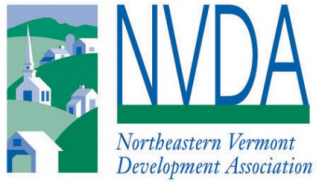
2019 ANNUAL PROGRESS REPORT
for VERMONT

Energy Action Network Members

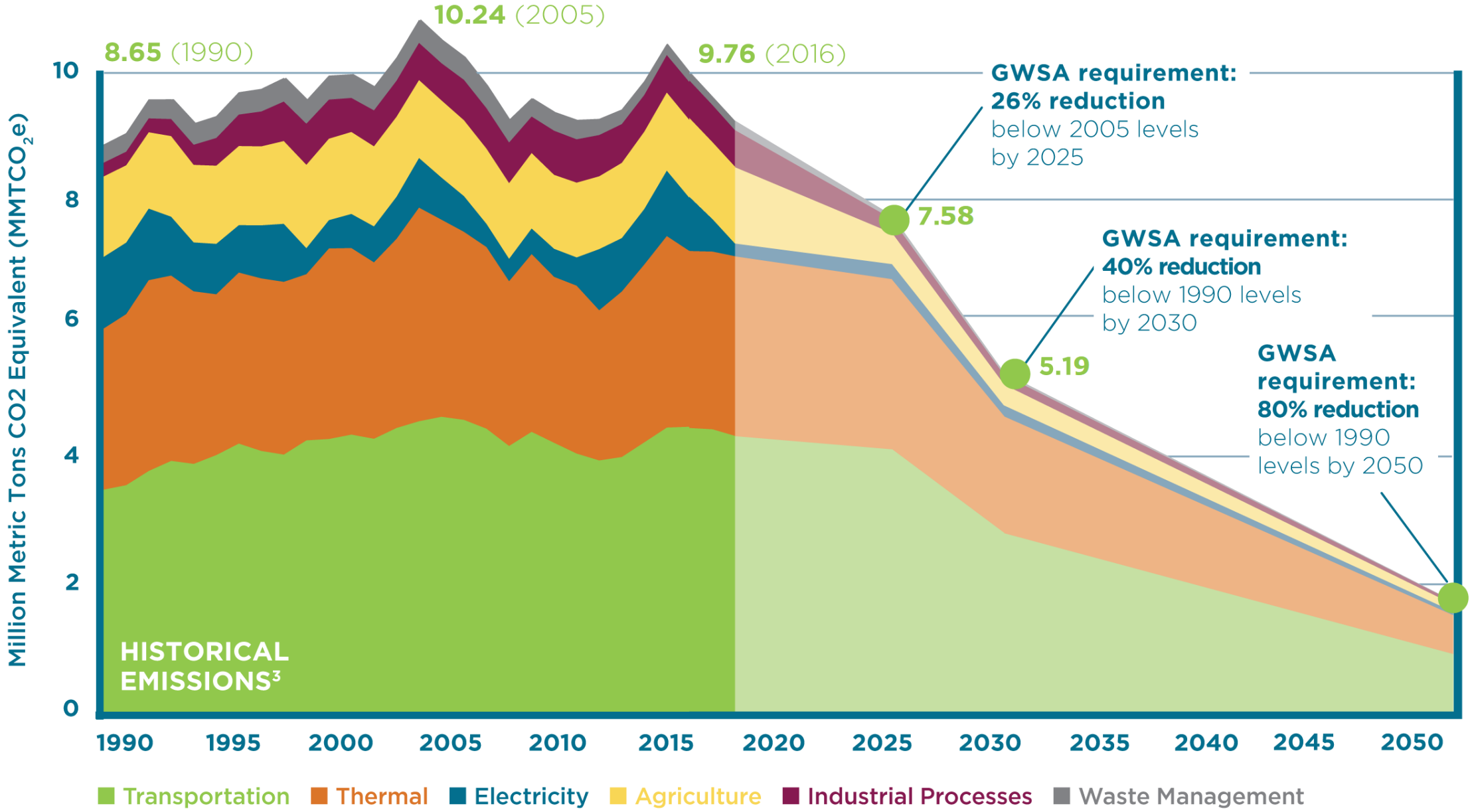
Over 100 Network Members

Energy Action Network Public Partners

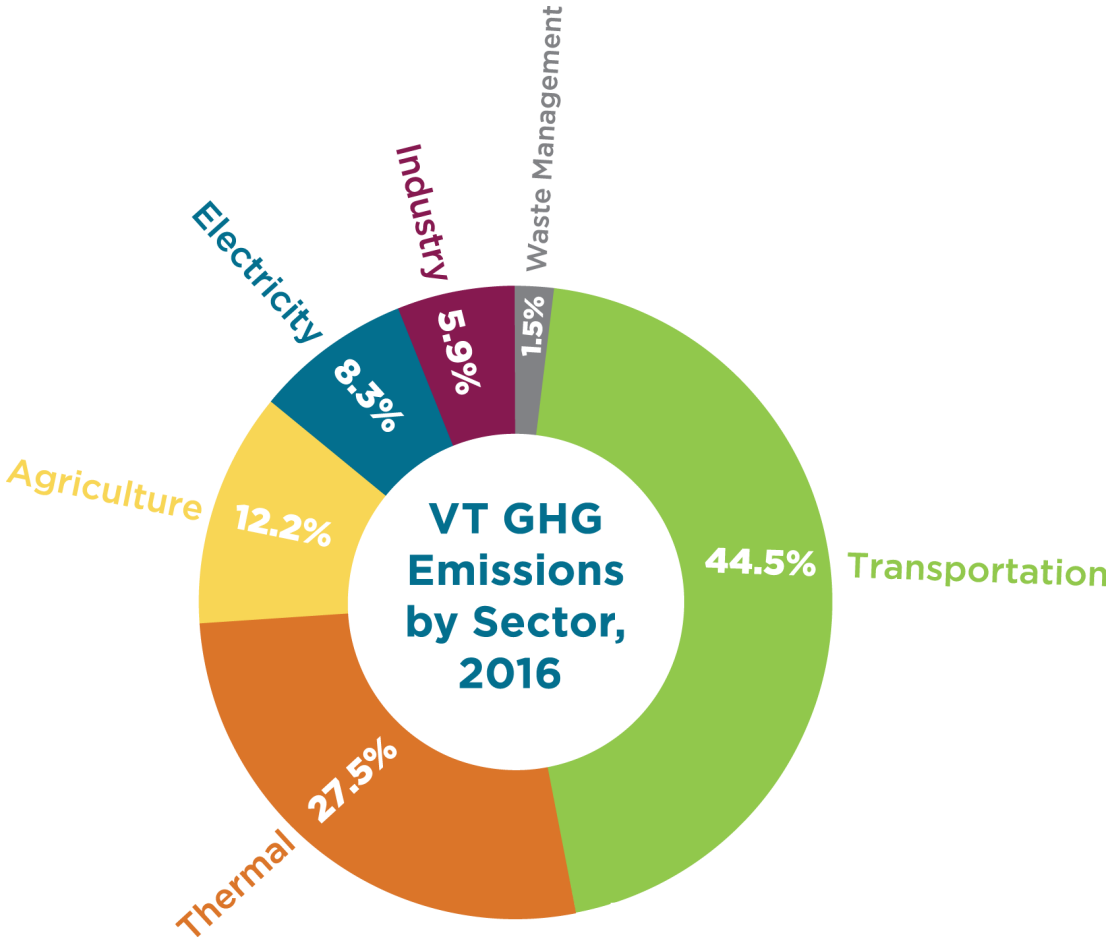
