



# Household Energy Burden in Beacon Hill, Seattle, WA

Trent Dillon, Integrated Decision Support, [trent.dillon@nrel.gov](mailto:trent.dillon@nrel.gov)

Natasha Musalem, Integrated Decision Support, [natasha.musalem@nrel.gov](mailto:natasha.musalem@nrel.gov)

Mayukh Datta, Integrated Decision Support, [mayukh.datta@nrel.gov](mailto:mayukh.datta@nrel.gov)

July 2024

# Notice

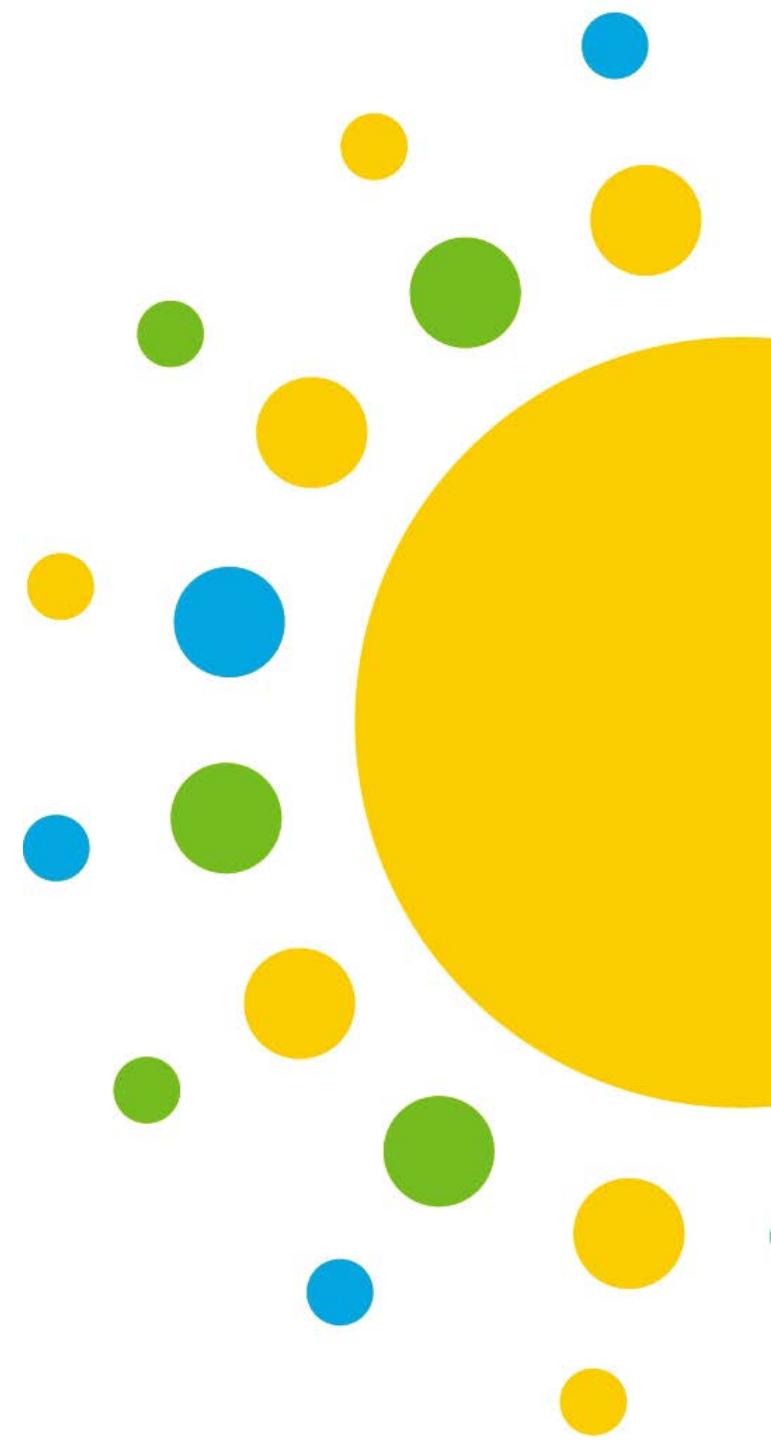
This work was authored by the National Renewable Energy Laboratory (NREL), operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08G028308. Funding provided by the DOE's Communities LEAP (Local Energy Action Program) Pilot.

The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy  
Operated by the Alliance for Sustainable Energy, LLC

This report is available at no cost from NREL at [www.nrel.gov/publications](http://www.nrel.gov/publications).

National Renewable Energy Laboratory  
15013 Denver West Parkway  
Golden, CO 80401  
303-275-3000 • [www.nrel.gov](http://www.nrel.gov)



# Definitions and Disclaimers

## Definitions:

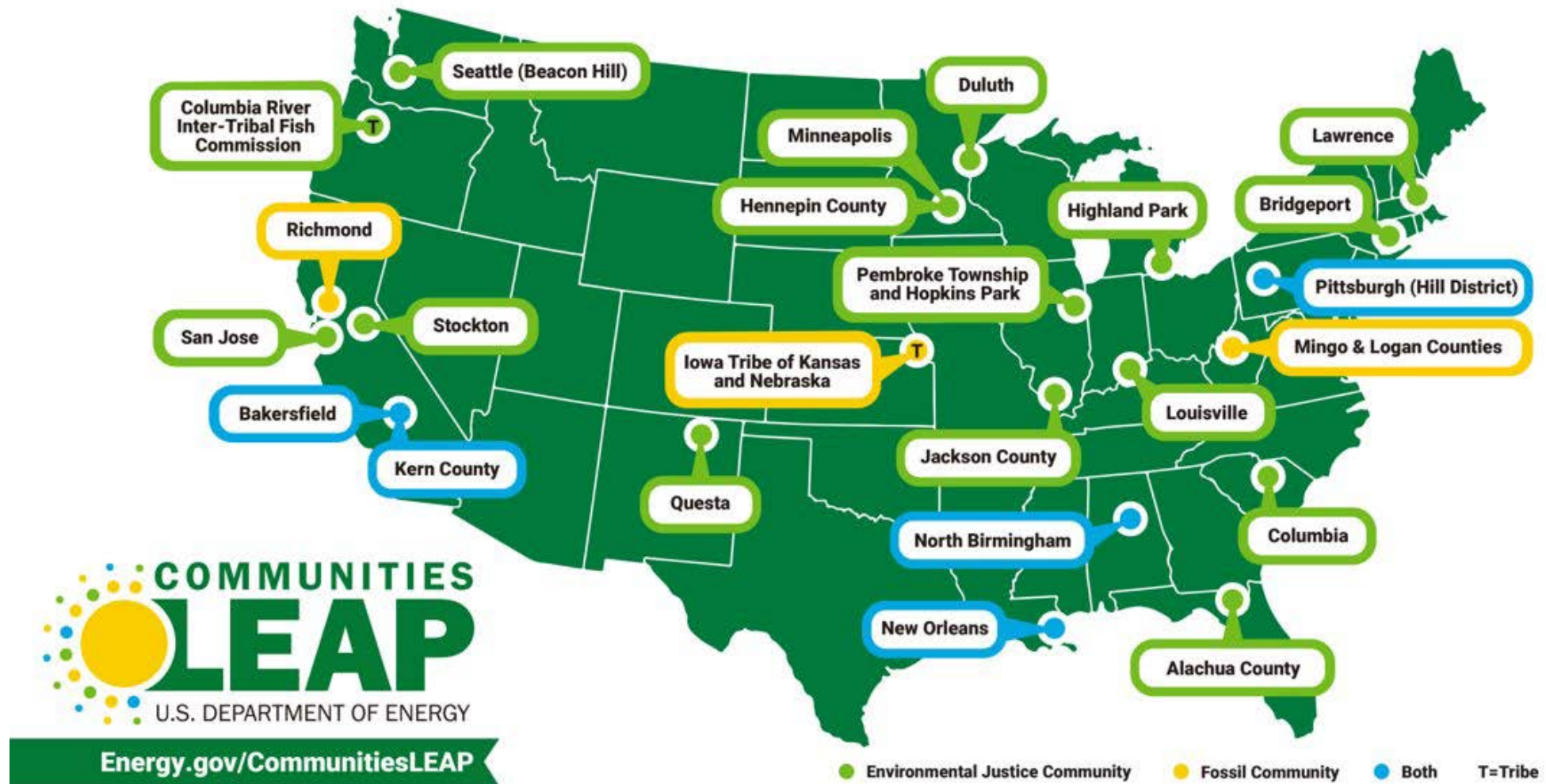
- Please note the following definitions of terms used throughout this report:
- Multifamily housing units are homes, such as townhouses, that are often attached to other units.
- Single-family detached units are stand-alone units, and single-family attached units are attached to a larger housing complex (townhomes, condos, etc.).
- Heating fuel: Primary heating fuel for the housing unit (electricity, natural gas, fuel oil, bottled gas, wood, and other):
  - Bottled gas includes propane.
  - The “Other” fuel type includes fuel such as biomass, coke, etc.

## Disclaimer:

- If using this information for future study or analysis, please note:
- Average energy burden rates presented in this study for different fuel types (natural gas, electricity, fuel oil, wood, bottled gas, etc.) are based on the 2016-2020 5-year American Community Survey data.
- Rental units utilizing wood as their primary heating fuel are not reported within this analysis’s source dataset.

# **Communities LEAP and Beacon Hill Background**

# Map of LEAP Communities



# Communities LEAP Pilot Technical Assistance Opportunity



The Communities Local Energy Action Program (LEAP) Pilot Competitive Technical Assistance opportunity aims to facilitate sustained community-wide economic empowerment through clean energy, improve local environmental conditions, and open the way for other benefits primarily through DOE's clean energy deployment work.

This opportunity was open to low-income, energy-burdened communities that are also experiencing either direct environmental justice impacts or direct economic impacts from a shift away from historical reliance on fossil fuels.



# Beacon Hill, Seattle LEAP Project

	Beacon Hill	Seattle	King County	Washington
<b>Total population</b>	34,944	737,015	2,269,675	7,705,281
<b>% Not identifying as "White alone"</b>	73%	41%	46%	36%
<b>% Foreign born</b>	41%	20%	25%	15%
<b>% Individuals with income below 200% poverty level</b>	29%	19%	18%	24%
<b>% With a disability</b>	12%	9%	10%	13%
<b>% 62 years and over</b>	20%	16%	17%	19%
<b>% Language other than English spoken at home</b>	47%	23%	30%	21%
<b>% Speak English less than very well</b>	27%	8%	11%	8%
<b>% Renter-occupied housing units</b>	48%	54%	43%	36%
<b>% Owner-occupied housing units</b>	52%	46%	57%	64%

Compared to the City of Seattle and Washington state, Beacon Hill has a higher share of historically marginalized community members who may be more vulnerable to climate change and high energy prices:

- 73% of individuals in Beacon Hill identify as “non-white,” compared to 41% in Seattle and 36% in WA.
- 29% of Beacon Hill earns an income that is 200% below the federal poverty level, compared to 19% in Seattle and 24% in WA.
- 12% of individuals in Beacon Hill live with a disability, compared to 9% in Seattle and 13% in WA.

Source of data: 2020 Decennial Census and 2020 American Community Survey

Table 1: Beacon Hill Population compared to Seattle, King County, and Washington State Populations

# Beacon Hill Stakeholder Group Goals

The goals of the stakeholder group, related to Communities LEAP, included:

- **HEALTH:** Improve the health of Beacon Hill residents by improving indoor and outdoor air quality, reducing noise, and reducing the impacts of extreme heat.
- **ECONOMY:** Increase economic stability and mitigate displacement of Beacon Hill residents by reducing energy bills, exploring anti-displacement/stay-in-place policies, and providing job training and job opportunities.
- **RESILIENCE:** Improve community resilience in the face of climate change impacts such as extreme heat, extreme storms, power outages, and wildfire smoke.
- **GREENHOUSE GASES:** Reduce greenhouse gases and other environmental impacts from fossil fuel extraction and use.

Several stakeholders working in the Beacon Hill neighborhood applied for and were selected for Communities LEAP. The partners in this project included:

## **Community Stakeholders**

- El Centro de la Raza
- Beacon Hill Council
- Bethany United Church of Christ.

## **Supportive partners**

- Seattle City Light
- Seattle Office of Sustainability & Environment.

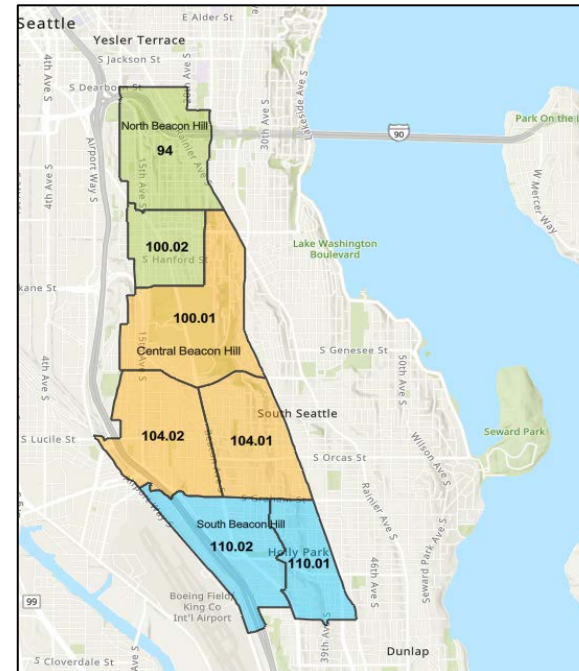


# **Low-Income Energy Affordability Data (LEAD) Tool**

# LEAD Tool and Beacon Hill Overview

- The Low-Income Energy Affordability Data (LEAD) tool maps household energy burden, the percentage of a household’s income being spent in energy costs, by census tract (Ma et al. 2019).
- Households paying more than 6% of their average income on household energy costs are defined as having a high energy burden (or as "highly burdened"). Those paying more than 10% of their income are defined as having a severe energy burden (or as "severely burdened") (Drehobl et al. 2020).
- Beacon Hill is made of seven census tracts: 94, 100.01, 100.02, 104.01, 104.02, 110.01, and 110.02.
- There are five income levels within the LEAD tool, and for Seattle, Washington, the five income levels are broken down below.

Area Median Income Levels	Seattle Thresholds (calculated for an average household size of 2.75)
0% to 30%	\$0 to \$32,965
30% to 60%	\$32,966 to \$63,608
60% to 80%	\$63,609 to \$80,928
80% to 100%	\$80,929 to \$101,161
100% +	\$101,161+



For this analysis, Beacon Hill was subdivided into three parts in consultation with the community.

- **North Beacon Hill:** Census Tracts 94 and 100.02
- **Central Beacon Hill:** Census Tracts 100.01, 104.01, and 104.02
- **South Beacon Hill:** 110.01 and 110.02.

# Renter vs. Owner-Occupied Units: Annual Household Income and Energy Costs in Beacon Hill, Seattle, WA

Figure 1: Average Annual Income and Energy Costs for Renter-Occupied Households

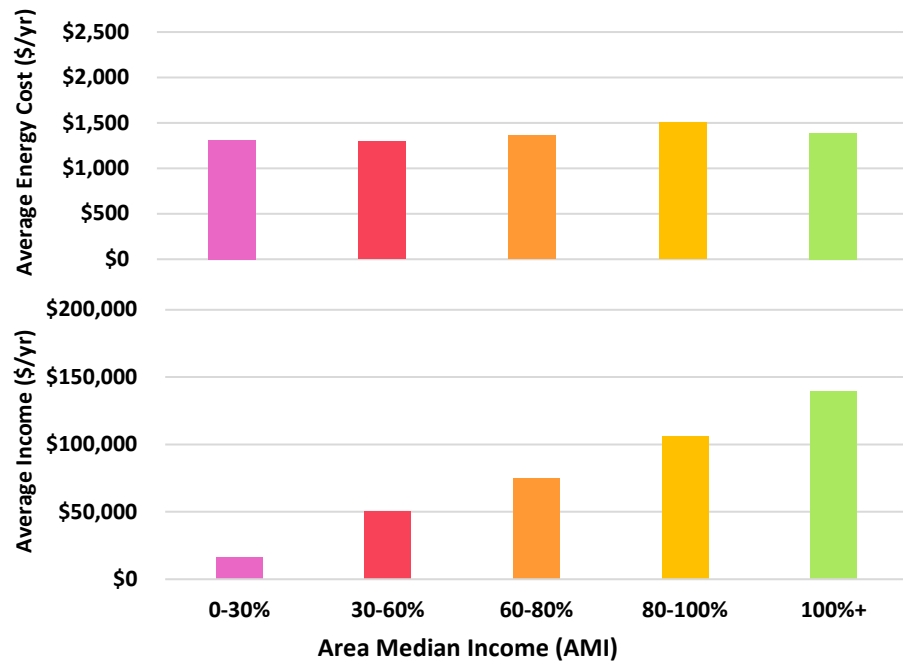
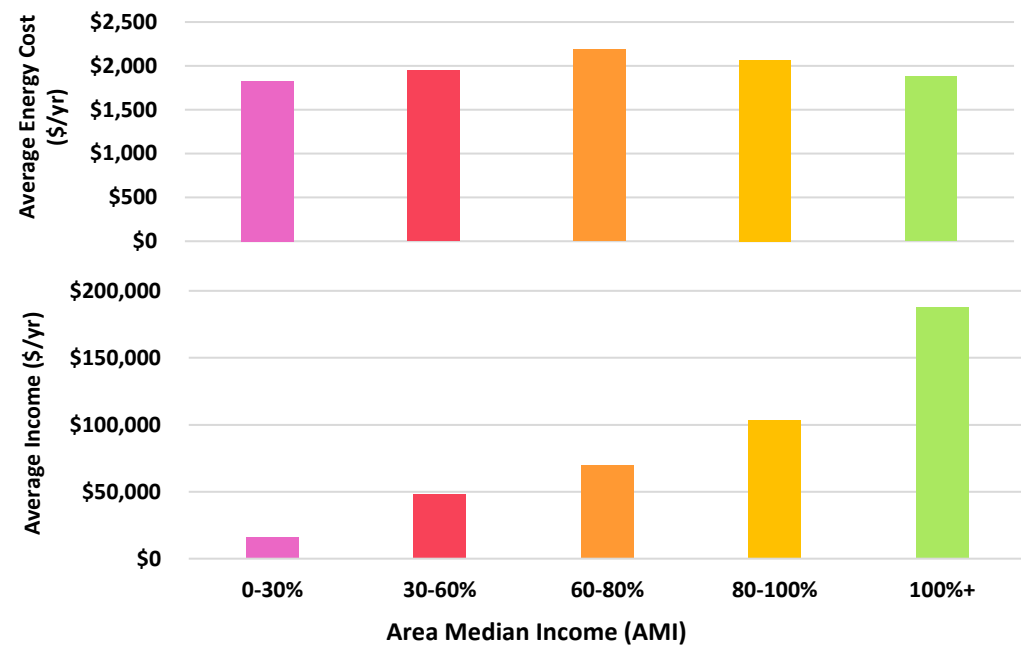


Figure 2: Average Annual Income and Energy Costs for Owner-Occupied Households



- Both renter- and owner-occupied households across all area median income levels have relatively similar average energy costs and consumption.
- Therefore, disparities in household income, as opposed to energy costs, in Beacon Hill are one of the biggest drivers of average energy burden (ratio of average household energy costs and average household income).

# Renter vs. Owner-Occupied Households: Average Energy Burden Across Beacon Hill, Seattle, WA

Figure 3: Average Energy Burden and Housing Counts for Renter-Occupied Households by Area Median Income

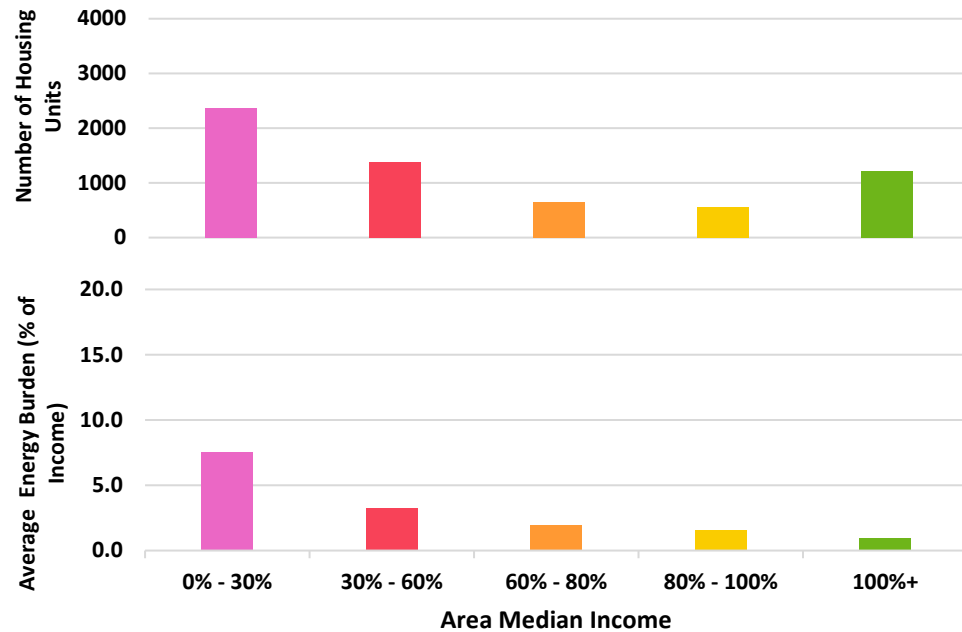
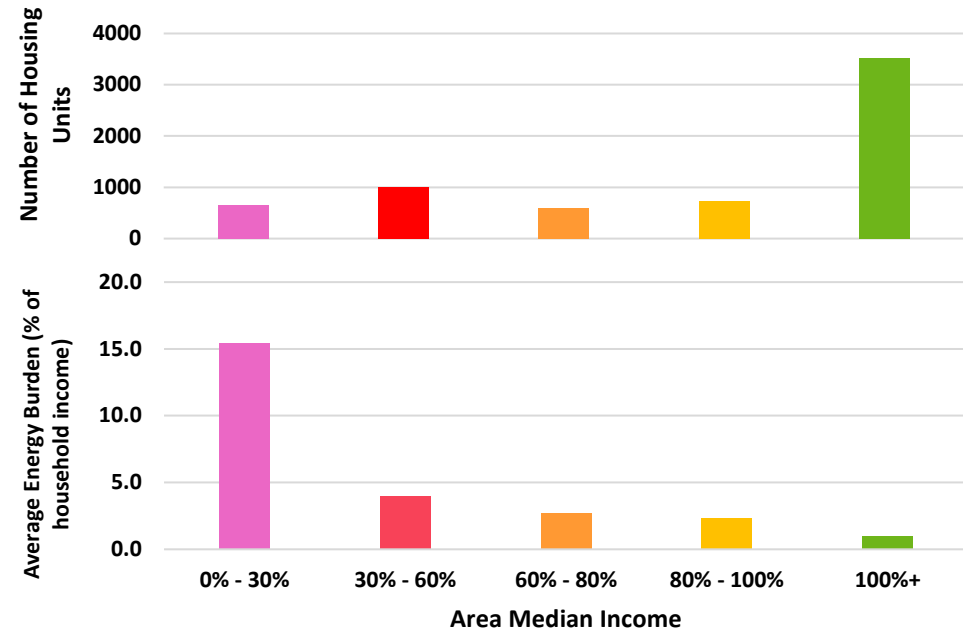


Figure 4: Mean Energy Burden and Housing Count for Owner-Occupied Households by Area Median Income



- Households earning 0% to 30% Area Median Income (AMI) occupy 10% of the owner-occupied housing stock and 38% of the rental housing stock in Beacon Hill.
- Within the 0% to 30% AMI group, owner-occupied households face an average energy burden of 15.4% and on average qualify as severely burdened (at or above 10%), while renter-occupied households face an average energy burden of 7.6% and on average qualify as highly burdened (at or above 6%).

# Renter vs. Owner-Occupied Households: Average Energy Burden in North Beacon Hill

Figure 5: Average Energy Burden and Housing Count for Renter-Occupied Households in North Beacon Hill by Area Median Income

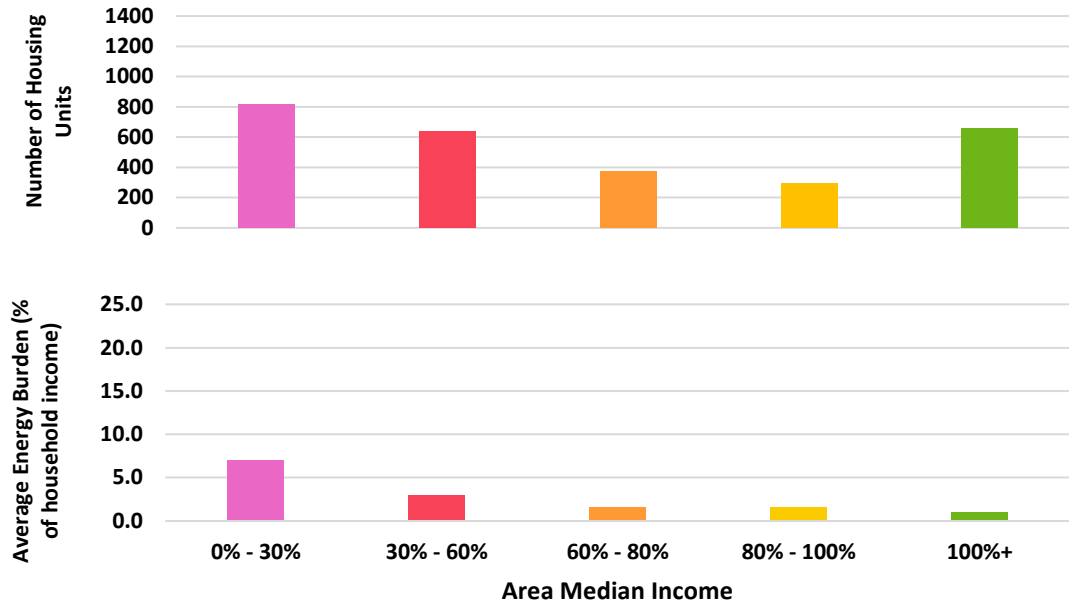
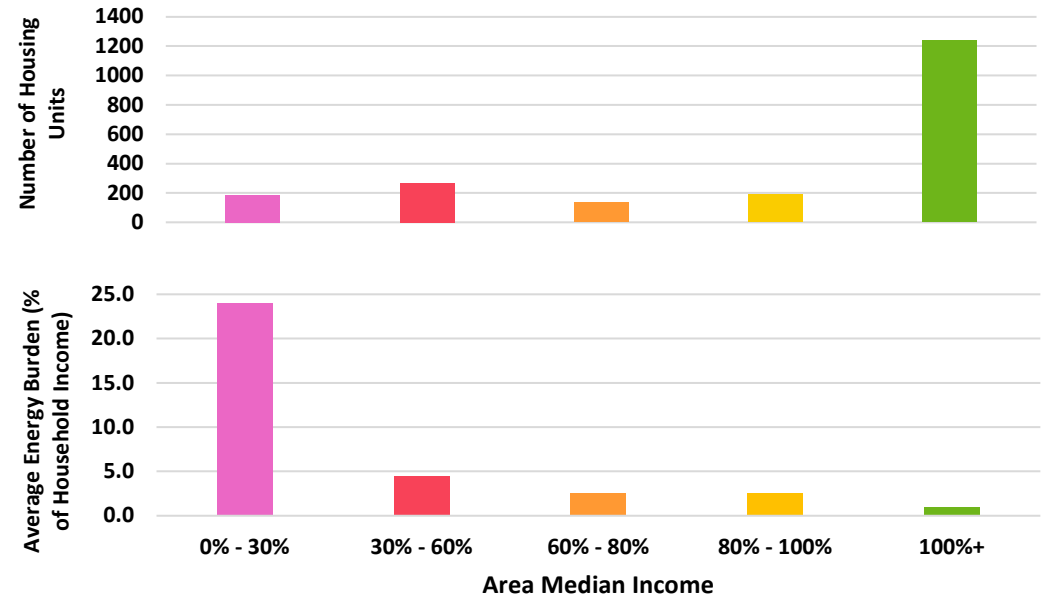


Figure 6: Average Energy Burden and Housing Count for Owner-Occupied Households by Area Median Income in North Beacon Hill



- In North Beacon Hill, households that are within the 0% to 30% AMI group have the highest average energy burden for both owner-occupied households (24.0%) and renter-occupied households (7.0%). These households make up approximately 20% of the housing stock in North Beacon Hill.
- The average owner-occupied household energy burden within the 0% to 30% AMI group can be categorized as severely burdened (at or above 10%) and is significantly higher than the average energy burden for renter-occupied households. There are 186 0% to 30% AMI owner-occupied households in North Beacon Hill.

