

Vermont Energy Burden Report

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EXECUTIVE SUMMARY

Energy burden, which expresses annual spending on energy as a percentage of income, is a powerful metric for understanding the impact of energy costs on Vermonters and their communities. This analysis strives for a comprehensive understanding of residential total energy costs: transportation energy, thermal energy, and electricity.

We find many of the same basic energy spending patterns in the current report that were observed in the first exploration of Vermont residential energy burden, published in 2016. Transportation energy remains the largest component of most households' energy spending (45%, on average), followed by thermal energy spending (35%) and electricity spending (20%). We estimate that statewide energy burden is 10%, on average, similar to our findings in 2016. Across Vermont's towns, energy burden varied threefold, from 6% to 20%. Total energy spending ranged from about \$3,860 to \$6,950, meaning that households in towns with the lowest energy expenditure spent roughly 45% less on their energy annually than those in the highest-spending towns. For all energy categories that we analyzed, spending tended to increase with income while burden decreased.

We found that clean energy technologies, which can reduce costs and burden, generally do not have high rates of adoption in the areas where they may be needed most: towns characterized by high burden and low income. Penetration rates of cold climate heat pumps, solar photovoltaics, and electric vehicles were highest in areas of low to moderate energy burden. In the case of weatherization, some progress has been made in reaching Vermont's most energy-burdened communities, but much work remains to be done in order to meet the state's aggressive energy and climate goals.

In order to achieve these goals, it is critical that they are in alignment with state policies. Vermont's Energy Efficiency Utilities (EEUs) are currently required to invest in programs that reach low income households, but these requirements are often in tension with aggressive statewide savings targets that encourage a focus on customers who have high energy expenditures, rather than those who have high energy burdens. Efficiency Vermont is applying new strategies, including the launch of programs targeted at low- and moderate-income customers and new support for businesses that are creating jobs. Ultimately, these changes will ensure that all Vermonters can reduce their costs, invest in their communities, and advance economic development across the state.

INTRODUCTION

In 2016 Efficiency Vermont commissioned the first Vermont total energy burden report, examining spatial patterns in the three components of household energy use: thermal (heating),¹ electric, and transportation. With Vermont's primarily rural settlement pattern, cold winters, and relatively old building stock, these energy costs can add up to a significant expense for the average household and can represent an especially high burden for lower income households.

For this updated study, we again mapped this energy cost data, looking at energy in two ways:

- Expenditures (average dollars spent annually)
- Burden (energy spending as a percent of income by town)

Applying the lens of energy burden enables us to better understand the true context – and impact – of energy usage on people and communities.

Why take the time to update the Vermont Energy Burden Report now? A primary goal of this report is to examine if and how increasing availability of clean energy technologies has impacted household energy spending. It turns out that for Vermont's most energy-burdened communities, the answer is largely no. Although clean energy technologies like electric vehicles, cold climate heat pumps, and solar PV are available in Vermont, penetration rates remain relatively low, especially in communities where energy burden is the highest.

Another goal of this report is to explore if there were any other notable shifts or changes in the basic patterns that we identified in our first report, particularly among those communities where energy burdens are the highest. Again, the answer is no. Although changes in our methods prevent a perfect apples-to-apples comparison, we still observed that the Northeast Kingdom and Vermont's most rural communities carry the highest energy burden, while those in the greater Chittenden County region have the lowest burdens. Indeed, we identified 12 communities with energy burdens of 15% and above, the majority of which are in Northeast Kingdom counties.

¹ Thermal costs are primarily made up of home heating costs but may also include cooking and hot water fuel costs.

We made two key changes to our methods in the updated report: 1. All data is aggregated by town, rather than census block group, to improve the value of this analysis for local planning, and 2. We use Vermont-specific estimates of thermal energy fuel usage, rather than New England, which increased our estimates of thermal spending.

Challenges and opportunities in supporting highly energy-burdened communities go far beyond dollars and cents. As we stated in our 2016 report:

Households and communities for which energy burden tends to be highest could benefit more than the average state resident from energy efficiency programs and products. People with high energy burdens may be at higher risk of health problems. There is a higher likelihood that the homes they inhabit may be kept cooler, which can result in increased dampness as moisture condenses on cooler surfaces. They may sit for long periods as they commute to distant jobs or shopping.

“We can address burden in a multifaceted way: both in programs that serve residential customers directly to lower their energy costs, and through investments in businesses that create jobs and raise incomes in rural communities.”

Energy-burdened households are more in need of the financial benefits that can be accrued from energy improvements – but they also stand to gain in many other ways if we can address the upfront barriers that are keeping them from taking these steps.

Ultimately, the value of this analysis is in helping service providers recognize which customers and communities need increased levels of support, thereby enabling us to make focused and effective choices in our program offerings. It also enables us to look at all the factors that impact energy burden – both costs and income – across the state. This means we can address burden in a multifaceted way: both in programs that serve residential customers directly to lower their energy costs, and through investments in businesses that create jobs and raise incomes in rural communities.

Over the last three years, Efficiency Vermont has leveraged learnings from the first total energy burden report in a number of ways:

- Collaborated with the Vermont Agency of Commerce and Community Development (ACCD) to offer enhanced incentives to businesses in order to encourage them to expand and/or relocate to rural or economically-challenged communities. This supports the goal of reducing energy burden by helping bring new jobs (and increased household incomes) to areas of the state where they are needed most.
- Launched increased incentives to help moderate income Vermonters weatherize their homes, enabling them to get 50% of their project covered (up to \$4,000), with a 0% interest loan to pay for the remaining costs.

- Launched a new Targeted Communities program, in partnership with ACCD, to bring enhanced incentives and direct door-to-door outreach to the state’s designated downtowns. The program serves 4 communities per year, and energy burden data is used to ensure that communities with higher burdens are served first.
- Completely redesigned a program that provides free appliances and heating equipment to low income Vermonters with high electricity usage. Qualification for this program formerly required using 10,000 kWh or more of electricity per year. Now, any customer whose income is below 80% of Area Median Income qualifies, with two levels of support available based on their energy burden. This is the first efficiency program in the nation to base eligibility criteria on energy burden.²
- Placed a renewed focus on helping rental property owners complete upgrades, by deploying new outreach tactics to connect with them and identify opportunities to improve their rental properties. Nearly 80% of Vermont renters are estimated to be low-income.³

The above changes represent a fundamental shift in the way that Efficiency Vermont invests its resources and engages with customers – and they were driven, in large part, by the data and lessons gleaned from the first energy burden report. We look forward to continuing to build on them over the next three years. It is our hope that this new report can also provide critical insights to other service providers, and to leaders and policymakers who want to understand if the state’s current policy framework is driving at the outcomes we want – to make energy cleaner and more affordable for all Vermonters.

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METHODS

We used a combination of modeling, usage data, and survey data to estimate energy spending and burden in each of Vermont’s towns. Our exploration of household energy spending included three categories: electricity, thermal energy, and transportation energy.⁴ Total energy spending is the sum of spending on these three categories. Energy burden is defined as annual energy spending expressed as a percentage of household income.⁵ To

² Per the American Council for an Energy-Efficient Economy

³ The Vermont Housing Finance Agency: <https://www.housingdata.org/profile/income-employment/households-income-group>

⁴ Estimates of spending do not account for fuel assistance that qualifying households may receive.

⁵ See Appendix B for a more detailed description of our methods.

estimate energy spending and burden for each of the three energy categories we used the following data sources:

- Electricity: Through Efficiency Vermont’s ongoing partnership with Vermont’s electric utilities, we obtained average electricity usage per household for each town in Vermont for 2017. We multiplied average household usage by \$0.17, the statewide 2017 average electric rate (\$/kWh).⁶
- Thermal energy: Thermal energy spending data came from two sources: the American Community Survey (ACS), an annual survey performed by the US Census Bureau, and Vermont Gas. The ACS estimates the number of households and their primary heating fuel type for each town in Vermont. We calculated thermal energy use based on household size (number of people) and type (renter vs. owner). Energy spending was calculated based on usage and primary heating fuel. We created a weighted average of thermal energy spending for each town using energy costs (per MMBTU) for each fuel type (except natural gas) available through Efficiency Vermont. Vermont Gas provided average household spending for each town in its territory.⁷
- Transportation energy: The Housing and Transportation Affordability (H+T) Index models vehicle miles travelled (VMT) for each census block group nationally, based on a variety of land use and demographic characteristics. We merged the modeled VMT for each block group in Vermont to create town-level VMT estimates. These estimates were combined with statewide average vehicle efficiency (22.2 miles per gallon) and average gasoline prices to calculate fuel usage and spending.^{8,9}

A more detailed description of our methods is included in Appendix C.

In this report, we estimate total energy burden for each town in Vermont. Estimates of town-level median income were available through the American Community Survey. We calculated energy burden as spending expressed as a percentage of median household income: (Average energy spending / Median household income) * 100%.



⁶ EIA: Statewide average price of electricity by end-use sector.

⁷ A key change from the previous version of this report is the assumed household energy usage (Btu/square foot) used to calculate thermal energy spending. In the previous report we used a value of 30,000 Btu/square foot, the 2009 Residential Energy Consumption Survey estimate of thermal energy use in New England. In this report we use 63,000 Btu/square foot, based on the 2018 Existing Homes Market Assessment, an annual survey conducted by the Vermont Department of Public Service and the only Vermont-specific data available related to residential thermal energy consumption. This change increased our estimates of household energy consumption and spending, but likely made it more accurate in most cases. However, this market assessment does not include any multifamily units and thus may inflate spending estimates in areas of the state with higher proportions of this housing type.

⁸ Vermont Agency of Transportation: 2017 Vermont Transportation Energy Profile

⁹ EIA: New England average gasoline prices: https://www.eia.gov/dnav/pet/pet_pri_gnd_a_epmr_pte_dpga_a.htm

RESULTS

We estimate that, on average, Vermont households are spending about \$5,830 annually on electricity, thermal and transportation energy (Table 1), approximately 10% of total household income. We observed the greatest variation among households in spending on electricity and thermal energy. We observed a range of \$1,400 in spending on electricity and \$1,900 in thermal energy spending. In contrast, our estimates of transportation energy spending only varied by about \$800 statewide (Figure 1). However, transportation spending is the highest cost across the board: an average of \$2,638. Nearly half of household energy spending goes to transportation energy (45%) followed by spending on thermal energy (35%), and electricity (20%; Figure 2).

To help illustrate the results of this analysis, we have included profiles of three highly energy-burdened communities, providing a demographic overview and potential paths for residents to take to reduce their energy costs.