Over 100 Public Partners

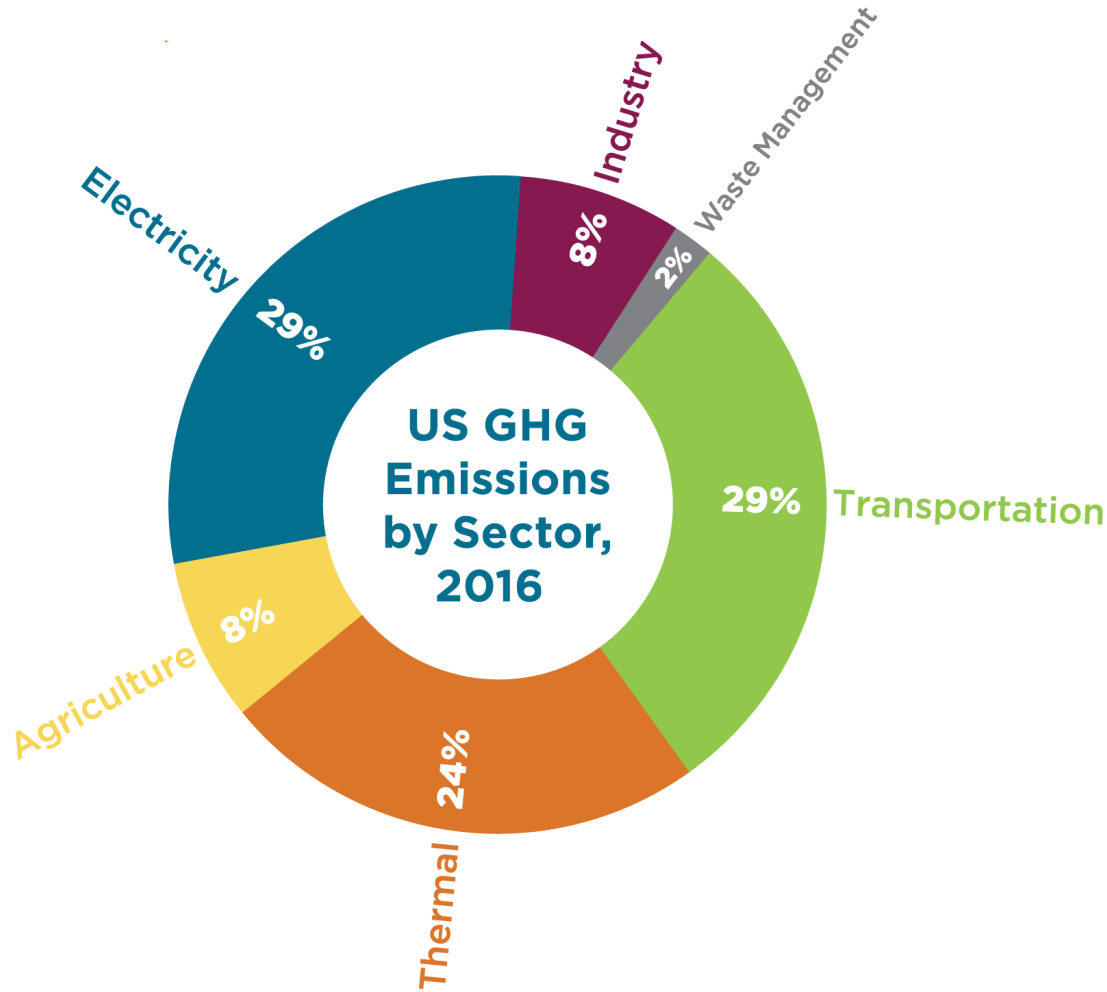


Vermont's historic emissions and future requirements