# Renter vs. Owner-Occupied Units: Average Energy Burden in Central Beacon Hill

Figure 7: Average Energy Burden and Housing Count for Renter-Occupied Households by Area Median Income in Central Beacon Hill

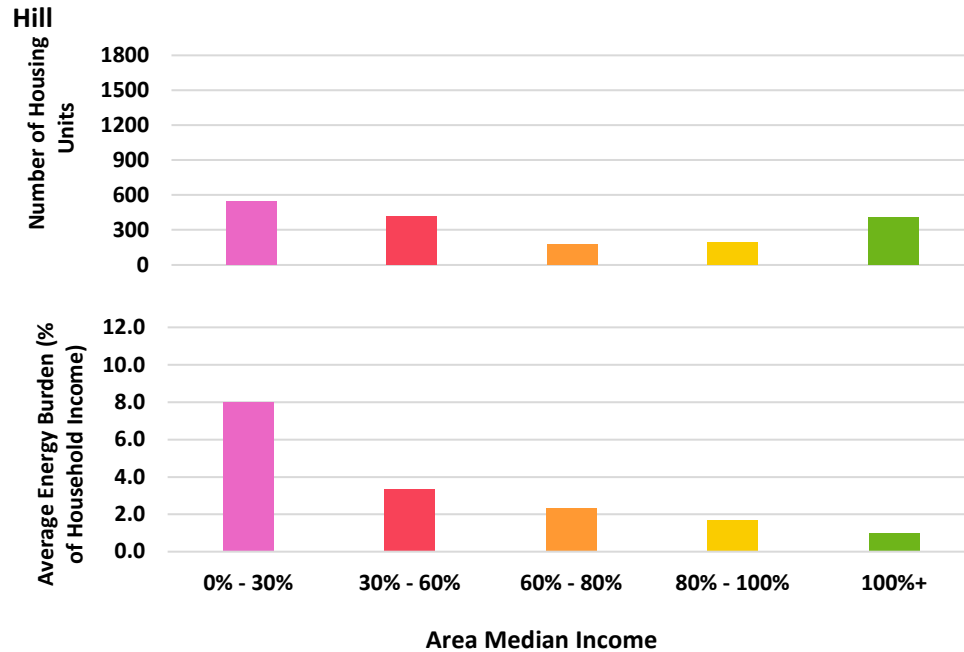
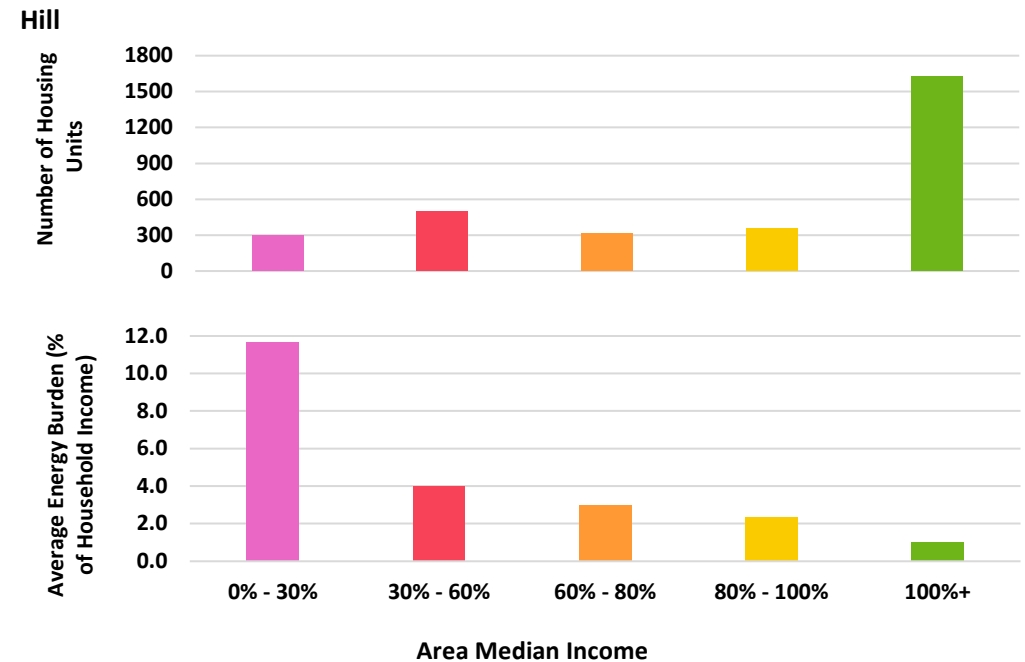


Figure 8: Average Energy Burden and Housing Count for Owner-Occupied Households by Area Median Income in Central Beacon Hill



- In Central Beacon Hill, households that are within the 0% to 30% AMI group have the highest average energy burden for both owner-occupied (11.7%) and rental (8.0%) units. The average owner-occupied household energy burden within this AMI group is severely burdened (at or above 10%), and the average renter-occupied household is highly burdened (at or above 6%).
- 0% to 30% AMI households occupy approximately 18% of the housing stock in Central Beacon Hill.



# Renter vs. Owner-Occupied Households: Average Energy Burden in South Beacon Hill

Figure 9: Average Energy Burden and Housing Count for Renter-Occupied Households by Area Median Income in South Beacon Hill

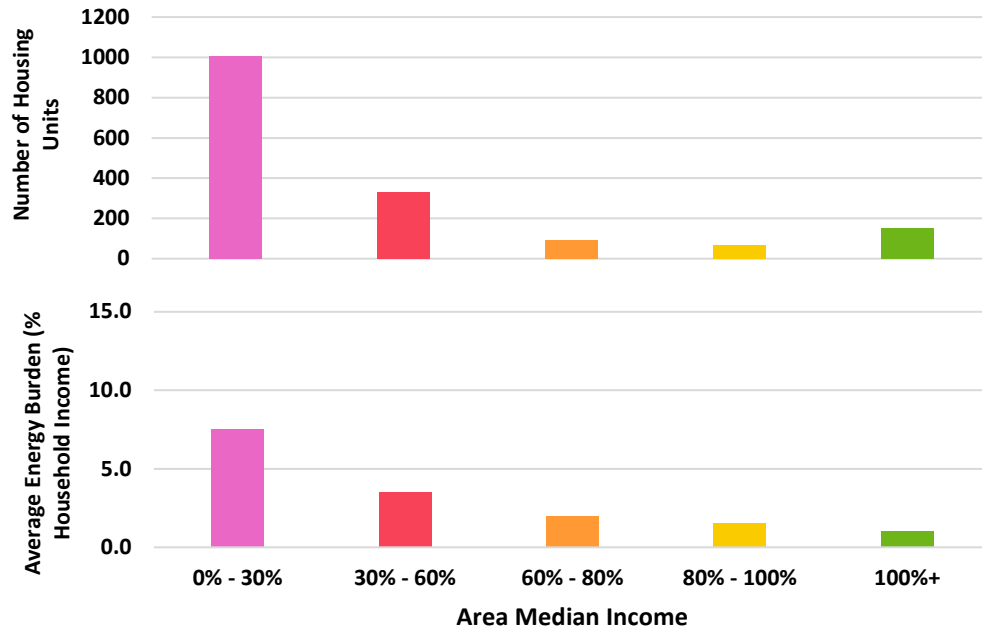
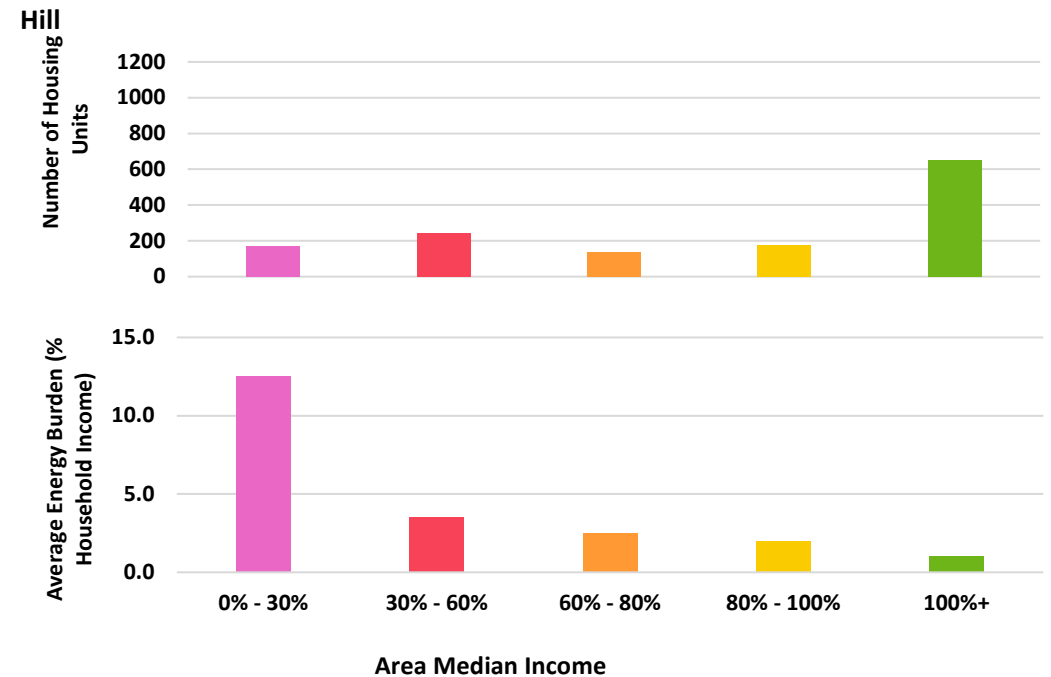


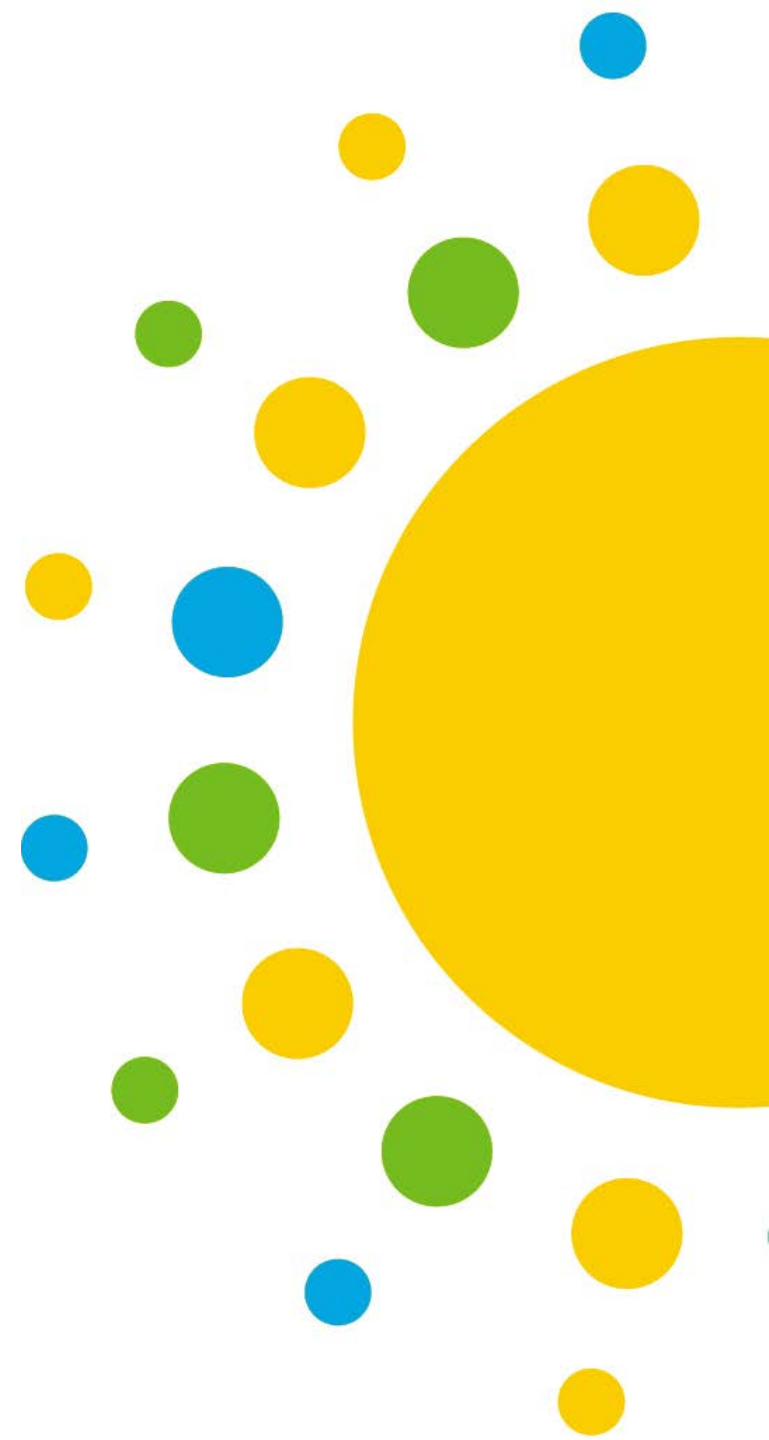
Figure 10: Average Energy Burden and Housing Count by Area Median Income for Owner-Occupied Households in South Beacon Hill



- In South Beacon Hill, households within the 0% to 30% AMI group face the highest average energy burden for both owner-occupied (12.5%) and renter-occupied (7.5%) households. Owner-occupied households within this AMI group are on average severely burdened (at or above 10%), and renter-occupied households are on average highly burdened (at or above 6%).
- 0% to 30% AMI households make up approximately 39% of the housing stock in South Beacon Hill.

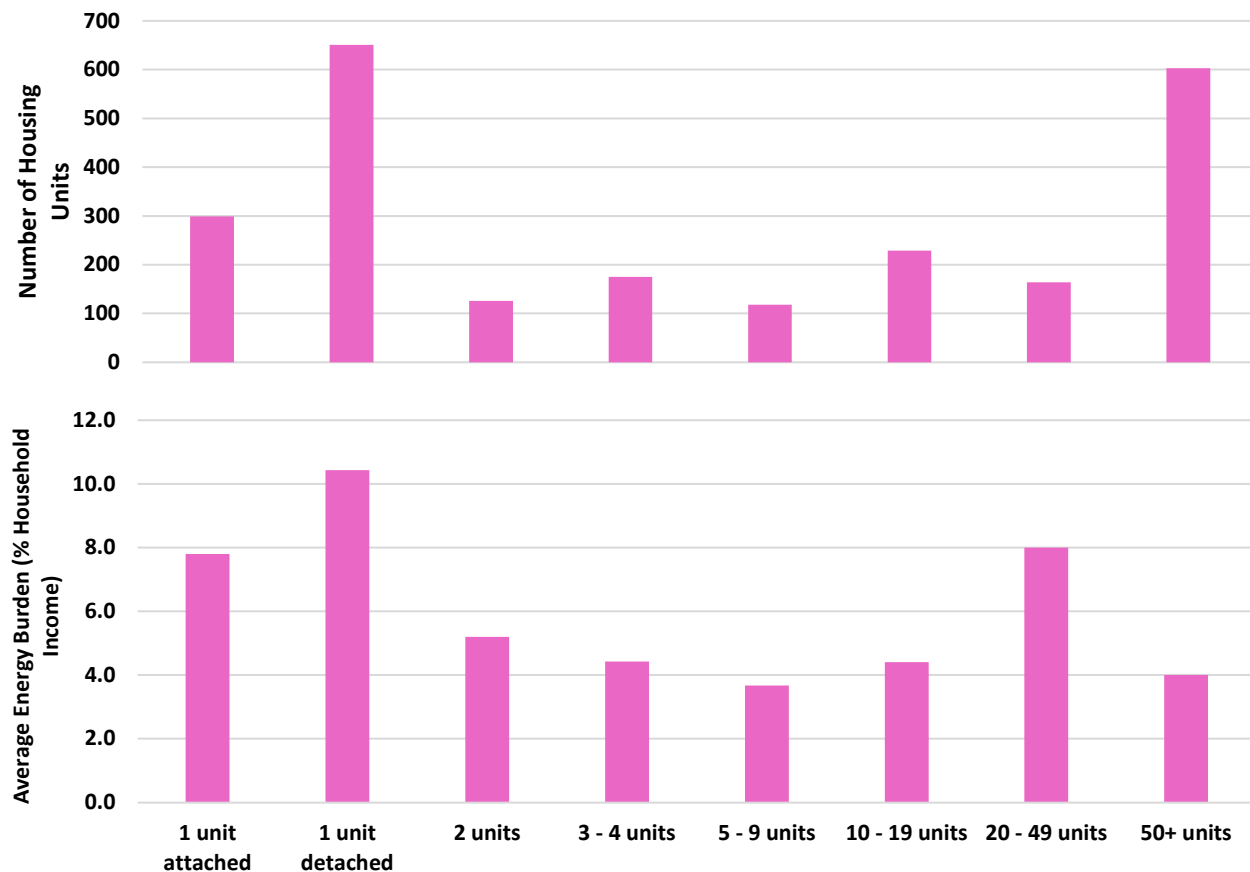
# Energy Burden in Different Housing Types in Beacon Hill

(0-30% AMI only)



# Renter-Occupied Households: 0% to 30% Area Median Income

Figure 11: Average Energy Burden and Housing Count for 0% - 30% AMI Renter-Occupied Households by Building Type

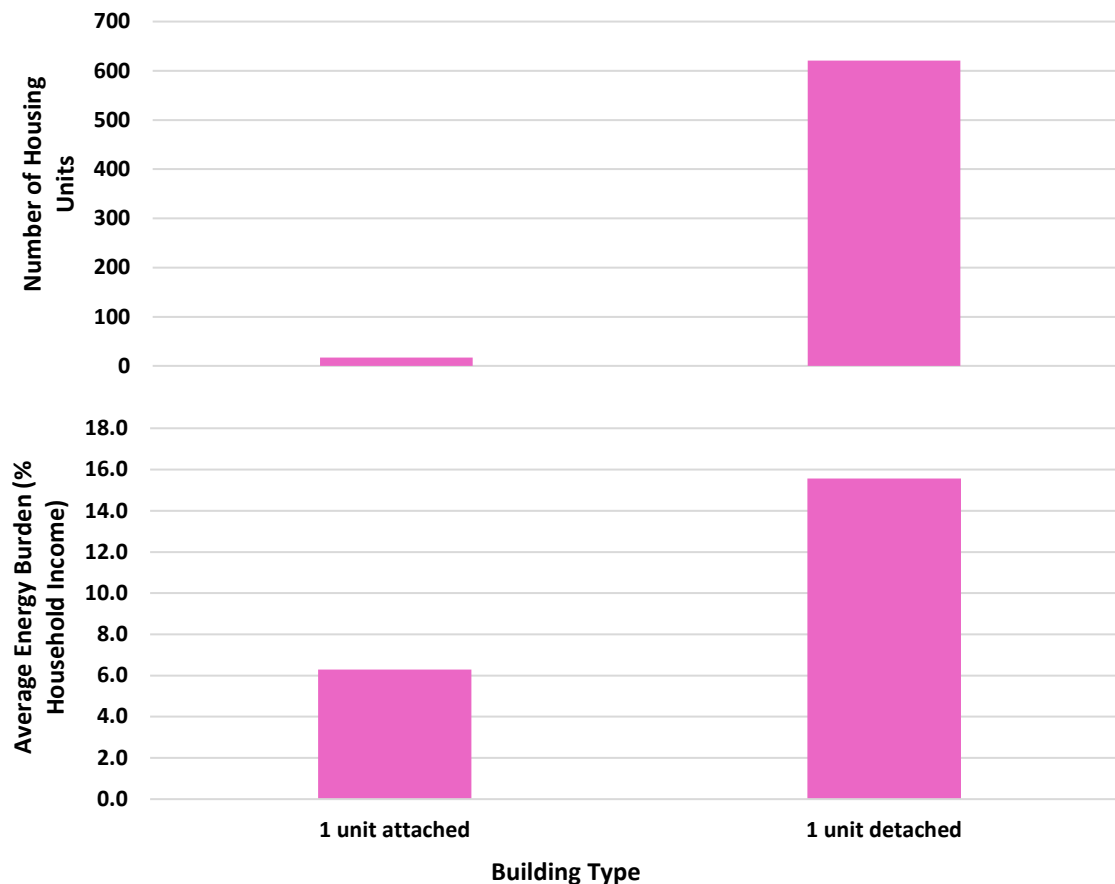


On average, very low-income renters in single-family detached units can be categorized as severely burdened, with an energy burden rate of 10.4%. There are 651 of these households in Beacon Hill, making up 28% of the rental housing stock within this AMI group.

Energy burden was not reported for mobile and trailer homes because the unit count was so low.

# Owner-Occupied Households: 0% to 30% Area Median Income

Figure 12: Energy Burden and Housing Count by Owner-Occupied Building Types\* at 0% - 30% AMI

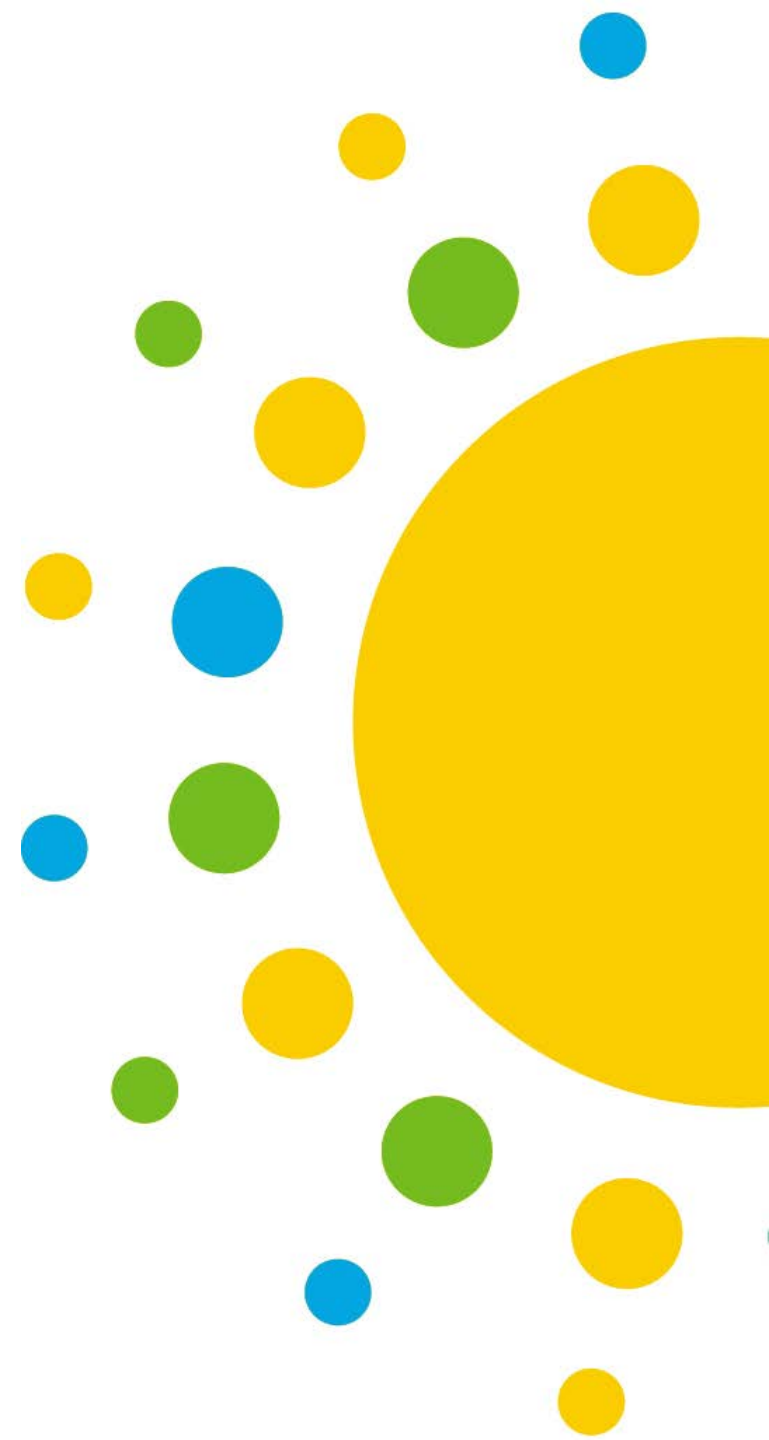


On average, very low-income homeowners in single-family detached homes are severely burdened, with an energy burden rate of 15.6%. There are 621 of these households in Beacon Hill, representing 97% of the owner-occupied housing stock within this AMI group.

Energy burden was not reported for any owner-occupied units other than the 1-unit detached and the 1-unit attached categories because the unit count was so low.

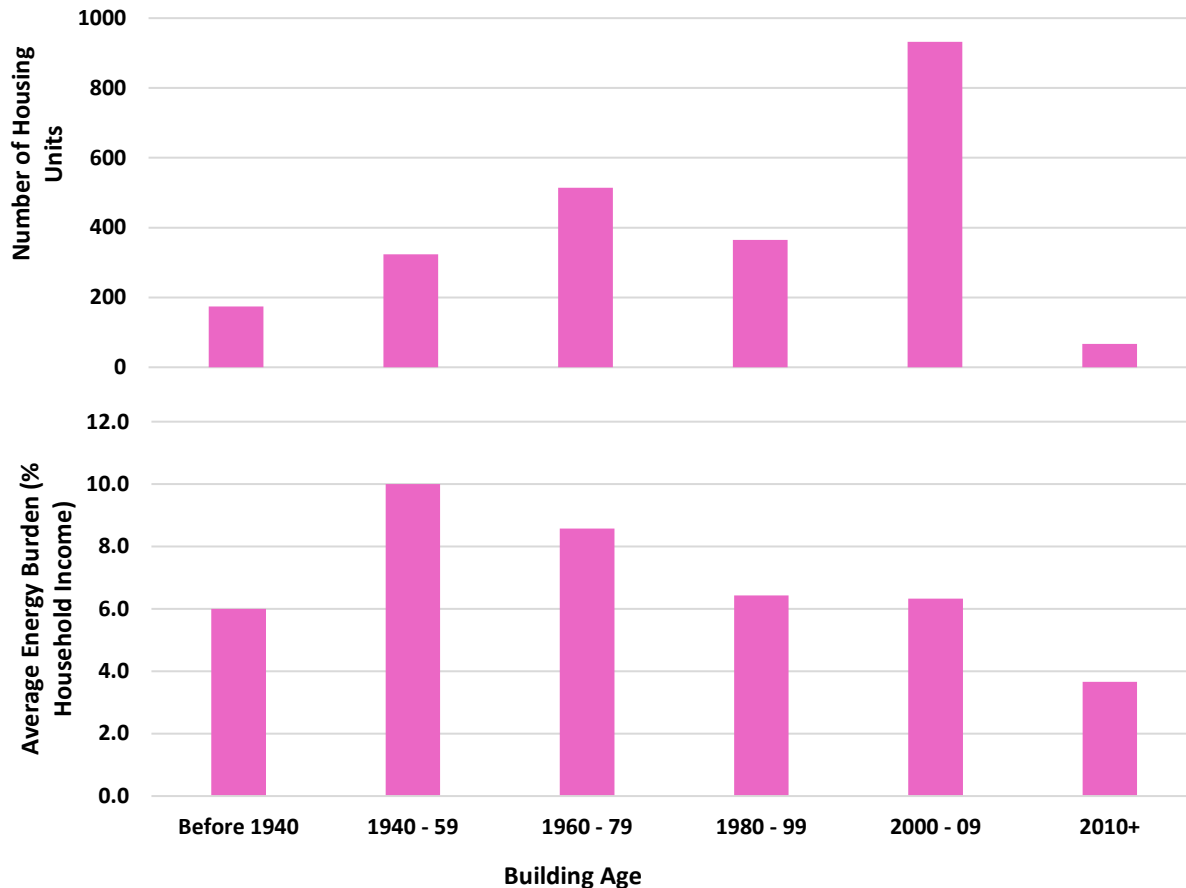
\*Data for other owner-occupied households was not available for this AMI group.

# **Energy Burden by Building Age in Beacon Hill**



# Renter-Occupied Households: 0% to 30% AMI

Figure 13: Average Energy Burden and Housing Count by Rental Building Ages at 0% - 30% AMI

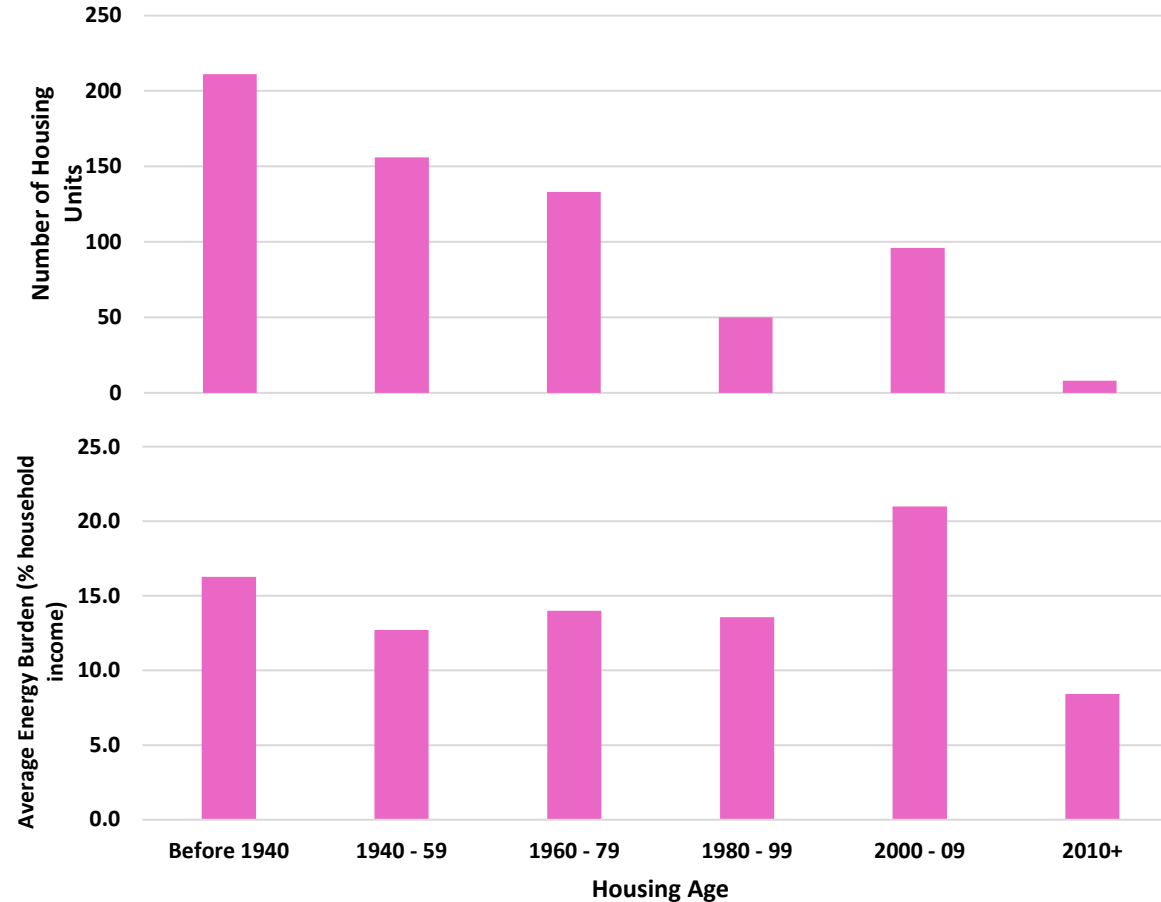


- 0% to 30% AMI renters in buildings built between 1940 and 1959 have the highest average energy burden (10.0%) and could qualify as severely burdened. These buildings make up approximately 14% of the rental housing stock.
- 0% to 30% AMI renters in buildings built between 1960 and 1979 have the second-highest energy burden (8.6%) within Beacon Hill and make up 22% of the rental housing stock.
- Finally, 0% to 30% AMI renters in buildings built between 2000 and 2009 make up the largest portion (40%) of the rental housing stock and can be categorized as highly burdened, with an energy burden rate of 6.3%.
  - It is possible that these (2000-2009) housing units are for students (student housing), the elderly (retirement homes), or for others without a fixed income.
- Other than the newest buildings (2010+), which have the lowest energy burden but also make a small portion of the housing stock, renters in all other building ages are highly burdened.



