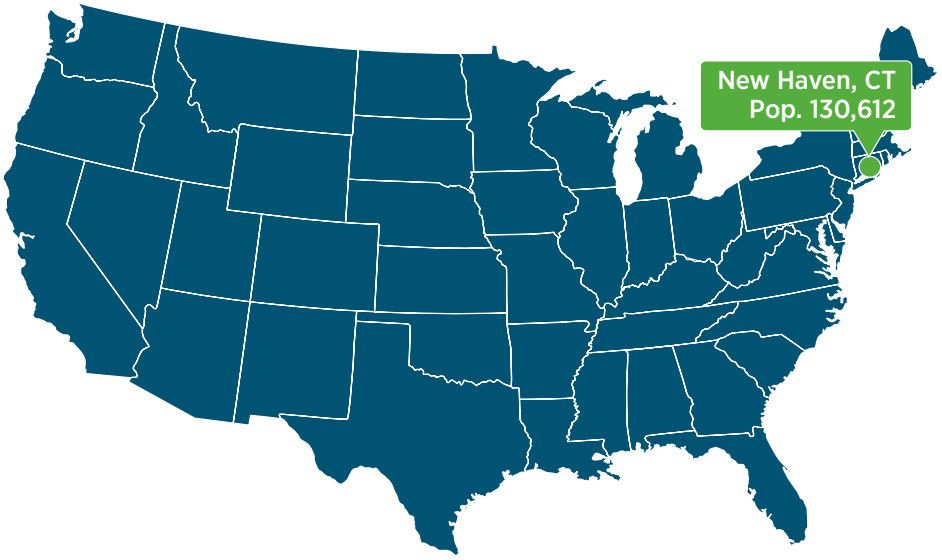
New Haven, Connecticut: Targeting Low-Income Household Energy Savings

The City of New Haven partnered with the U.S. Department of Energy (DOE) and the National Renewable Energy Laboratory (NREL) to demonstrate how data and analysis can inform more strategic energy decisions. NREL based this 2015 analysis in-part on the City Energy Profiles on data from DOE's Low-Income Energy Affordability Data (LEAD) Tool[1] and the State and Local Planning for Energy (SLOPE) Platform.[2] Cities across the country can follow the same approach and use data-driven analysis in their own energy planning.

City Energy Goal

The City of New Haven, Connecticut, was in the process of updating its 2004 Climate Action Plan[3] and developing climate and sustainability goals. One of the city's goals is to expand energy programs to underserved populations, yet the city lacks the staffing capacity to focus analysis on this issue. To help prioritize actions to meet this goal and identify best practices and options, city officials asked for data and analysis to help target building energy actions and policies to benefit low-income households.



"Energy use in buildings accounts for 54% of the city's greenhouse gas emissions. New Haven wants to prioritize actions that both reduce energy consumption and associated emissions and save money for residents, especially for low-income households. This [Cities-LEAP] analysis correlating building stock, ownership, and energy source provides insight and supporting documentation for those actions that will most benefit low-income communities."

—Dawn Henning, Engineering Department Project Manager, City of New Haven, Connecticut

Data and Analysis

This analysis is based on estimated city energy data from 2015 LEAD data and supplemental data inputs obtained directly from the City of New Haven.

Renters in New Haven are more likely to fall into lower-income brackets than their homeowner counterparts, according to Cities-LEAP analysis (Figure 1). Of the 49,771 occupied housing units in New Haven, 71% are renter-occupied, approximately double the average percentage of renter-occupied units in the state of Connecticut and the United States (Table 1).

Table 1. Renter- and Owner-Occupied Units in New Haven, Connecticut, Compared to State and U.S. Averages

	New Haven	Connecticut	United States
Percent renter-occupied	71.1%	33.0%	36.1%
Percent owner-occupied	28.9%	67.0%	63.9%

Source: U.S. Census Bureau, American Fact Finder: Selected Housing Characteristics, 2011–2015 American Community Survey 5-Year Estimates.