Figure 1. Graph of average spending by energy category +/- standard error

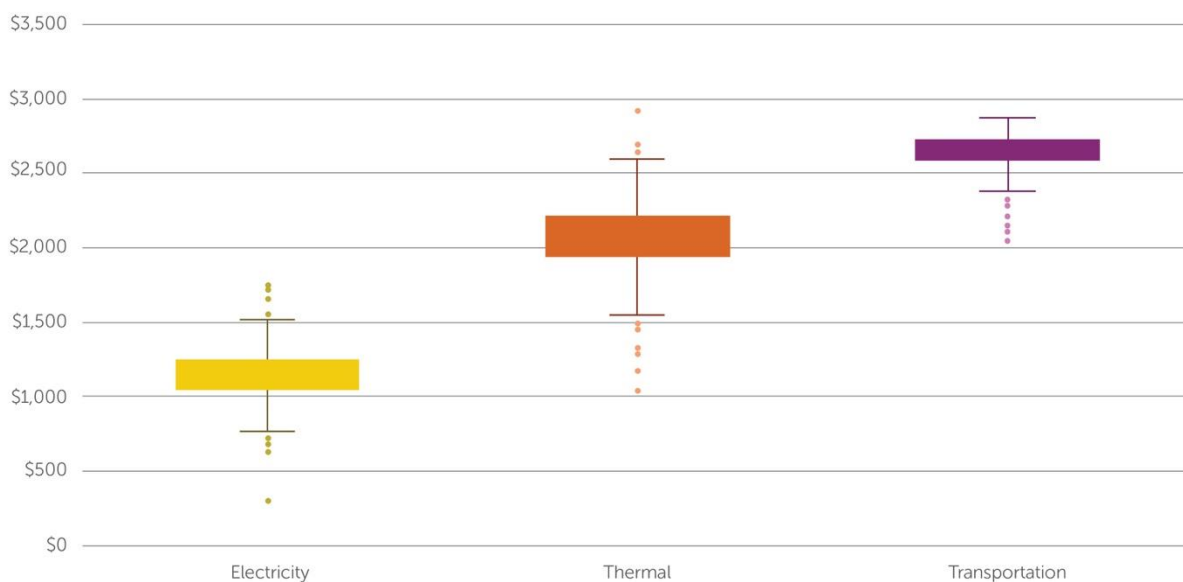


Table 1. Average spending by energy category +/- standard error

Energy type	Average annual household expenditure (mean ± SD)	Range of average household expenditures	Expenditure a percent of total energy cost
Electricity	\$1,150 ± 199	\$302-1,777	20%
Thermal	\$2,050 ± 290	\$1,041-2,916	35%

Transportation	\$2,638 ± 126	\$2,047-2,874	45%
Total energy cost	\$5,837 ± 471	\$3,859-6,949	-

Figure 2. Components of household energy spending by energy category



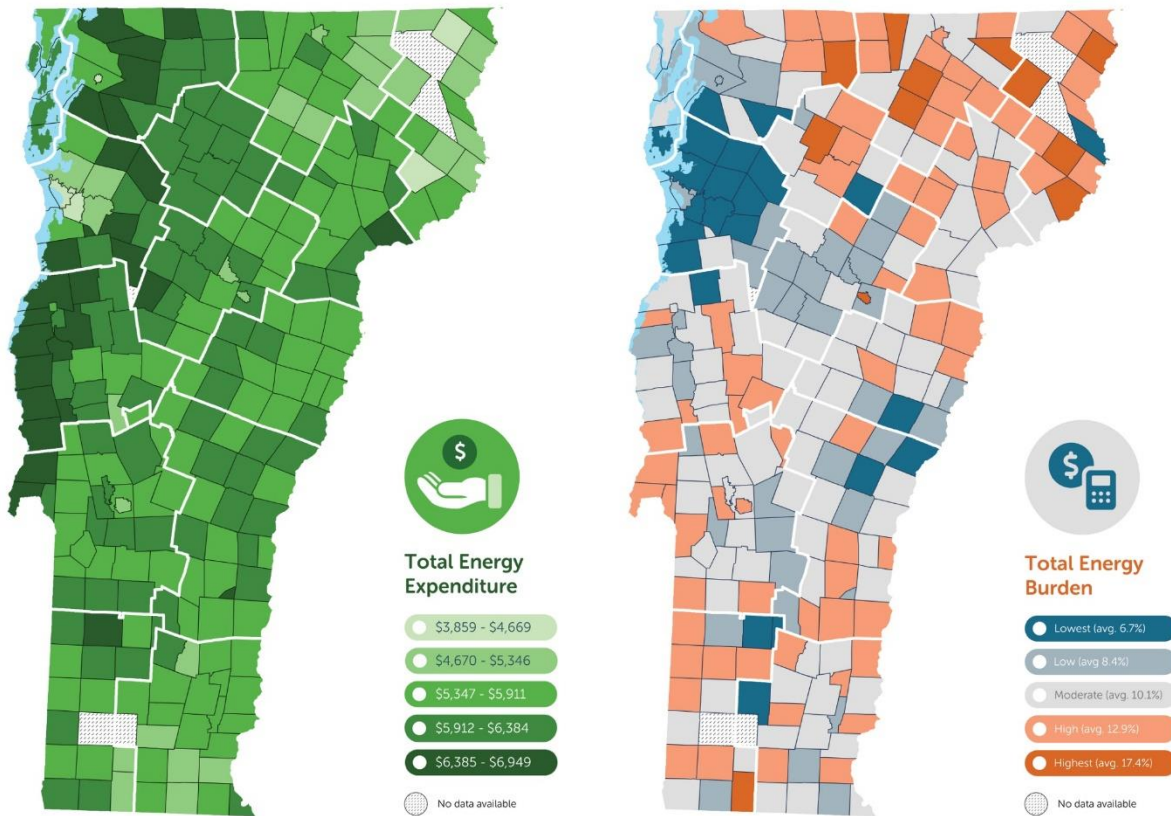
TOTAL ENERGY SPENDING AND BURDEN

We estimate that statewide total energy burden in Vermont is 10% of household income, similar to our results in the previous report. Energy burden varied from 6% to 20% across Vermont’s towns. Total energy spending ranged from about \$3,860 to \$6,950, meaning that households in towns with the lowest energy expenditure spent roughly 45% less on their energy annually than those in the highest-spending towns.

We identified clear areas of high and low spending in Vermont. Similar to our previous analysis, towns in Chittenden County and the Burlington commuter-shed are characterized by low energy burden, indicating households are spending proportionately less on energy than in other parts of the state. This pattern is driven by high household incomes, low transportation costs in some areas, and access to lower-cost natural gas. The Northeast Kingdom is characterized by higher energy burdens, despite relatively low energy expenditures. These communities have high rates of heating with wood, generally a more affordable fuel source. Low median incomes, however, lead to higher energy burdens, and indeed many of the most severely burdened towns in the state are found in this region. Many of the towns in southern Vermont also exhibit energy burdens higher than the statewide average.

“Households in towns with the lowest energy expenditure spent roughly 45% less on their energy annually than those in the highest-spending towns.”

Figure 3. Maps – Total Energy Expenditure and Burden by town



The 12 highest burdened towns in Vermont had total energy burdens ranging from 15-20% of total income (Table 2, Figure 3). Most of these towns are located in the Northeast Kingdom, but this list also includes Barre City in Washington County, Readsboro in Bennington County, and Montgomery in Franklin County. All of these towns are characterized by low median income (<\$40,000) and near average spending on energy. It is important to note that our analysis estimates what people would need to spend in order to be comfortable (warm) in their home and travel where they need to go. With the exception of electricity and natural gas, we don't have data sources indicating what they actually spent or used.

Table 2. Highest burdened Vermont towns

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden
Lemington	\$26,094	\$919	\$1,804	\$2,569	\$5,292	20%
Irasburg	\$35,446	\$1,234	\$1,990	\$2,583	\$5,807	16%
Johnson	\$36,833	\$1,208	\$2,232	\$2,577	\$6,017	16%
Troy	\$38,152	\$1,137	\$2,129	\$2,586	\$5,852	15%

Lunenburg	\$36,125	\$1,028	\$2,020	\$2,469	\$5,518	15%
Barre City	\$35,225	\$1,110	\$1,965	\$2,227	\$5,302	15%
Morgan	\$35,000	\$675	\$1,910	\$2,647	\$5,232	15%
Brighton	\$34,737	\$768	\$1,958	\$2,465	\$5,191	15%
Albany	\$35,268	\$1,013	\$1,585	\$2,636	\$5,234	15%
Montgomery	\$41,513	\$1,042	\$2,263	\$2,806	\$6,111	15%
Readsboro	\$35,625	\$1,019	\$1,598	\$2,616	\$5,234	15%
Granby	\$33,125	\$797	\$1,501	\$2,558	\$4,856	15%
Vermont	\$57,513	\$1,150	\$2,050	\$2,638	\$5,837	10%

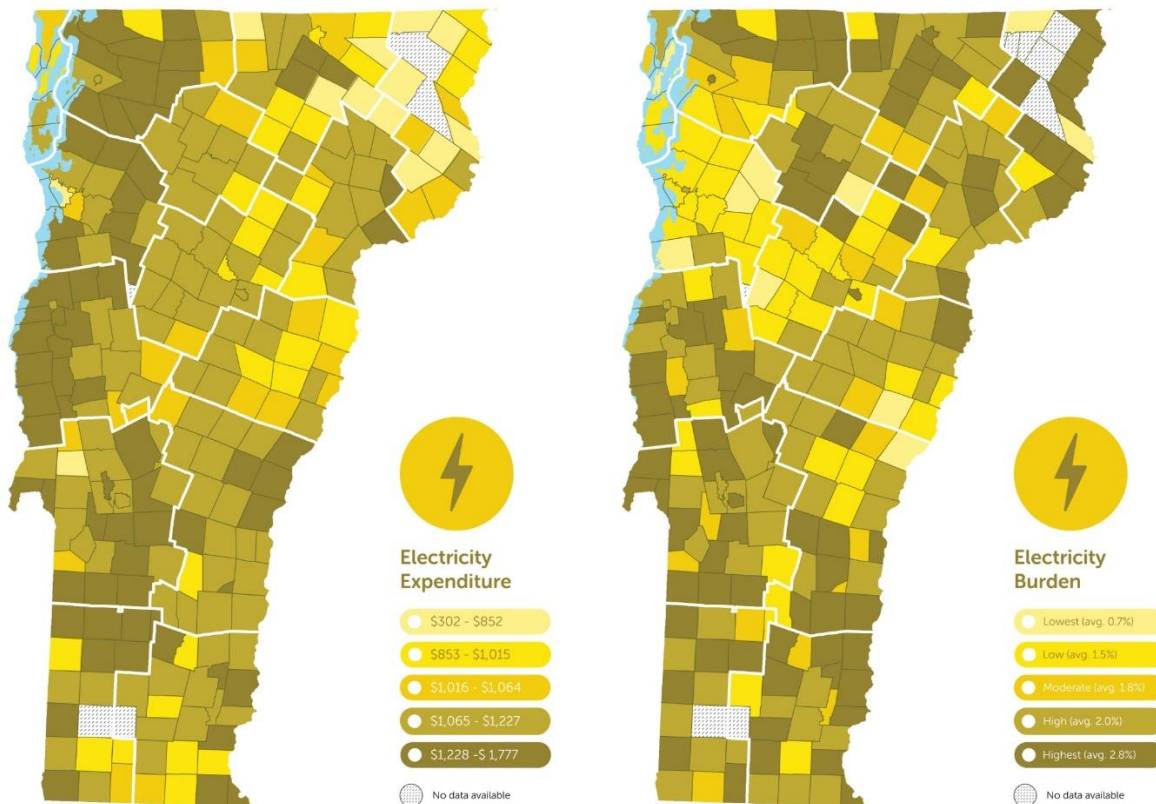
The highest spending towns are located primarily in Addison and Chittenden Counties (Table 3, Figure 3). Expenditures are all over \$6,000 annually, although a range of energy burden is present among these towns, varying from less than 6% to 13%.