# Owner-Occupied Units: 0% to 30% Area Median Income

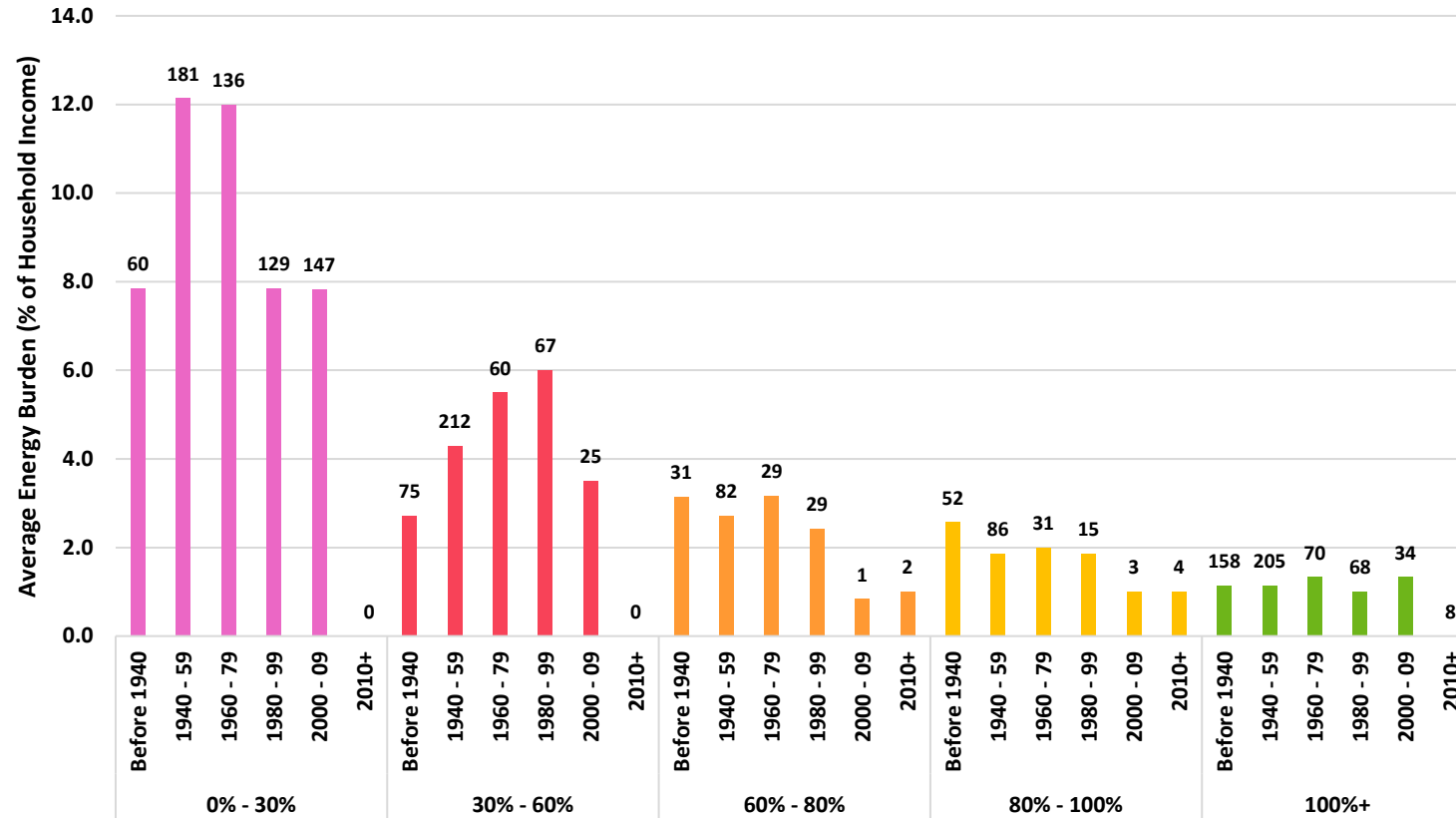
Figure 14: Average Energy Burden and Housing Count by Owner-Occupied Building Ages at 0% - 30% AMI



- 0% to 30% AMI homeowners in homes built between 2000 and 2009 have the highest energy burden (21.1%) and make up 15% of the owned housing stock, suggesting that even households in new buildings can be severely burdened.
  - It is possible that these units are affordable housing units that already receive energy assistance from their utilities.
- Across all building types, residents between 0% to 30% AMI tend to mostly own housing units that were built before 1940 (making up 32% of the housing stock at this income level) and face the second-highest energy burden among the housing age groups at 16.3%.

# Renters in Single-Family Homes by AMI and Building Age

Figure 15: Average Energy Burden in Rental Single-Family Detached Units by Building Age and Area Median Income in Beacon Hill, WA



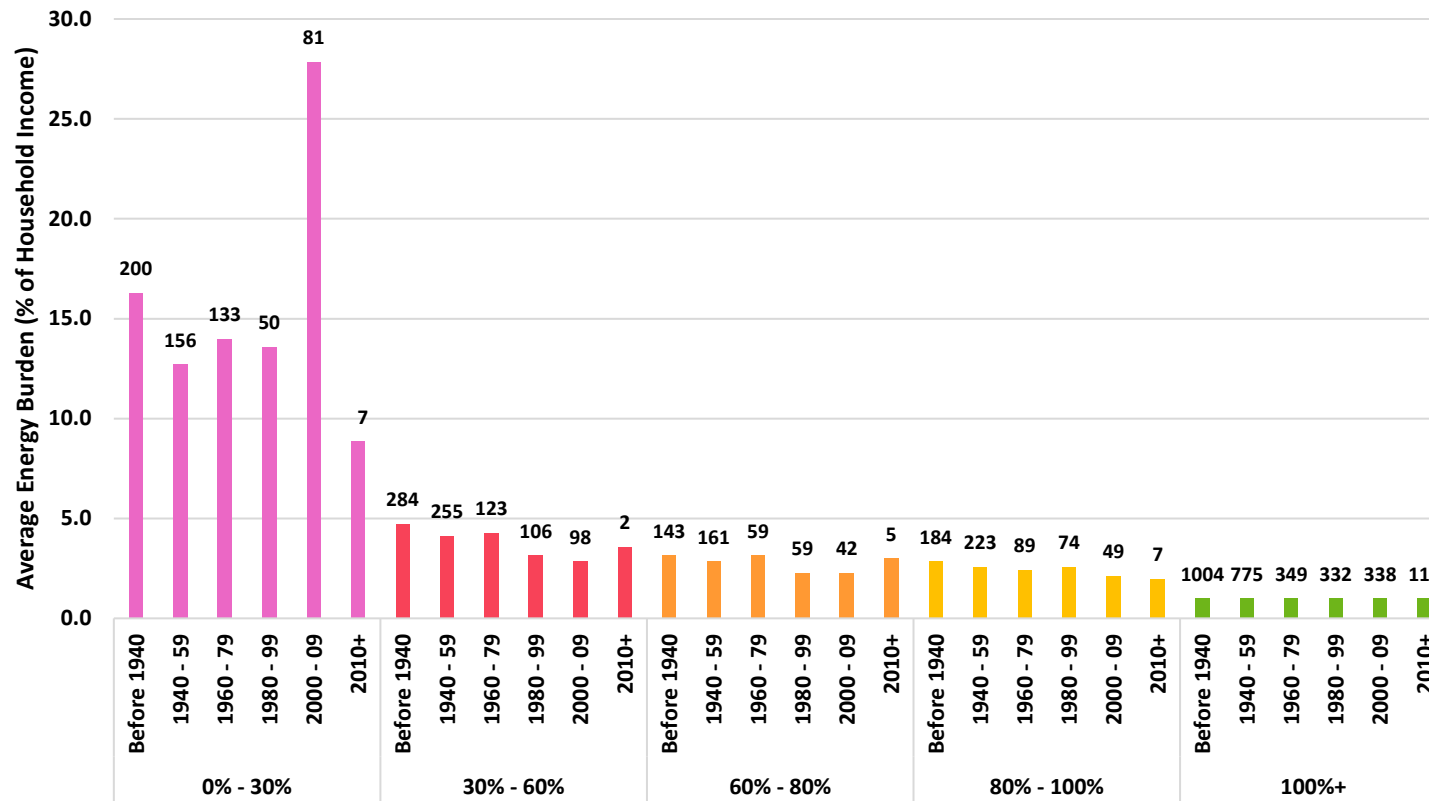
\*Housing count is shown above each bar.

Building Age and Area Median Income

- 0% to 30% AMI renters in buildings of all ages are on average highly burdened. Renters in single-family units built between 1940-1959 and 1960-1979 have the highest average energy burden of 12.1% and 12.0%, respectively. These households make up over one-half of the single-family housing stock at this income level.
- Within the 30% to 60% AMI group, renters in single-family units built between 1980 and 1999 face the highest average energy burden at 6.0% and make up 15% of the single-family housing stock at this income level.
- Between 60% to 100%+ AMI, renters in buildings of all ages have an average energy burden lower than 4%.

# Owner-Occupied Households in Single-Family Homes by AMI and Building Age

Figure 16: Average Energy Burden in Owner-Occupied Single-Family Detached Units by Building Age and Area Median Income in Beacon Hill, WA

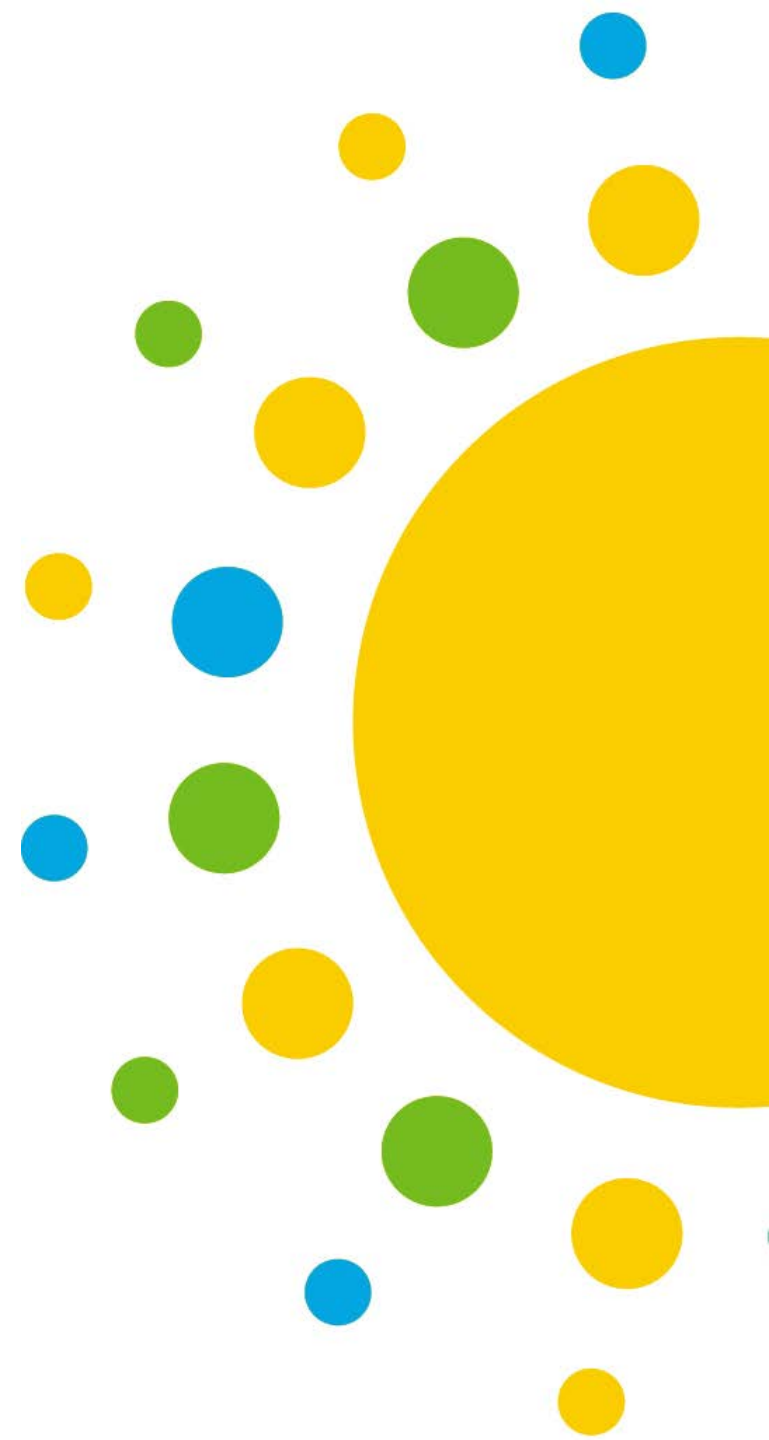


\*Housing count is shown above each bar.

Building Age and Area Median Income

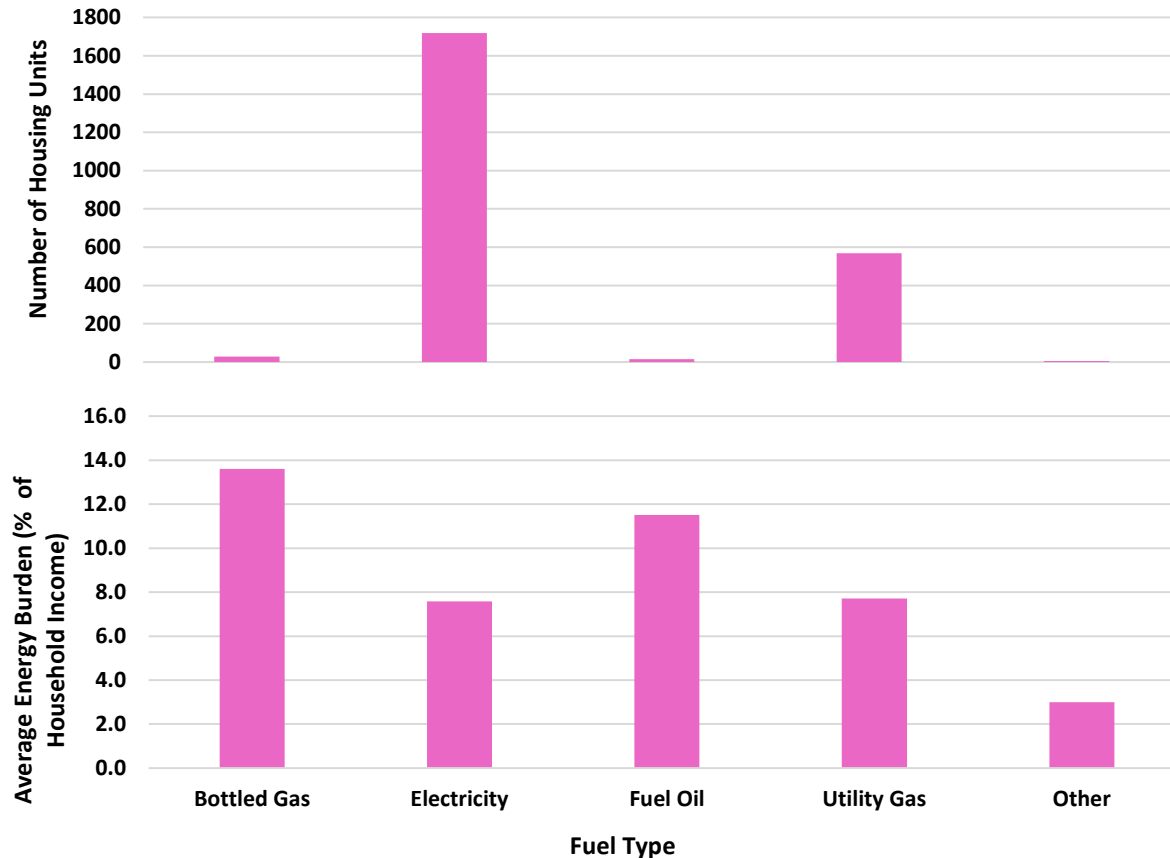
- Single-family owner-occupied households below 30% AMI face the highest average energy burden, regardless of the age of home.
  - Here, homeowners in all building age types are on average *severely burdened*, except for those in houses built in 2010+, who are low in number and still qualify as *highly burdened*.
  - Households in units built before 1940 and between 2000-2009 face the highest average energy burden of 16.3% and 27.9%, respectively.
- Single-family homeowners across all other income levels and building ages have average energy burden below 5%.

# Energy Burden by Heating Fuel Type in Beacon Hill



# Renter-Occupied Households: 0% to 30% Area Median Income

Figure 17: Average Energy Burden and Housing Count for 0% - 30% AMI Renters by Heating Fuel Type

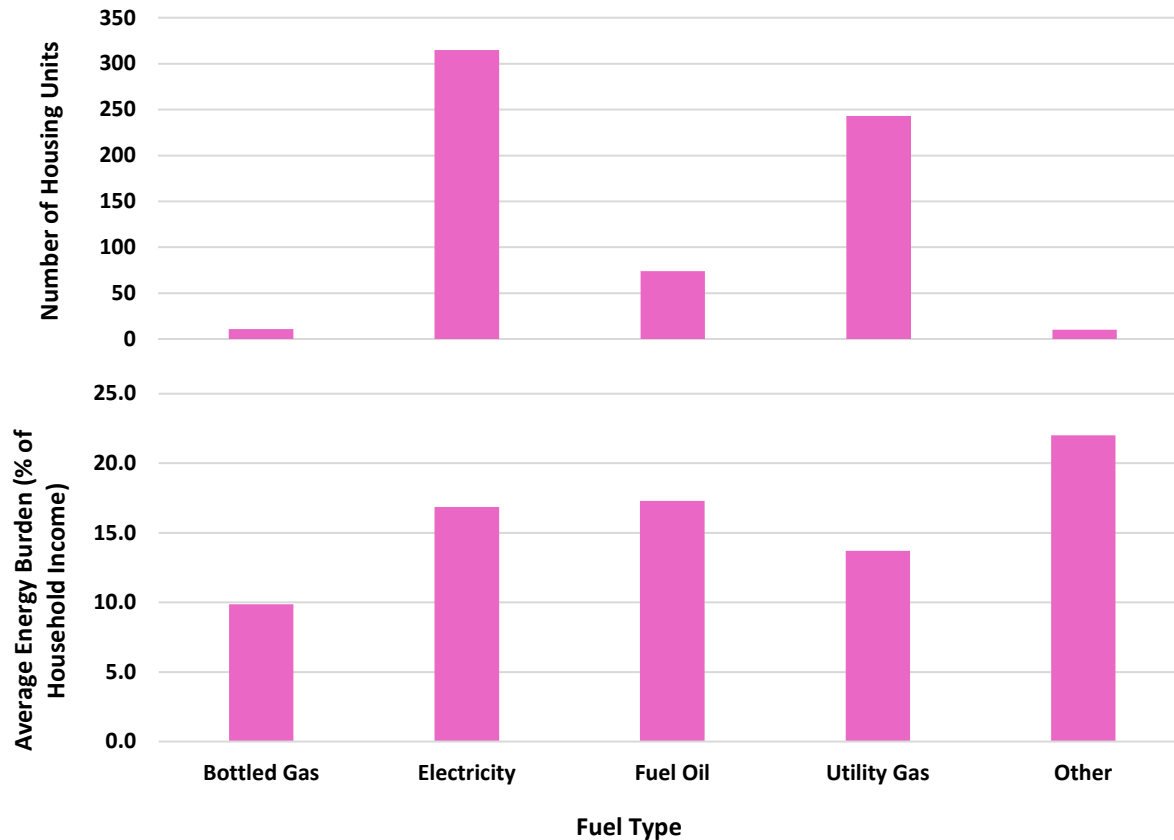


\*The heating fuel type “Other” includes coal, geothermal, waste-to-heat and biofuel

- Renters who earn between 0% to 30% AMI and use bottled gas (propane) or fuel oil as their main heating fuel are on average *severely burdened*.
  - These households only make up 2% of the rental housing stock at this income level.
- 0% to 30% AMI renters that use electricity and utility gas (natural gas) are on average *highly burdened*, with an energy burden of 7.6% and 7.7%, respectively.
  - 0% to 30% AMI households that use electricity and natural gas as their main heating fuel make up 74% and 24% of the rental housing stock, respectively.

# Owner-Occupied Households: 0% to 30% Area Median Income

Figure 18: Average Energy Burden and Housing Count for 0% - 30% AMI Owner-Occupied Households by Heating Fuel Type



\*The heating fuel type “Other” includes coal, geothermal, waste-to-heat and biofuel

- Owner-occupied households that use electricity and natural gas are *severely burdened*, with energy burden at or above 10% on average.
- Owner-occupied units that earn between 0% and 30% AMI and use fuel oil as their main heating fuel are *severely burdened*, with an average energy burden of 17.3%. These units make up approximately 12% of the owned housing stock in this AMI group.
- 10 owner-occupied units using the “other” fuel category have the highest energy burden at 22.0%
- At the 0% to 30% AMI level, no owner-occupied homes use wood as their primary heating fuel.



# Renter and Owner-Occupied Households: 30% to 60% Area Median Income

Figure 19: Average Energy Burden and Housing Count for Renters by Heating Fuel Type at 30%- 60% AMI

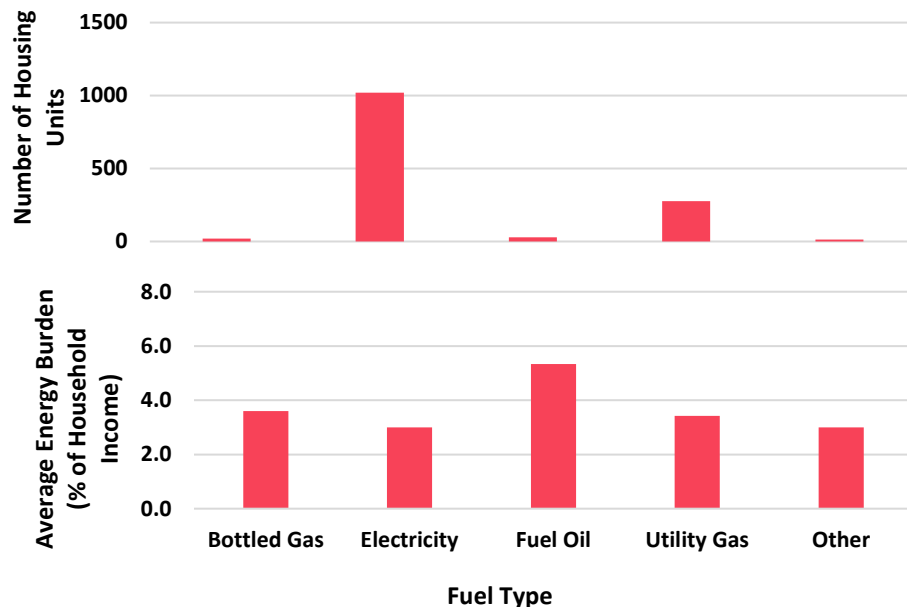
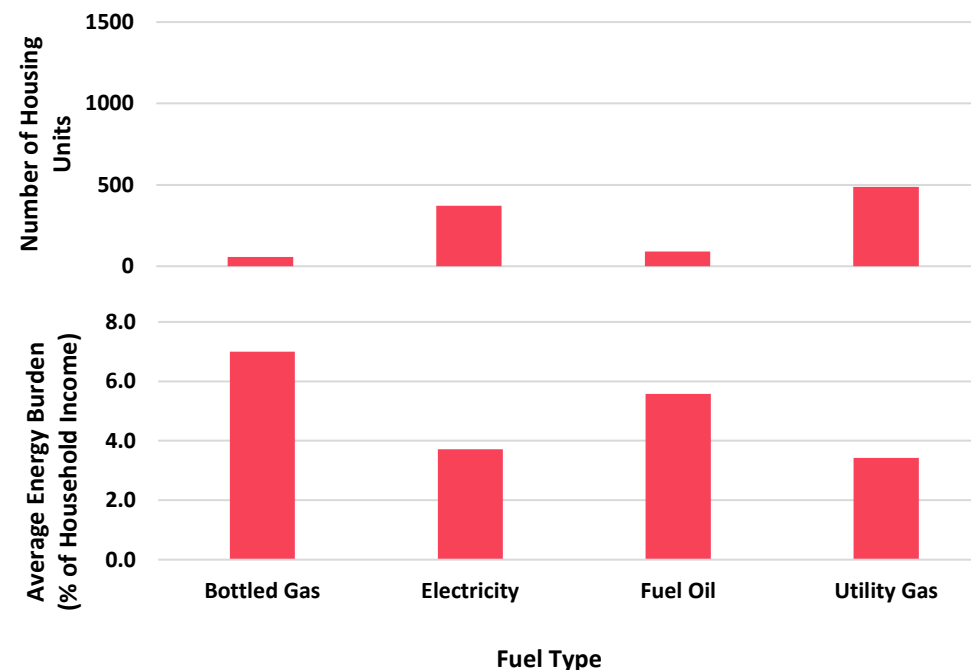


Figure 20: Average Energy Burden and Housing Count for Owner-Occupied Households by Heating Fuel Type at 30% - 60% AMI



- Renters in the 30% to 60% AMI group that use fuel oil for heating face the highest average energy burden (5.3%). However, this is less than the 6% threshold, and therefore this group might not qualify for energy assistance.
- Owner-occupied units in the 30% to 60% AMI group that use bottled gas for heating face the highest average energy burden (7.0%) in this AMI category, which qualifies as *highly burdened*. After bottled gas, owner-occupied households that use fuel oil as their main heating fuel have an average energy burden of 5.6%.
- Within the 30% to 60% AMI group, no homes use wood as their primary heating fuel.