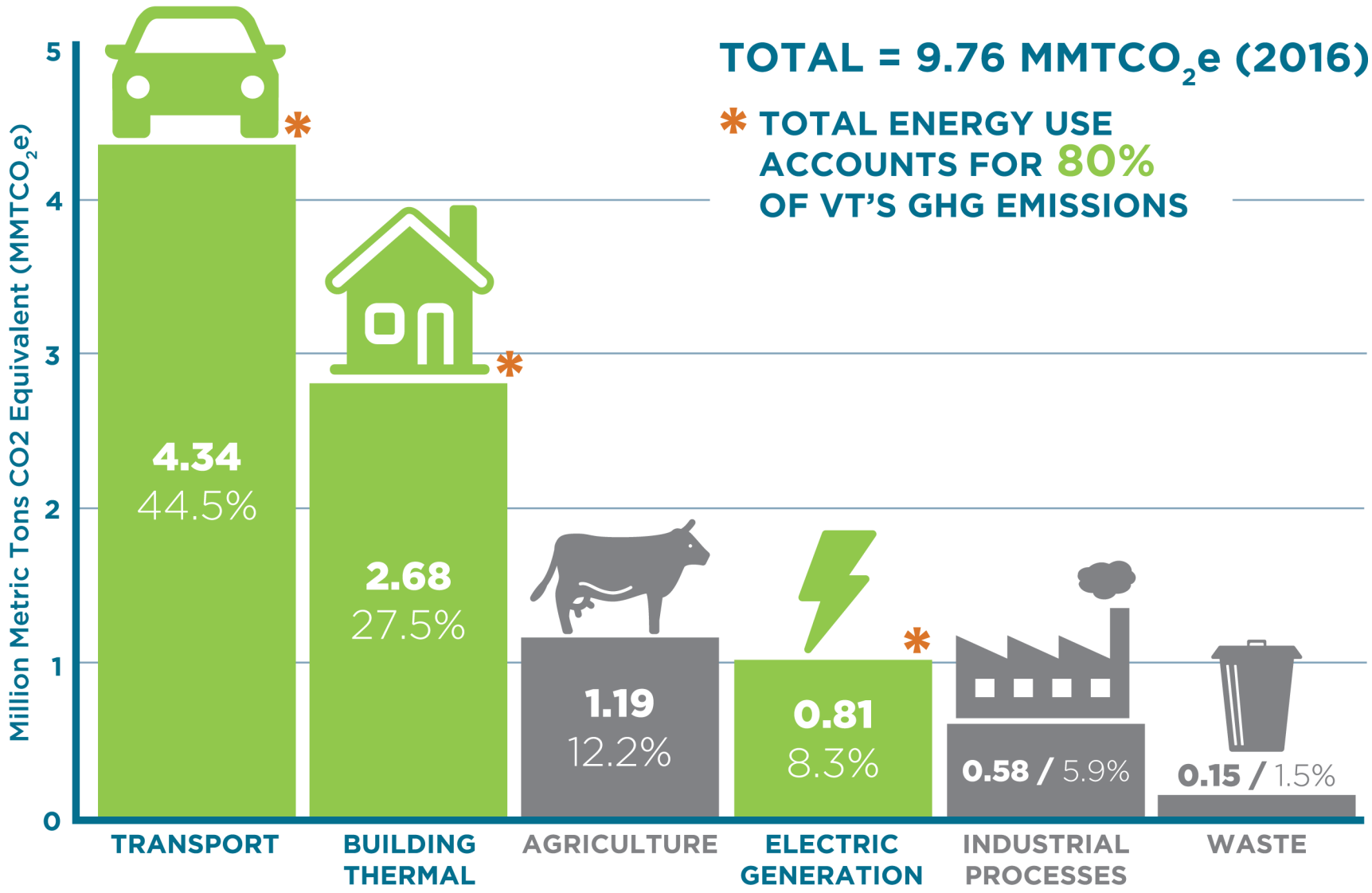


Source: Vermont Greenhouse Gas Inventory: 1990–2016, Vermont Agency of Natural Resources, 2020