[1] U.S. Department of Energy. n.d. "Low-Income Energy Affordability Data Tool." https://www.energy.gov/scep/slsc/lead-tool.
[2] National Renewable Energy Laboratory. n.d. "State and Local Planning for Energy Platform." https://maps.nrel.gov/slope/.
[3] City of New Haven. 2004. "New Haven Community Clean Air Initiative Climate Action Plan 2004." https://www.newhavenct.gov/home/showpublisheddocument/1458/637743202999589366.

The U.S. Department of Housing and Urban Development (HUD) determines low-income status as a percentage of area median income (AMI) for a given location. HUD defines low-income as households earning 80% or less of AMI.[4] Based on an analysis of HUD and U.S. Census data, 73% of renter-occupied units in New Haven are low-income households (Figure 1).

Energy burden (the ratio of energy expenditures to household income) is a metric commonly used to evaluate the relative cost burden of energy expenditures. As shown in Figure 2, renters have a slightly lower energy burden than owners. This situation may be correlated with factors such as differences in unit area and household size, as well as shared walls and rental units that do not have separately metered utilities. Renters in New Haven are more likely to live in multifamily units; 72% of all renter-occupied units are in buildings with three or more units.

In New Haven, an estimated 27% of rental units are electrically heated compared to approximately 4.5% of owner-occupied units (Figure 3). The lower energy burden among renters of electrically heated units may also be correlated with the increased likelihood that these rental units are smaller apartments with lower overall heating demands (Figure 4). Nearly 32% of owned units in New Haven use fuel oil, which represents a high monthly energy expenditure in the city, compared to around 27% of rented units. More than half of both owned and rented units use utility gas (62% of owner-occupied units and 58% of renter-occupied units).

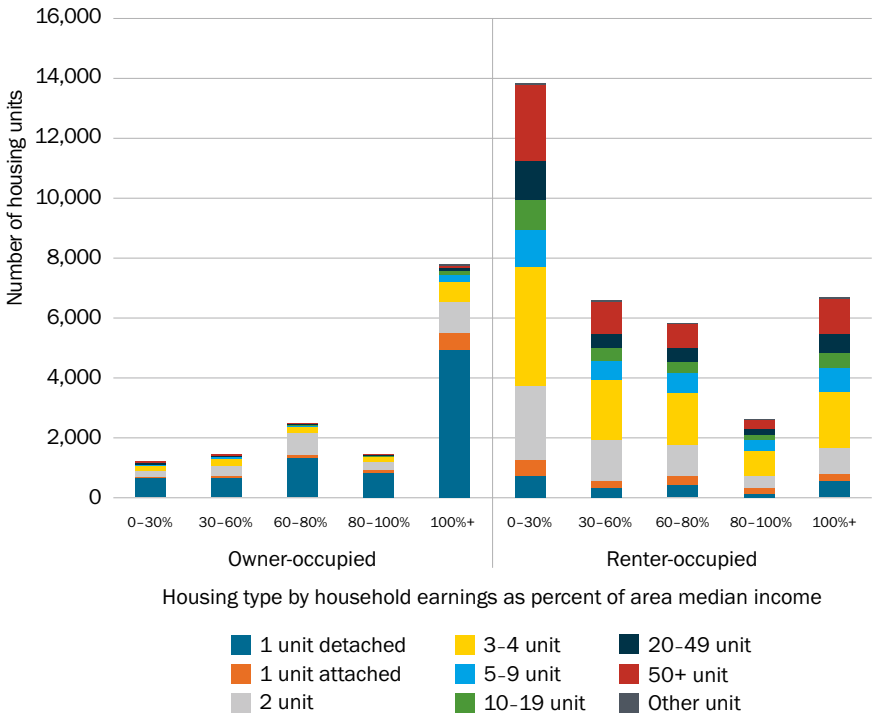


Figure 1. Number of housing units by housing type and area median income (2015) in New Haven, Connecticut (Source: U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data)