Table 3. Ten highest spending towns arranged by energy burden

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden
Whiting	\$51,250	\$1,753	\$2,185	\$2,745	\$6,683	13%
Highgate	\$57,819	\$1,415	\$2,697	\$2,766	\$6,878	12%
West Haven	\$53,571	\$1,717	\$2,261	\$2,665	\$6,643	12%
Panton	\$59,444	\$1,777	\$2,117	\$2,772	\$6,667	11%
Bridport	\$62,159	\$1,584	\$2,270	\$2,760	\$6,614	11%
Addison	\$78,712	\$1,653	\$2,502	\$2,794	\$6,949	9%
Fairfax	\$71,227	\$1,279	\$2,710	\$2,742	\$6,730	9%
Westford	\$89,464	\$1,414	\$2,598	\$2,864	\$6,877	8%
Richmond	\$86,369	\$1,281	\$2,658	\$2,697	\$6,636	8%
Charlotte	\$117,407	\$1,464	\$2,660	\$2,820	\$6,943	6%
Vermont	\$57,513	\$1,150	\$2,050	\$2,638	\$5,837	10%

ELECTRICITY: SPENDING, BURDEN, AND TRENDS

Figure 4. Maps – Electricity Expenditure and Burden by town



Clear pockets of high-spending on electricity emerge in our analysis: western Addison County and northern Bennington County, as well as much of Franklin County. The high spending in Addison County is consistent with our previous report. The towns with highest average residential account electricity consumption are Panton, Enosburgh, Whiting, and West Haven. Because most Vermont utilities, if not all, allow agricultural operations to use residential rates, a combination of residential and agricultural electricity consumption (all billed and classified as residential) could explain the cluster of high use towns in Franklin County and in western Addison County. By using residential rates farms can avoid demand charges and use electricity at a single, predictable rate. Both Addison and Franklin counties have a high concentration of farms, especially dairy farms, that could increase the average electricity consumption for residential accounts.

We also explored whether use of resistance heat, air source heat pumps, or electric vehicles could be increasing electricity usage in areas of high consumption but did not find a strong correlation in any of these cases.¹⁰

While electricity use is higher for homes in wealthier towns, on average, the correlation between median household income and average electricity use is not strong in Vermont’s towns. Similarly, data from residences across New England suggest that high income households consume more electricity than low- and moderate-income households, but there is almost no relationship between income and electricity consumption within low- and moderate-income households.

Many of the towns with the lowest per-residence electricity consumption are located in the lowest density towns of the Northeast Kingdom, such as Averill, Victory, and Norton. Each of these three towns have more residential accounts than actual residents. Thus, the averages may reflect residences that have electricity service but are unoccupied for a portion of the year, such as summer cottages or hunting camps. For example, Averill is home to 48 electric accounts for 10 occupied homes (per US Census Bureau figures). Town-wide average consumption is lower because many of these camps are vacant for much of the year, especially winter.

The ten towns most burdened by electricity costs are similar to those burdened by total energy costs: many in the Northeast Kingdom, and Barre City, as well as Panton in Addison County. These towns all have electricity spending burdens that are over 3% of household income.

Table 4. Ten highest burdened towns – electricity

Town	Median Income	Annual Electricity Spending	Electricity Burden
Irasburg	\$35,446	\$1,234	4%
Lemington	\$26,094	\$919	4%
Whiting	\$51,250	\$1,753	3%
Barre City	\$35,225	\$1,110	3%
Johnson	\$36,833	\$1,208	3%
Enosburgh	\$54,900	\$1,769	3%
Pawlet	\$45,875	\$1,475	3%
West Haven	\$53,571	\$1,717	3%
Athens	\$41,406	\$1,300	3%
Panton	\$59,444	\$1,777	3%
Vermont	\$57,513	\$1,150	2%

¹⁰ Prevalence of electric resistance heat is available by town, through the ACS. Per capita rates of air source heat pumps was provided by Energy Action Network. Town-level EV adoption was provided by Drive Electric Vermont.

Figure 5. Electricity Burden vs. Spending

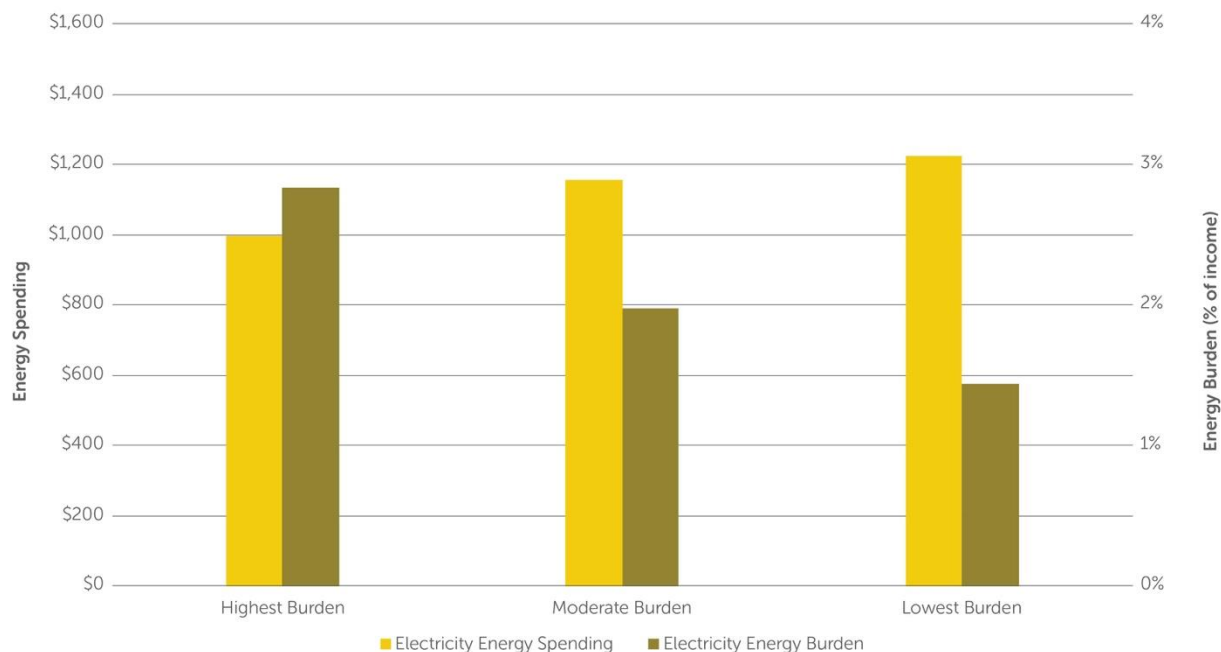


Figure 5 demonstrates the impact of income on Energy Burden. The lowest burdened households have the highest electric spending, but higher incomes make this spending less impactful on energy burden.

Electricity usage is unique among our three energy categories because we have actual usage data, and the key focus of Efficiency Vermont’s work is to reduce electric usage and costs for Vermonters. For those reasons, we also explored how electricity consumption has changed over time, comparing average residential usage in 2012 to 2017 for each of Vermont’s counties (Table 5). Average consumption dropped in all but two counties: Windham and Lamoille.

Table 5. Five-year growth in average residential electric consumption by county

County	Growth in Average Consumption (kWh), 2012 – 2017
Addison	-402
Bennington	-174
Caledonia	-307
Chittenden	-651
Essex	-119
Franklin	-284
Grand Isle	-138
Lamoille	134

Orange	-325
Orleans	-287
Rutland	-250
Washington	-257
Windham	18
Windsor	-113
Statewide	-261

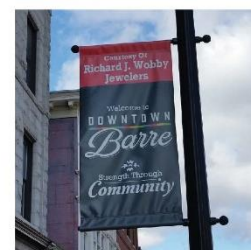
Barre City was identified as an area of high energy burden in our last report. In our community spotlight for electricity, we estimate that 63% of the households in Barre could be eligible for additional assistance to reduce their electric costs, beyond standard Efficiency Vermont appliance rebates.



BARRE CITY: EFFICIENT APPLIANCES

Solutions to reduce **Electricity Energy Burden**

Median income	\$35,225
Average household size	2.14
Total population	8,778
Total households	3,994



	Energy burden 3% +	Energy burden below 3%	Over 80% AMI
	Based on your electric spending and income, you are eligible for free replacement of all of your eligible appliances.	Based on your electric spending and income, you are eligible for free replacement of one of seven eligible appliances.	Efficiency Vermont works with a network of retailers across the state to lower the cost of efficient appliances at point of sale.
Estimated number of qualifying households in Barre City	2,110	408	1,476

How do efficient appliances reduce a household's electric energy burden?

Efficient appliances waste less energy, meaning you're not paying for energy you're not using. For instance, a new efficient refrigerator can save you \$150 over the life of the appliance.

How can we increase participation to help reduce Barre City residents' energy burden?

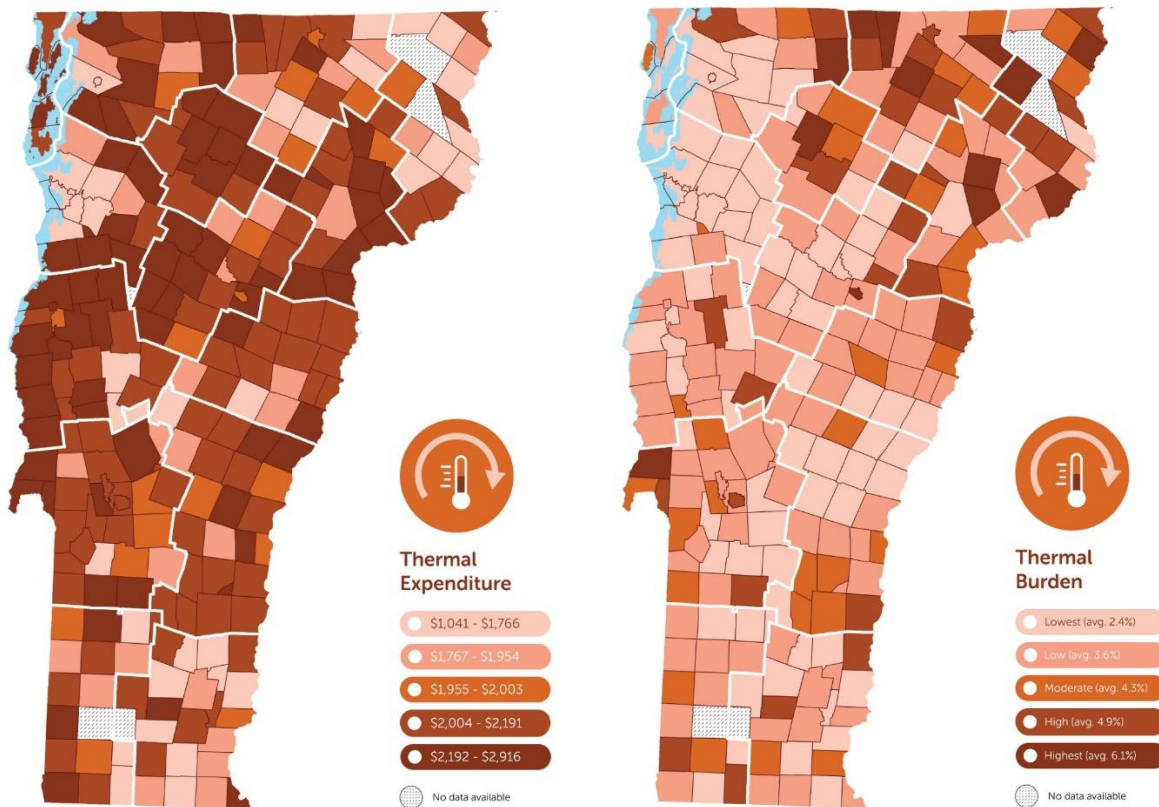
Education: With such a new program, many Vermonters still don't know about Efficiency Vermont's efficient appliances program. Through partnerships with the Weatherization agencies, contractors, and distribution utilities, we can continue getting the word out.