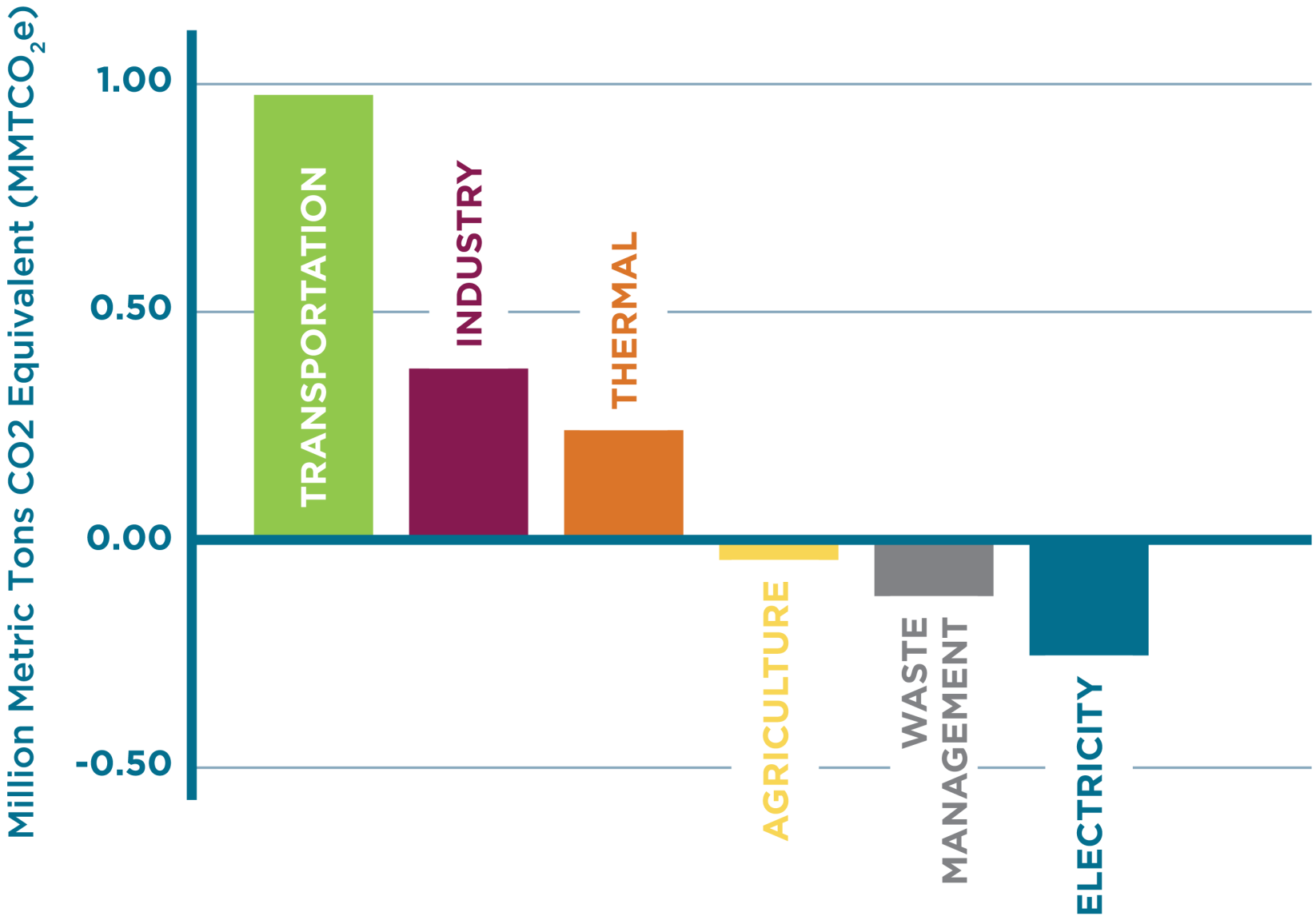

VT GHG Emissions by Sector, 2016
Transportation
44.5%
Thermal
27.5%
Agriculture
12.2%
Electricity
8.3%
Industry
5.9%
Waste Management
1.5%