\*The heating fuel type “Other” includes coal, geothermal, waste-to-heat and biofuel

# Renter and Owner-Occupied Households: 60% to 80% Area Median Income

Figure 21: Average Energy Burden and Housing Count for Renters by Heating Fuel Type at 60% - 80% AMI

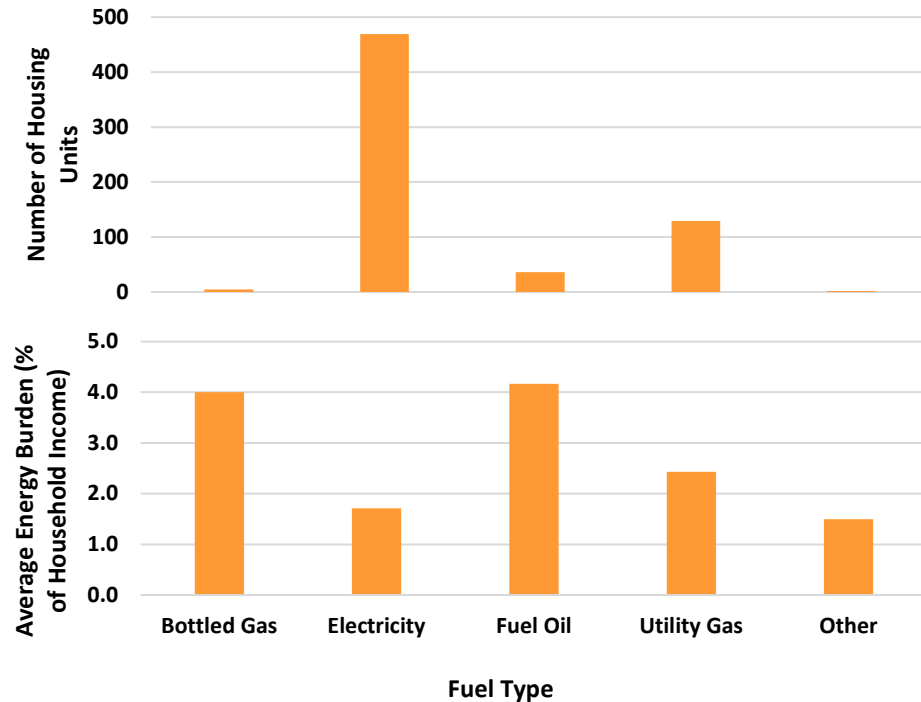
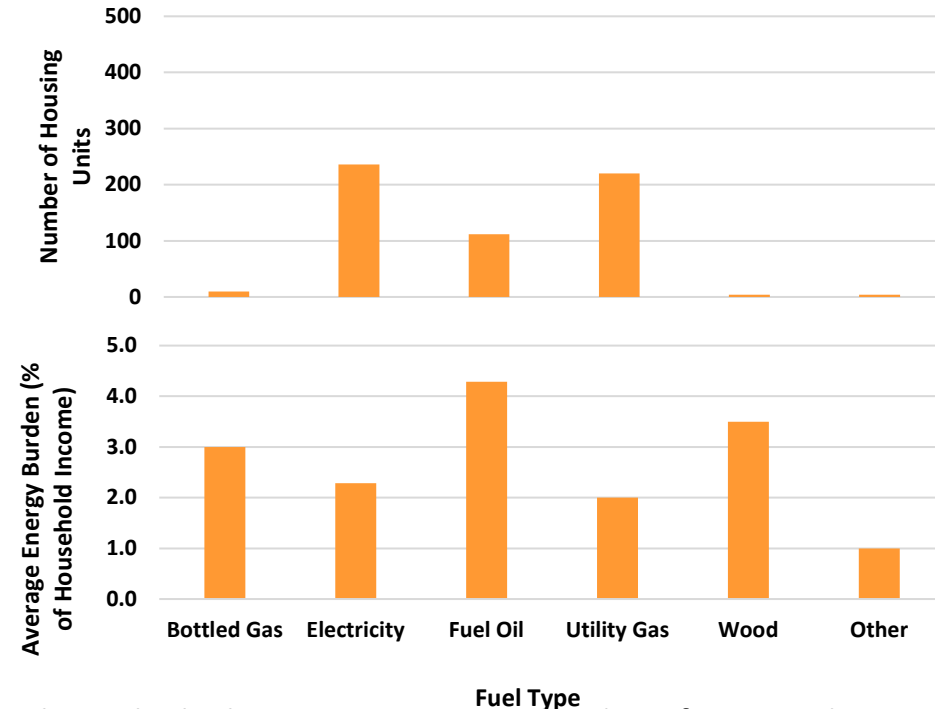


Figure 22: Average Energy Burden and Housing Count for Owner-Occupied Households by Fuel Type at 60% - 80% AMI



- Renter households within 60% to 80% AMI using fuel oil and bottled gas have the highest average energy burden of 4.2% and 4.0%, respectively.
- Owner-occupied households using fuel oil have the highest average energy burden of 4.3%.
- Only 4 owner-occupied homes use wood as their primary heating fuel, and their average energy burden is 3.5%.

\*The heating fuel type "Other" includes coal, geothermal, waste-to-heat and biofuel

# Renter and Owner-Occupied Households: All Area Median Income Groups

Figure 23: Average Energy Burden and Housing Count for Renters by Heating Fuel Type at all AMI Groups

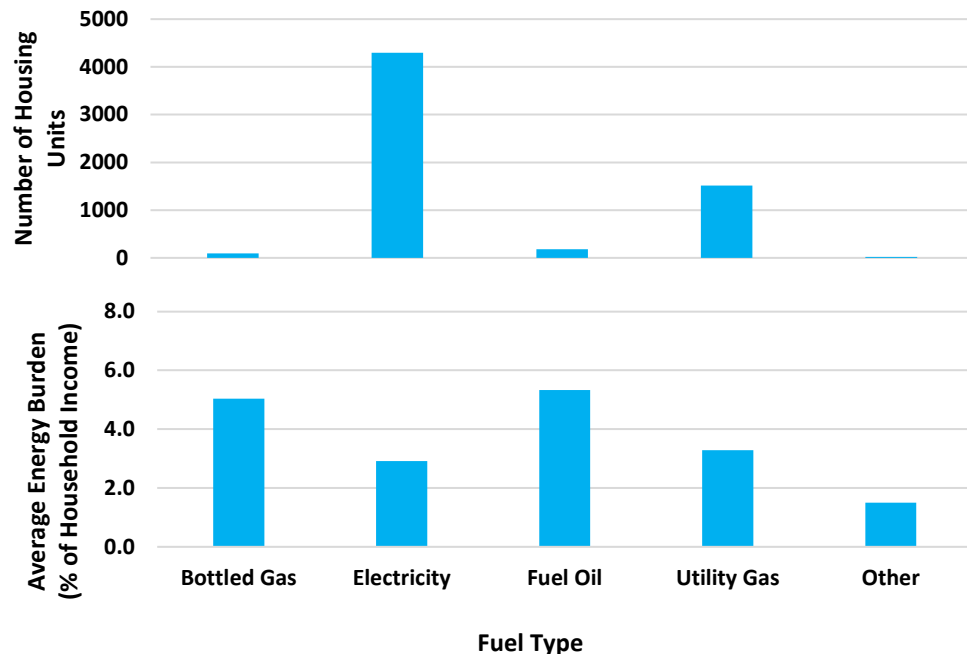
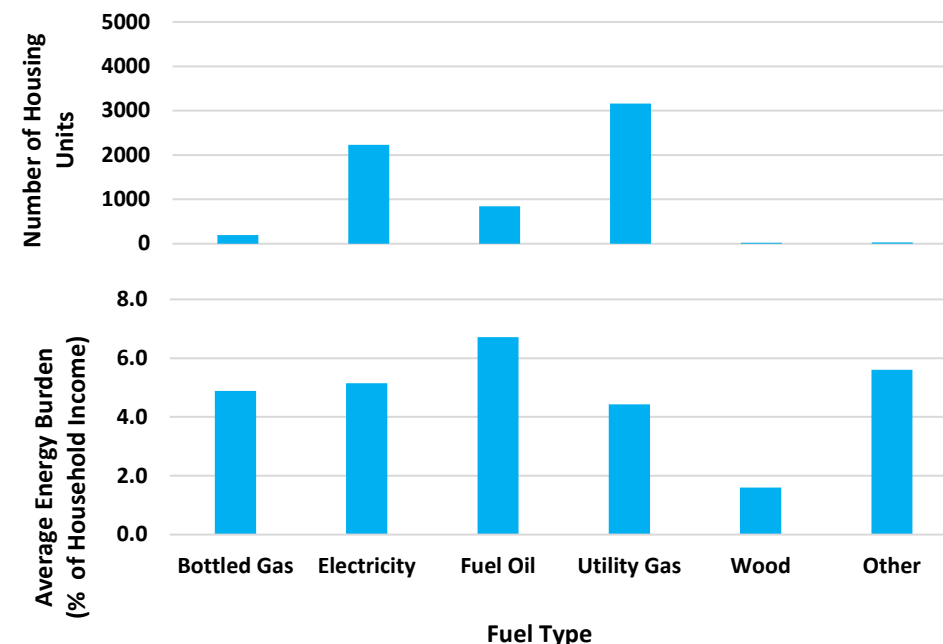


Figure 24: Average Energy Burden and Housing Count for Owner-Occupied Households by Fuel Type at all AMI Groups

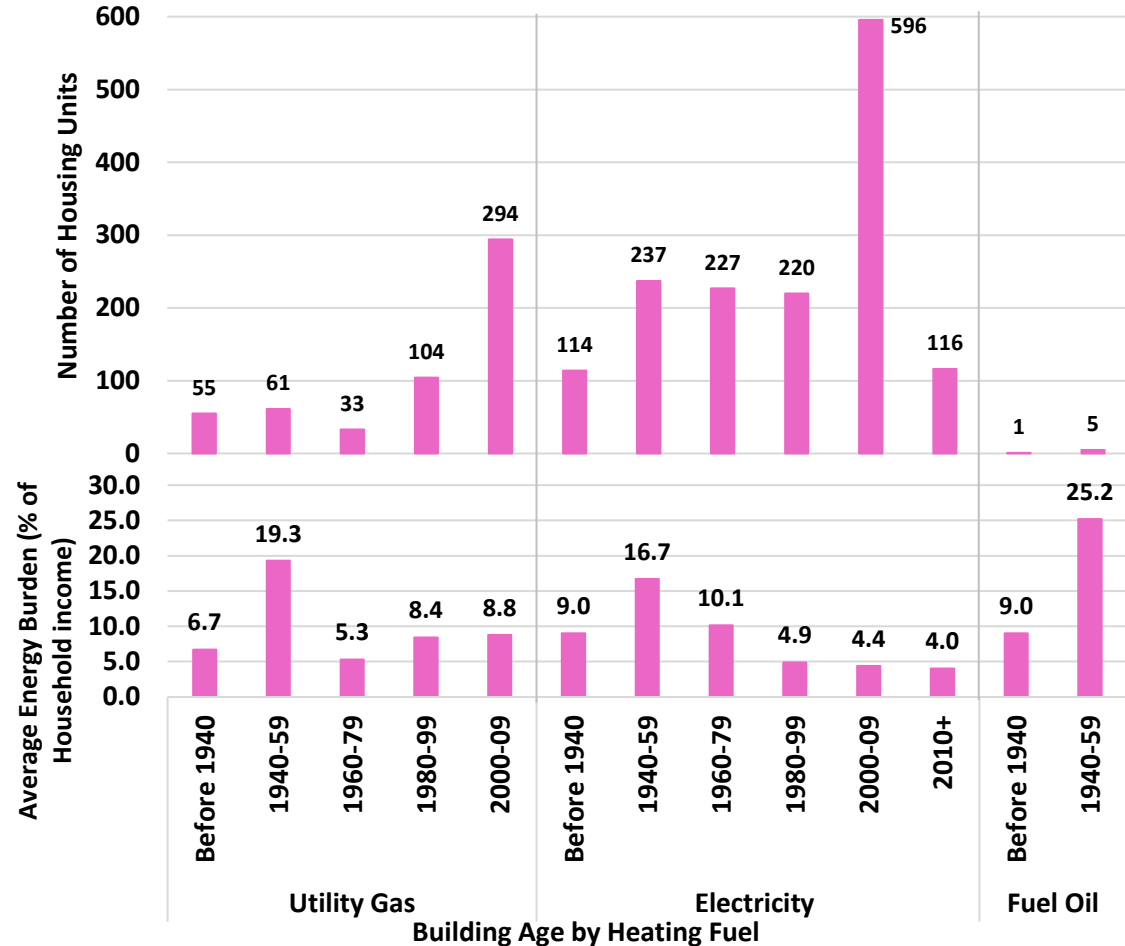


- Renters using fuel oil or bottled gas have the highest average energy burden at 5.3% and 5.0%, respectively.
- Owner-occupied households using fuel oil have the highest average energy burden at 6.7%, and this is the only fuel category to qualify as *highly burdened*.
- Only 18 owner-occupied homes use wood as their primary heating fuel, and their average energy burden is on average less than 1.6%.

\*The heating fuel type “Other” includes coal, geothermal, waste-to-heat and biofuel

# Building Age: Renter-Occupied Households at 0% to 30% AMI

Figure 25: Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Renters at 0%-30% AMI



The following renter-occupied household groups are *severely energy burdened*:

## Utility Gas

- 61 units built between 1940-1959 with an average energy burden of 19.3%.

## Electricity

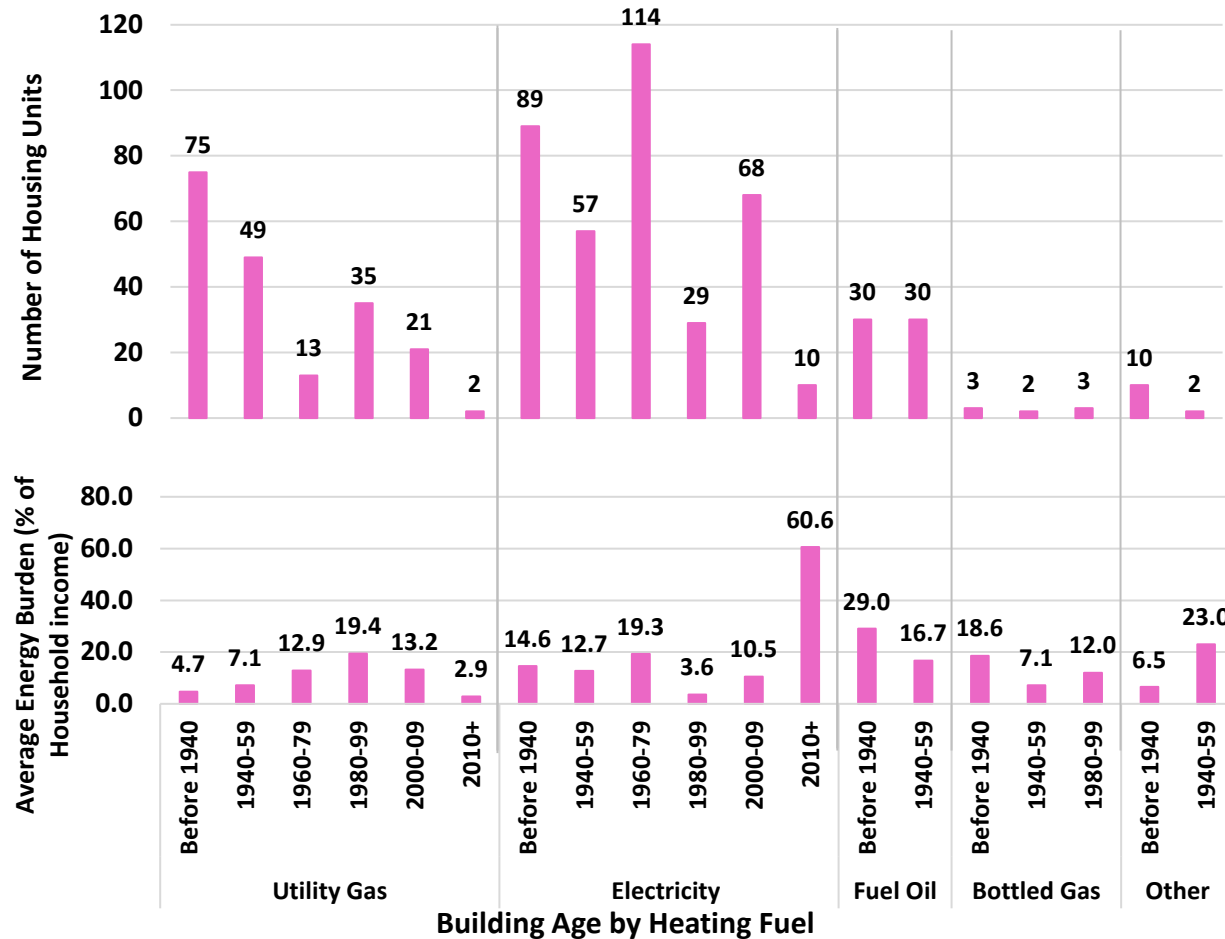
- 237 units built between 1940-1959 with an average energy burden of 16.7%
- 227 units built between 1960-1979 with an average energy burden of 10.1%.

## Fuel Oil

- 5 units built between 1940-1959 with an average energy burden of 25.2%.

# Building Age: Owner-Occupied Households at 0% to 30% AMI

Figure 26: Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Owner-Occupied Households at 0%-30% AMI



The following owner-occupied household types are *severely energy burdened*:

### Utility Gas

- 13 units built between 1960-1979 with an average energy burden of 12.9%
- 35 units built between 1980-1999 with an average energy burden of 19.4%
- 21 units built between 2000-2009 with an average energy burden of 13.2%.

### Electricity

- 89 units built before 1940 with an average energy burden of 14.6%
- 57 units built between 1940-1959 with an average energy burden of 12.7%
- 114 units built between 1960-1979 with an average energy burden of 19.3%
- 68 units built between 2000-2009 with an average energy burden of 10.5%
- 10 units built after 2010 with an average energy burden of 60.6%.
- It is possible that these units are housing for limited-income residents, such as students or seniors, meaning that these income groups have such low income and rent that their energy burdens are inflated.

### Fuel Oil

- 30 units built before 1940 with an average energy burden of 29.0%
- 30 units between 1940-1959 with an average energy burden of 16.7%.

### Bottled Gas

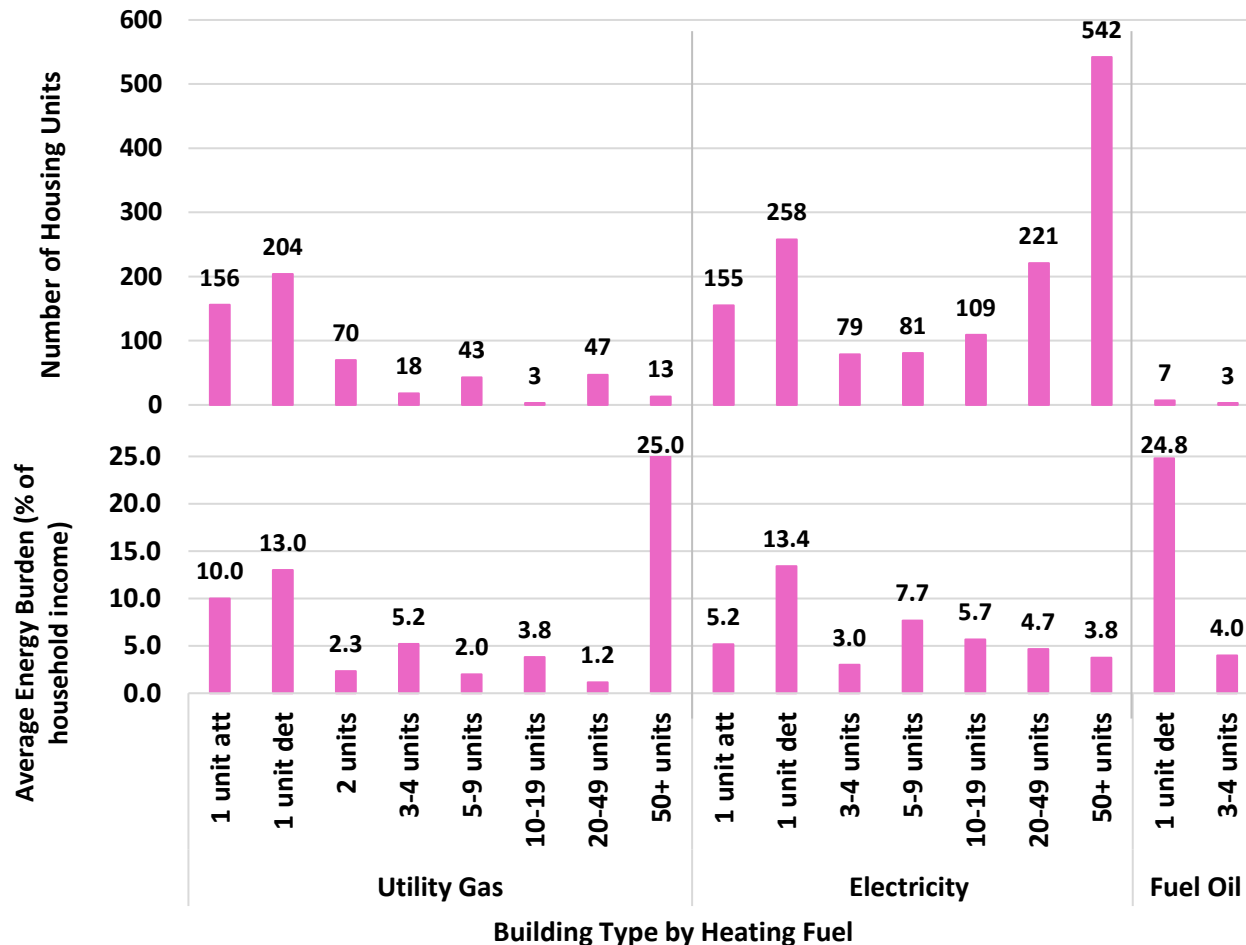
- 3 units built before 1940 with an average energy burden of 18.6%
- 3 units built between 1980-1999 with an average energy burden of 12.0%.

### Other\*

- 2 units built between 1940-1959 with an average energy burden of 23.0%.

# Building Type: Renter-Occupied Households at 0% to 30% AMI

Figure 27: Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Renter-Occupied Households at 0%-30% AMI



The following renter-occupied household types are *severely energy burdened*:

## Utility Gas

- 156 single-family attached units with an average energy burden of 10.0%
- 204 single-family detached units with an average energy burden of 13.0%
- 13 buildings with 50+ units with an average energy burden of 25.0%.
  - Since these are large buildings, it is possible that they are used as affordable housing and might not qualify for energy assistance under certain state or federal programs (U.S. HHS, 2016).

## Electricity

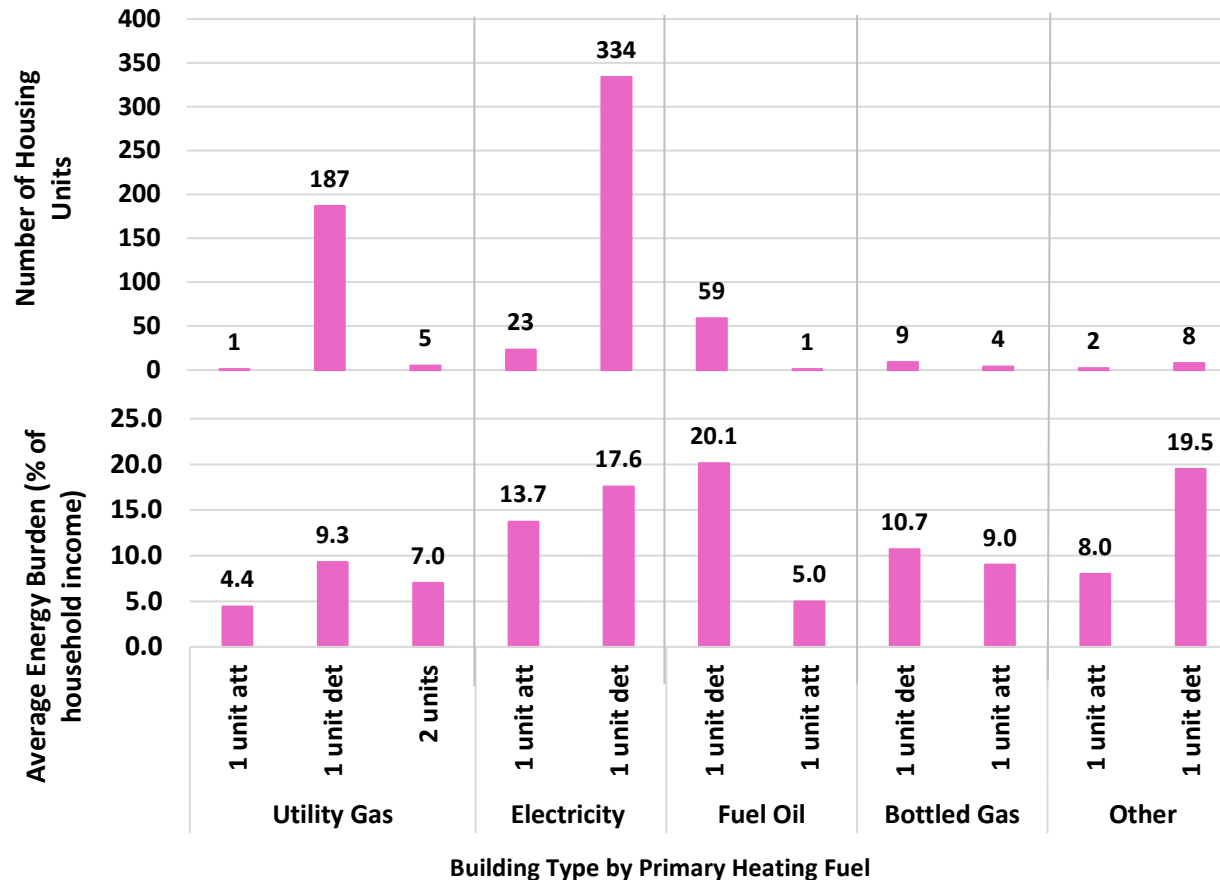
- 258 single-family detached units with an average energy burden of 13.4%.

## Fuel Oil

- 7 single-family detached units with an average energy burden of 24.8%.

# Building Type: Owner-Occupied Households at 0% to 30% AMI

Figure 28: Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Owner-Occupied Households at 0%-30% AMI



The following owner-occupied housing types are *severely energy burdened*:

### Utility Gas

- No building types using utility gas were *severely energy burdened*.

### Electricity

- 23 single-family attached units with an average energy burden of 13.7%
- 334 single-family detached units with an average energy burden of 17.6%.

### Fuel Oil

- 59 single-family detached units with an average energy burden of 20.1%.

### Bottled Gas

- 9 single-family detached units with an average energy burden of 10.7%.

### Other\*

- 8 single-family detached units with an average energy burden of 19.5%.

# Key Findings

## Energy Burden by Income in Beacon Hill, WA:

- On average, very low-income households (0%–30% AMI) in Beacon Hill are considered *highly burdened* (Slide 12).

## Energy Burden by Housing Type in Beacon Hill, WA:

- Renter and owner-occupied households within the 0% to 30% AMI category occupying single-family detached homes had the highest energy burden (Slides 17 & 18).

## Energy Burden by Housing Age in Beacon Hill, WA:

- Renter-occupied households at 0% to 30% AMI that live in units built between 1940 and 1979 had the highest average energy burden of between 8% to 10% (Slide 20).
- Households within the 0% to 30% AMI category that live in owner-occupied units of all ages were *severely burdened*. Those living in the newest units (built after 2010) had a slightly lower energy burden, but still very high, at 8% on average (Slide 21).

## Energy Burden by Fuel Type:

- Renter-occupied households within the 0% to 30% AMI category that heat with electricity (Slide 25) are *highly burdened*, whereas owner-occupied households that heat with electricity (Slide 26) are *severely burdened*
- Renter-occupied households within the 0% to 30% AMI category that heat with utility gas (Slide 25) are *highly burdened*, whereas owner-occupied households that heat with utility gas (Slide 26) are *severely burdened*.
- Households within the 0% to 30% AMI category that heat with fuel oil (renters and owners) are *severely burdened* (Slide 25 & 26)



# Summary and Next Steps

Focusing on residential energy burden has the potential to address all four of the Beacon Hill Community Stakeholder (also “Solutions Collaborative”) Group’s goals, primarily through the ECONOMY goal. Identifying and reducing energy bills for residents in Beacon Hill can meaningfully address these residents’ ability to meet the rising cost-of-living in the neighborhood and resist displacement.

Furthermore, providing stable energy bills and reducing severe energy burden in the Beacon Hill can support residents’ ability to perform building upgrades that improve health (e.g., indoor air quality), resilience (e.g., air conditioning), and reduce greenhouse gases (e.g., energy efficiency).

The Beacon Hill community plans to leverage the findings in this report in applications for federal, state, and local grants that have the potential to alleviate energy burden for residents.



# Thank you!

[www.energy.gov/communitiesLEAP](http://www.energy.gov/communitiesLEAP)

Produced for the U.S. Department of Energy  
by the National Renewable Energy Laboratory (NREL).

DOE/GO-102024-6286 | July 2024

# References

- Drehobl, Ariel; Ross, Lauren; Ayla, Roxana. “How High Are Household Energy Burdens? An Assessment of National and Metropolitan Energy Burden across the United States.” Washington, DC: American Council of Energy Efficient Economy (ACEEE), September 2020 <https://www.aceee.org/sites/default/files/pdfs/u2006.pdf>.
- Ma, Ookie, Krystal Laymon, Megan Day, Ricardo Oliveira, Jon Weers, and Aaron Vimont. “Low-Income Energy Affordability Data (LEAD) Tool Methodology.” Golden, CO: National Renewable Energy Laboratory (NREL), 2019 <https://www.nrel.gov/docs/fy19osti/74249.pdf>.
- U.S. Census Bureau. “2020 American Community Survey.” Washington, D.C.: United States Census Bureau, November 2021 <https://www.census.gov/programs-surveys/acs>.
- U.S. Census Bureau. “2020 Decennial Census.” Washington, D.C.: United States Census Bureau, November 2022 <https://www.census.gov/programs-surveys/decennial-census/decade/2020/2020-census-main.html>.
- U.S. HHS. (2016, November). Subsidized housing and LIHEAP. Subsidized Housing and LIHEAP | The LIHEAP Clearinghouse. <https://liheapch.acf.hhs.gov/pubs/440.htm>.

# Appendix

# Appendix 1: AMI Income Level Calculations

- Table A.1 below shows data from the 2021 American Community Survey on the average household income across different area median income levels and household sizes.