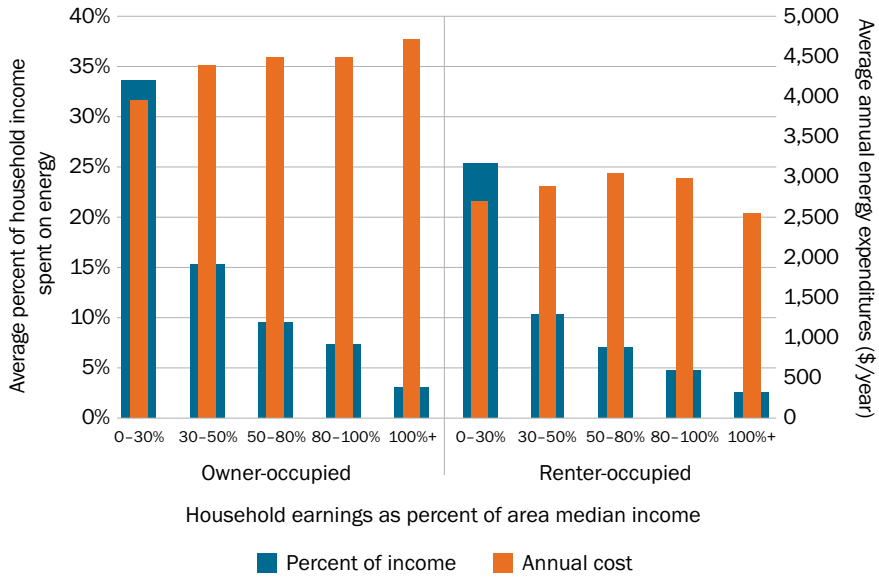


Figure 2. Average energy expenditures and energy burden for residential units (2015) in New Haven, Connecticut (Source: U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data[5])

Approaches to Reducing Energy Burden

As shown by the analysis in New Haven, programs that target energy efficiency upgrades in renter-occupied, multifamily buildings for low-income households may provide the opportunities for high impact. Converting rental units that use less-efficient electric-resistance heating measures to higher-efficiency heat pumps

[4] State and county-level income limits are updated every fiscal year and are based on the number of people per household. Income limit documentation is available at https://www.huduser.gov/portal/datasets/il.html.

[5] Figure based on a preliminary NREL residential household disaggregation and cross-tabulation of U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data.

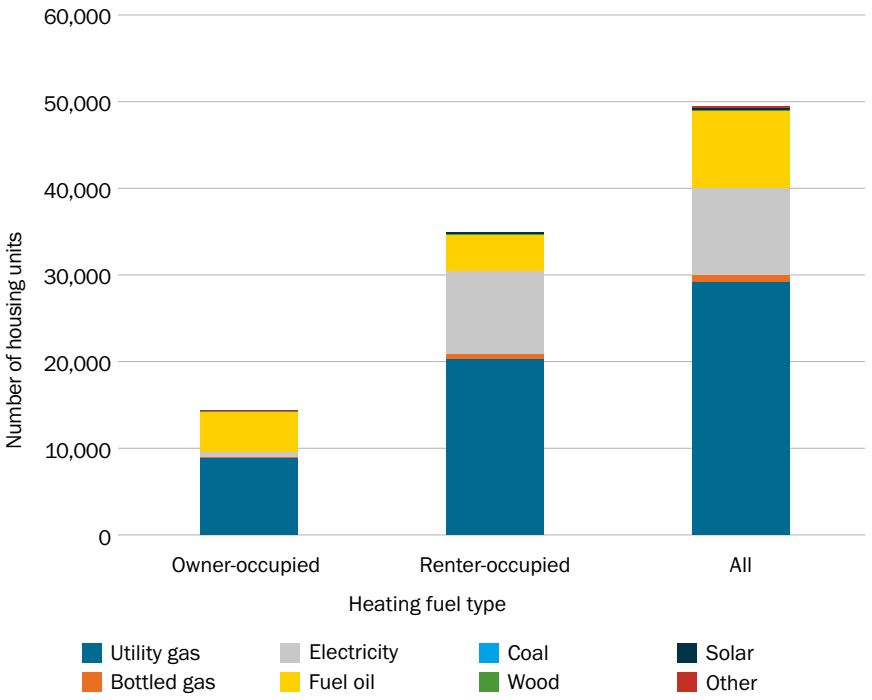


Figure 3. Number of housing units by heating fuel type and ownership status (2015) in New Haven, Connecticut (Source: U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data[6])