Expansion: This program will be helpful to households that have an electric burden above 3%, but their burden may still be higher than they can afford. Expanding this program will enable more homeowners to save electricity and money.

Complementary Programs: Rooftop or community solar are also great ways to reduce electric costs. Solar is still out of reach for many low- and moderate-income households, so programs that expand access to solar would support reducing energy burden for these households.

THERMAL ENERGY SPENDING AND BURDEN

Figure 6. Maps – Thermal Energy Expenditure and Burden by town



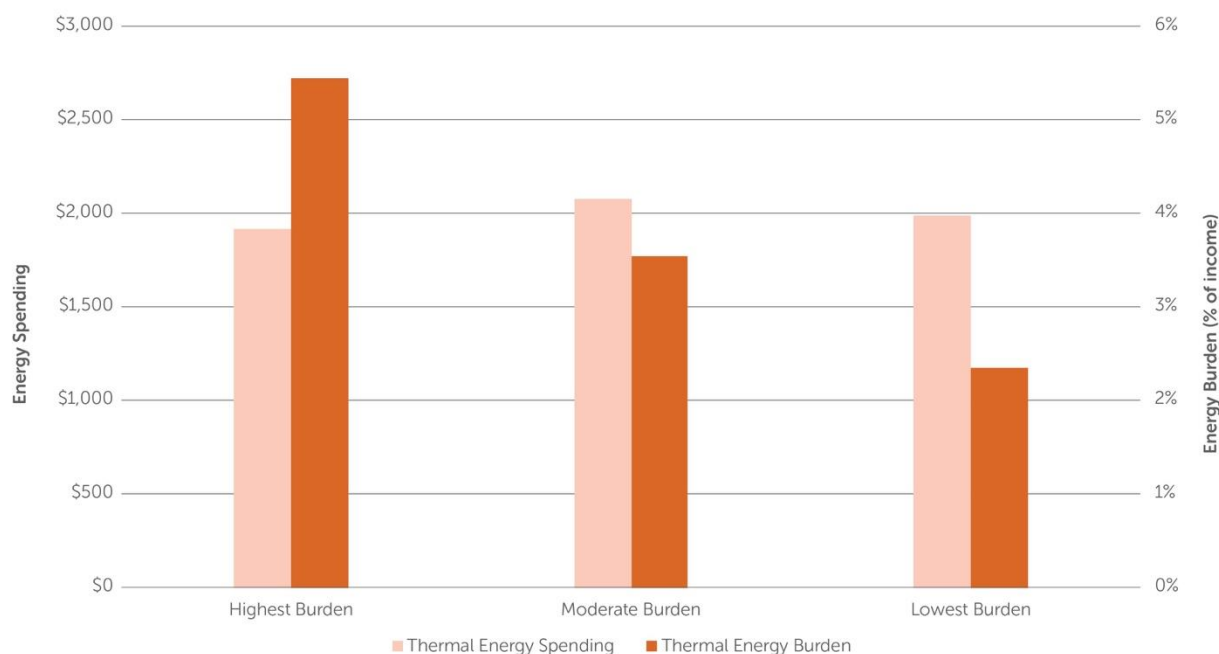
Similar to spending on electricity, Addison County has high estimated thermal energy spending relative to the rest of the state. This area was estimated to be high spending in the previous report as well. Households in Burlington have relatively low levels of spending on thermal energy, due to the high proportion of multi-family housing and high usage of natural gas.

The towns we identified as being most severely burdened by heating costs exhibit relatively low estimated thermal spending, as shown in Figure 8. This low spending is due to high rates of wood fuel usage in areas of the Northeast Kingdom and high rates of renters (assumed to be in apartments and smaller dwellings) in Barre City. However, low spending was not enough to offset household incomes well below the statewide median. In these highly burdened towns, thermal expenses are estimated to comprise 6-7% of total household income, higher than the statewide burden of 4%.

Table 6. Ten Highest burden towns – thermal energy

Town	Median Household Income	Thermal Spending	Thermal Burden
Lemington	\$26,094	\$1,804	7%
Johnson	\$36,833	\$2,232	6%
Benson	\$44,688	\$2,524	6%
Brighton	\$34,737	\$1,958	6%
Irasburg	\$35,446	\$1,990	6%
St. Johnsbury	\$39,806	\$2,230	6%
Lunenburg	\$36,125	\$2,020	6%
Troy	\$38,152	\$2,129	6%
Barre city	\$35,225	\$1,965	6%
Morgan	\$35,000	\$1,910	6%
Vermont	\$57,513	\$2,050	4%

Figure 7. Thermal Spending vs. Burden



With a relatively low median income, a small percentage of renters, and a mix of primary fuels, Irasburg exemplifies many of the Northeast Kingdom towns that we identified as highly burdened in this report. We estimate that 61% of the households in Irasburg meet qualifications for Vermont’s low-income Weatherization program, and an additional 25% would qualify for Efficiency Vermont’s moderate-income incentives for weatherization.



IRASBURG: WEATHERIZATION

Solutions to reduce Thermal Energy Burden

Median income	\$35,446
Average household size	2.38
Total population	1,241
Total households	521
% renters	16%
Primary fuel source	49% fuel oil / 10% propane / 38% wood / 3% other



	Under \$51,000*	Between \$51,000 – \$76,000*	Above \$76,000*
	You are eligible for the Weatherization Assistance Program, which provides free full-home weatherization services to qualifying households.	You are eligible for new incentives that will cover half the upfront cost of a comprehensive weatherization project – up to \$4000. You can also take advantage of 0% interest financing to help you pay for the remainder of the project cost.	New weatherization incentives will cover up to \$2000 of the upfront cost of the project (capped at half the total cost).
Estimated number of qualifying households in Irasburg	319	131	71

How does weatherization reduce a household's thermal energy burden?

Weatherizing has saved Vermont households on average 15% on their fuel prices. Weatherizing also makes your home more comfortable and improves the health in your home.

How can we increase participation to help reduce Irasburg residents' energy burden?

Waiting Times: Wait times for weatherization services are dependent on income, home size, and number of other homes awaiting services. Wait times can be months, which can discourage qualified homeowners.

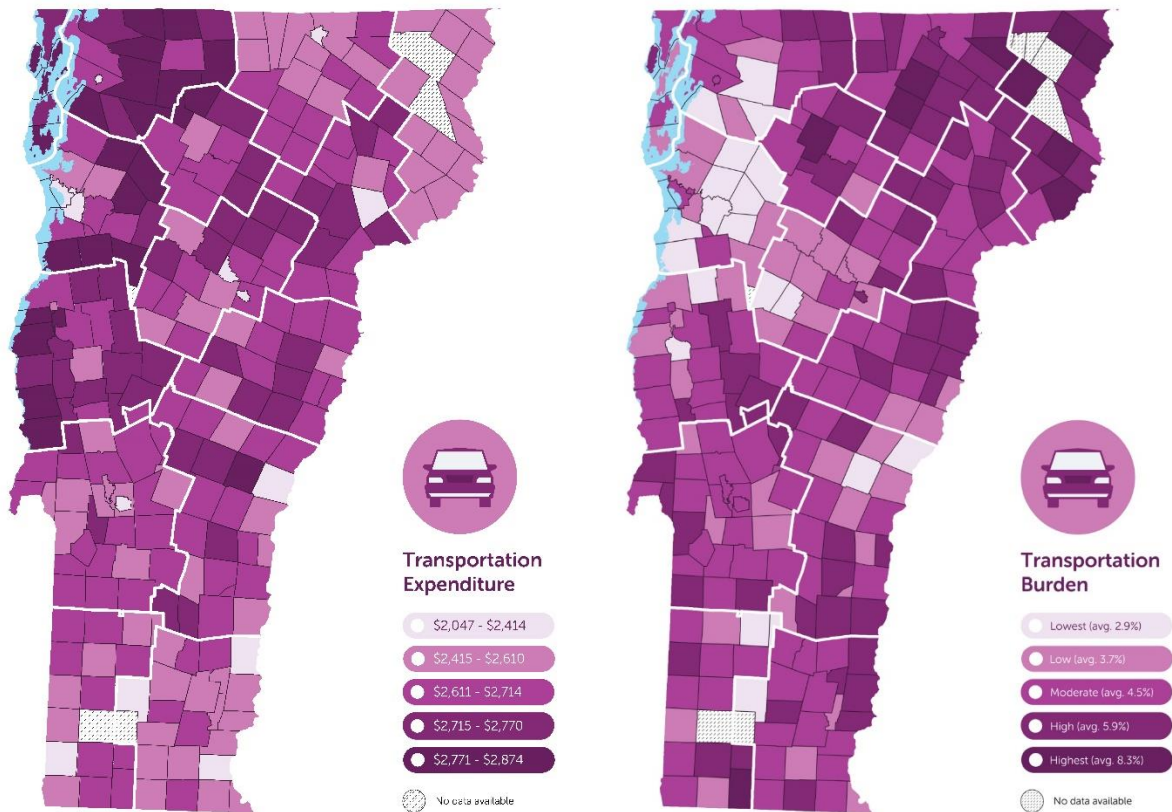
Upfront Costs: Even with the new incentive program, the upfront costs of weatherization can be out of reach, and households may be unwilling to take on increased debt.

Complementary Programs: Cold climate heat pumps can also help residents save on thermal expenses. Vermont electric utilities and Efficiency Vermont currently offer rebates on heat pumps, but the upfront cost is still out of reach for many energy burdened households.

**Income qualifications vary by household size and Area Median Income. Examples given are for a household size of 2 in Orleans County.*

Transportation Energy Spending and Burden

Figure 8. Maps – Transportation Energy Expenditure and Burden by town

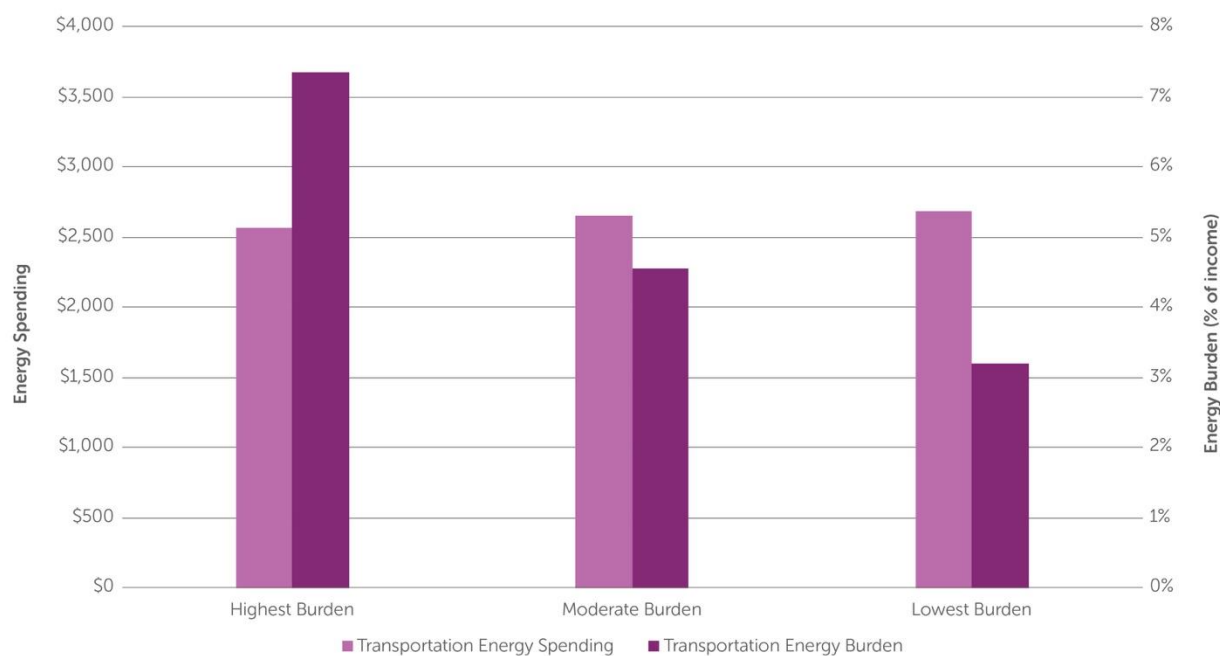


Transportation spending is estimated to be greatest in rural areas, on the outskirts of commuter-sheds, such as western Addison County where people may be commuting to Middlebury, or southern and northern Chittenden County (and much of Franklin County) where people are likely traveling to the Burlington area. Among the three energy categories we explored, we observed the greatest variation in transportation energy burden. Among the ten most highly burdened towns, transportation energy burden varied from 10% in Lemington to 5% in Pantton. That variation comes, again, from dramatic variation in incomes rather than in spending, as you can see from Figure 9.

