

HIEE Energy-burden Report DRAFT

5/12/22

Introduction

Approximately 718,684 Virginia households pay more than six percent of their household income for electricity and other fuel costs. About 30 percent of these households, 210,344, have low incomes and among the highest energy costs (top 25%) for their region. These households are excellent candidates for energy efficiency interventions including weatherization and home energy upgrades, mobile home replacement, and/or opportunities to move to a more energy efficient and comfortable residence. Efforts to provide these households with more energy efficient residences would achieve dual goals of freeing up household income to meet other needs and conserving costly energy resources.

VCHR analyzed energy costs, energy burden, and household characteristics that contribute to high energy costs and energy burden to prepare estimates of where households with high energy costs live. Though there are households with high energy costs and energy burdens throughout the state, these estimates highlight where large numbers of households with high energy costs are concentrated and where public investments are likely to have the greatest impact for individuals and communities.

Purpose and contents

This section addresses housing and household needs related high energy costs, especially among households with low incomes. VCHR has prioritized the relevance and reliability of estimates in order to provide information that DHCD can use to target interventions and measure outcomes. As such, VCHR has taken a different approach to estimation than other existing tools. Notably the DOE LEAD TOOL is useful for increasing public awareness, but because it aggregates data from very small populations at the block level is heavily impacted by high margins of error, especially outside of the most densely populated places¹. Therefore, the LEAD tool is useful for comparative spatial analysis and demonstrating the spread and magnitude of energy burden, but cannot be use for programmatic bench marking or longitudinal analysis. VCHR's estimates are based on reliable, regional estimates and applied to reliable tract-level populations or in-lieu of a reliable estimate, the conservative lower-bound² of an estimate is applied.

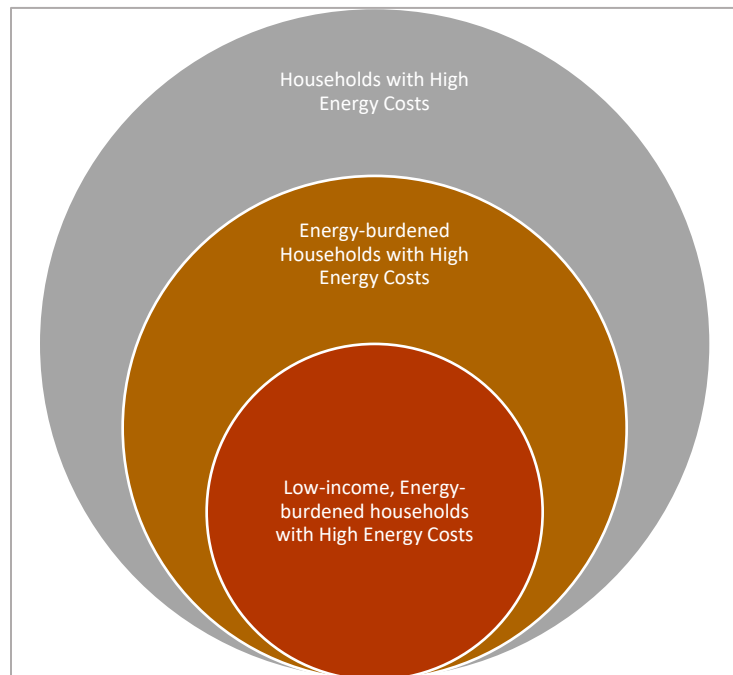
¹ VCHR's conclusion references Ma et al 2019, "Low-Income Energy Affordability Data (LEAD) Tool Methodology;" and U.S. Census Bureau 2019, Understanding and Using American Community Survey Data: What State and Local Government Users Need to Know, U.S. Government Printing Office, Washington, DC, 2019.

² Estimate minus margin of error.

Process and methodology

VCHR estimated the number of households in three overlapping population subgroups by Census tract, using a combination of regional proportions and relevant tract-level household estimates.