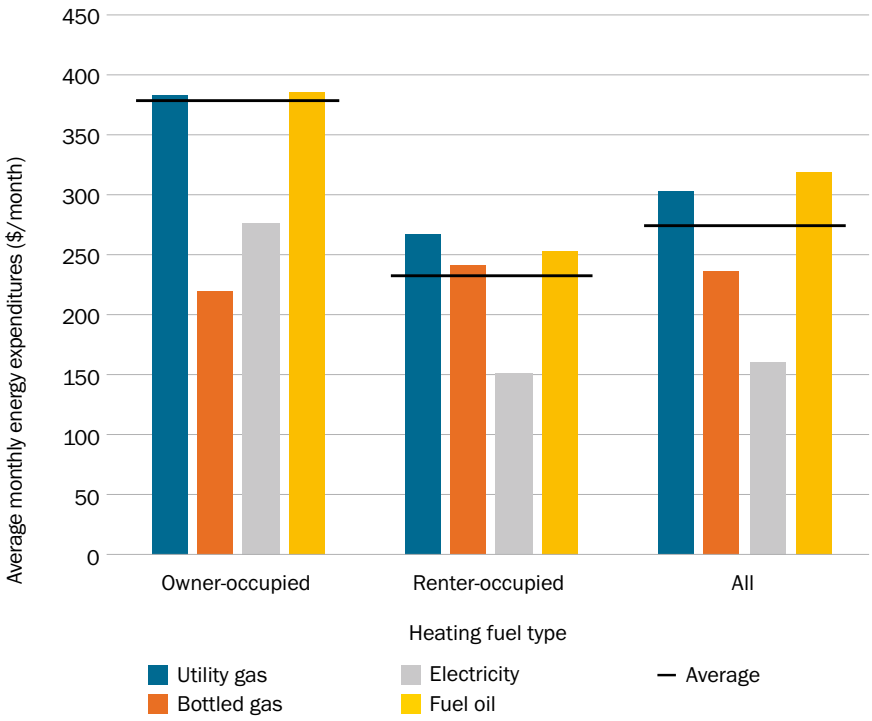


Figure 4. Average monthly expenditures by heating fuel type (2015) in New Haven, Connecticut (Source: U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data[6])

may also reduce the energy burden among low-income renters.

Additional measures to increase the efficiency of low-income and rental properties include the following:

- Time-of-sale efficiency requirements
- Rental and low-income weatherization programs
- Mechanisms to disclose anticipated utility bills to potential renters and buyers
- Requiring renovations to meet code
- Improving code compliance rates
- Adopting beyond-code measures (i.e., city policies that go beyond state-level or the latest vintage of building codes, such as the International Energy Conservation Code[7])
- Requiring new multifamily developments to meet efficiency standards in order to receive zoning and development approvals.

In addition, commercial building energy benchmarking or disclosure policies that include multifamily housing may lead to increased adoption of energy efficiency measures among these building types. Multifamily housing constitutes more than 30% of the commercial building area and more than 20% of the commercial buildings count in New Haven according to Cities-LEAP analysis of CoStar data (see Figure 5).

Weatherization Assistance Program

DOE's Weatherization Assistance Program (WAP) provides weatherization services to low-income families to reduce their energy costs. Connecticut Department of Energy and Environmental Protection (DEEP) has administered the program since 2012 and weatherized 1,802 homes with WAP funding at an average cost per home of $4,950. New Haven represented almost 16% of the state-wide production with a total of 287 homes weatherized during the same period.

[6] Figure based on a preliminary NREL residential household disaggregation and cross-tabulation of U.S. Census, U.S. Housing and Urban Development, and Energy Information Administration data.
[7] International Code Council. 2024. "International Code Council Digital Codes." https://codes.iccsafe.org/.