Table 7. Ten highest burden towns – transportation energy

Town	Median Household Income	Transportation Energy Spending	Transportation energy burden
Lemington	\$26,094	\$2,569	10%
Irasburg	\$35,446	\$2,583	7%
Johnson	\$36,833	\$2,577	7%
Athens	\$41,406	\$2,597	6%
Barre City	\$35,225	\$2,227	6%
Pawlet	\$45,875	\$2,696	6%
Whiting	\$51,250	\$2,745	5%
West Haven	\$53,571	\$2,665	5%
Enosburgh	\$54,900	\$2,645	5%
Panton	\$59,444	\$2,772	5%
Vermont	\$57,513	\$2,638	4%

Figure 9. Transportation Spending vs. Burden



In our community spotlight below, we focus on the town of Johnson, Vermont and explore a variety of government and utility programs to promote electric vehicles. Although upfront purchase and lease prices for EVs remain higher than gasoline vehicles, they are less than half as expensive to fuel, providing one clear way to reduce transportation energy burden. Ultimately however, substantial and sustainable reductions in overall transportation spending and energy use will require reduced dependence on automobiles, electric or otherwise.

Coordinated efforts to promote compact, mixed use development will reduce vehicle miles traveled- and energy use, burden, and overall environmental impact of the transportation sector. Although, such development can seem a challenge in a rural state such as Vermont, thoughtful land use planning executed at the state and town level are perhaps the most transformative means we have to create equitable and sustainable communities.

Our analysis shows the estimated transportation energy burden in Johnson to be 7%, higher than the statewide burden of 4%. We estimate that residents of Johnson travel 23,500 miles annually in their vehicles, and public transit options are extremely limited.



JOHNSON: EFFICIENT VEHICLES

Solutions to reduce Transportation Energy Burden

Median income	\$36,833
Average household size	2.43
Total population	3,564
Total households	1,252
Estimated VMT	23,588
Transit options	Free bus to Williston & Morrisville twice per month



	Under \$51,000*	Between \$51,000 – 160% statewide median income*	Above 160% SMI*
	You may be eligible for the vehicle trade-in program in order to get a more efficient hybrid vehicle.	N/A	N/A
	Your utility may have additional incentives for Electric Vehicles (\$100-200 back).	You are eligible for a statewide Electric Vehicle incentive program (launching in 2020).	Every electric utility in the state has an incentive for the purchase or lease of an EV. Combined with the Federal Tax Credit and dealer offers, EVs are more affordable than ever.
Estimated number of households in Johnson	716	322	214

How do efficient vehicles reduce a household's transportation energy burden?

Efficient vehicles save on every mile they drive in fuel costs. EVs also require less maintenance over their lifespan. AAA found that between operations and maintenance, EV drivers can save almost \$10,000 over 150,000 miles.

How can we increase participation to help reduce Johnson residents' energy burden?

Upfront Costs: To date, there has been no statewide incentive program for electric or efficient vehicles. The program created by the legislature in 2019 will be in place in 2020. However, funding is limited, which means the impact of the program on reducing transportation energy burden will also be limited.

Complementary Programs: Transit options are very limited in the Northeast Kingdom, which means residents must drive to get to jobs, shopping, and other activities. The transit options that are available, while limited, are free, which is a good option for Johnson residents. Increasing our investment in transit and providing additional low- or no-cost transit alternatives would be a strong strategy to reduce transportation burdens.

**Income qualifications vary by household size and Area Median Income. Examples given are a household of 2 in Johnson.*

Discussion

The most important determinant of energy burden is household income. We see this across all energy categories and as we look at distinctions among neighboring towns.

In seeking to apply this analysis effectively, we must look at the entire energy burden equation, leveraging energy program resources to make investments that drive economic development throughout the state, especially outside of the traditional growth centers in and adjacent to Chittenden County. This will have the effect of making businesses more competitive, creating jobs in rural communities, and increasing incomes at the same time that we are reducing energy costs.

Ultimately the same economic challenges that drive income inequities across the state likely have the effect of reducing energy program participation among Vermonters with low- and moderate-incomes.

“We must look at the entire energy burden equation, leveraging energy program resources to make investments that drive economic development throughout the state, especially outside of the traditional growth centers in and adjacent to Chittenden County.”

According to the Energy Action Network’s 2018 Annual Progress report, in order to meet the targets of the Paris Climate Accord, this is an example of the kind of adoption Vermont needs to achieve by 2025:

- add 90,000 electric vehicles
- install 90,000 cold climate heat pumps
- weatherize 90,000 additional homes

This level of energy transformation will be impossible without aggressive steps to reduce upfront costs of clean energy technologies to ensure that all Vermonters can afford and are inclined to make major changes in the way they use energy. Energy transformation actions will reduce energy costs, but as of now they may be out of reach for many Vermonters or perceived as too expensive. Given that, this analysis suggests that Vermont’s energy providers and policy makers need to expand their focus to reach more customers with low- and moderate-incomes. Because greater reductions in energy use and environmental impact may be achieved through focus on high spending and often low burdened communities, these programs must continue. However, an expansion of programming for Vermonters with low and moderate incomes will ensure an equitable distribution of program benefits.

Table 8. Top ten towns by adoption of clean energy technology¹¹

Cold Climate Heat Pumps	Solar PV	Electric Vehicles	Weatherized Homes
Searsburg	Cornwall	Plainfield	Winhall
Ripton	Waltham	Charlotte	Victory
St. George	West Windsor	Montpelier	Montpelier
Mendon	Lincoln	Norwich	Shrewsbury
Stratton	Strafford	Strafford	Landgrove
Killington	Charlotte	Waitsfield	Jamaica
Peru	New Haven	Putney	Mount Holly
Andover	Weybridge	Calais	Barton
West Windsor	Norwich	Searsburg	Rutland City
Waterbury	Thetford	Cornwall	St. Albans City

Energy burden bin

- Lowest burden
- Low burden
- Moderate burden
- High burden
- Highest burden

The above table illustrates Vermont’s challenge – and opportunity. The most widespread adoption of clean energy technologies and efficiency appears to be in communities with the lowest energy burden. In other words, energy transformation is primarily in the purview of those who can afford the upfront cost. In contrast, there are several moderate to high burden communities that have relatively high rates of weatherization, the only ‘clean technology’ with comprehensive, no-cost programs targeted at Vermont’s low-income households. Efficiency Vermont’s weatherization programs have recently been transformed to deliver more direct support for moderate income customers, more effectively reducing costs (and burden) for those customers, and freeing up dollars that they can spend in their communities rather than on their energy bills.

This analysis makes clear that the residential customers who use the most energy are often located in the most economically developed regions of the state. To address the risk that Vermont’s EEs (Efficiency Vermont, Burlington Electric Department, and Vermont Gas Systems) would focus primarily in affluent and developed parts of the state, they have long been required to invest resources in serving low income customers, based on a minimum spending threshold defined by the Public Utilities Commission. Additionally, Efficiency Vermont is required to deliver a minimum level of benefits in each county it serves, based on population. But are these current policies doing enough to ensure that all Vermonters have equal access to the energy efficiency services that will reduce their costs? Are they driving the scale of

“The most widespread adoption of clean energy technologies and efficiency appears to be in communities with the lowest energy burden.”

¹¹EAN Vermont Energy Dashboard: www.vtenergydashboard.org

investment needed to support economic development throughout Vermont, increasing incomes in rural communities?

“A similar focus on serving highly burdened communities and households will ensure that all Vermonters have easy access to EEU services.”

Indeed, other policies governing the EEUs naturally encourage them to seek out and serve customers with high energy usage and expenditures. A good example of this is aggressive statewide targets for annual energy savings: MWH (in the electric sector) and MMBTU (for thermal and process fuels). These targets have been a cost-effective and highly successful tactic for driving benefits on a system-wide level. They naturally encourage programs to seek out a few large projects with large energy saving potential, since that is cheaper and faster than supporting a large number of customers in taking on relatively small projects to reduce energy costs in their homes and businesses. A

similar focus on serving highly burdened communities and households will ensure that all Vermonters have easy access to EEU services.

As Efficiency Vermont works to deliver on its current performance requirements, we are employing some core strategies to improve access for all customers, particularly those with high energy burdens:

Income Qualification. A mechanism for income qualification beyond just “low income,” and “market rate.” Having this critical process in place enables us to develop standalone programs focused on reaching moderate income customers, as well as offer bonuses and enhancements to existing programs (such as offering higher incentives and loan buy downs to support weatherization for moderate income customers).

Investing in Businesses. Applying more flexibility to energy program resources enables us to target investments that will help reduce energy costs for businesses, making them more competitive and helping create jobs in areas of the state where they are needed the most. This increases incomes and reduces the impact of energy costs, working on both sides of the energy burden equation. Efficiency Vermont continues to look for new ways to structure our business incentives, so they can be leveraged to attract and grow businesses, particularly in areas of the state where energy burdens are high.