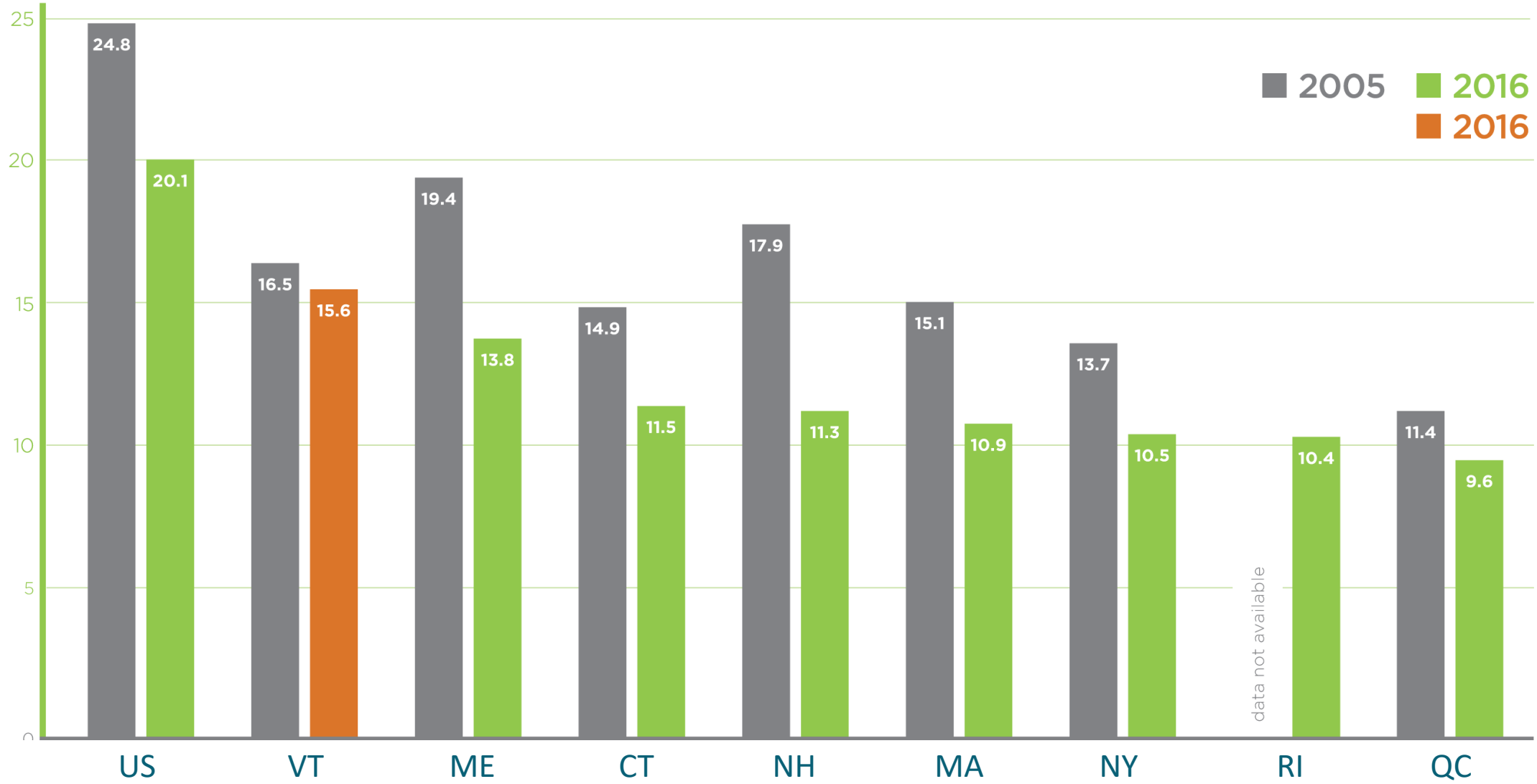

US GHG Emissions by Sector, 2016
Transportation
29%
Thermal
24%
Agriculture
8%
Electricity
29%
Industry
8%
Waste Management
2%