Seattle AMI	Table A.1 Household Size							
	1	2	3	4	5	6	7	8
30% AMI	\$27,200	\$31,050	\$34,950	\$38,800	\$41,950	\$45,050	\$48,150	\$51,250
50% AMI	\$45,300	\$51,800	\$58,250	\$64,700	\$69,900	\$75,100	\$80,250	\$85,450
80% AMI	\$66,750	\$76,250	\$85,800	\$95,300	\$102,950	\$110,550	\$118,200	\$125,800
150% AMI	\$125,156	\$142,969	\$160,875	\$178,688	\$193,031	\$207,281	\$221,625	\$235,875

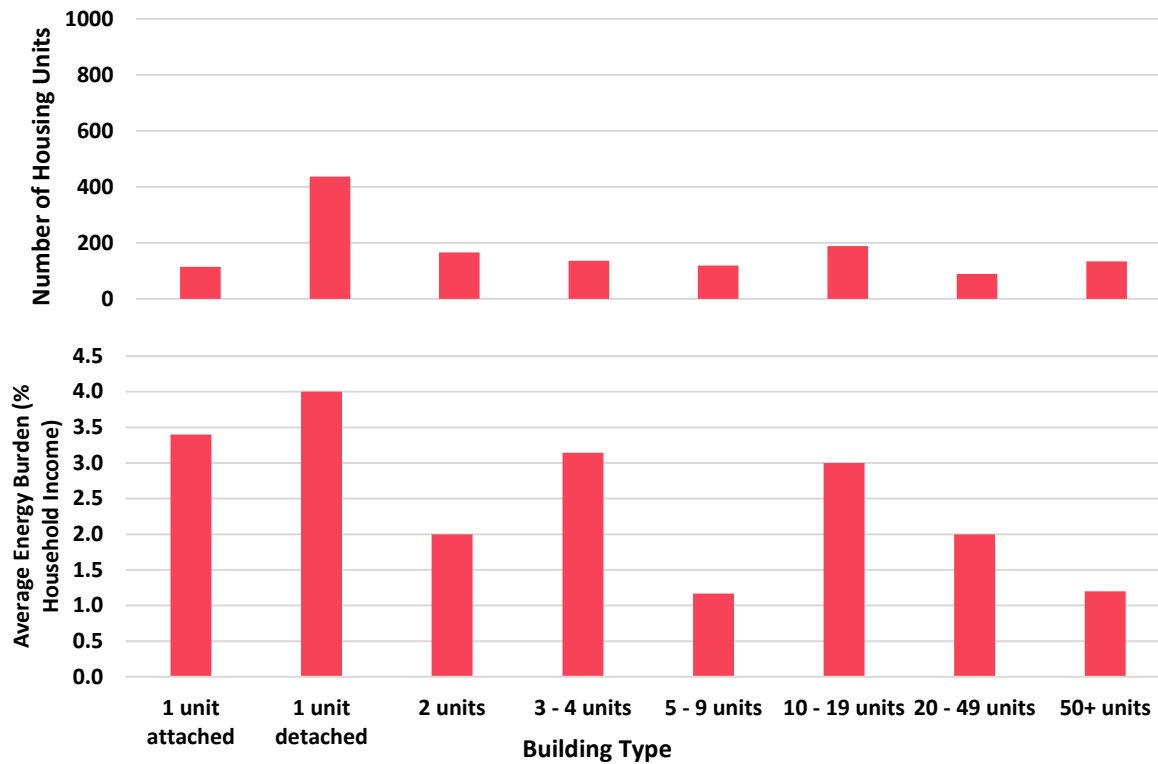
# Appendix 1 (cont'd): AMI Income Level Calculations

- Table A.2 below was derived from Table A.1 based on linear interpolation across different AMI levels in Table A.1 and by assuming an average household size of 3 people.

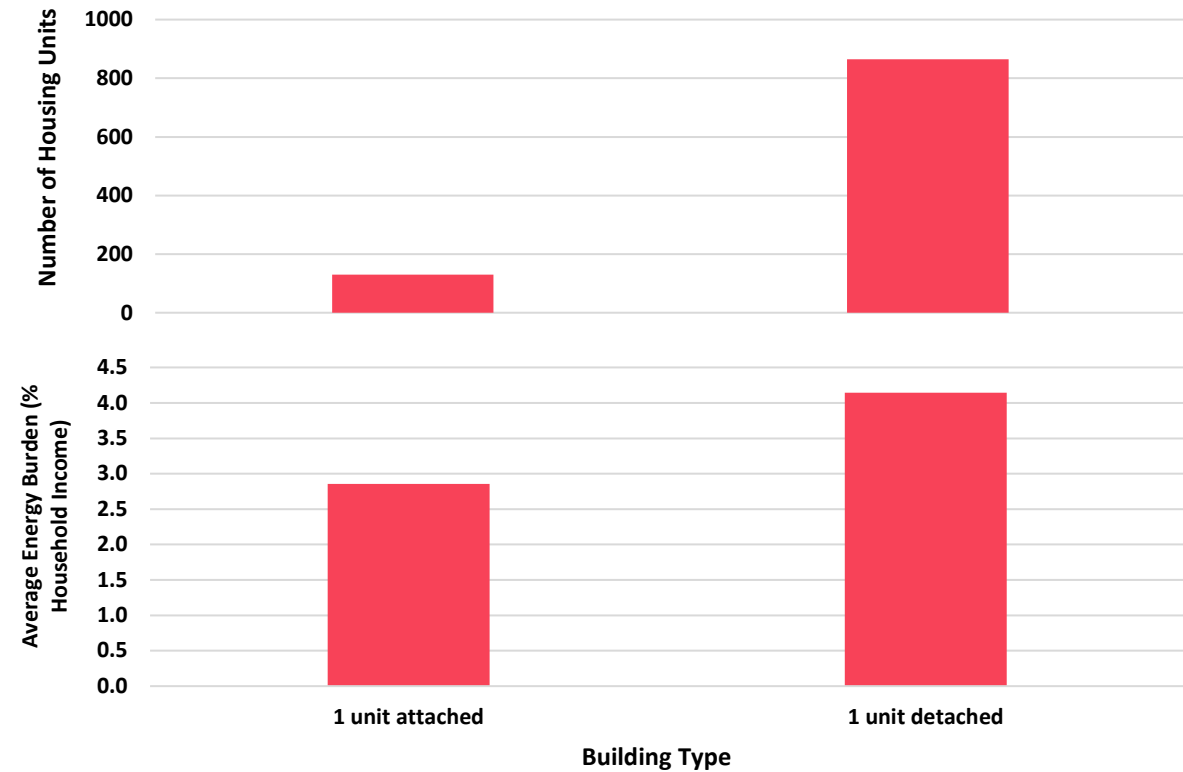
Table A.2	
AMI Level	Household Income Range for A 3-Person Household
0-30% AMI	\$0 - \$32,965
30% - 60% AMI	\$32,965 - \$63,608
60% - 80% AMI	\$63,608 - \$80,928
80% - 100% AMI	\$80,928 - \$101,161
100%+ AMI	\$101,161+

# Appendix 2: Energy Burden by Building Type for 30% to 60% AMI

Average Energy Burden and Housing Count for Rental Units by Building Type between 30% - 60% AMI



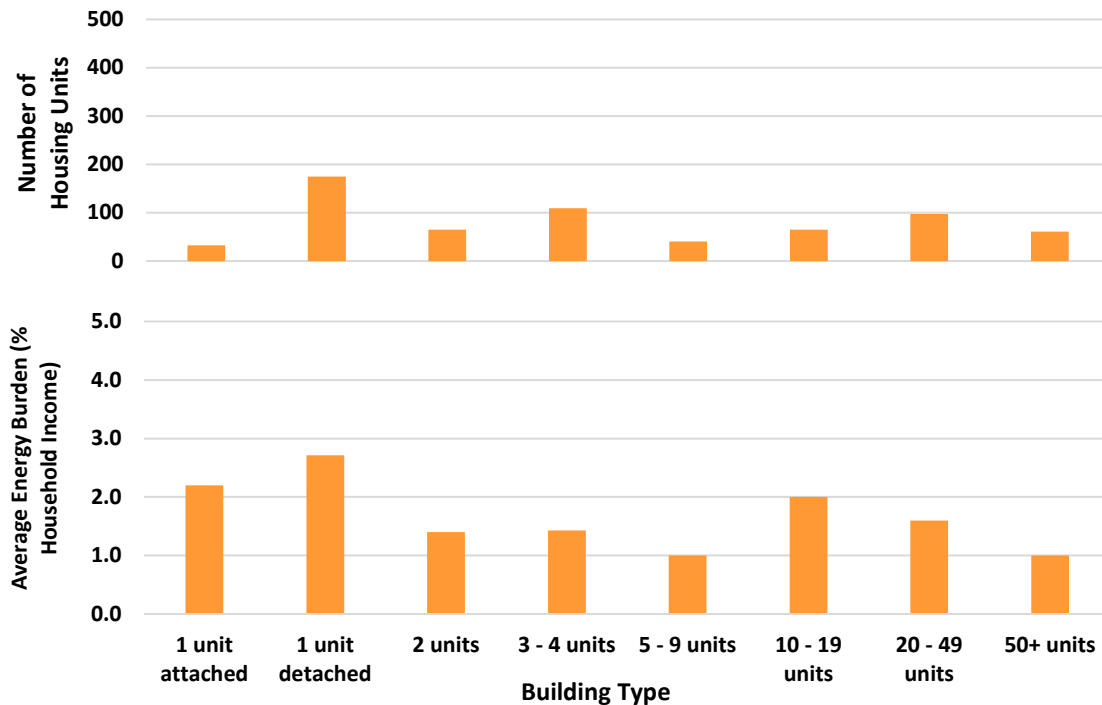
Average Energy Burden and Housing Count for Owned Building Types\* at 30% - 60% AMI



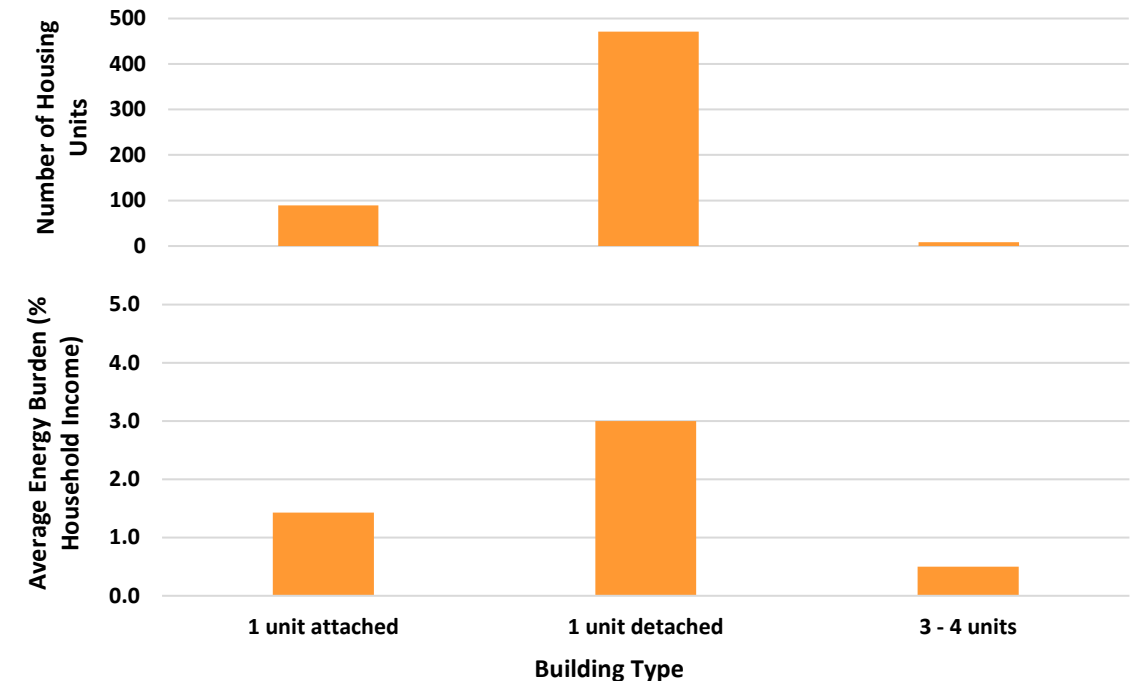
\*Data for other owner-occupied households was not available for this AMI group.

# Appendix 3: Energy Burden by Building Type for 60% to 80% AMI

Average Energy Burden and Housing Count for Rental Units by Building Type between 60% - 80% AMI



Energy Burden and Housing Count for Owned Building Types at 60% - 80% AMI

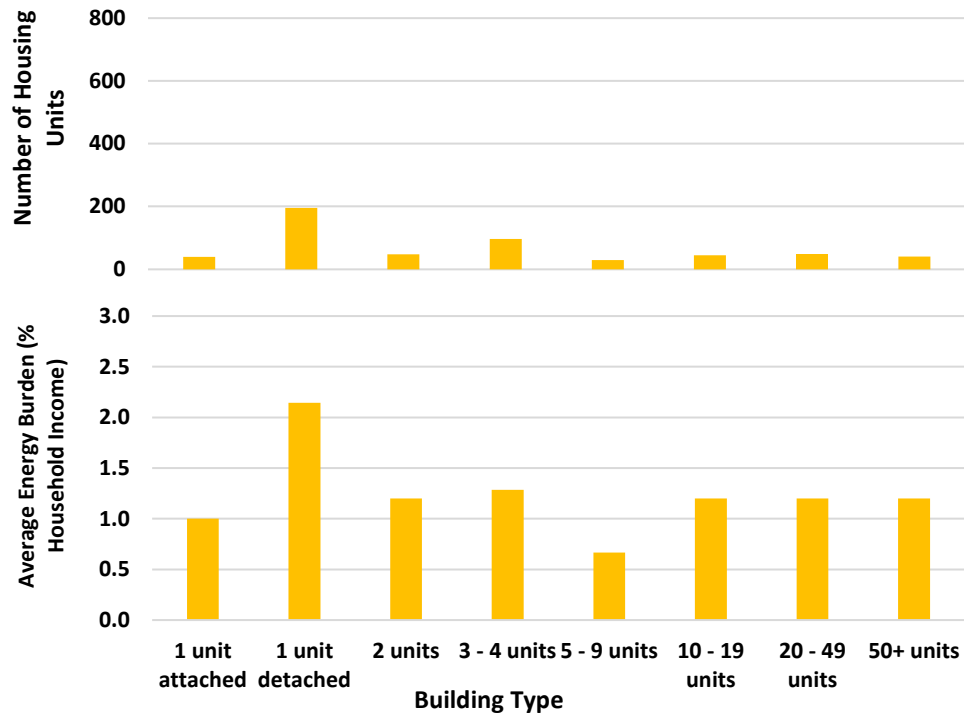


\*Data for other owner-occupied households was not available for this AMI group.

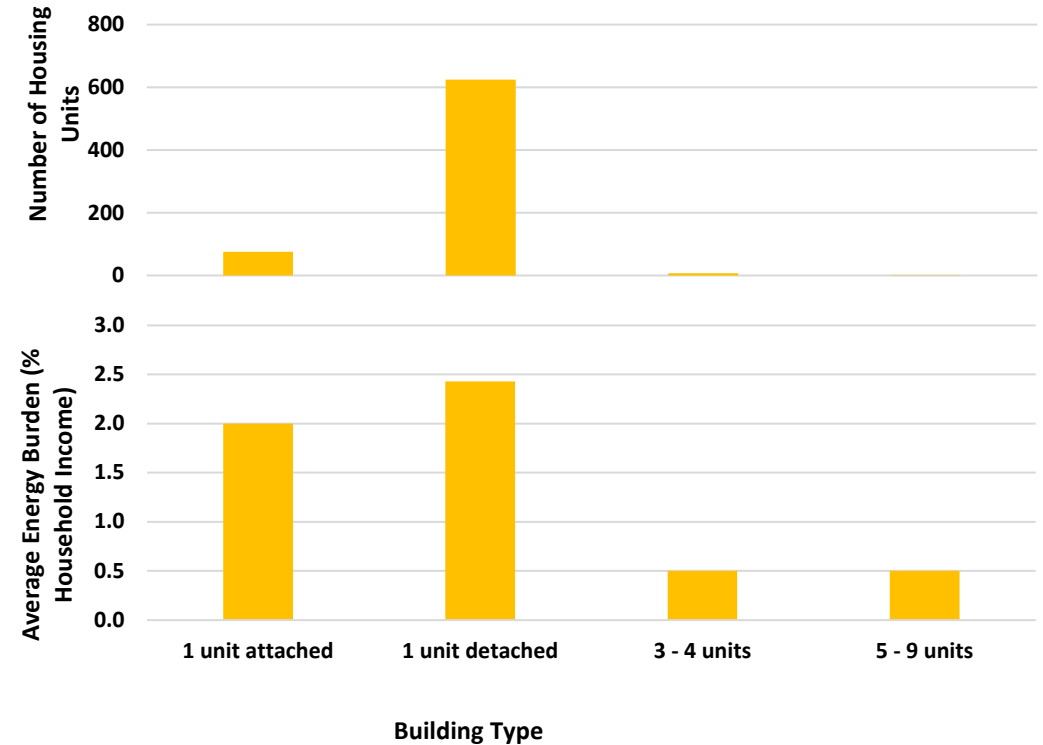


# Appendix 4: Energy Burden by Building Type for 80% to 100% AMI

Average Energy Burden and Housing Count for Rental Units by Building Type between 80% - 100% AMI



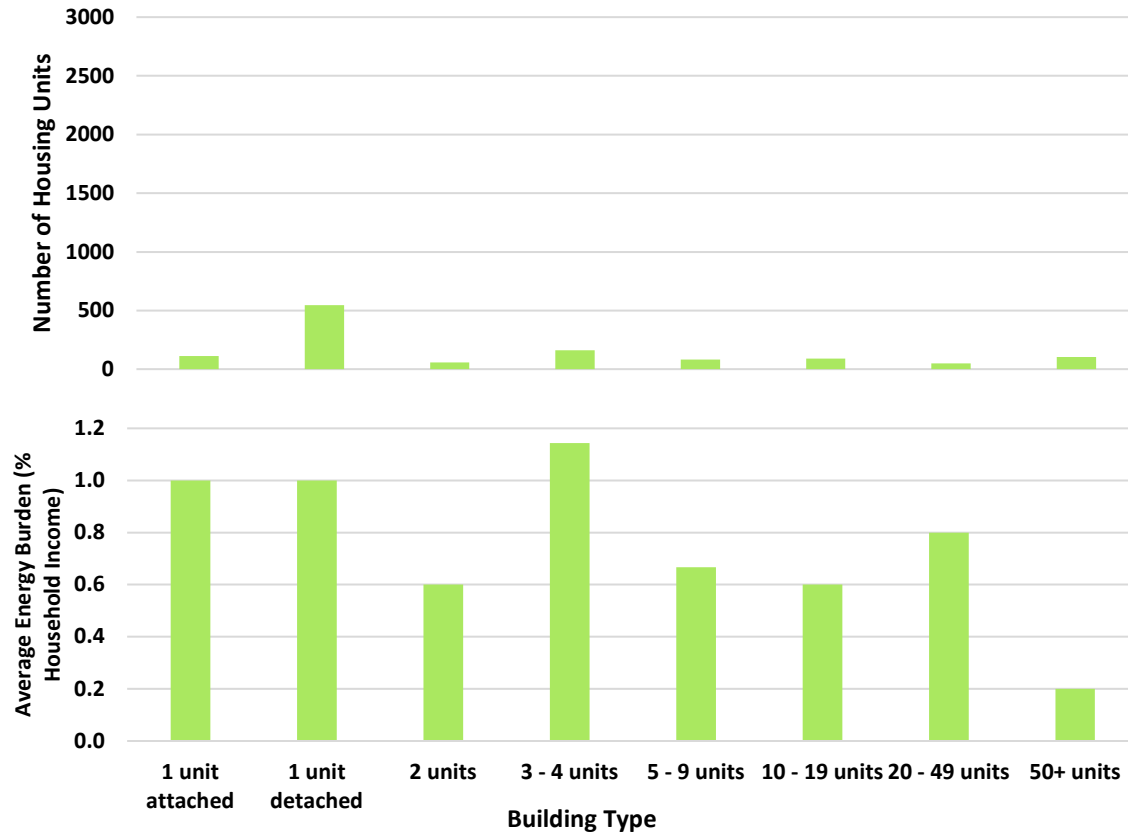
Energy Burden and Housing Count for Owned Building Types\* at 80% - 100% AMI



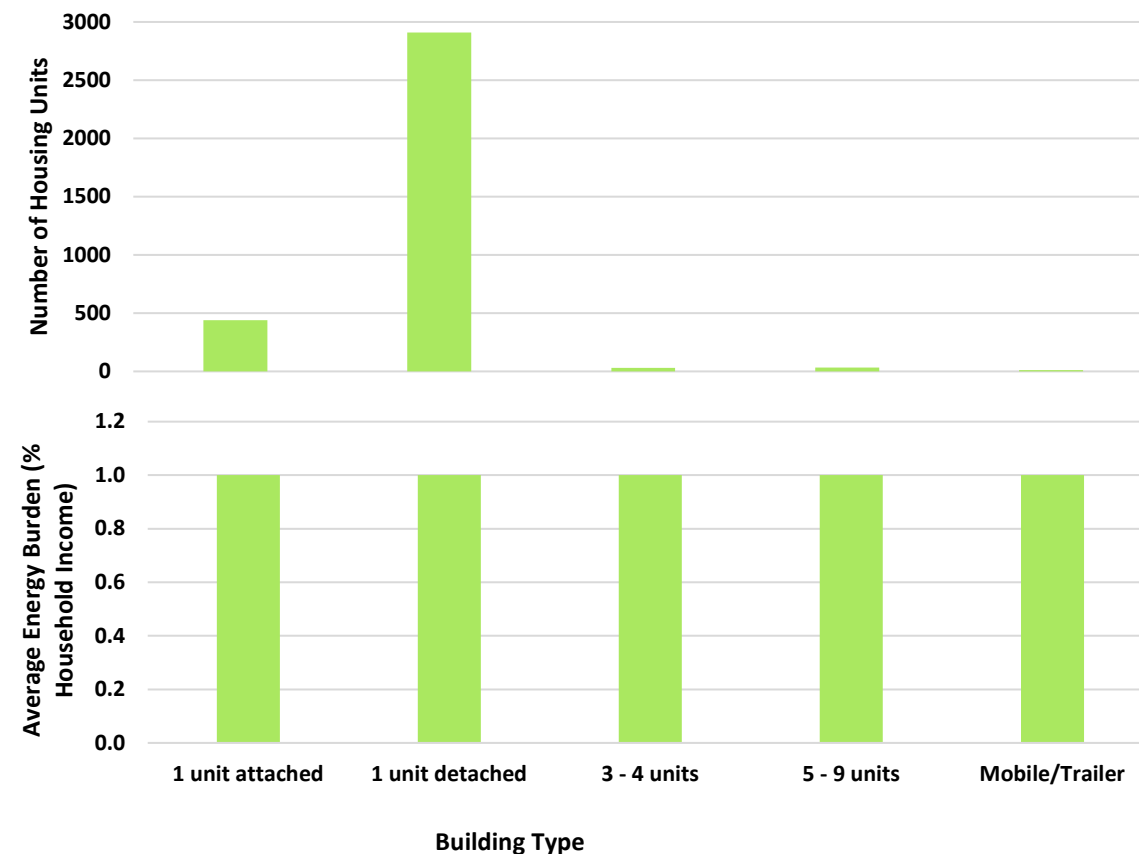
\*Data for other owner-occupied households was not available for this AMI group.

# Appendix 5: Energy Burden by Building Type for 100%+ AMI

Energy Burden and Housing Count for Rental Units by Building Type for Households above 100% AMI



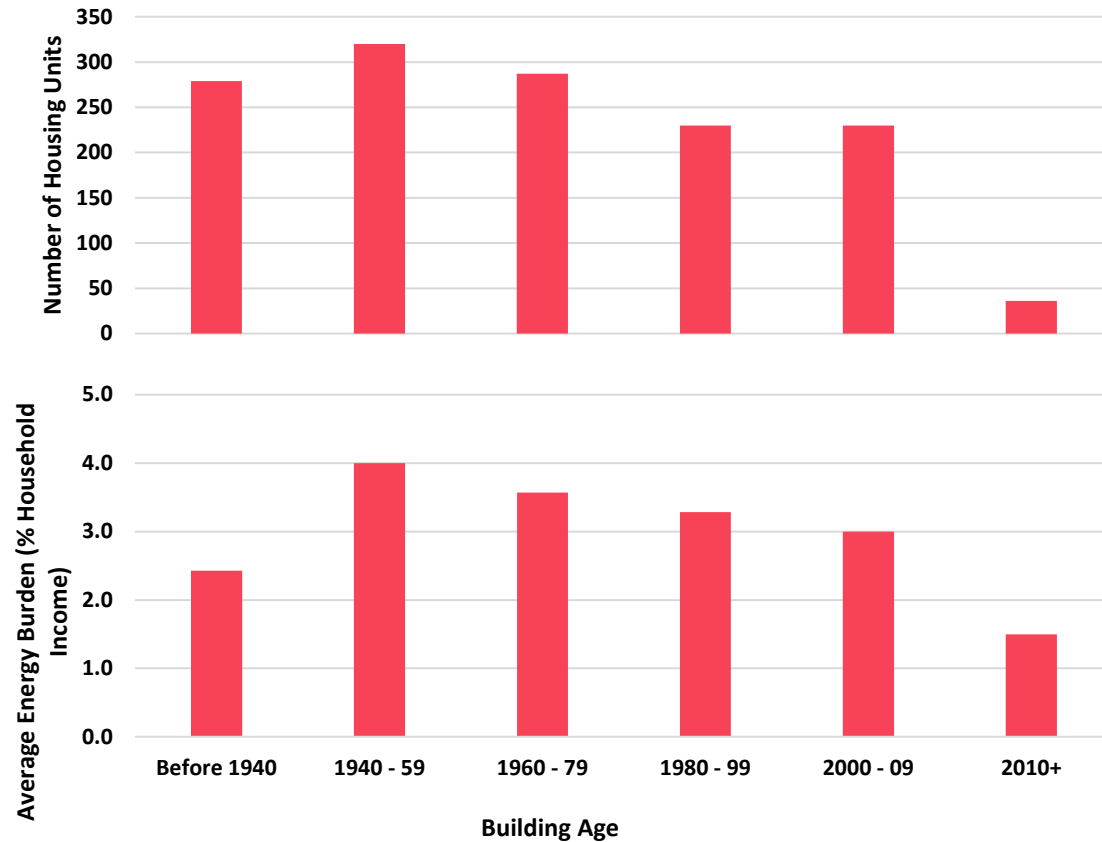
Energy Burden and Housing Count for Owned Building Types\* above 100% AMI



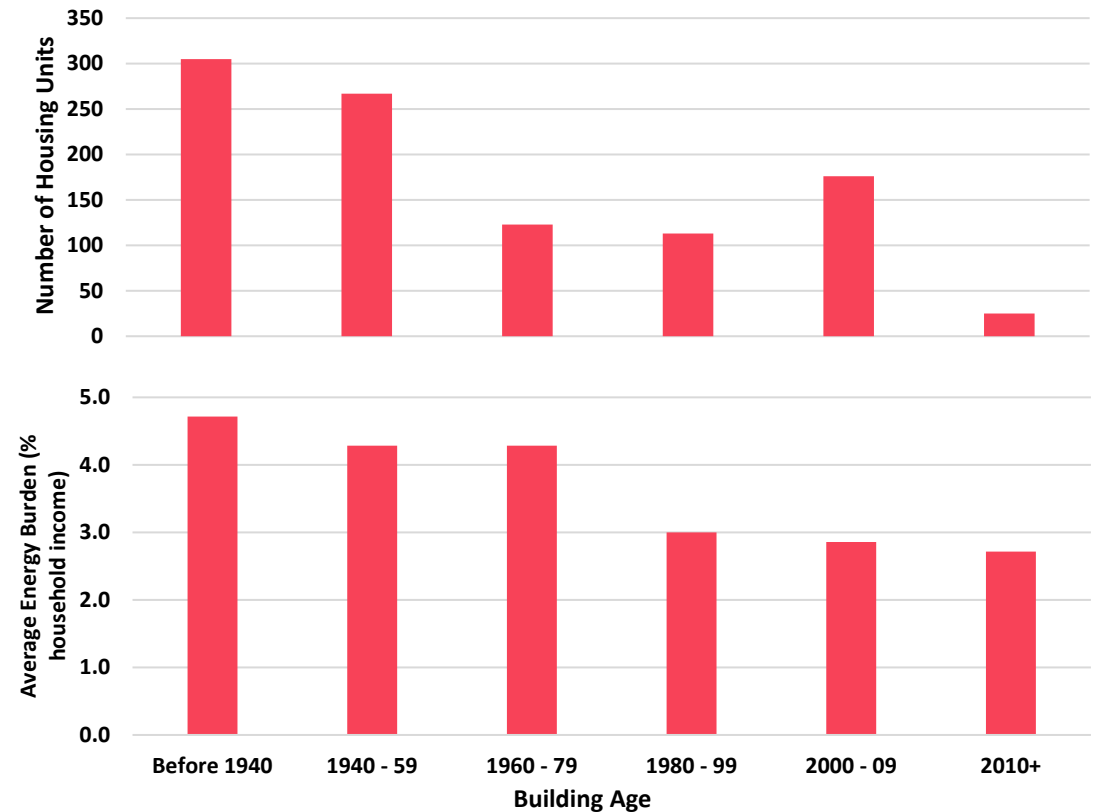
\*Data for other owner-occupied households was not available for this AMI group.