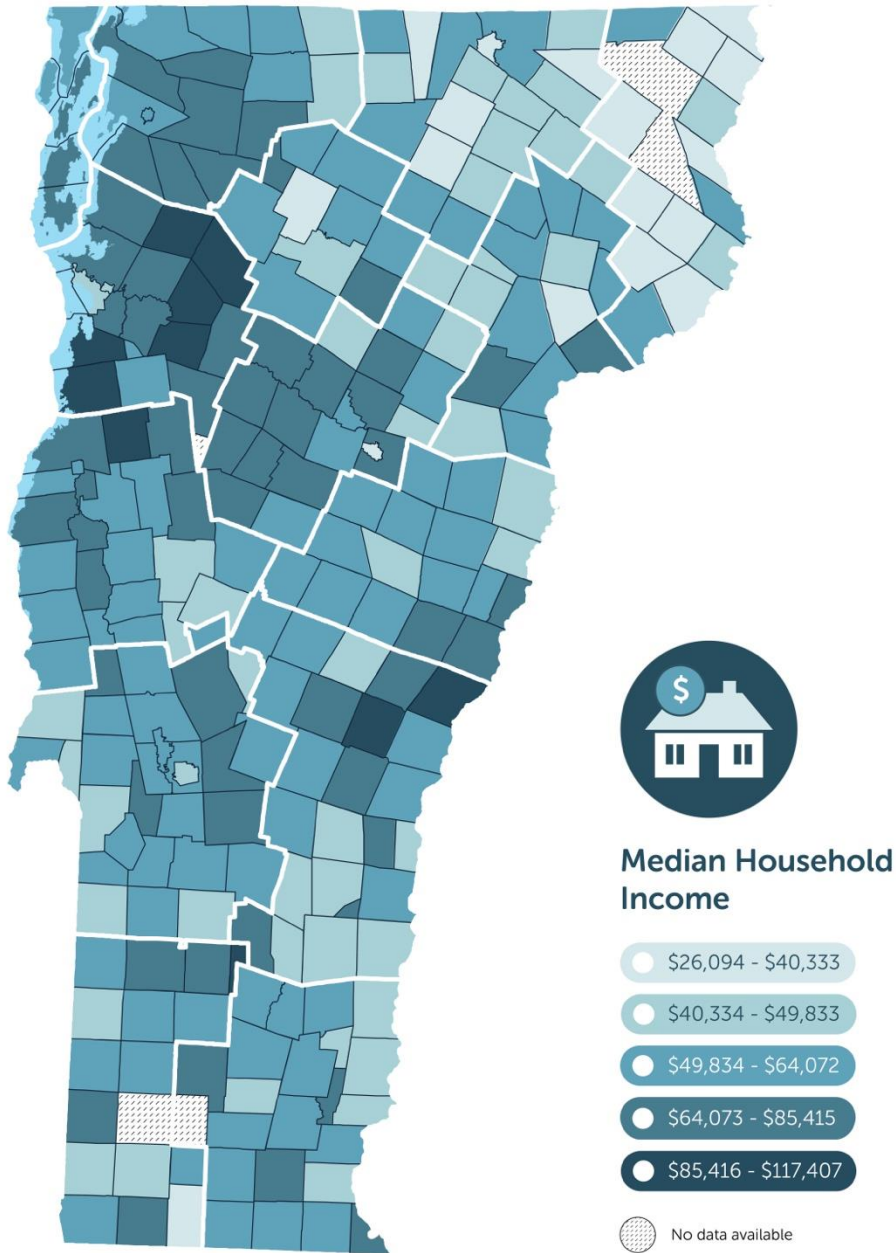
Flexible Service Delivery. Addressing the needs of low- and moderate-income customers may, in many cases, go beyond providing additional financial support. It may also mean addressing other barriers (time, access to contractors and technology, access to guidance and project management) that keep them from taking steps to reduce their energy costs. These program offerings are among the most expensive and labor intensive to operate – but they can also be the most effective for connecting with new customers and helping them act quickly, especially for complex projects such as weatherization.

Working together over the next decade, Vermonters will need to achieve an unprecedented transition of our energy system. It will not happen if we do not ensure that our resources are invested more explicitly in serving low-and moderate-income communities – thereby bringing new benefits to our neighbors who will otherwise be unable to take the steps needed to reduce their costs and environmental impact. The scale of this work is daunting enough on its own. It will be impossible if we do not revisit and realign our current energy policies to make sure they are producing the outcomes we all want – and that the planet, and our fellow Vermonters, need.

Appendices

APPENDIX A

Figure 10. Map – Median Income by town



APPENDIX B

Table 9. Total energy spending and burden by county

County	Household Income	Total energy spending (\$)	Total burden
Addison	\$61,875	\$6,169	10%
Bennington	\$52,251	\$5,833	11%
Caledonia	\$47,371	\$5,869	12%
Chittenden	\$66,906	\$4,935	7%
Essex	\$38,767	\$5,371	14%
Franklin	\$62,214	\$5,921	10%
Grand Isle	\$66,111	\$6,007	9%
Lamoille	\$54,899	\$6,072	11%
Orange	\$56,584	\$5,855	10%
Orleans	\$45,664	\$5,552	12%
Rutland	\$52,635	\$5,728	11%
Washington	\$60,602	\$5,757	9%
Windham	\$50,831	\$5,473	11%
Windsor	\$56,828	\$5,803	10%

APPENDIX C

Methods

Geographic unit

In the previous version of this report, we used census block group as our unit of study. Census block groups are census designated areas akin to a neighborhood; each one contains between 600 and 3,000 people. We repeatedly received feedback that this unit was confusing. Although it provided a high level of resolution (there are over 500 census block groups in Vermont vs. only about 250 towns), it was not easy for the public and policy makers to relate this unit back to their own experiences. In this updated report we chose to aggregate our data by town, a simpler geographic unit.

Electricity spending

Based on data provided by Vermont's electric distribution utilities, Efficiency Vermont analyzed average residential electricity usage data from 2017 for each town in Vermont. For St. Albans town and city, estimates of average electricity usage are combined. According to the Energy Information Administration, in 2017 the average residential electric rate in Vermont was \$0.1736. To calculate average household spending by town, we multiplied average household usage by this rate.

Thermal energy spending

Vermont Gas provided average annual residential usage data for towns in their service territory. We used this actual usage data combined with natural gas price data for Vermont (\$14.21/thousand cubic feet)¹² to estimate thermal expenditures for these households.

For households not served by Vermont Gas, our estimates of household spending on thermal energy were derived from the American Community Survey (ACS), an annual survey conducted by the U.S. Census Bureau. We used ACS data pooled over five years (2013-2017) to reduce variability, especially in rural areas where sample sizes are small. The ACS provides average household size and tenure (the proportion of renters and owners) for each town, as well as the percentage of households heating with each of the following fuel types: heating oil, propane, natural gas, electricity, and wood and other.

Using data available through EVT's Home Performance with Energy Star program and a 2007 report prepared for the Agency of Housing and Urban Development, we assumed an average dwelling size of 750 sq. ft. per resident.^{13,14} We assumed a thermal energy usage rate of 63,000 Btu/square foot based on the 2017 Vermont Single Family On-Site Report, an existing homes market assessment. Estimated thermal energy usage was then multiplied by fuel cost per delivered MMBTU of heat.^{15,16} The totals were added up separately for rentals and

¹² Natural gas: <https://www.eia.gov/state/data.php?sid=VT#Prices>, residential, 2017-2018.

¹³ EVT HPwES program data, inception through 2019.

¹⁴ Measuring Overcrowding in Housing: https://www.huduser.gov/publications/pdf/measuring_overcrowding_in_hsg.pdf.

¹⁵ Oil and propane: VT DPS Fuel Price Report, 2017-2018; Cordwood: VT DPS Fuel Price Report 2013-2014.

¹⁶ The cost of electricity for heating was not calculated and included in the total, it was assumed to be included in the electricity load of the homes.

homeownership and a weighted average was calculated based on the proportion of renters and owners by fuel type, in each town.

Transportation

We used the Housing and Transportation Affordability Index to estimate household transportation energy consumption. The Housing and Transportation Affordability Index is a model maintained by the Center for Neighborhood Technology. The Index provides an estimate of total vehicle miles traveled (VMT) for several different household types for each census block group in Vermont. We used VMT estimates for a household earning 100% of median income and re-aggregated the data at the town level by merging block groups where appropriate. We then took the estimate of household VMT for each town and multiplied it by statewide average fuel efficiency and New England's 2017 average cost per gallon of gasoline to calculate an estimate of transportation energy spending.¹⁷

$$\text{Annual Transportation Energy Spending} = \text{Household VMT (miles)} * 22.2 \text{ miles per gallon} * \$2.43$$

Our estimates do not consider other transportation costs such as vehicle maintenance, insurance, etc., nor costs associated with other modes of transportation such as transit.

In the previous report we used HUD's Location Affordability Index (LAI) for estimates of household VMT. The two indices are similar. We chose to use the H&T Index as our data source for this report for a number of reasons. The source data is more up to date (2013-2017 ACS vs. 2012-2016). Further, specific improvements have been made to the H&T index to improve modeling of transportation costs in rural areas.

¹⁷ Although there are vehicles powered by fuels other than gasoline in Vermont, the vast majority of the state's private vehicles still run on gasoline. According to the 2017 Vermont Transportation Energy Profile, 94% of Vermont's vehicles are powered by gasoline, and 5% by diesel. Drive Electric Vermont estimates that plug-in vehicles make up approximately 0.07% of the fleet. The Transportation Energy Profile can be found here: https://vtrans.vermont.gov/sites/aot/files/planning/documents/planning/The%20Vermont%20Transportation%20Energy%20Profile_2017.pdf

APPENDIX D

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Addison	\$78,712	\$1,653	\$2,502	\$2,794	\$6,949	9%	Low
Albany	\$35,268	\$1,013	\$1,585	\$2,636	\$5,234	15%	Highest
Alburgh	\$55,714	\$1,033	\$2,140	\$2,731	\$5,904	11%	Moderate
Andover	\$49,688	\$1,121	\$2,040	\$2,737	\$5,897	12%	High
Arlington	\$51,490	\$1,188	\$2,155	\$2,529	\$5,873	11%	High
Athens	\$41,406	\$1,300	\$1,491	\$2,597	\$5,387	13%	High
Averill	\$34,375	\$302	\$1,473	\$2,569	\$4,345	13%	High
Bakersfield	\$64,410	\$1,307	\$1,996	\$2,847	\$6,150	10%	Moderate
Baltimore	\$73,750	\$1,309	\$2,577	\$2,663	\$6,549	9%	Low
Barnard	\$69,063	\$1,155	\$2,122	\$2,758	\$6,036	9%	Low
Barnet	\$58,500	\$1,082	\$2,384	\$2,678	\$6,143	11%	Moderate
Barre City	\$35,225	\$1,110	\$1,965	\$2,227	\$5,302	15%	Highest
Barre Town	\$70,521	\$1,204	\$2,396	\$2,669	\$6,268	9%	Low
Barton	\$44,340	\$843	\$2,095	\$2,501	\$5,438	12%	High
Belvidere	\$60,714	\$1,121	\$2,198	\$2,771	\$6,089	10%	Moderate
Bennington	\$46,337	\$1,125	\$2,085	\$2,322	\$5,532	12%	High
Benson	\$44,688	\$1,216	\$2,524	\$2,654	\$6,394	14%	High
Berkshire	\$53,182	\$1,435	\$2,356	\$2,808	\$6,598	12%	High
Berlin	\$59,792	\$1,161	\$2,120	\$2,585	\$5,866	10%	Moderate
Bethel	\$56,641	\$1,158	\$2,181	\$2,639	\$5,978	11%	Moderate
Bloomfield	\$40,938	\$929	\$1,741	\$2,569	\$5,239	13%	High
Bolton	\$72,679	\$1,193	\$2,058	\$2,758	\$6,009	8%	Low
Bradford	\$49,667	\$1,063	\$2,064	\$2,556	\$5,683	11%	High
Braintree	\$59,643	\$1,179	\$1,911	\$2,661	\$5,751	10%	Moderate
Brandon	\$52,344	\$1,205	\$2,169	\$2,599	\$5,973	11%	High
Brattleboro	\$44,359	\$1,004	\$1,858	\$2,215	\$5,077	11%	High
Bridgewater	\$62,813	\$1,191	\$1,987	\$2,674	\$5,852	9%	Moderate
Bridport	\$62,159	\$1,584	\$2,270	\$2,760	\$6,614	11%	Moderate
Brighton	\$34,737	\$768	\$1,958	\$2,465	\$5,191	15%	Highest
Bristol	\$51,417	\$1,161	\$2,354	\$2,618	\$6,132	12%	High