Figure 1. Populations estimated



VCHR used the American Community Survey (ACS) Public Use Microdata Sample (PUMS) to estimate the number of households with high energy costs, energy costs³ in the top 25 percent (greater than or equal to the third quartile) for the Public Use Microdata Area (PUMA). Among households with high energy costs, VCHR estimated the number of households that are considered energy burdened, those that spend six percent or more of their gross household income on energy costs. Identifying households with a dual challenge of high energy costs and energy burden is important for program implementation because energy efficiency housing interventions will have

the greatest benefit, both household savings and energy conservation, in these cases. Furthermore, this approach excludes households with extremely low incomes that are burdened by very small energy costs associated with high-energy-efficiency housing and for whom other supports may be more beneficial. Last, VCHR estimated the number of low-income households with high energy costs that represent an energy burden for the household. VCHR applied proportions of households in these categories among relevant subgroups to create tract level estimates. Available, relevant subgroups were limited by ACS published tables for which tract-level estimates are available and reliable. VCHR regressed housing and household characteristics that are associated with higher household energy costs⁴ and energy burden⁵ on energy cost and energy burden levels in order to prioritize nested-subgroups. Since reliability is limited for small populations in small geographies, VCHR's nesting was limited to 2-levels in the most populous groups (i.e. single-family units by number of people in the household) and 1 level in less populous groups (i.e. multifamily units, low income households). Though these subgroups were chosen for the relevance and reliability, some tracts have too few households to allow for reliable estimation at all. In tracts where the number of households alone is not reliable, VCHR has not reported data. In tracts where the number

³ Energy costs include electricity cost (PUMS ELEP), gas cost (PUMS GASP), and fuel (other than gas or electricity) cost (PUMS FULP). Energy costs were converted from annual costs to average monthly costs.

⁴ Year built, households' size, housing type (mobile or manufactured home, single family detached, single-family attached, multifamily by number of units), tenure, fuel type, households with children, households with seniors, household income

⁵ Household income, household size, race identity of householder, tenure, energy cost

of households is reliable, but the subgroup estimate is not reliable, VCHR used the lower bound, the estimate minus the margin of error, to produce a final estimate.

Figure 2. Regional proportions applied to tract-level published estimates

<i>PUMA Region Proportions</i>		<i>Tract-level Populations</i>
Percent of 1-person households in single-family units that have high energy costs	→	1-person households in single family units
Percent of 2-person households in single-family units that have high energy costs	→	2-person households in single family units
Percent of 3-person households in single-family units that have high energy costs	→	3-person households in single family units
Percent of 4-more-person households in single-family units that have high energy costs	→	4-or-more-person households in single family units
Percent of households in multi-family units that have high energy costs	→	Households in multi-family units
Percent of low-income, energy-burdened households with high energy costs	→	Households with low incomes

