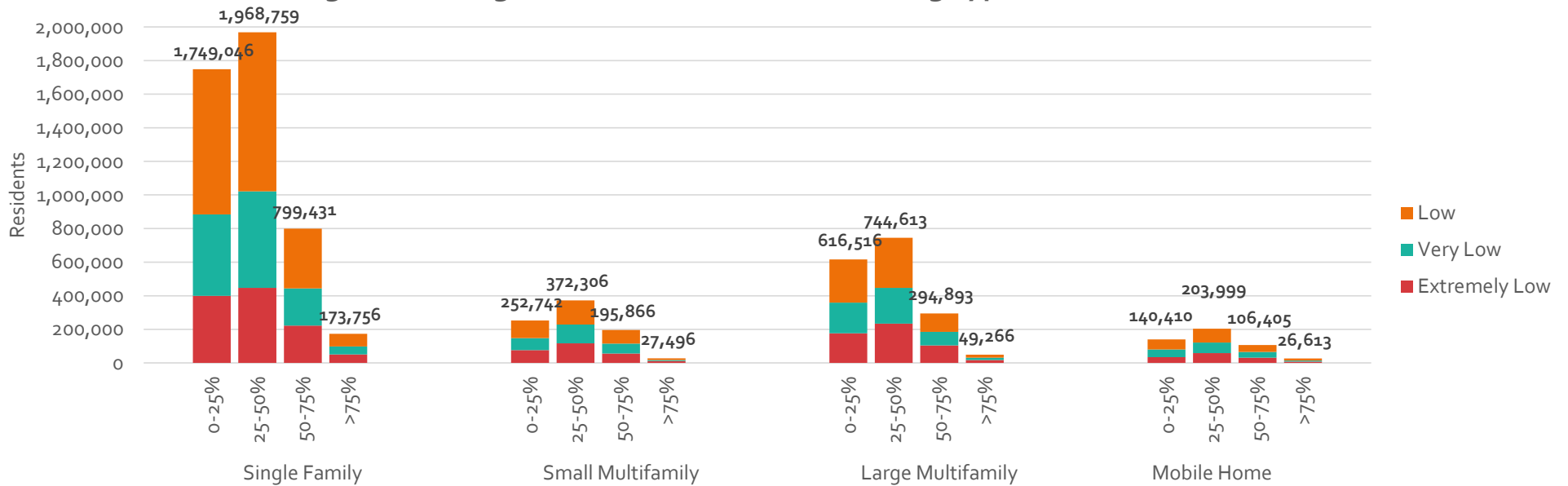


Fig 18. Heating Fuel Cost Ratio Across Building Type & Income Levels



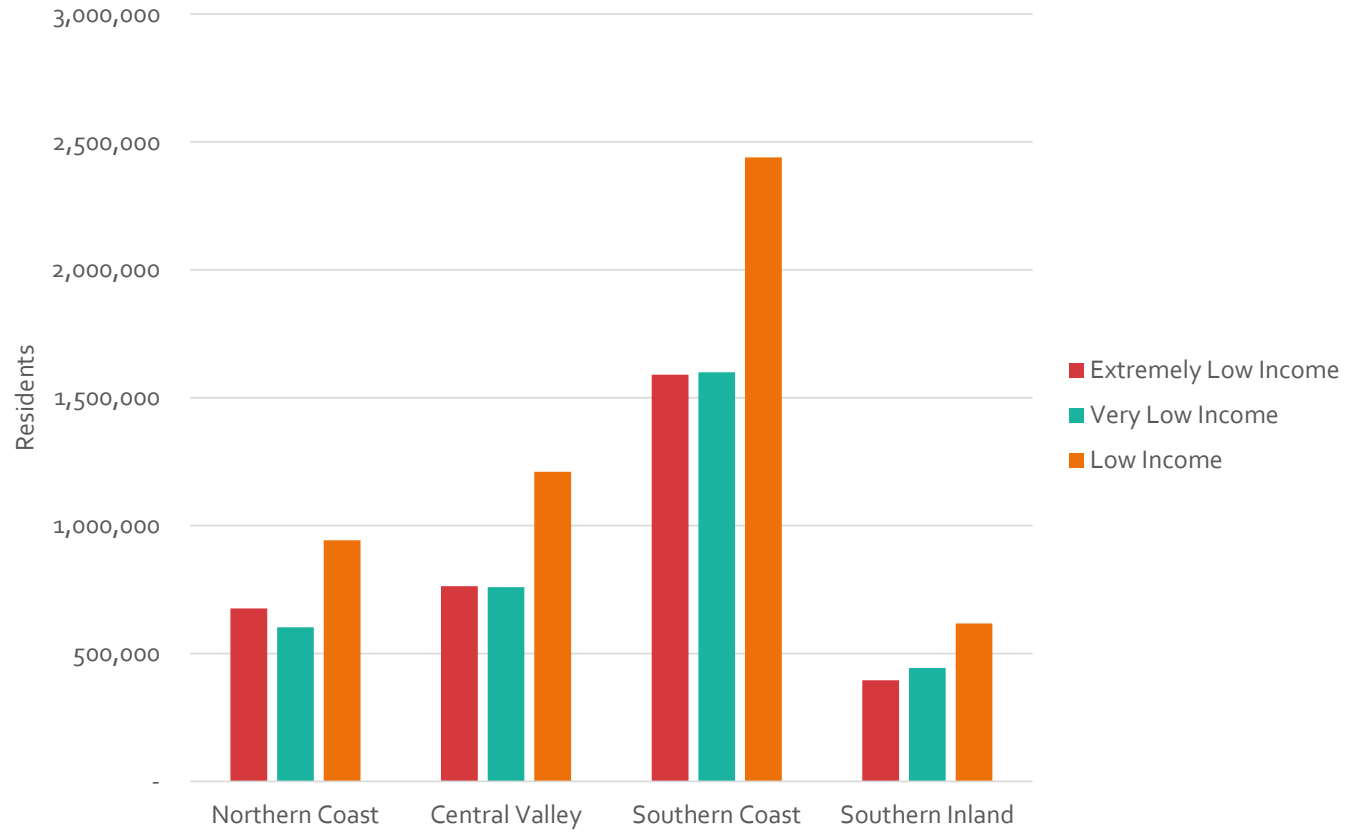
Heating Fuel Cost Ratio

- Most low income Californians spend under 50 percent of their energy budget on heating fuels.
- A cumulative 277,131 low income Californians live in households that dedicate over 75% of their energy budgets on heating fuels.
- This chart largely encompasses residents in SCG’s service territory.

Climate Zones

- Low income Californians are most concentrated in the Southern Coast climate zone.

Fig 19. Low Income Climate Zone Distribution



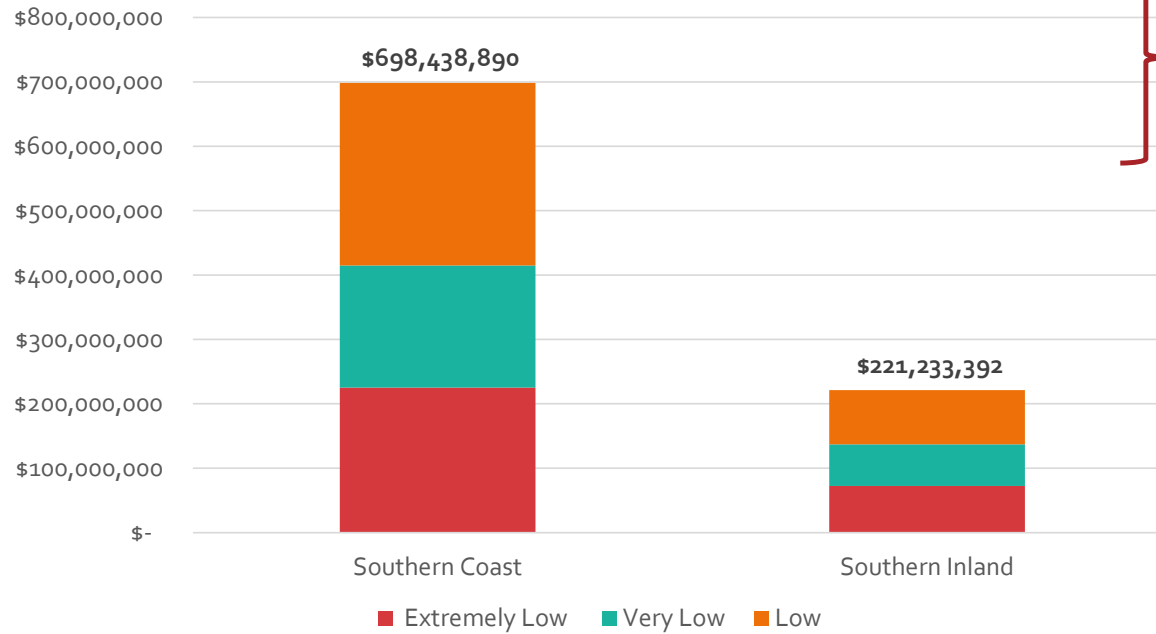
Heating Fuel Spending in SoCal Households

- Low income households of the Southern Coast and Southern Inland regions spend \$920M annually on heating fuels.
- Although low income households comprise about 39% of the total population of Southern California, they only comprise about 31% of the region's aggregate spending on heating fuels.

Low Income Southern Coast Households: 2.3M
 Low Income Southern Inland Households: 0.5M

Low Income SoCal Households:
2.8 Million

FIG 26. LOW INCOME SOCAL HEATING FUEL SPENDING



} \$920M
 Per Year

Building electrification efforts in California can **center low income residents** by directly addressing their material conditions and housing needs, with major potential impacts.

OPPORTUNITY	IMPACT
Extremely low income, extremely rent burdened Californians	2.5 Million People
Low income multifamily renters in Southern California	2.3 Million People
Low income single family homeowners in Southern California	1.9 Million People
Low income households spending >50% of their energy expenditures on heating fuel	1.7 Million People
Households spending >20% of income on energy expenses	1 Million People
Low income single family homeowners in the Central Valley	0.9 Million People

Opportunities at the Intersection of Affordable Housing & Building Decarb