# Appendix 6: Energy Burden by Building Age for 30% to 60% AMI

Average Energy Burden and Housing Count for Rental Units by Building Age at 30% - 60%

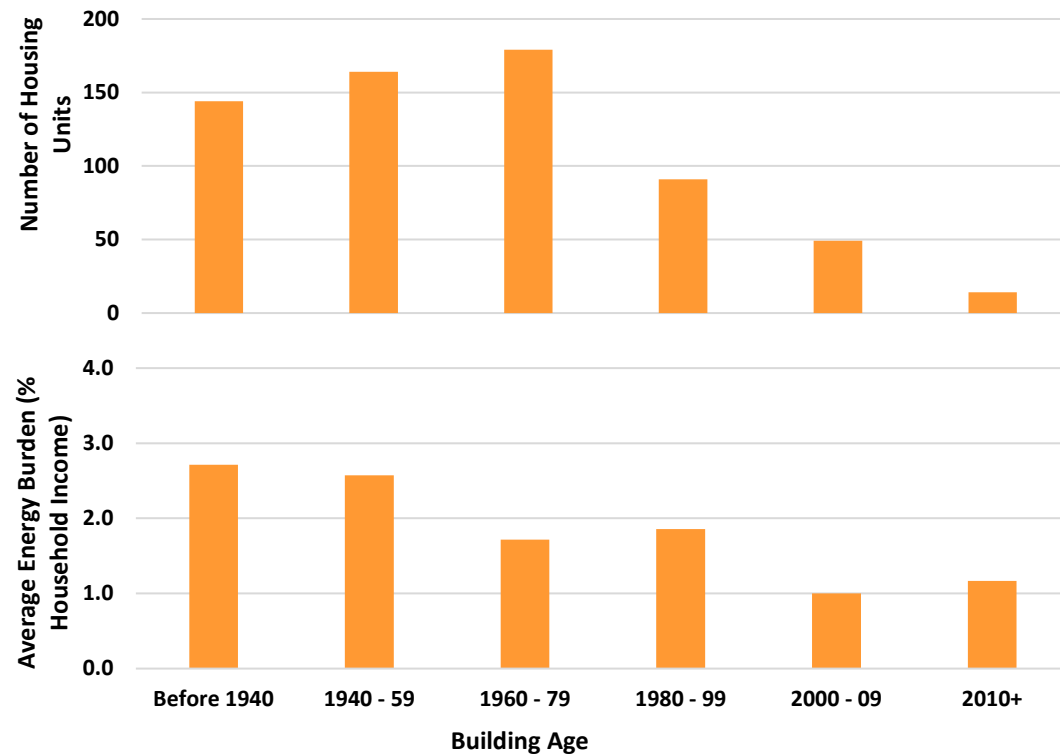


Average Energy Burden and Housing Count for Owned Units by Building Age at 30% - 60% AMI

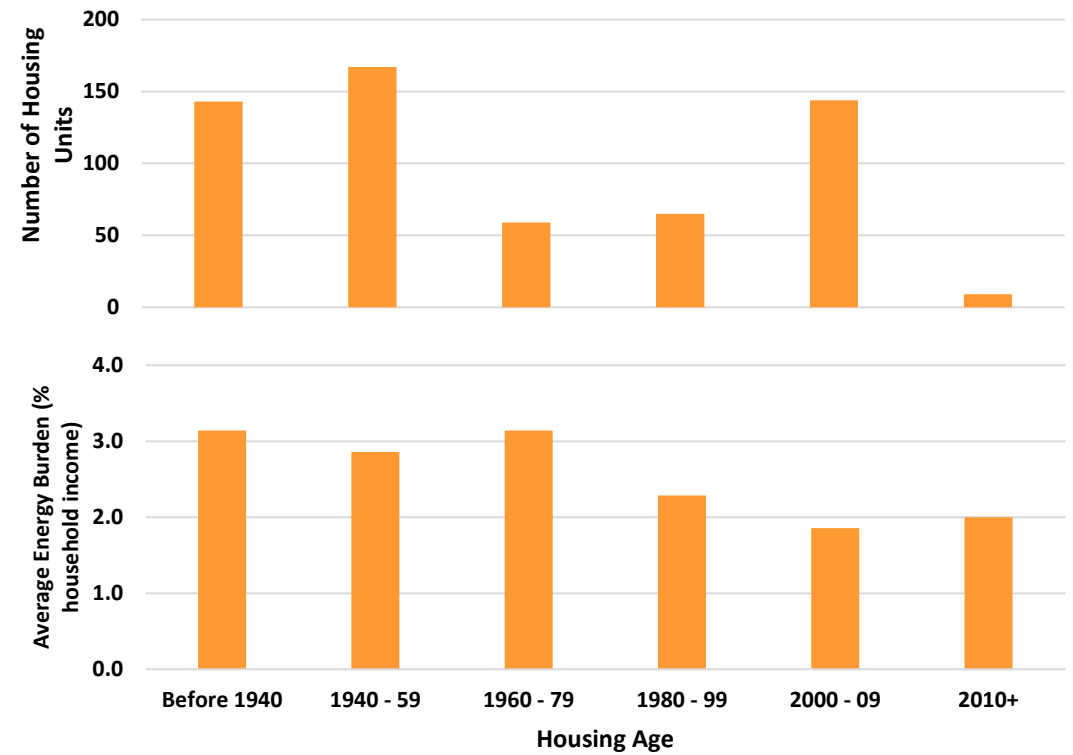


# Appendix 7: Energy Burden by Building Age for 60% to 80% AMI

Average Energy Burden and Housing Count for Rental Units by Building Age at 60% - 80% AMI

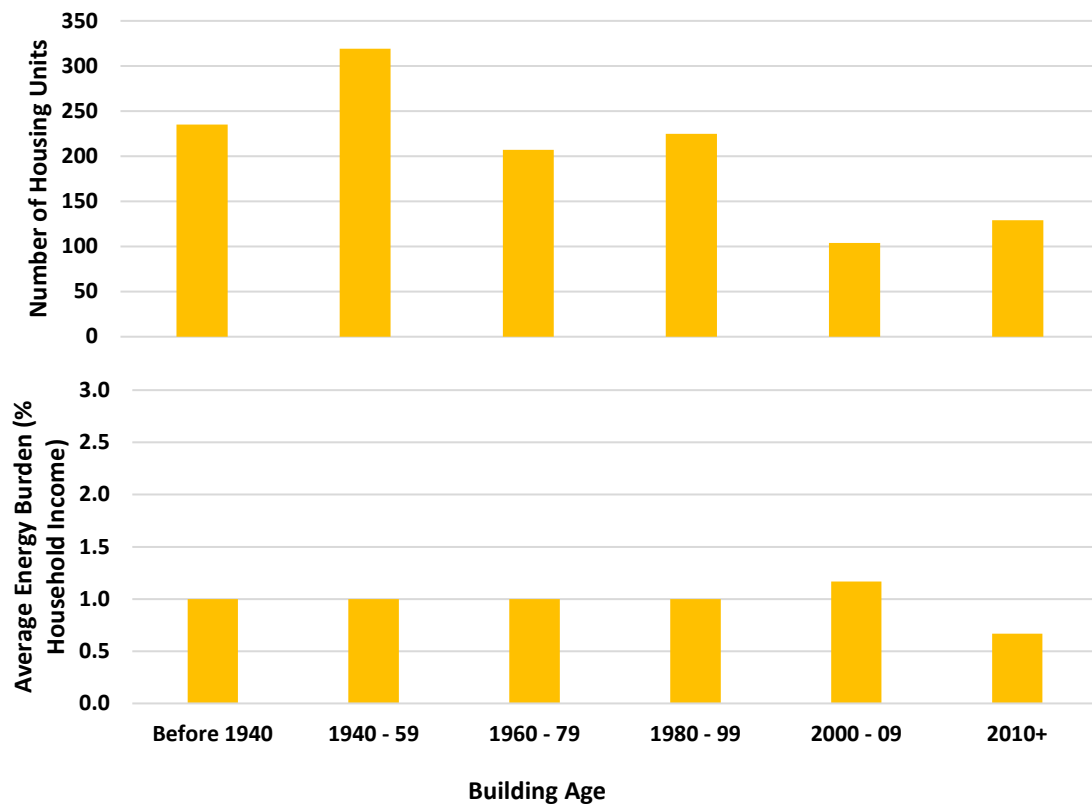


Average Energy Burden and Housing Count for Owned Units by Building Age at 60% - 80% AMI

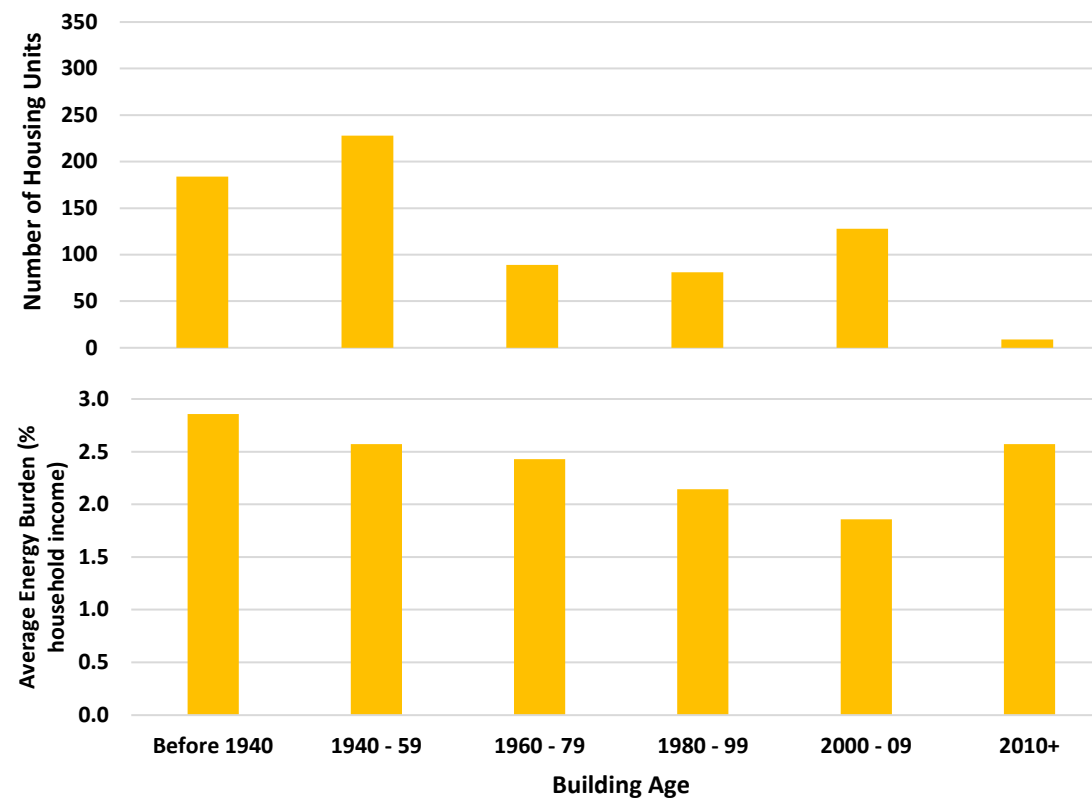


# Appendix 8: Energy Burden by Building Age for 80% to 100% AMI

Energy Burden and Housing Count for Rental Units by Building Age at 80% - 100% AMI

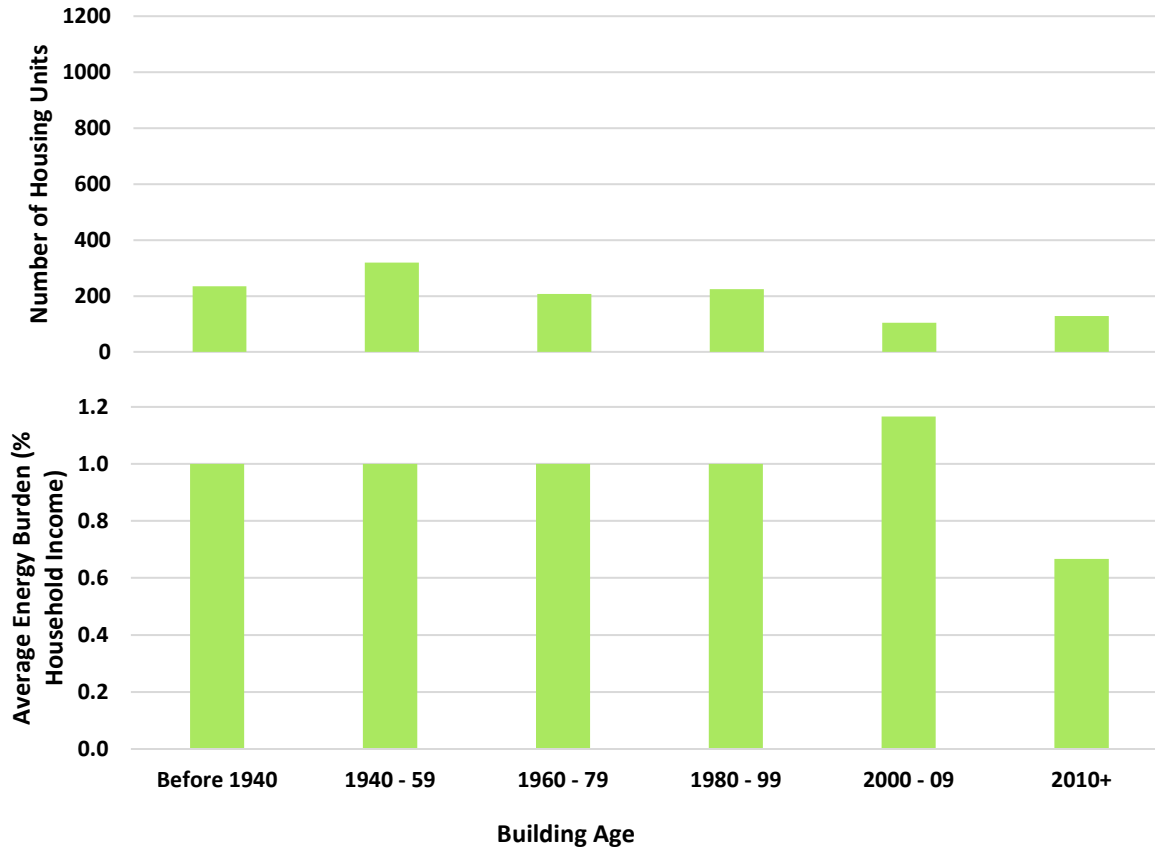


Average Energy Burden and Housing Count for Owned Units by Building Age at 80% - 100% AMI

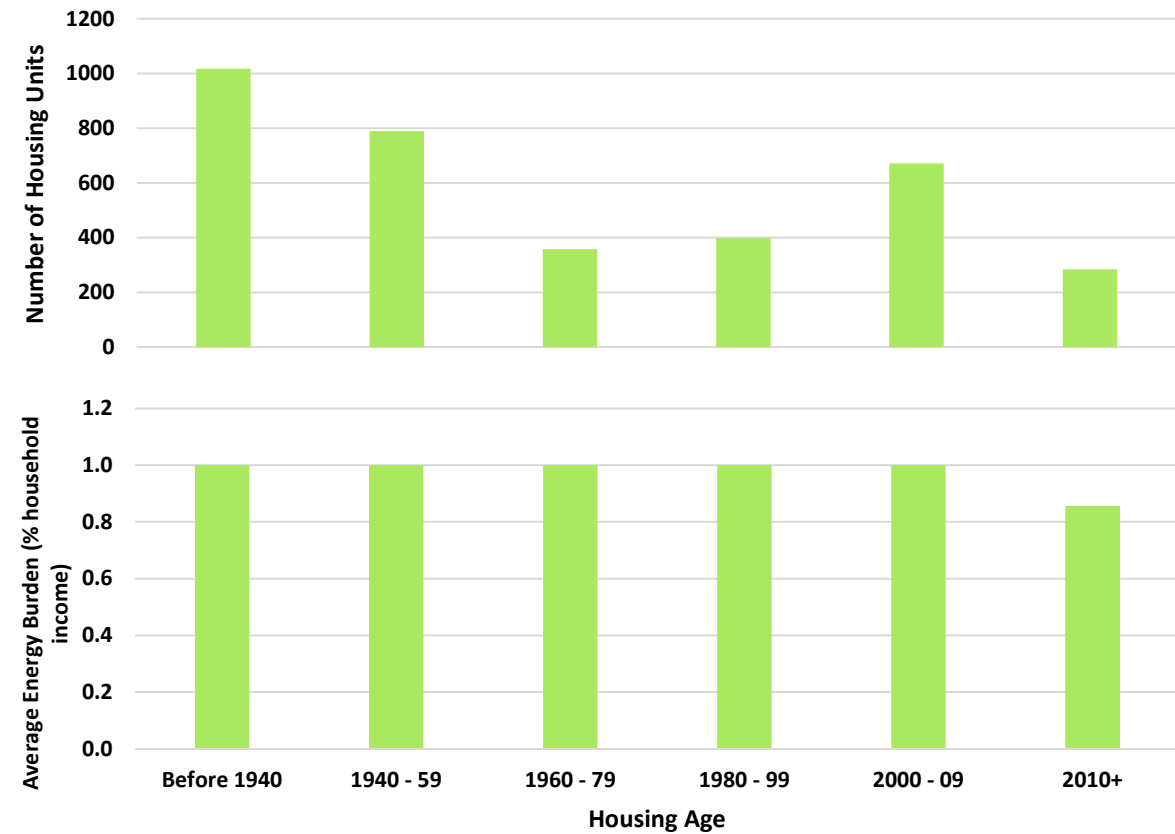


# Appendix 8: Energy Burden by Building Age for 100%+ AMI

Average Energy Burden and Housing Count for Rental Units by Building Age for Households Earning above 100% AMI

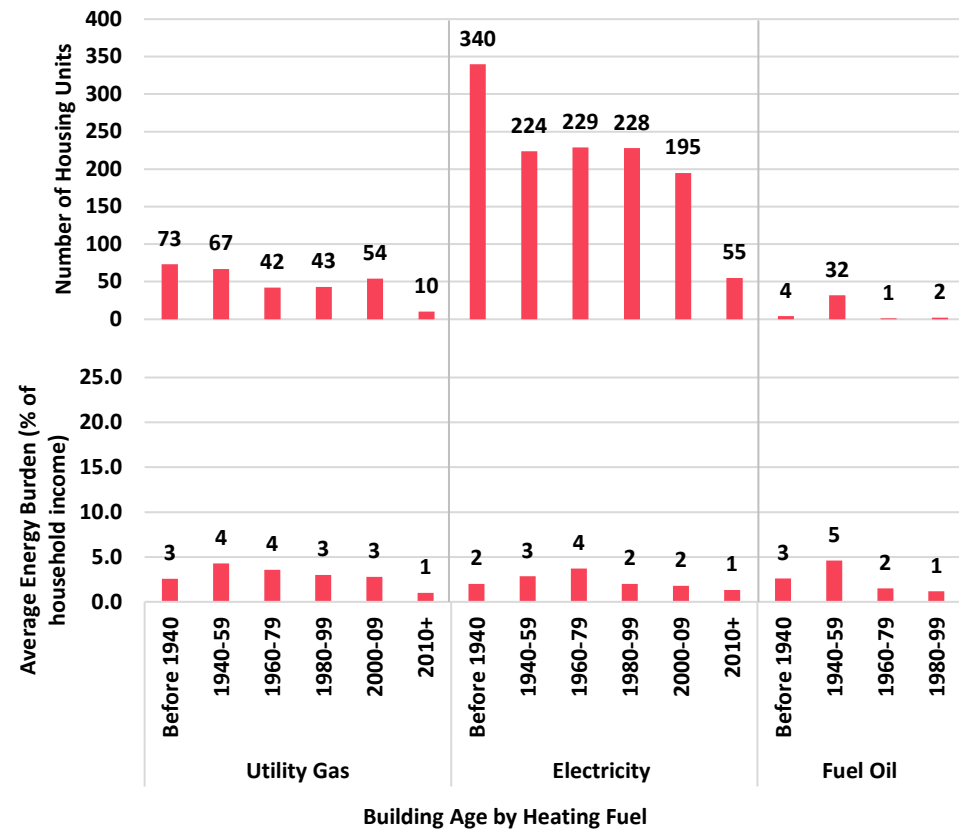


Average Energy Burden and Housing Count for Owned Units by Building Age for Households Earning above 100% AMI

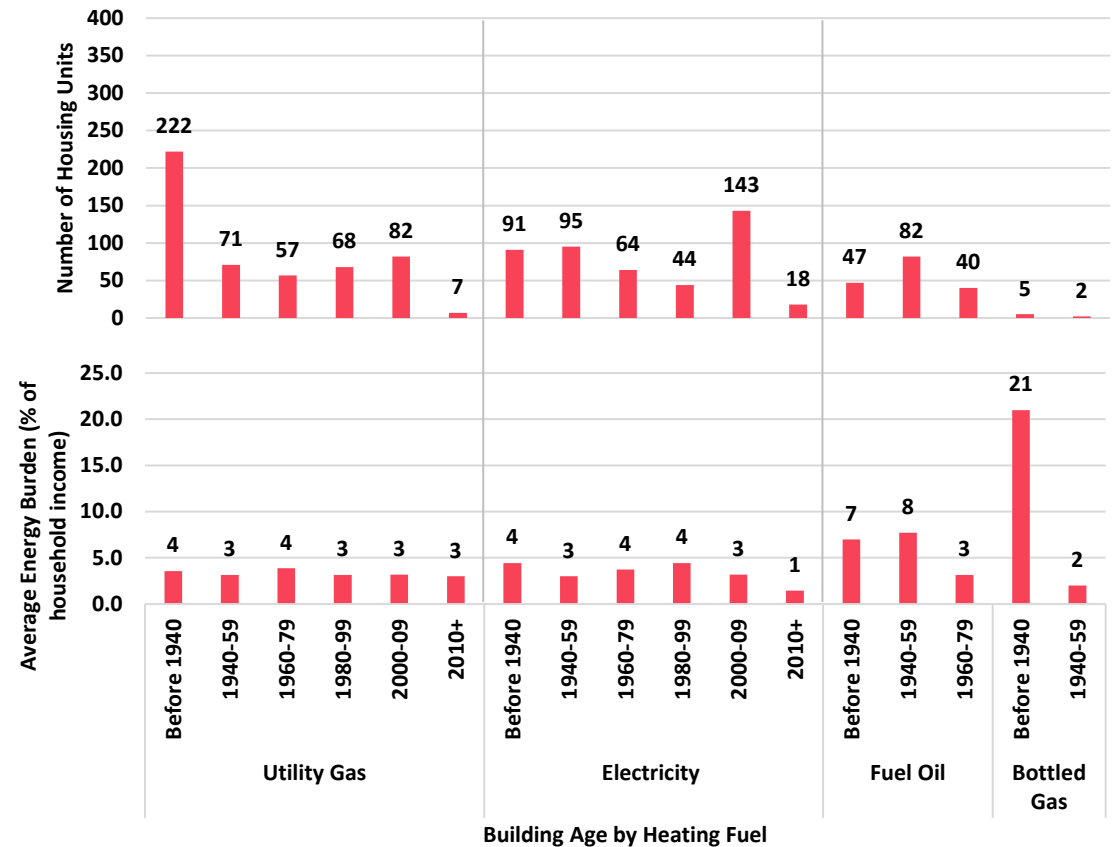


# Appendix 9: Energy Burden by Building Age and Heating Fuel Type – 30% to 60% AMI

Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Rental Units at 30%-60% AMI

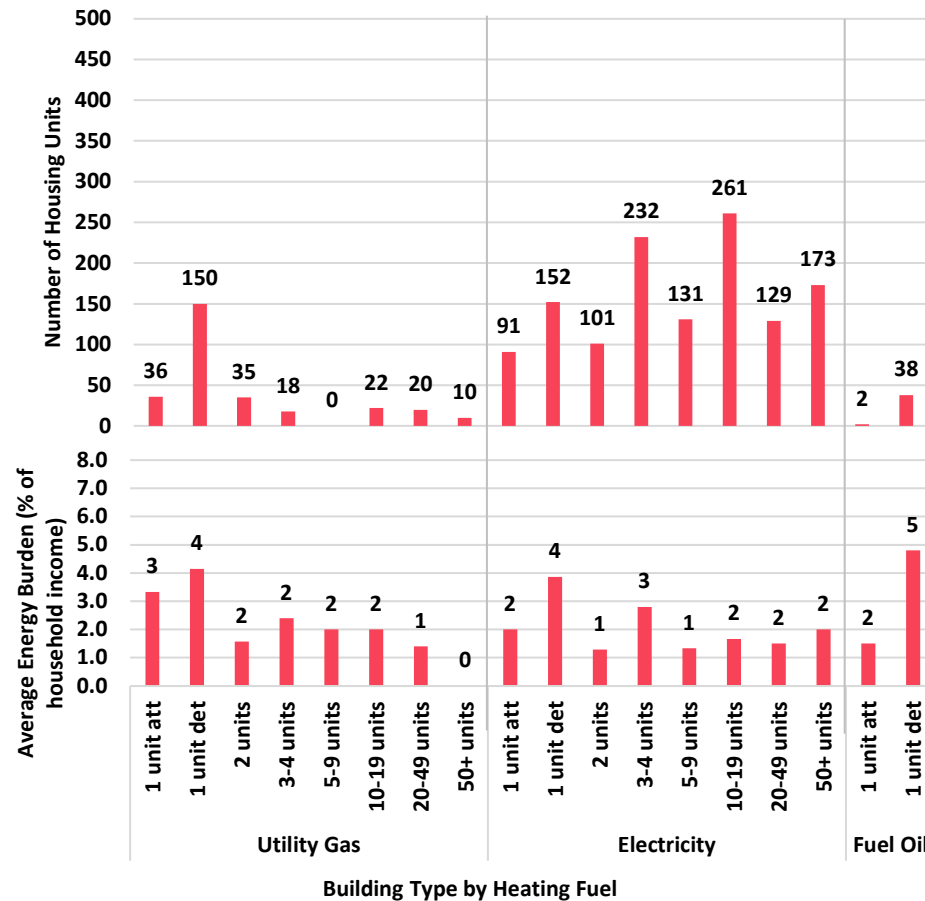


Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Rental Units at 30%-60% AMI

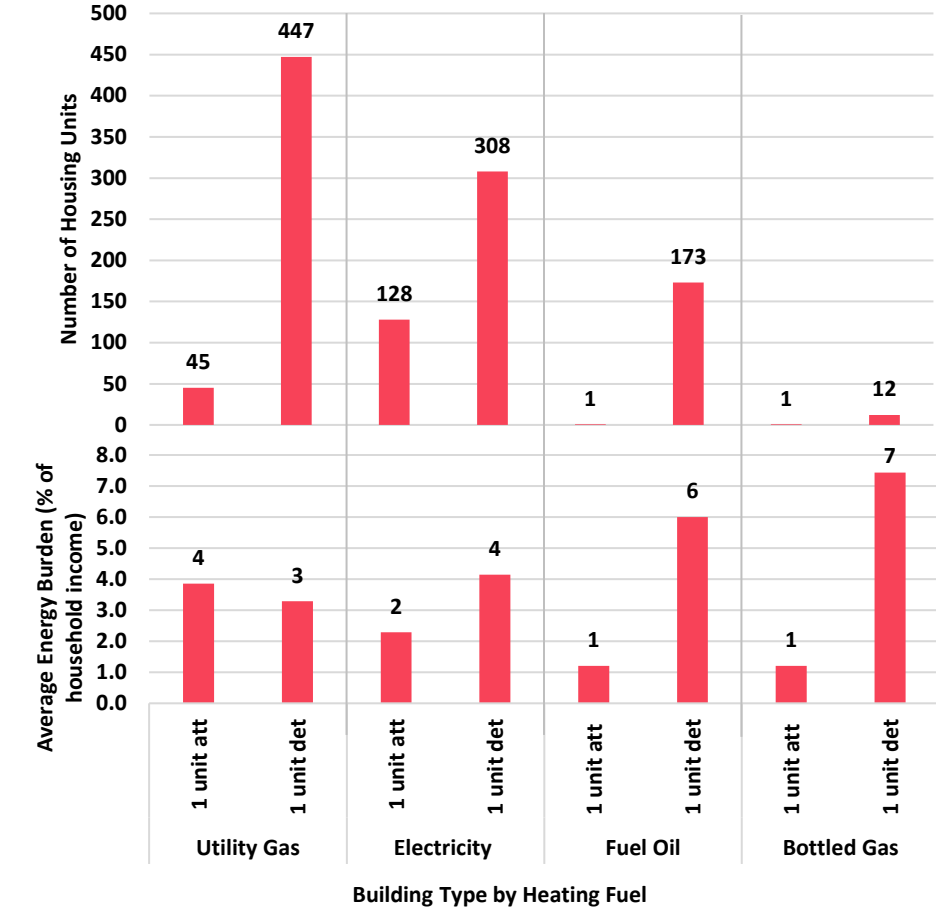


# Appendix 10: Energy Burden by Building Type and Heating Fuel Type – 30% to 60%

Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Rental Units at 30%-60% AMI



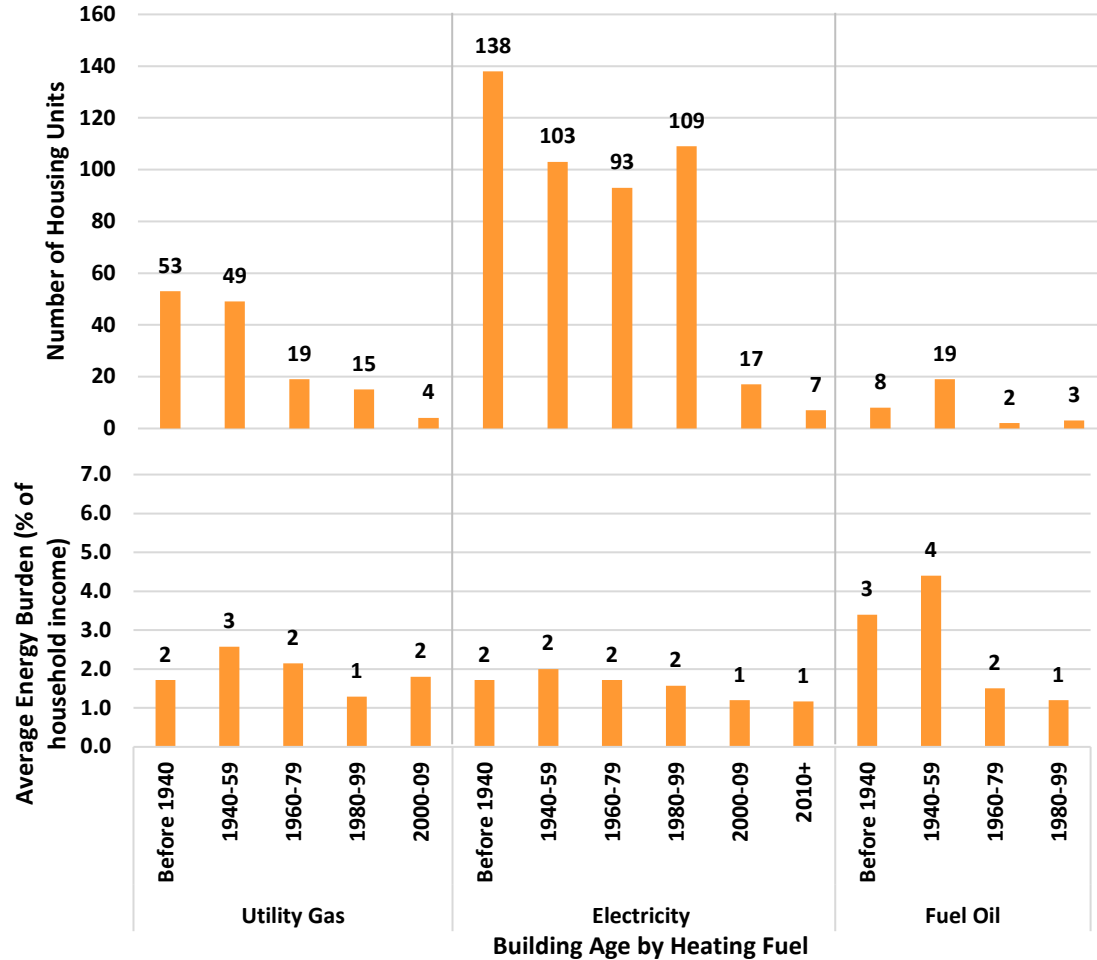
Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Owner-Occupied Units at 30%-60% AMI