Results

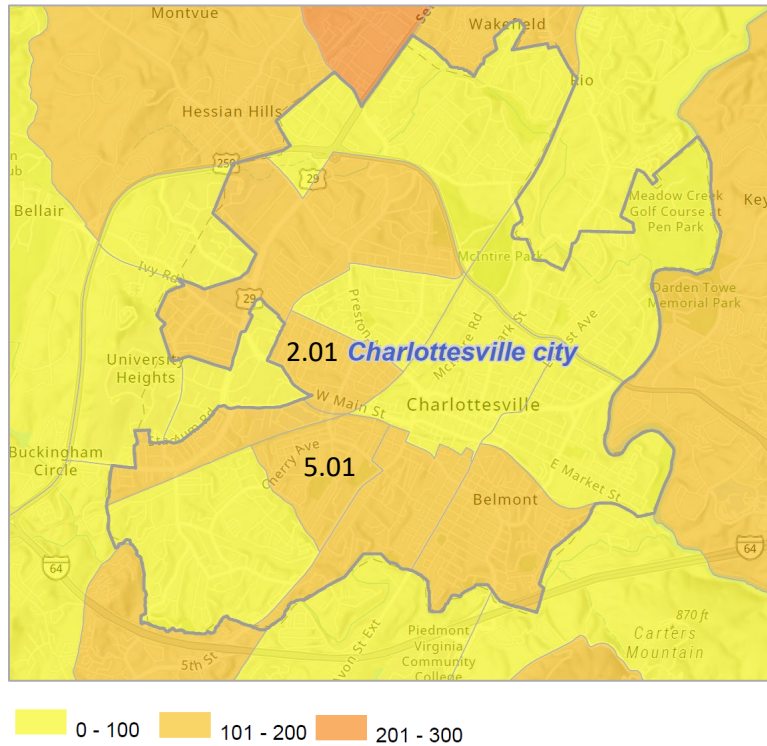
VCHR and VCU CURA produced a mapping application to allow DHCD staff to reference the number of households with high energy costs and the number of households with low incomes and high energy cost that comprise more than 6 percent of the household’s income. Within the application, users can overlay construction costs to further assess the efficiency of investments by geography and overlay projects to begin the benchmarking process and allow for monitoring of program efficacy over time. The following examples demonstrate how these estimates can be used.

Charlottesville

Each of Charlottesville's 12 tracts includes households with average energy costs greater than \$244/month.⁶ The average number of households with high energy costs is per tract is 219. However, these households are most likely to be low income and energy burdened in tracts 5.01 and 2.02 which comprise the Fifeville, 10th and Page, and Venable neighborhoods. Combined, these neighborhoods would be good candidates for investment in housing because at least 300 households have high energy costs and at least 81 percent of those households are low income and energy burdened.

Figure 3. Estimated Low-income, energy-burdened households with high energy cost by tract

Source: VCHR-CURA



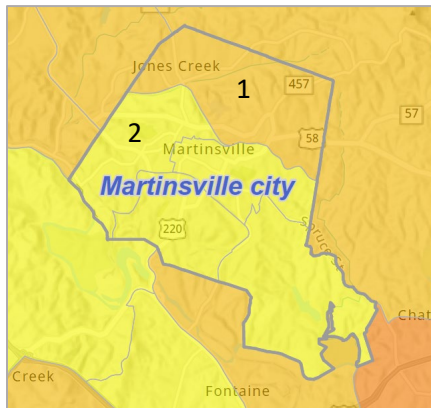
⁶Third quartile measure for the Thomas Jefferson North PUMA which include the entire city of Charlottesville.

Martinsville

Each of Martinsville's 5 tracts includes households with average energy costs greater than \$289/month.⁷ The average number of households with high energy costs is per tract is 162. However, these households are most likely to be low income and energy burdened in tracts 1 and 2 which comprise the Westend, Northside and Eastend areas skirting the city center. Tract 1 would be the best candidate for investments in housing because at least 180 households have high energy costs and at least 89 percent of those households are low income and energy burdened.

Figure 4. Estimated Low-income, energy-burdened households with high energy cost by tract: Martinsville

Source: VCHR-CURA



Conclusions

Nearly every tract in Virginia includes households with high energy costs. Single-family detached homes, more household members and higher income are correlated with higher energy costs. Lower incomes are correlated with higher energy burden, but for household extremely-low incomes, even low energy bills can be burdensome. Identifying places with where households have high energy costs, low incomes *and* energy burden will allow DHCD and other agencies and organizations to target investments to conserve energy and relieve cost burdens.

Identifying areas with high numbers of households with high energy costs *and* concentrations of these households with low incomes and energy burden may allow rehabilitation and weatherization providers to operate more effectively. The maps and data in the ArcGIS online tool can facilitate this analysis and offer additional overlays that are useful from the state-level, strategic perspective: construction costs and program interventions to date.

⁷Third quartile measure for the Thomas Jefferson North PUMA which include the entire city of Charlottesville.