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Bin Assignment	Total Energy Burden Range (%)
Lowest	5.7-7.6
Low	7.7-8.9
Moderate	9.1-11.0
High	11.1-14.5
Highest	14.6-20.3

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Brookfield	\$59,063	\$1,133	\$2,092	\$2,740	\$5,965	10%	Moderate
Brookline	\$67,292	\$1,199	\$2,056	\$2,597	\$5,852	9%	Low
Brownington	\$43,889	\$1,287	\$1,945	\$2,621	\$5,854	13%	High
Brunswick	\$40,000	\$1,028	\$2,038	\$2,569	\$5,635	14%	High
Burke	\$52,500	\$1,095	\$2,003	\$2,654	\$5,751	11%	Moderate
Burlington	\$47,140	\$745	\$1,067	\$2,047	\$3,859	8%	Low
Cabot	\$43,864	\$1,096	\$2,081	\$2,725	\$5,902	13%	High
Calais	\$64,766	\$964	\$1,974	\$2,747	\$5,685	9%	Low
Cambridge	\$62,023	\$1,182	\$2,184	\$2,679	\$6,045	10%	Moderate
Canaan	\$39,917	\$911	\$2,061	\$2,487	\$5,460	14%	High
Castleton	\$55,635	\$1,144	\$2,150	\$2,534	\$5,828	10%	Moderate
Cavendish	\$49,375	\$1,068	\$2,162	\$2,668	\$5,898	12%	High
Charleston	\$47,578	\$989	\$1,680	\$2,592	\$5,261	11%	Moderate
Charlotte	\$117,407	\$1,464	\$2,660	\$2,820	\$6,943	6%	Lowest
Chelsea	\$48,864	\$969	\$2,020	\$2,666	\$5,656	12%	High
Chester	\$46,164	\$1,138	\$2,048	\$2,617	\$5,803	13%	High
Chittenden	\$65,326	\$1,250	\$2,308	\$2,707	\$6,265	10%	Moderate
Clarendon	\$60,652	\$1,318	\$2,071	\$2,610	\$5,999	10%	Moderate
Colchester	\$68,021	\$1,123	\$1,452	\$2,519	\$5,095	7%	Lowest
Concord	\$51,458	\$1,016	\$2,059	\$2,510	\$5,584	11%	Moderate
Corinth	\$52,143	\$957	\$2,090	\$2,742	\$5,789	11%	Moderate
Cornwall	\$79,226	\$1,430	\$2,053	\$2,745	\$6,228	8%	Low
Coventry	\$45,625	\$1,250	\$2,279	\$2,552	\$6,082	13%	High
Craftsbury	\$51,618	\$909	\$1,938	\$2,665	\$5,512	11%	Moderate
Danby	\$59,853	\$1,304	\$2,248	\$2,644	\$6,196	10%	Moderate
Danville	\$60,694	\$1,110	\$1,938	\$2,718	\$5,766	9%	Moderate
Derby	\$53,226	\$1,024	\$2,005	\$2,523	\$5,552	10%	Moderate
Dorset	\$73,021	\$1,569	\$2,219	\$2,654	\$6,442	9%	Low
Dover	\$50,363	\$1,104	\$1,675	\$2,490	\$5,269	10%	Moderate
Dummerston	\$62,594	\$1,253	\$1,815	\$2,597	\$5,664	9%	Moderate
Duxbury	\$75,000	\$1,074	\$2,276	\$2,752	\$6,103	8%	Low
East Haven	\$40,000	\$1,049	\$1,872	\$2,558	\$5,479	14%	High
East Montpelier	\$67,844	\$1,209	\$2,131	\$2,678	\$6,018	9%	Low
Eden	\$53,906	\$1,058	\$2,350	\$2,766	\$6,175	11%	High
Elmore	\$78,229	\$969	\$2,191	\$2,758	\$5,918	8%	Lowest
Enosburgh	\$54,900	\$1,769	\$1,908	\$2,645	\$6,322	12%	High
Essex	\$76,677	\$1,087	\$1,286	\$2,526	\$4,899	6%	Lowest
Fair Haven	\$45,871	\$1,300	\$2,357	\$2,516	\$6,173	13%	High

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Fairfax	\$71,227	\$1,279	\$2,710	\$2,742	\$6,730	9%	Moderate
Fairfield	\$82,500	\$1,417	\$2,292	\$2,823	\$6,533	8%	Low
Fairlee	\$66,691	\$1,051	\$2,190	\$2,623	\$5,864	9%	Low
Fayston	\$79,940	\$1,080	\$2,646	\$2,681	\$6,407	8%	Low
Ferrisburgh	\$67,414	\$1,439	\$2,411	\$2,698	\$6,548	10%	Moderate
Fletcher	\$84,500	\$1,322	\$2,111	\$2,874	\$6,307	7%	Lowest
Franklin	\$58,611	\$988	\$2,045	\$2,806	\$5,839	10%	Moderate
Georgia	\$84,880	\$1,313	\$2,365	\$2,784	\$6,462	8%	Lowest
Glover	\$45,921	\$888	\$1,620	\$2,617	\$5,125	11%	High
Goshen	\$41,875	\$1,063	\$1,316	\$2,753	\$5,132	12%	High
Grafton	\$52,188	\$1,137	\$1,683	\$2,638	\$5,459	10%	Moderate
Granby	\$33,125	\$797	\$1,501	\$2,558	\$4,856	15%	Highest
Grand Isle	\$64,760	\$1,095	\$2,339	\$2,715	\$6,149	9%	Moderate
Granville	\$55,000	\$1,029	\$2,056	\$2,727	\$5,812	11%	Moderate
Greensboro	\$63,750	\$1,110	\$1,997	\$2,656	\$5,762	9%	Moderate
Groton	\$47,250	\$906	\$2,411	\$2,694	\$6,011	13%	High
Guildhall	\$40,625	\$1,178	\$1,551	\$2,558	\$5,287	13%	High
Guilford	\$62,614	\$1,234	\$1,787	\$2,578	\$5,599	9%	Low
Halifax	\$50,795	\$992	\$1,720	\$2,623	\$5,335	11%	Moderate
Hancock	\$41,250	\$1,091	\$2,108	\$2,727	\$5,926	14%	High
Hardwick	\$44,545	\$1,068	\$2,237	\$2,612	\$5,918	13%	High
Hartford	\$62,170	\$1,235	\$1,998	\$2,407	\$5,640	9%	Moderate
Hartland	\$62,378	\$1,245	\$2,076	\$2,605	\$5,926	10%	Moderate
Highgate	\$57,819	\$1,415	\$2,697	\$2,766	\$6,878	12%	High
Hinesburg	\$56,686	\$1,173	\$2,274	\$2,771	\$6,218	11%	Moderate
Holland	\$41,125	\$966	\$1,730	\$2,647	\$5,343	13%	High
Hubbardton	\$56,071	\$851	\$1,860	\$2,698	\$5,409	10%	Moderate
Huntington	\$77,279	\$1,231	\$2,385	\$2,829	\$6,444	8%	Low
Hyde Park	\$55,170	\$1,174	\$2,325	\$2,673	\$6,173	11%	High
Ira	\$70,625	\$1,247	\$2,009	\$2,716	\$5,972	8%	Low
Irasburg	\$35,446	\$1,234	\$1,990	\$2,583	\$5,807	16%	Highest
Isle La Motte	\$53,750	\$939	\$2,204	\$2,784	\$5,928	11%	Moderate
Jamaica	\$53,438	\$1,173	\$1,619	\$2,601	\$5,392	10%	Moderate
Jay	\$53,750	\$838	\$2,916	\$2,601	\$6,356	12%	High
Jericho	\$97,574	\$1,267	\$1,951	\$2,787	\$6,005	6%	Lowest
Johnson	\$36,833	\$1,208	\$2,232	\$2,577	\$6,017	16%	Highest
Killington	\$58,000	\$1,131	\$2,036	\$2,527	\$5,695	10%	Moderate
Kirby	\$60,833	\$1,304	\$2,195	\$2,620	\$6,118	10%	Moderate

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Landgrove	\$86,750	\$1,381	\$2,048	\$2,569	\$5,998	7%	Lowest
Leicester	\$63,472	\$1,082	\$2,297	\$2,689	\$6,068	10%	Moderate
Lemington	\$26,094	\$919	\$1,804	\$2,569	\$5,292	20%	Highest
Lincoln	\$64,625	\$1,155	\$2,078	\$2,763	\$5,996	9%	Moderate
Londonderry	\$52,377	\$1,354	\$2,050	\$2,573	\$5,976	11%	High
Lowell	\$53,661	\$1,120	\$1,930	\$2,633	\$5,682	11%	Moderate
Ludlow	\$49,519	\$936	\$2,046	\$2,485	\$5,467	11%	Moderate
Lunenburg	\$36,125	\$1,028	\$2,020	\$2,469	\$5,518	15%	Highest
Lyndon	\$41,464	\$1,151	\$2,212	\$2,507	\$5,870	14%	High
Maidstone	\$63,750	\$683	\$1,614	\$2,569	\$4,866	8%	Lowest
Manchester	\$54,306	\$1,452	\$2,170	\$2,507	\$6,129	11%	High
Marlboro	\$66,528	\$1,011	\$1,721	\$2,608	\$5,339	8%	Low
Marshfield	\$60,833	\$1,081	\$2,050	\$2,680	\$5,812	10%	Moderate
Mendon	\$67,014	\$1,273	\$1,981	\$2,633	\$5,887	9%	Low
Middlebury	\$53,250	\$1,122	\$2,039	\$2,492	\$5,654	11%	Moderate
Middlesex	\$74,188	\$1,130	\$2,191	\$2,749	\$6,071	8%	Low
Middletown Springs	\$56,389	\$1,157	\$2,056	\$2,695	\$5,908	10%	Moderate
Milton	\$73,854	\$1,243	\$1,778	\$2,682	\$5,704	8%	Lowest
Monkton	\$85,625	\$1,356	\$2,463	\$2,752	\$6,571	8%	Lowest
Montgomery	\$41,513	\$1,042	\$2,263	\$2,806	\$6,111	15%	Highest
Montpelier	\$60,793	\$957	\$1,804	\$2,288	\$5,049	8%	Low
Moretown	\$69,375	\$1,135	\$2,223	\$2,707	\$6,065	9%	Low
Morgan	\$35,000	\$675	\$1,910	\$2,647	\$5,232	15%	Highest
Morristown	\$47,400	\$1,140	\$2,317	\$2,642	\$6,099	13%	High
Mount Holly	\$63,220	\$1,084	\$1,939	\$2,683	\$5,706	9%	Low
Mount Tabor	\$46,875	\$1,312	\$2,314	\$2,644	\$6,270	13%	High
New Haven	\$63,889	\$1,458	\$2,288	\$2,713	\$6,458	10%	Moderate
Newark	\$44,485	\$775	\$2,040	\$2,721	\$5,537	12%	High
Newbury	\$44,043	\$1,010	\$2,054	\$2,652	\$5,716	13%	High
Newfane	\$55,556	\$1,080	\$2,014	\$2,616	\$5,711	10%	Moderate
Newport City	\$38,576	\$964	\$1,988	\$2,312	\$5,264	14%	High
Newport Town	\$59,469	\$1,181	\$2,091	\$2,596	\$5,867	10%	Moderate
North Hero	\$74,922	\$872	\$2,252	\$2,823	\$5,947	8%	Low
Northfield	\$67,750	\$1,105	\$2,099	\$2,585	\$5,789	9%	Low
Norton	\$50,536	\$643	\$1,728	\$2,569	\$4,940	10%	Moderate
Norwich	\$109,648	\$1,287	\$2,267	\$2,630	\$6,184	6%	Lowest
Orange	\$62,829	\$1,094	\$2,089	\$2,692	\$5,874	9%	Moderate