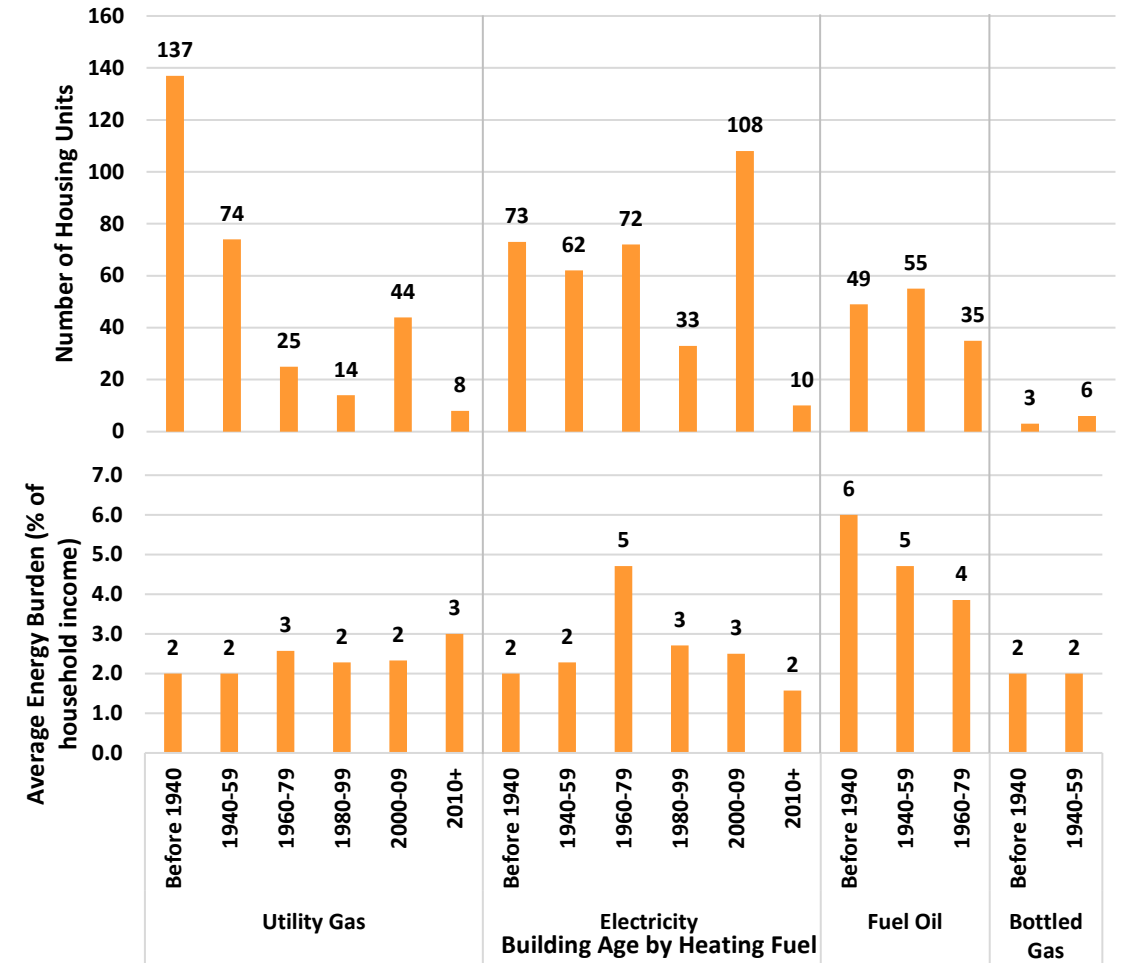


# Appendix 11: Energy Burden by Building Age and Heating Fuel Type – 60% to 80% AMI

Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Rental Units at 60%-80% AMI

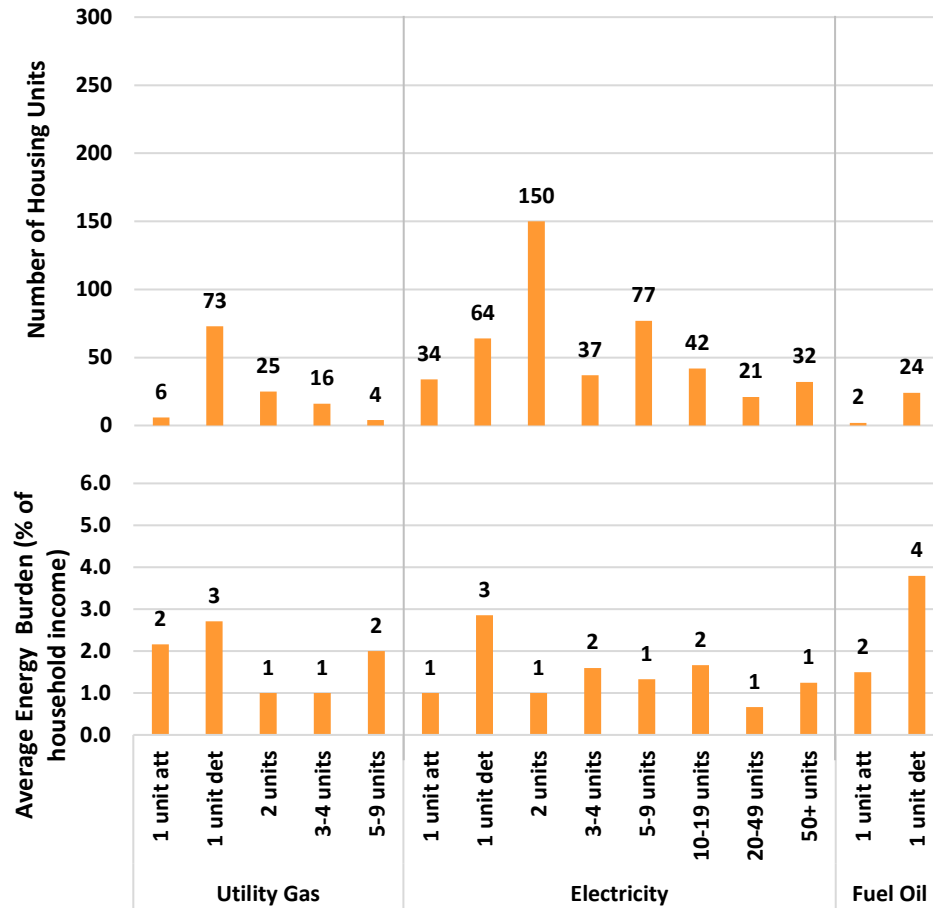


Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Owner-Occupied Units at 60%-80% AMI



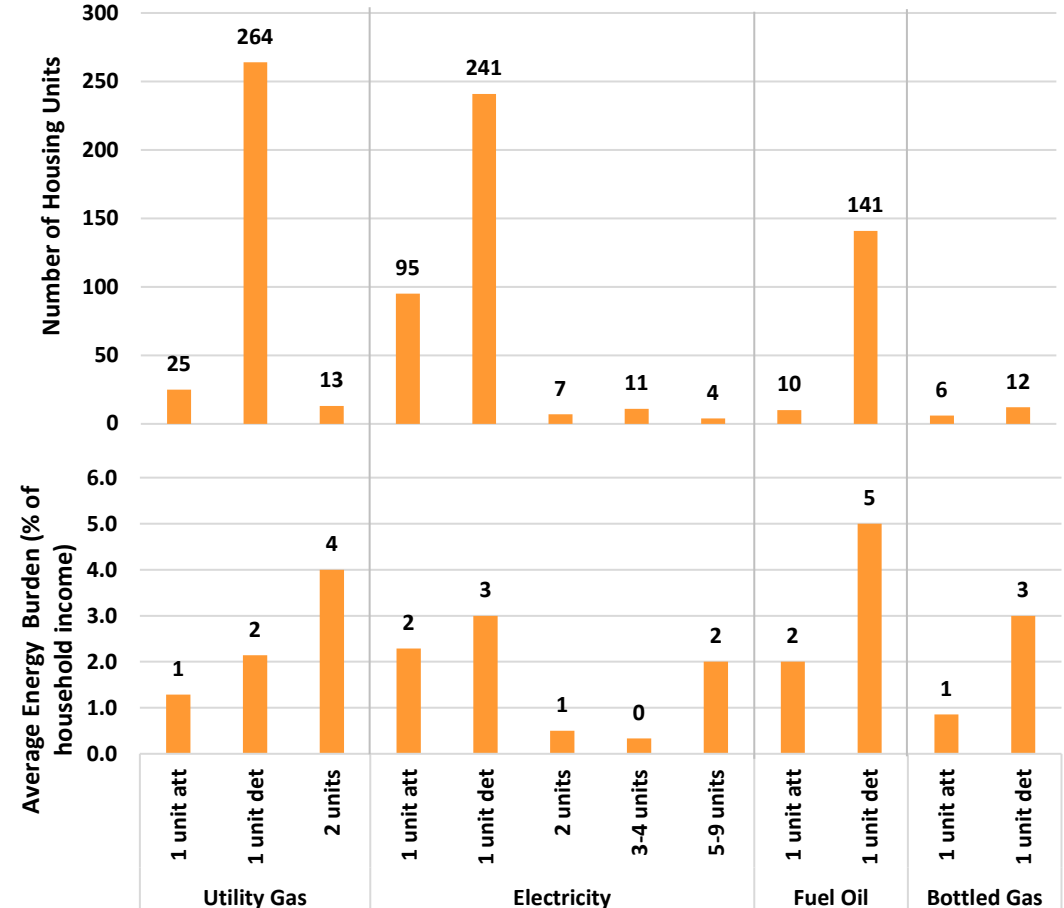
# Appendix 12: Energy Burden by Building Type and Heating Fuel Type – 60% to 80% AMI

Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Rental Units at 60%-80% AMI



Building Type by Heating Fuel

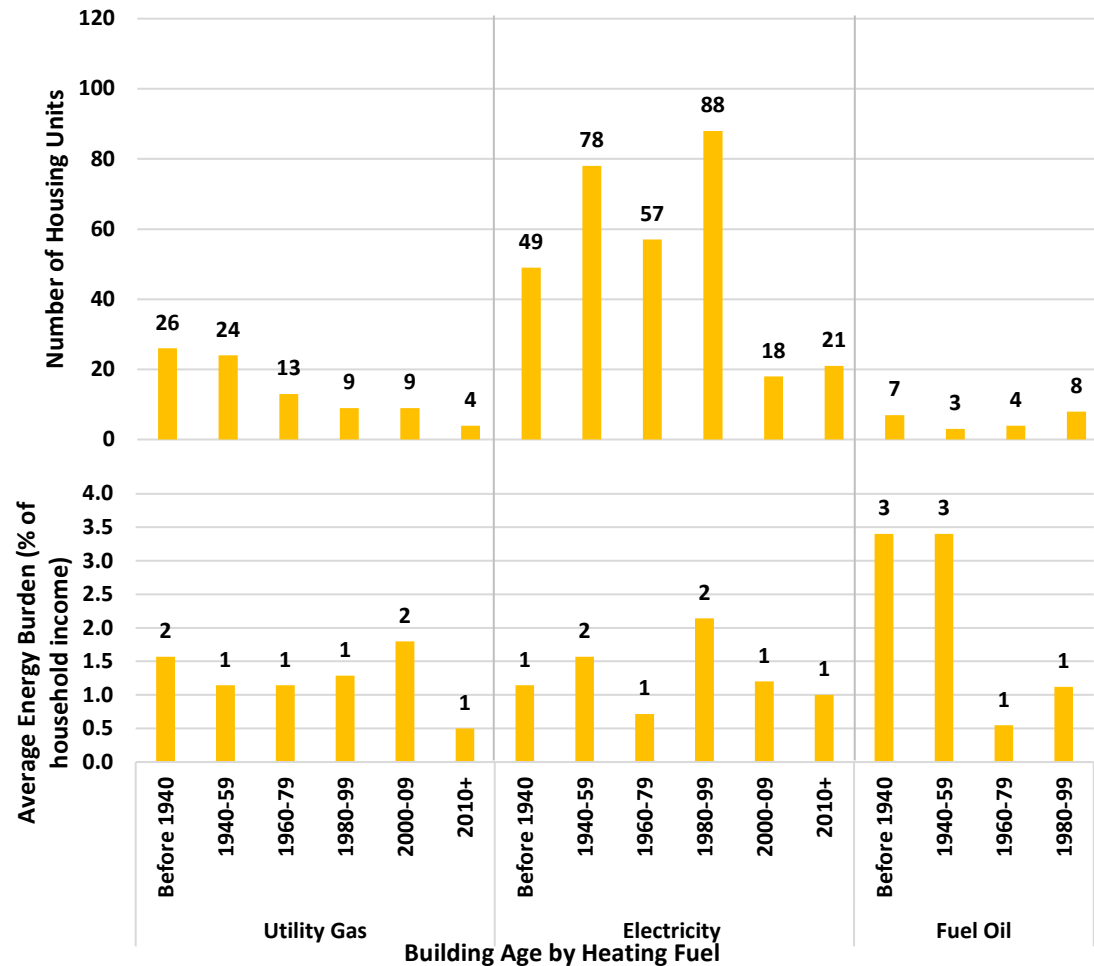
Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Owner-Occupied Units at 60%-80% AMI



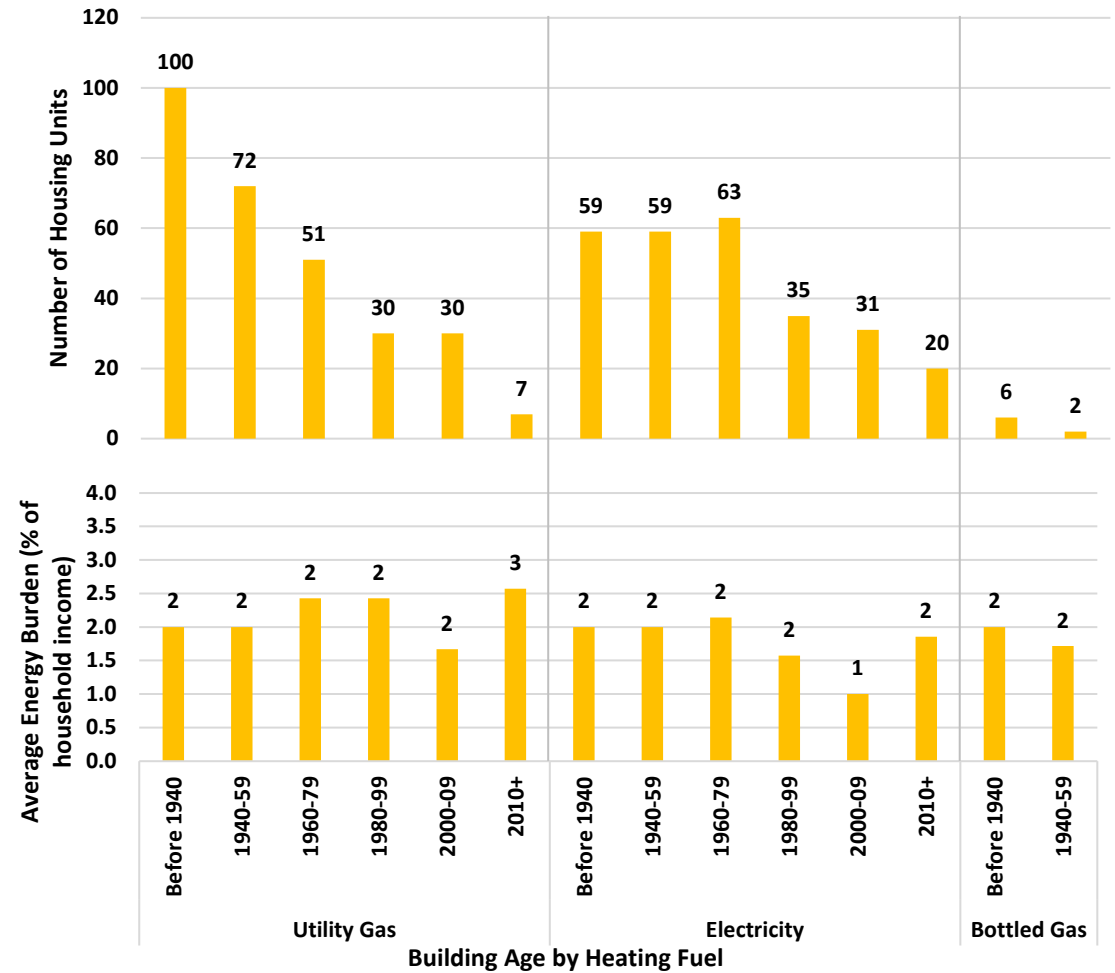
Building Type by Heating Fuel

# Appendix 13: Energy Burden by Building Age and Heating Fuel Type – 80% to 100% AMI

Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Rental Units at 80%-100% AMI

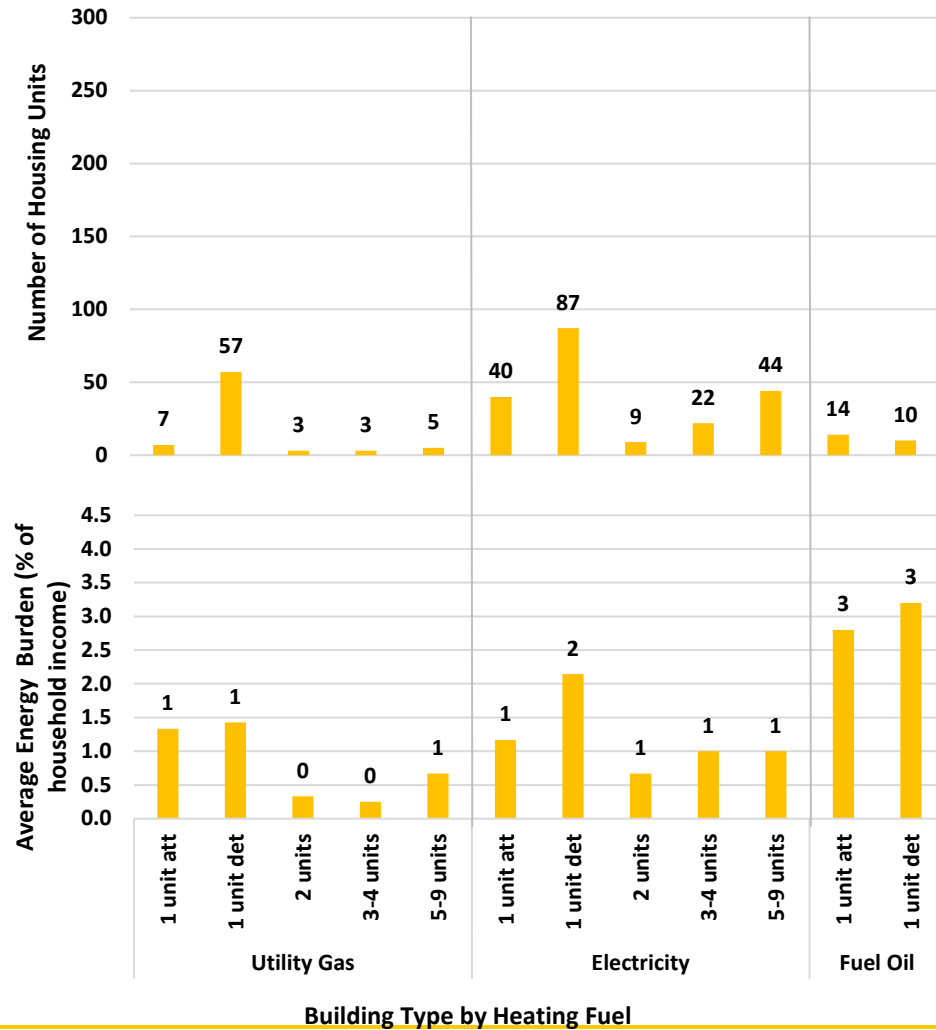


Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Owner-Occupied Units at 80%-100% AMI

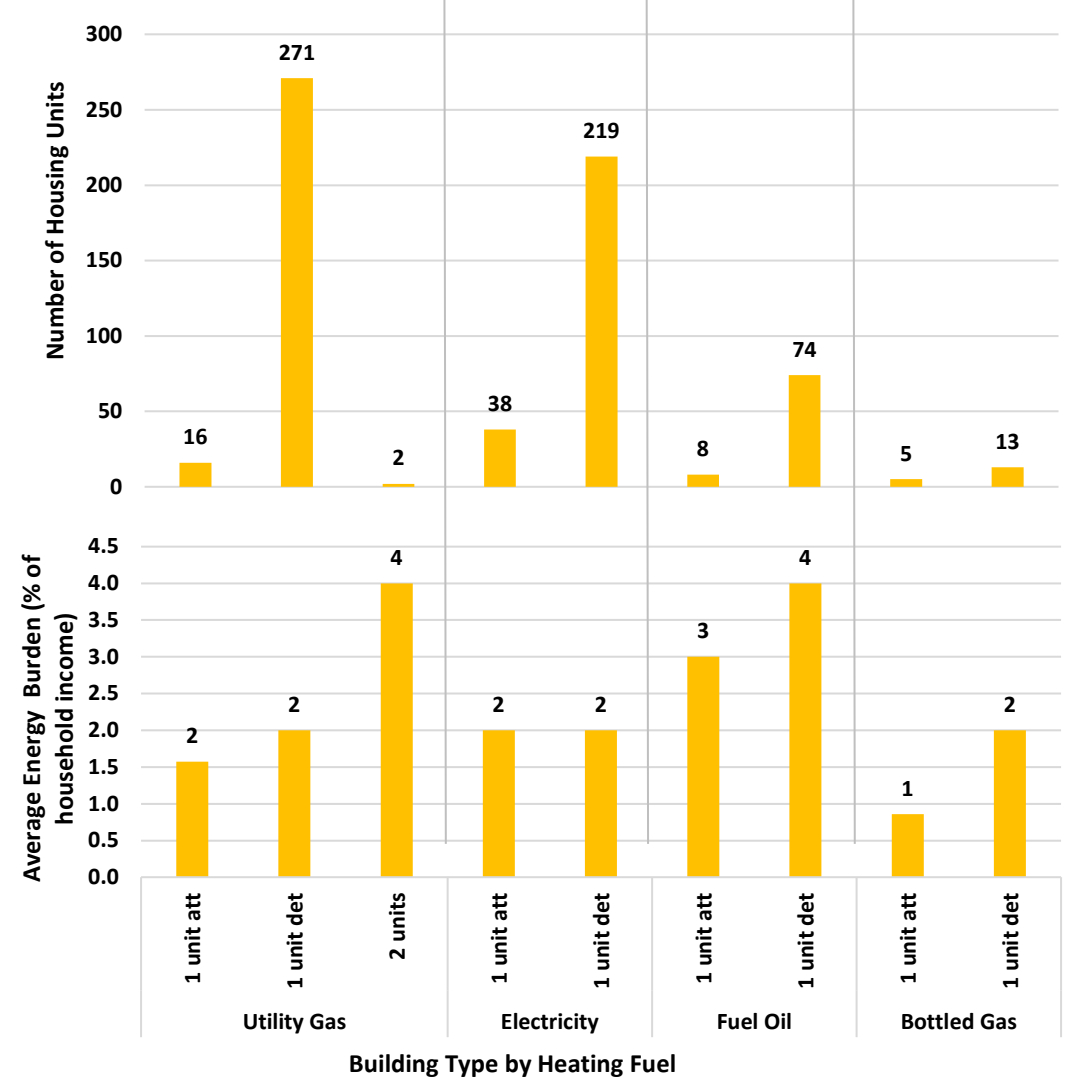


# Appendix 14: Energy Burden by Building Type and Heating Fuel Type – 80% to 100% AMI

Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Rental Units at 80%-100% AMI

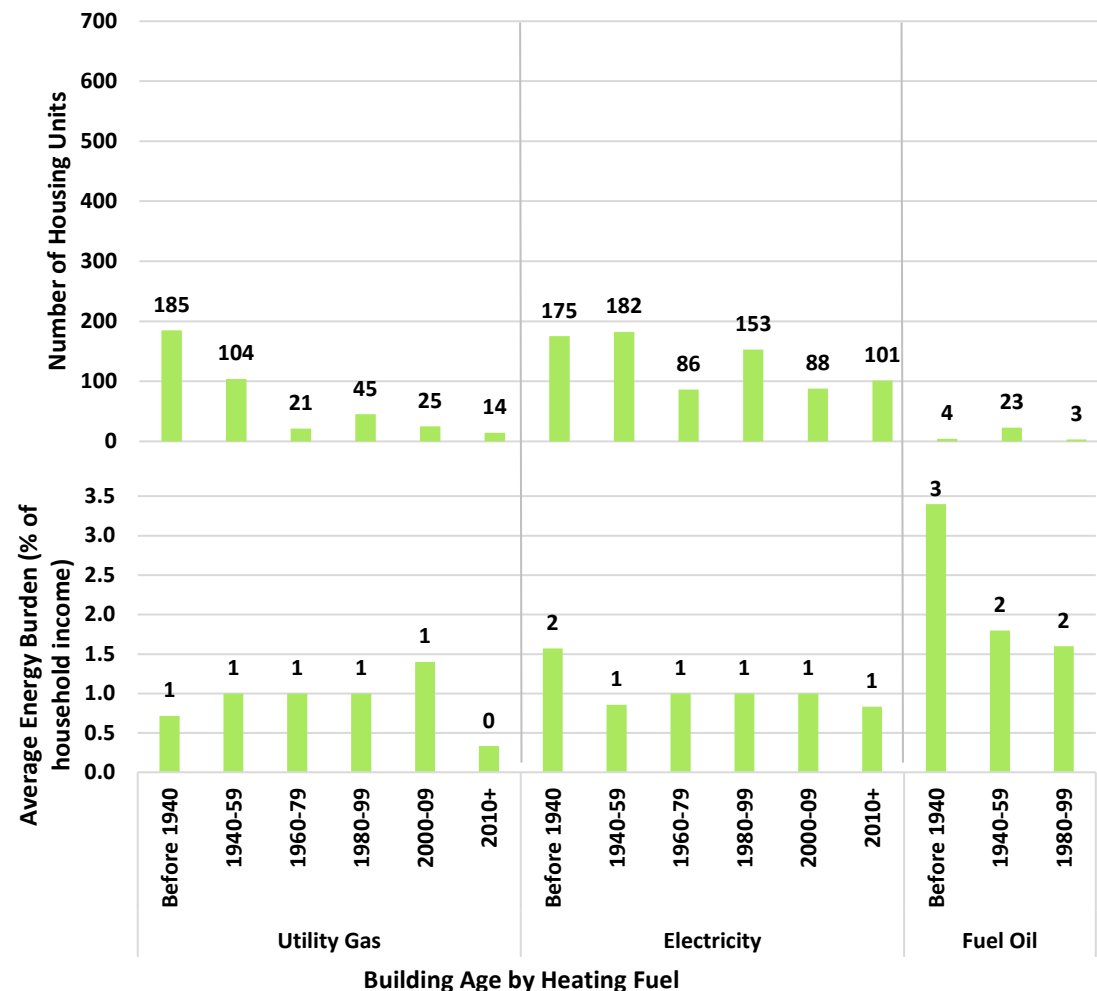


Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Owner-Occupied Units at 80%-100% AMI