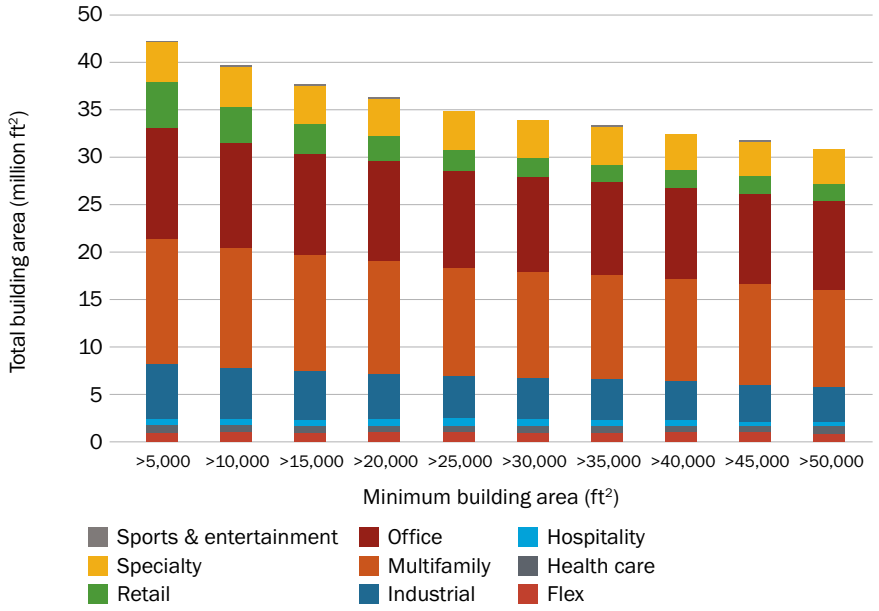


Figure 5. Commercial buildings in New Haven, Connecticut, by area and type (Source: Analysis of commercial properties data from SLOPE[8] in 2015)

Connecticut uses other resources to leverage WAP funding. A portion of the Low Income Home Energy Assistance Program (LIHEAP), funded by the U.S. Department of Health & Human Services, helps address health and safety barriers for WAP-funded homes. DEEP works to coordinate both state-administered federal programs in conjunction with utility-funded weatherization programs.

Resources

The following resources may be useful to guide further research and action steps for low-income household energy efficiency:

Rental Property Energy Efficiency Policy Case Studies

Vermont: Burlington, Vermont's Time of Sale Energy Efficiency Ordinance requires certain energy efficiency upgrades at the time of property sale for rental properties where tenants are responsible for heating costs: https://www.burlingtonelectric.com/time-sale-energy-efficiency-ordinance

Maine: Energy Efficiency Disclosure for Rental Units in Maine (landlords are required to disclose energy aspects of a property that may impact energy consumption at the location): https://www11.maine.gov/mpuc/sites/maine.gov.mpuc/files/inline-files/RentalEffDisclosureForm.pdf.

Low-Income Energy Efficiency

Residential

Better Buildings Clean Energy for Low Income Communities Accelerator: https://betterbuildingssolutioncenter.energy.gov/CELICA-Toolkit

Energy Efficiency in Affordable Housing, a U.S. Environmental Protection Agency guide for local governments: https://www.epa.gov/sites/default/files/2018-07/documents/final_affordablehousingguide_06262018_508.pdf

Better Buildings Residential Network: https://www.energy.gov/eere/better-buildings-residential-network/

Energy Efficiency: Buildings and Industry: https://www.energy.gov/eere/energy-efficiency-buildings-and-industry

Overcoming Renter-Owner Split Incentives

(Unwillingness of property owners to invest in upgrades that save tenants money)

Policy Options for the Split Incentive: Increasing Energy Efficiency for Low-Income Renters: https://www.sciencedirect.com/science/article/pii/S0301421512004661

Renters guide for energy efficiency: https://portal.ct.gov/-/media/DEEP/energy/ARentersGuidesToEnergyEfficiencypdf.pdf.

Report from the Rental Housing Energy Efficiency Work Group in Minnesota: https://nlihc.org/resource/minnesota-housing-partnership-releases-report-energy-efficiency-proposal-highlights-racial

Find additional resources on the LEAD and SLOPE platforms.

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LEAD
LOW-INCOME ENERGY AFFORDABILITY DATA
TOOL
U.S. DEPARTMENT OF ENERGY

Share your feedback and questions with us at LEAD.Tool@hq.doe.gov.

[8] National Renewable Energy Laboratory. n.d. "SLOPE Data Viewer Commercial Buildings Count." https://maps.nrel.gov/slope/data-viewer?filters=%5B%5D&layer=bldg-benchmarking.building-count&year=2020&res=state.