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Orwell	\$56,979	\$1,419	\$2,196	\$2,777	\$6,393	11%	High
Panton	\$59,444	\$1,777	\$2,117	\$2,772	\$6,667	11%	High
Pawlet	\$45,875	\$1,475	\$2,044	\$2,696	\$6,215	14%	High
Peacham	\$64,432	\$1,020	\$2,087	\$2,744	\$5,851	9%	Moderate
Peru	\$82,031	\$1,479	\$1,493	\$2,569	\$5,541	7%	Lowest
Pittsfield	\$49,821	\$1,196	\$1,857	\$2,685	\$5,738	12%	High
Pittsford	\$52,762	\$1,185	\$2,039	\$2,618	\$5,843	11%	Moderate
Plainfield	\$48,529	\$987	\$2,222	\$2,657	\$5,865	12%	High
Plymouth	\$56,250	\$1,320	\$2,139	\$2,710	\$6,169	11%	Moderate
Pomfret	\$91,042	\$1,256	\$2,186	\$2,782	\$6,224	7%	Lowest
Poultney	\$49,417	\$1,126	\$2,096	\$2,551	\$5,774	12%	High
Pownal	\$59,458	\$1,264	\$2,350	\$2,569	\$6,184	10%	Moderate
Proctor	\$61,675	\$1,271	\$2,109	\$2,562	\$5,943	10%	Moderate
Putney	\$49,506	\$1,117	\$1,958	\$2,508	\$5,584	11%	High
Randolph	\$55,882	\$1,165	\$2,162	\$2,607	\$5,934	11%	Moderate
Reading	\$47,981	\$1,091	\$1,939	\$2,763	\$5,792	12%	High
Readsboro	\$35,625	\$1,019	\$1,598	\$2,616	\$5,234	15%	Highest
Richford	\$46,094	\$1,115	\$2,232	\$2,730	\$6,077	13%	High
Richmond	\$86,369	\$1,281	\$2,658	\$2,697	\$6,636	8%	Lowest
Ripton	\$48,125	\$1,114	\$1,587	\$2,753	\$5,454	11%	High
Rochester	\$50,938	\$1,057	\$1,744	\$2,630	\$5,432	11%	Moderate
Rockingham	\$42,596	\$1,123	\$2,088	\$2,335	\$5,546	13%	High
Roxbury	\$56,667	\$1,059	\$1,987	\$2,703	\$5,749	10%	Moderate
Royalton	\$48,011	\$1,067	\$2,026	\$2,509	\$5,602	12%	High
Rupert	\$55,156	\$1,520	\$1,964	\$2,689	\$6,173	11%	High
Rutland City	\$42,861	\$1,128	\$2,017	\$2,110	\$5,255	12%	High
Rutland Town	\$57,255	\$1,115	\$2,005	\$2,494	\$5,614	10%	Moderate
Ryegate	\$54,432	\$1,180	\$2,226	\$2,657	\$6,063	11%	Moderate
Salisbury	\$62,019	\$1,276	\$2,212	\$2,736	\$6,224	10%	Moderate
Sandgate	\$49,444	\$992	\$1,928	\$2,689	\$5,609	11%	High
Searsburg	\$50,000	\$966	\$1,455	\$2,627	\$5,047	10%	Moderate
Shaftsbury	\$65,164	\$1,293	\$2,214	\$2,602	\$6,109	9%	Moderate
Sharon	\$68,438	\$1,212	\$2,193	\$2,631	\$6,036	9%	Low
Sheffield	\$51,750	\$1,097	\$2,102	\$2,676	\$5,875	11%	High
Shelburne	\$100,705	\$1,425	\$1,683	\$2,629	\$5,737	6%	Lowest
Sheldon	\$69,583	\$1,516	\$2,191	\$2,796	\$6,503	9%	Moderate
Shoreham	\$61,250	\$1,567	\$2,215	\$2,801	\$6,584	11%	Moderate
Shrewsbury	\$67,875	\$1,267	\$2,001	\$2,701	\$5,968	9%	Low

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
South Burlington	\$66,197	\$1,043	\$1,172	\$2,409	\$4,624	7%	Lowest
South Hero	\$77,679	\$1,114	\$2,079	\$2,792	\$5,984	8%	Lowest
Springfield	\$41,906	\$1,169	\$2,012	\$2,528	\$5,709	14%	High
St. Albans City	\$50,247	\$1,096	\$1,055	\$2,340	\$4,491	9%	Low
St. Albans Town	\$61,226	\$1,096	\$1,624	\$2,658	\$5,377	9%	Low
St. George	\$58,182	\$1,208	\$2,564	\$2,689	\$6,461	11%	Moderate
St. Johnsbury	\$39,806	\$1,071	\$2,230	\$2,413	\$5,714	14%	High
Stamford	\$69,750	\$1,206	\$2,123	\$2,655	\$5,983	9%	Low
Stannard	\$45,625	\$1,050	\$2,191	\$2,676	\$5,917	13%	High
Starksboro	\$68,980	\$1,320	\$2,281	\$2,752	\$6,353	9%	Moderate
Stockbridge	\$59,762	\$1,085	\$1,839	\$2,732	\$5,656	9%	Moderate
Stowe	\$54,549	\$1,212	\$2,169	\$2,620	\$6,001	11%	Moderate
Strafford	\$79,327	\$1,029	\$1,939	\$2,748	\$5,716	7%	Lowest
Stratton	\$80,750	\$1,198	\$2,079	\$2,384	\$5,660	7%	Lowest
Sudbury	\$68,750	\$1,032	\$2,103	\$2,731	\$5,866	9%	Low
Sunderland	\$58,472	\$1,224	\$1,926	\$2,637	\$5,787	10%	Moderate
Sutton	\$58,333	\$1,213	\$2,272	\$2,721	\$6,207	11%	Moderate
Swanton	\$64,141	\$1,335	\$1,807	\$2,617	\$5,759	9%	Low
Thetford	\$70,855	\$1,132	\$2,252	\$2,703	\$6,087	9%	Low
Tinmouth	\$53,125	\$1,188	\$1,697	\$2,673	\$5,558	10%	Moderate
Topsham	\$51,250	\$1,050	\$2,053	\$2,713	\$5,816	11%	High
Townshend	\$54,716	\$1,128	\$1,779	\$2,594	\$5,501	10%	Moderate
Troy	\$38,152	\$1,137	\$2,129	\$2,586	\$5,852	15%	Highest
Tunbridge	\$61,094	\$1,061	\$1,711	\$2,735	\$5,508	9%	Low
Underhill	\$98,981	\$1,285	\$2,384	\$2,849	\$6,517	7%	Lowest
Vergennes	\$56,250	\$1,127	\$2,199	\$2,465	\$5,791	10%	Moderate
Vernon	\$69,500	\$1,502	\$2,315	\$2,566	\$6,383	9%	Moderate
Vershire	\$56,711	\$915	\$1,889	\$2,740	\$5,544	10%	Moderate
Victory	\$38,000	\$624	\$1,324	\$2,558	\$4,506	12%	High
Waitsfield	\$78,264	\$1,189	\$2,317	\$2,660	\$6,166	8%	Low
Walden	\$49,519	\$865	\$2,019	\$2,717	\$5,601	11%	High
Wallingford	\$61,382	\$1,231	\$1,965	\$2,597	\$5,793	9%	Moderate
Waltham	\$71,250	\$1,421	\$1,977	\$2,772	\$6,170	9%	Low
Wardsboro	\$47,841	\$947	\$2,232	\$2,637	\$5,815	12%	High
Warren	\$66,250	\$1,101	\$2,343	\$2,608	\$6,052	9%	Moderate
Washington	\$56,696	\$1,213	\$2,062	\$2,693	\$5,968	11%	Moderate
Waterbury	\$65,750	\$1,131	\$2,426	\$2,557	\$6,114	9%	Moderate

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Energy Spending	Total Energy Spending	Total Energy Burden	Total Energy Burden Bin ¹⁸
Waterford	\$67,011	\$1,314	\$2,380	\$2,759	\$6,452	10%	Moderate
Waterville	\$66,776	\$1,093	\$2,133	\$2,771	\$5,996	9%	Low
Weathersfield	\$60,781	\$1,198	\$2,185	\$2,647	\$6,029	10%	Moderate
Wells	\$58,750	\$1,031	\$2,052	\$2,679	\$5,763	10%	Moderate
West Fairlee	\$52,727	\$1,107	\$2,071	\$2,679	\$5,857	11%	Moderate
West Haven	\$53,571	\$1,717	\$2,261	\$2,665	\$6,643	12%	High
West Rutland	\$53,822	\$1,117	\$2,340	\$2,601	\$6,057	11%	High
West Windsor	\$67,727	\$1,191	\$2,433	\$2,666	\$6,290	9%	Moderate
Westfield	\$41,806	\$1,053	\$2,108	\$2,601	\$5,762	14%	High
Westford	\$89,464	\$1,414	\$2,598	\$2,864	\$6,877	8%	Lowest
Westminster	\$49,471	\$1,329	\$1,574	\$2,550	\$5,454	11%	Moderate
Westmore	\$45,000	\$719	\$1,957	\$2,621	\$5,297	12%	High
Weston	\$72,692	\$1,161	\$2,085	\$2,737	\$5,983	8%	Low
Weybridge	\$82,788	\$1,654	\$2,203	\$2,740	\$6,597	8%	Low
Wheelock	\$61,250	\$1,126	\$2,045	\$2,676	\$5,847	10%	Moderate
Whiting	\$51,250	\$1,753	\$2,185	\$2,745	\$6,683	13%	High
Whitingham	\$55,395	\$1,016	\$1,951	\$2,593	\$5,559	10%	Moderate
Williamstown	\$57,792	\$1,221	\$2,317	\$2,584	\$6,122	11%	Moderate
Williston	\$81,540	\$1,144	\$1,326	\$2,646	\$5,116	6%	Lowest
Wilmington	\$51,034	\$1,202	\$2,081	\$2,518	\$5,800	11%	High
Windham	\$58,750	\$1,010	\$1,697	\$2,638	\$5,346	9%	Moderate
Windsor	\$46,750	\$1,157	\$1,964	\$2,431	\$5,552	12%	High
Winhall	\$53,750	\$1,554	\$1,823	\$2,630	\$6,006	11%	High
Winooski	\$45,590	\$896	\$1,041	\$2,146	\$4,082	9%	Low
Wolcott	\$58,029	\$1,118	\$2,348	\$2,758	\$6,225	11%	Moderate
Woodbury	\$63,438	\$949	\$1,839	\$2,755	\$5,543	9%	Low
Woodford	\$47,917	\$879	\$1,971	\$2,627	\$5,476	11%	High
Woodstock	\$74,556	\$1,168	\$2,208	\$2,640	\$6,015	8%	Low
Worcester	\$49,167	\$1,085	\$1,882	\$2,757	\$5,724	12%	High