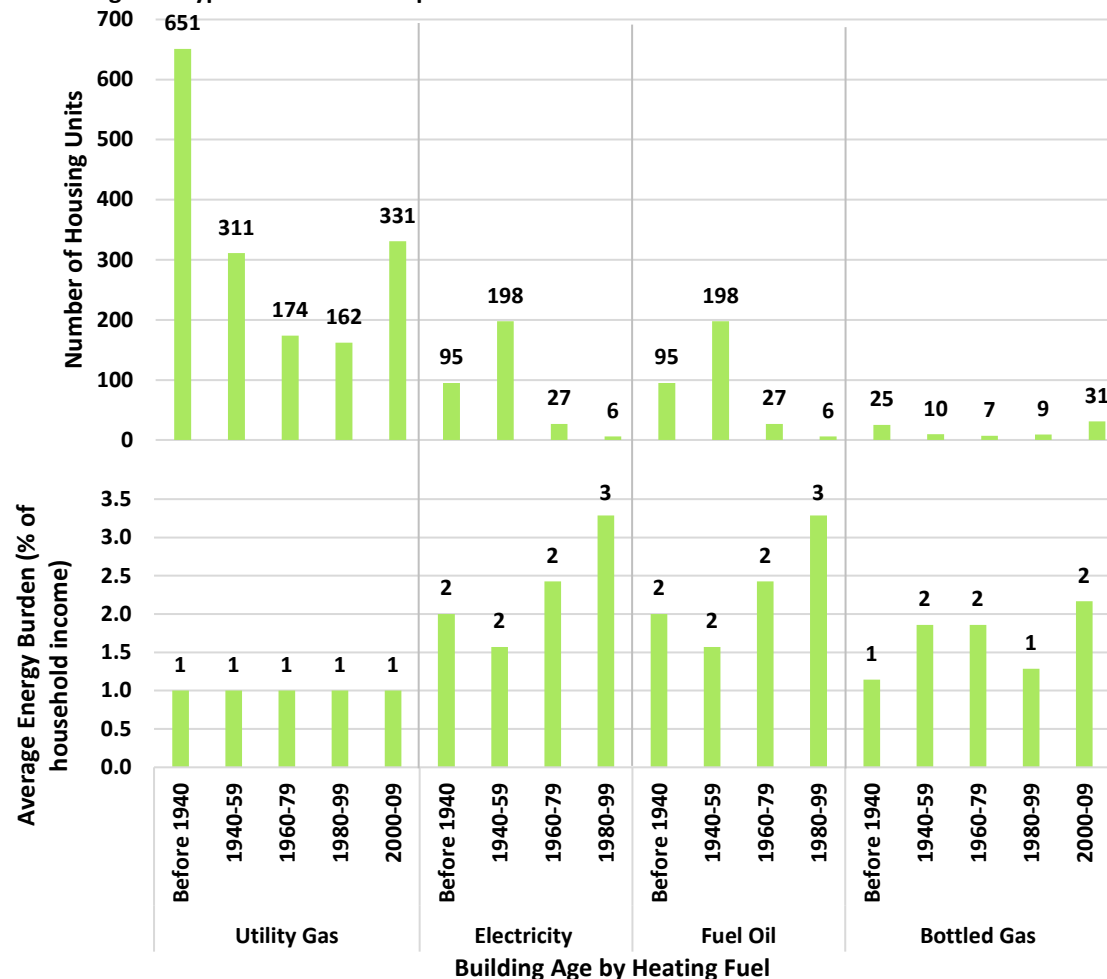


# Appendix 15: Energy Burden by Building Age and Heating Fuel Type – 100%+ AMI

Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Rental Units at 100%+ AMI

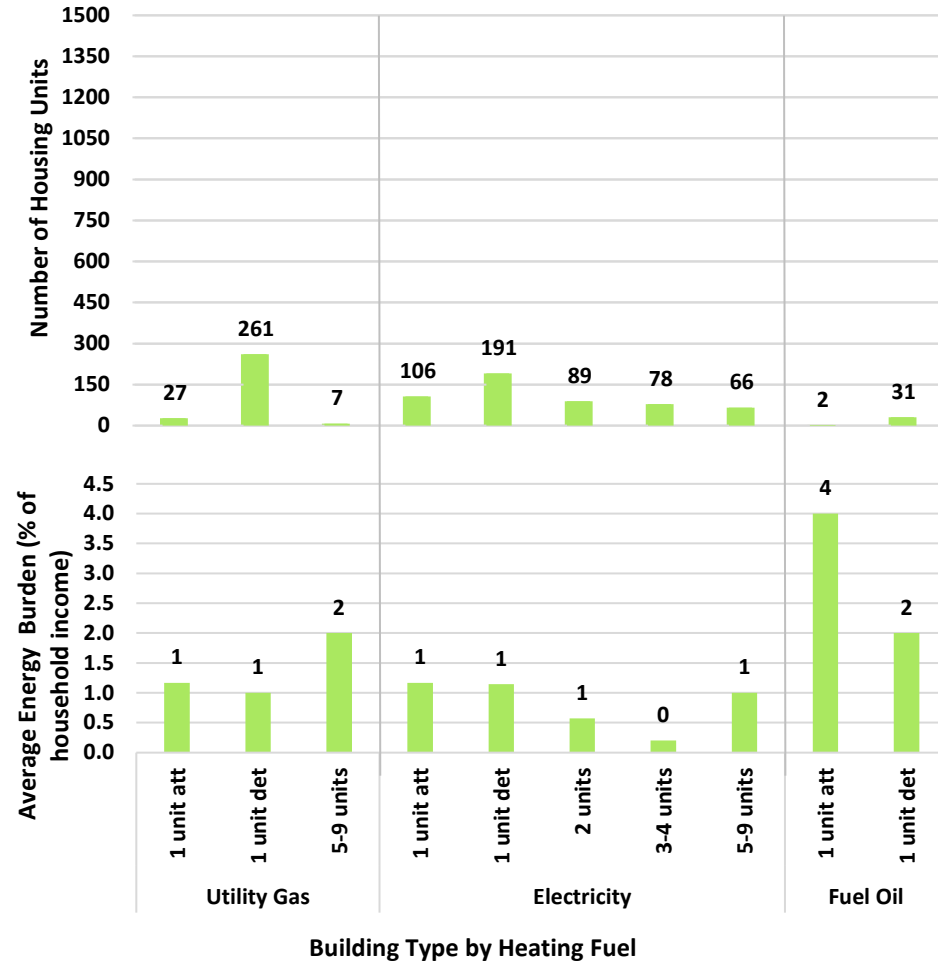


Average Energy Burden and Housing Count by Building Age and Heating Fuel Type for Owner-Occupied Units at 100%+ AMI

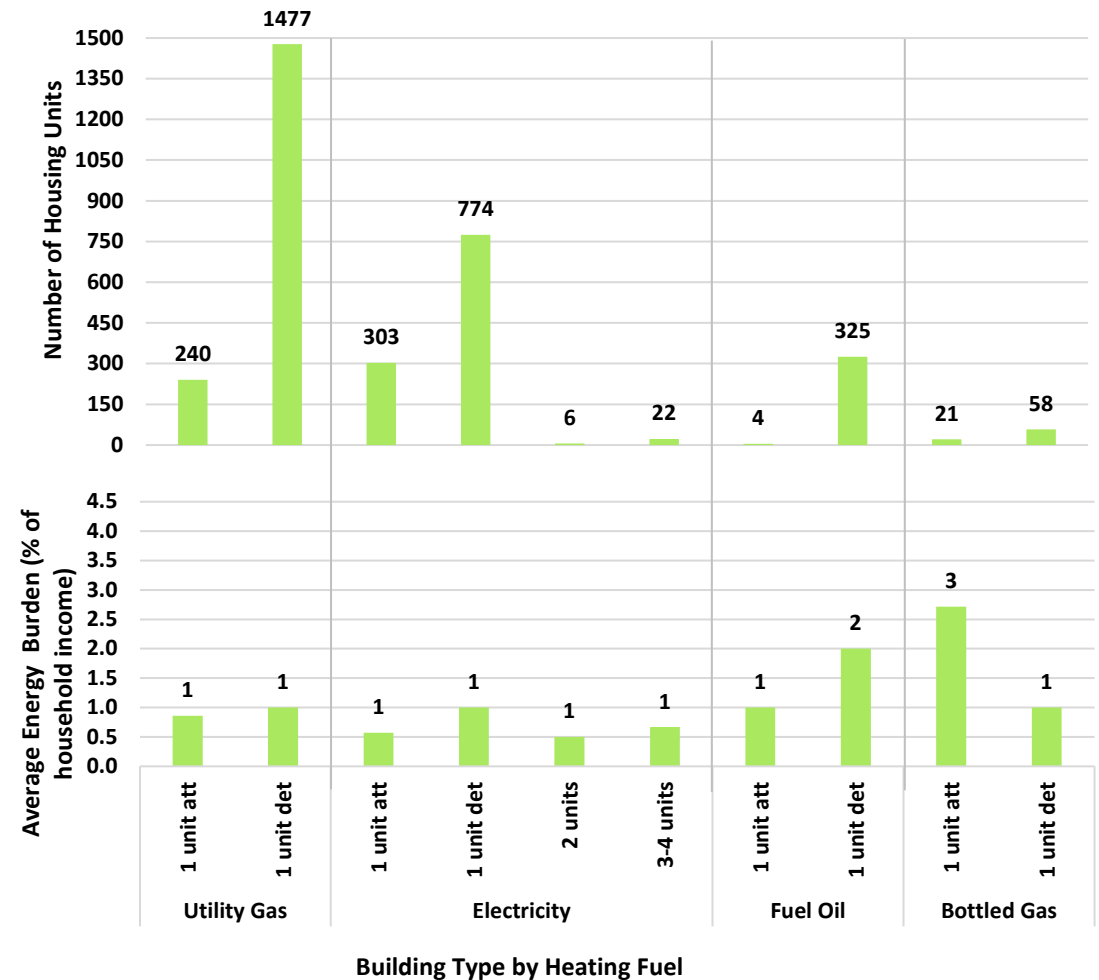


# Appendix 16: Energy Burden by Building Type and Heating Fuel Type – 100%+ AMI

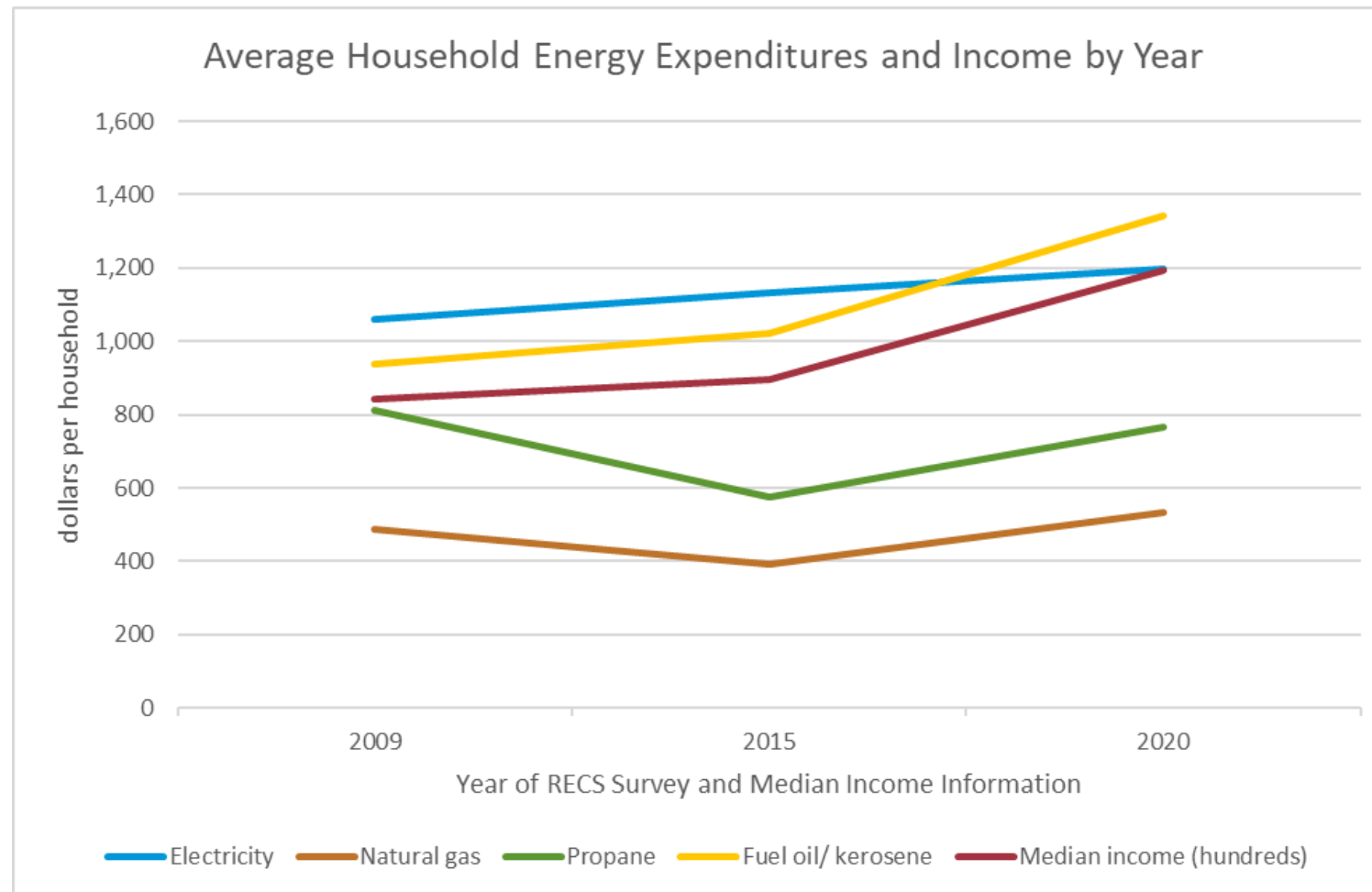
Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Rental Units at 100%+ AMI



Average Energy Burden and Housing Count by Building Type and Heating Fuel Type for Owner-Occupied Units at 100%+ AMI



# Appendix 17: Average Household Energy Expenditures and Income by Year



# Appendix 18: Section 8 Vouchers and Public Housing in Beacon Hill Census Tracts

	Census Tracts							
	94	100.01	100.02	104.01	104.02	110.01	110.02	Total
<b>Number of HCV Vouchers</b>	106	98	21	48	22	291	69	<b>655</b>

[https://hudgis-hud.opendata.arcgis.com/datasets/8d45c34f7f64433586ef6a448d00ca12\\_0/explore?location=47.538130%2C-122.276424%2C14.97](https://hudgis-hud.opendata.arcgis.com/datasets/8d45c34f7f64433586ef6a448d00ca12_0/explore?location=47.538130%2C-122.276424%2C14.97)

Public Housing Units	Location	Number of Units
New Holly Phase III	38th Ave South and Othello	212
New Holly Phase II	38th Ave South, S of Myrtle	94
Holly Court - MLK and Myrtle	MLK and Myrtle	66
New Holly Phase I	Holly and Shaffer	304
Rainier Vista Phase I	MLK and Alaska	178
	<b>Total</b>	<b>854</b>

<https://hudgis-hud.opendata.arcgis.com/datasets/HUD::public-housing-developments/explore?location=47.537486%2C-122.283520%2C16.99>

**Housing Choice Vouchers (HCV)** assist very low-income families, the elderly, and the disabled in obtaining decent, safe, and sanitary housing in the private market. Participants choose their own housing, which can include single-family homes, townhouses, or apartments. The HCV program is designed such that the tenants pay no more than 40% of their household income for rent, including utilities.

**Public housing** is managed by Housing Authorities to provide decent and safe rental housing for eligible low-income families, the elderly, and persons with disabilities. Public housing comes in all sizes and types, from single family to apartments. The total tenant payment, including utilities, is typically 30% of household income.

This type of housing assistance is not considered in the LEAD tool, so the energy burden of very low-income households may not be accurate for those households receiving a housing subsidy.

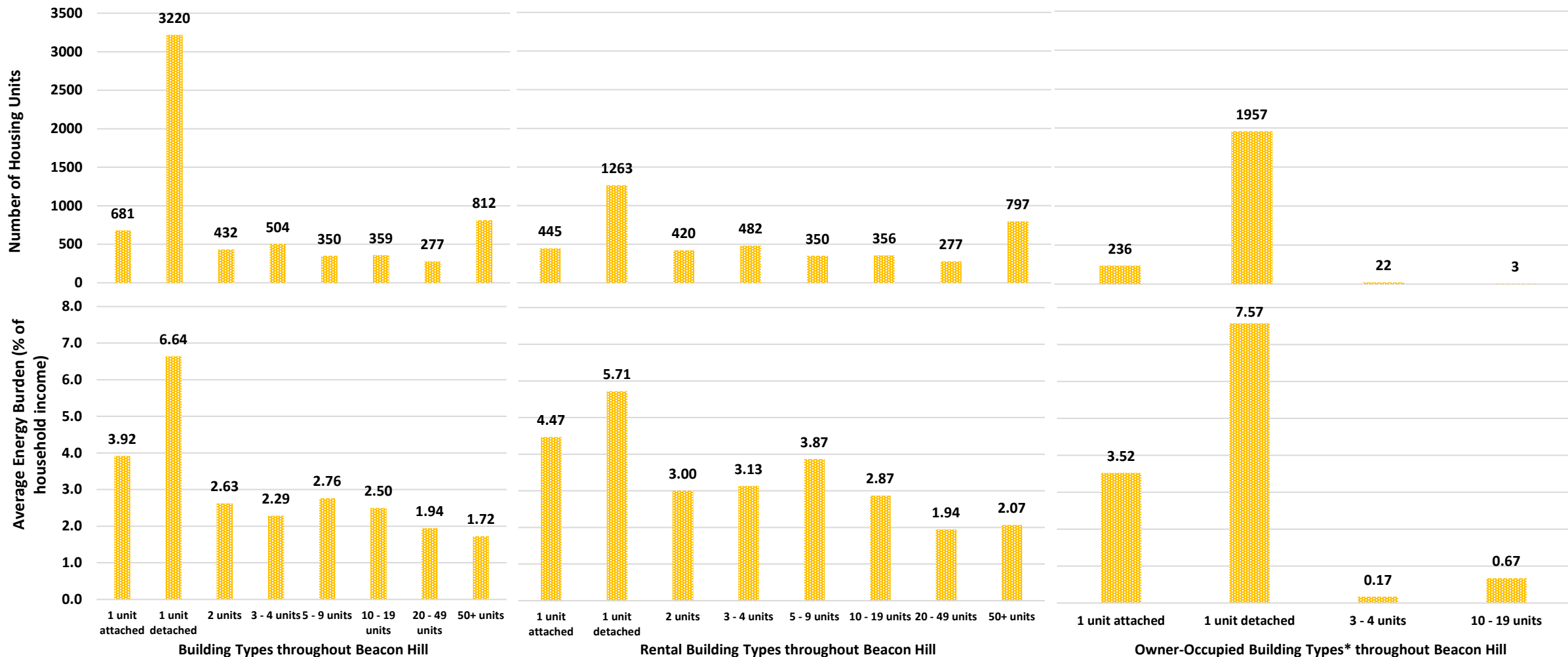


# Appendix 19: Energy Burden by Building Type from 0% to 80% AMI

Average Energy Burden and Housing Count by Building Type across All Buildings within the 0% to 80% AMI Categories

Average Energy Burden and Housing Count by Building Type across All Rental Buildings within the 0% to 80% AMI Categories

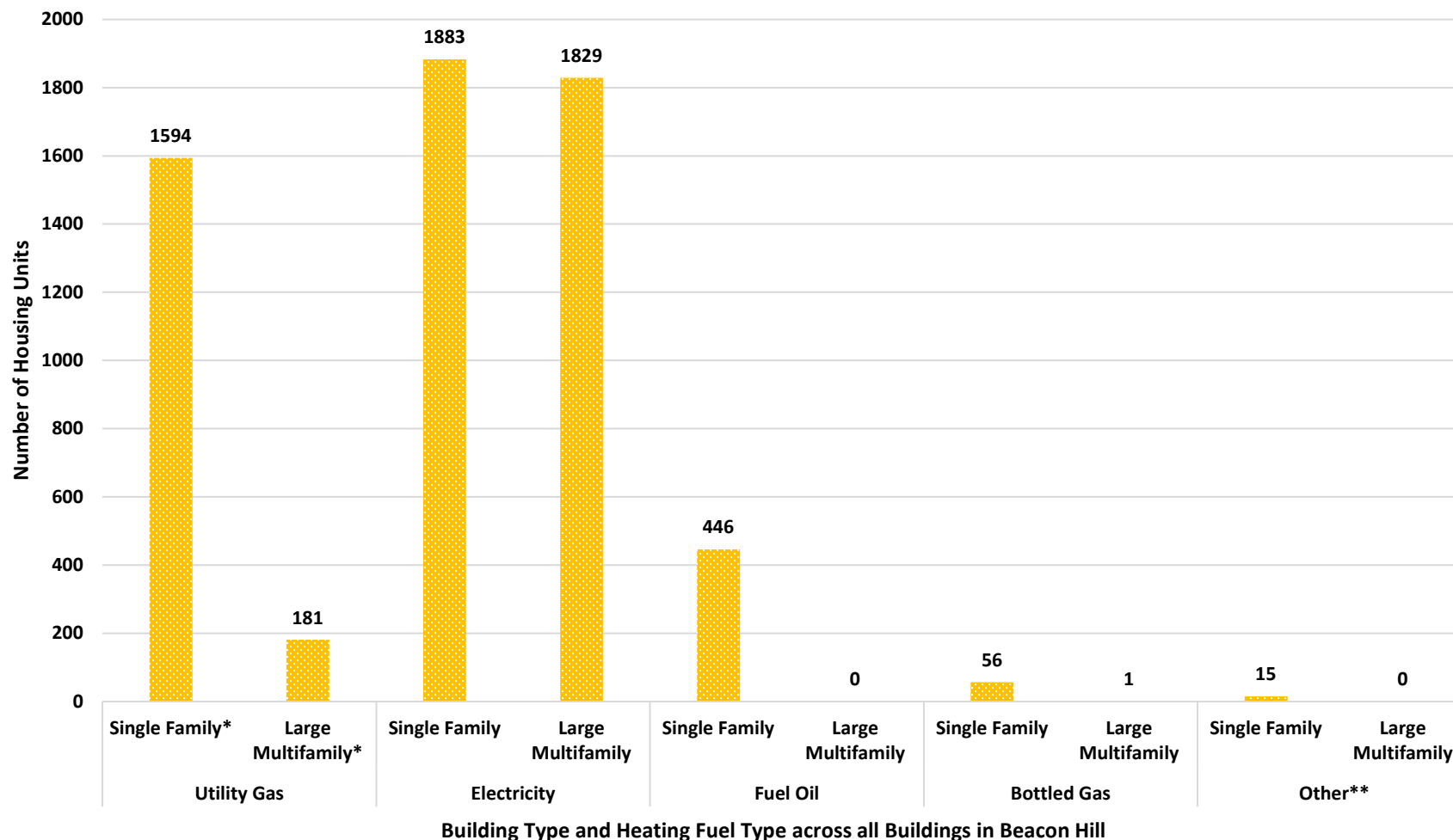
Average Energy Burden and Housing Count by Building Type across All Owner-Occupied Buildings within the 0% to 80% AMI Categories



\*Owner-occupied buildings between 0% to 80% AMI only reported data for 1-unit attached (i.e., single-family attached units), 1-unit detached, 3-4 unit buildings, and 10-19 unit buildings).

# Appendix 20: Housing Stock by Heating Fuel and Building Type Across all Buildings within 0% to 80% AMI Category

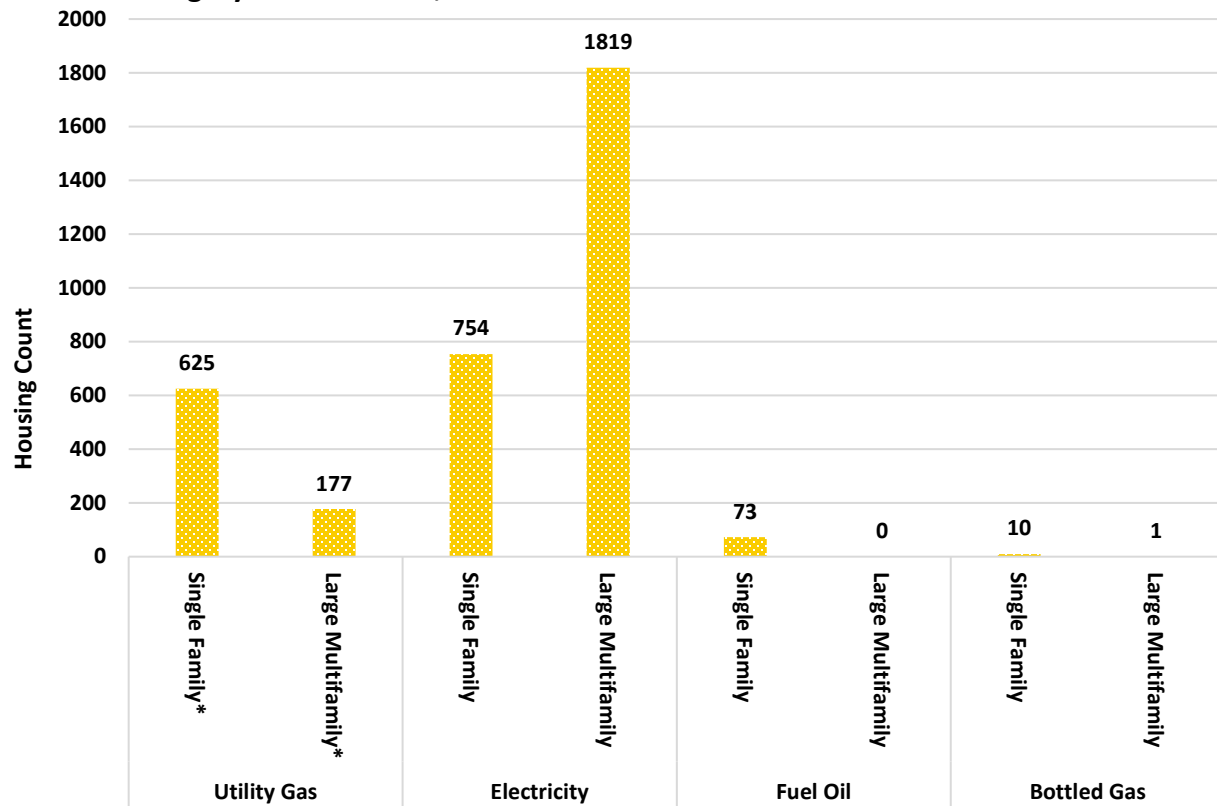
Housing Count by Building Type and Heating Fuel across All Buildings within the 0% - 80% AMI Category in Beacon Hill, WA



\*Single-family building type includes both 1-unit detached and 1-unit attached homes. Large multifamily building type includes all buildings with 5 or more units.  
 \*\*The other fuel type category includes biomass, coal, and wood, and within the LEAD tool, this fuel type category was reported only for owner-occupied buildings.

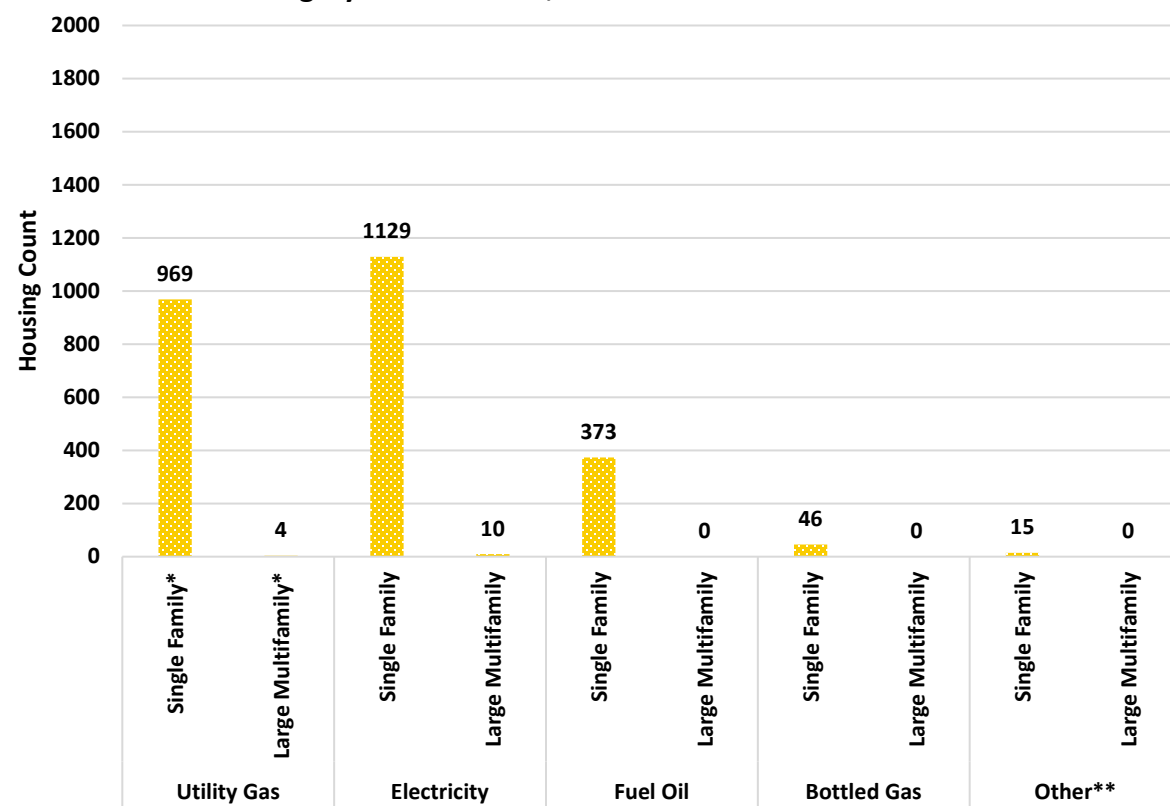
# Appendix 21: Housing Stock by Heating Fuel and Building Type Across Rental and Owner-Occupied Buildings within 0% to 80% AMI Category

Housing Count by Building Type and Heating Fuel across Rental Buildings within the 0% - 80% AMI Category in Beacon Hill, WA



Heating Fuel and Building Type across all Rental Buildings in Beacon Hill

Housing Count by Building Type and Heating Fuel across Owner-Occupied Buildings within the 0% - 80% AMI Category in Beacon Hill, WA



Heating Fuel and Building Type across all Owner-Occupied Buildings in Beacon Hill

\*Single-family building type includes both 1-unit detached and 1-unit attached homes. Large multifamily building type includes all buildings with 5 or more units.

\*\*The other fuel type category includes biomass, coal, and wood, and within the LEAD tool, this fuel type category was reported only for owner-occupied buildings.