Vermont's GHG emissions by sector



Total net change in VT GHG emissions, 1990 vs 2016: 1.11 MMTCO2e

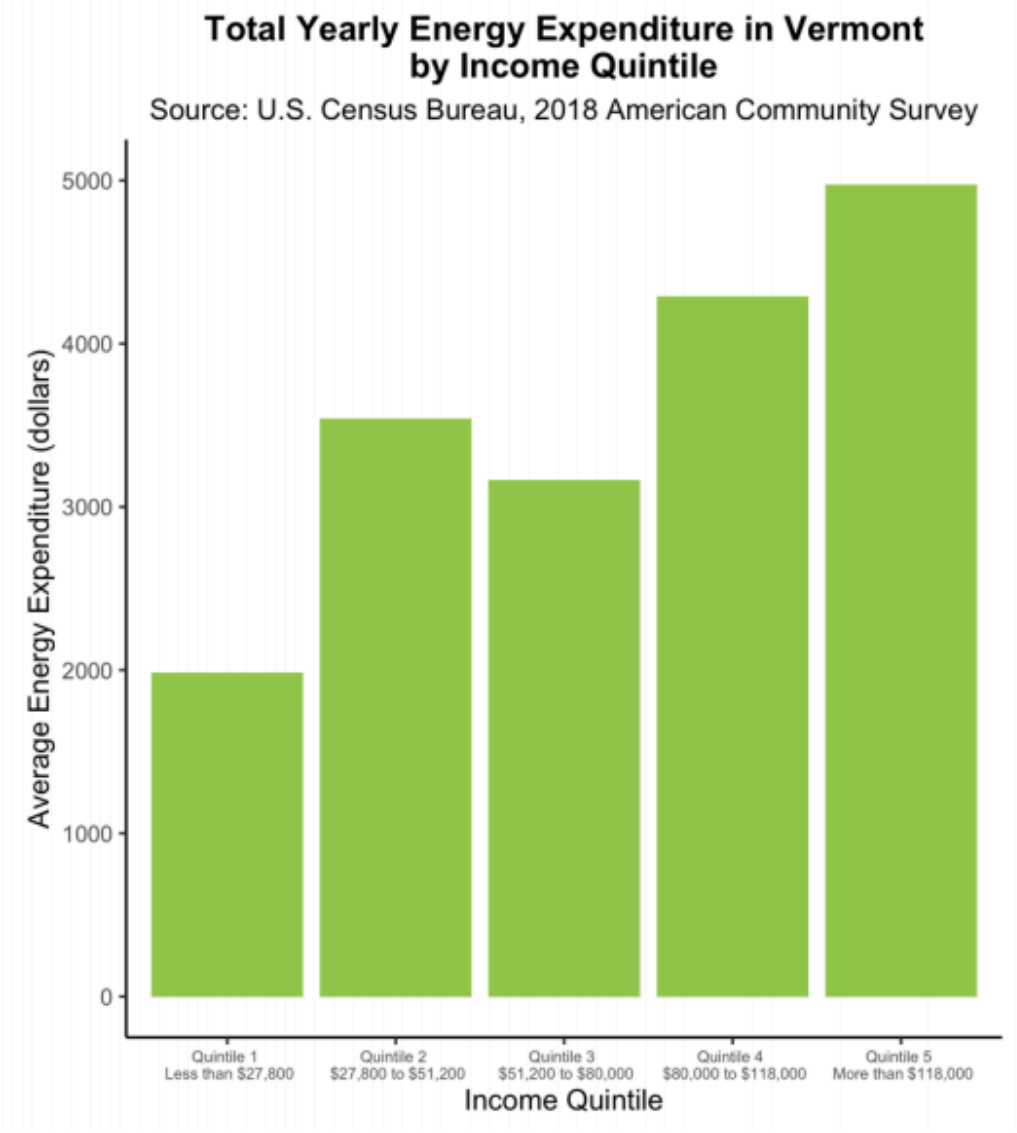




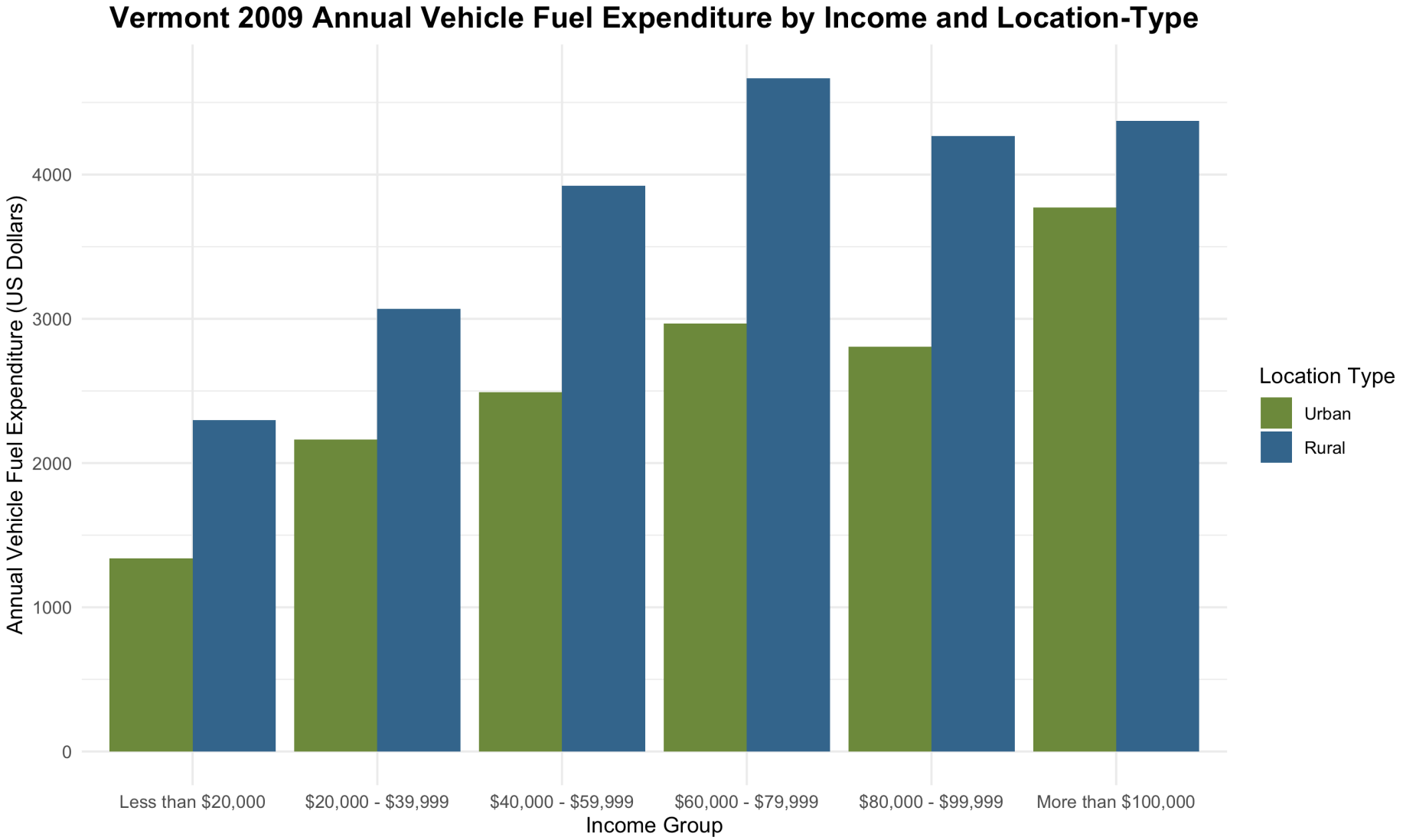
Per capita emissions

(metric tons CO2e per person)

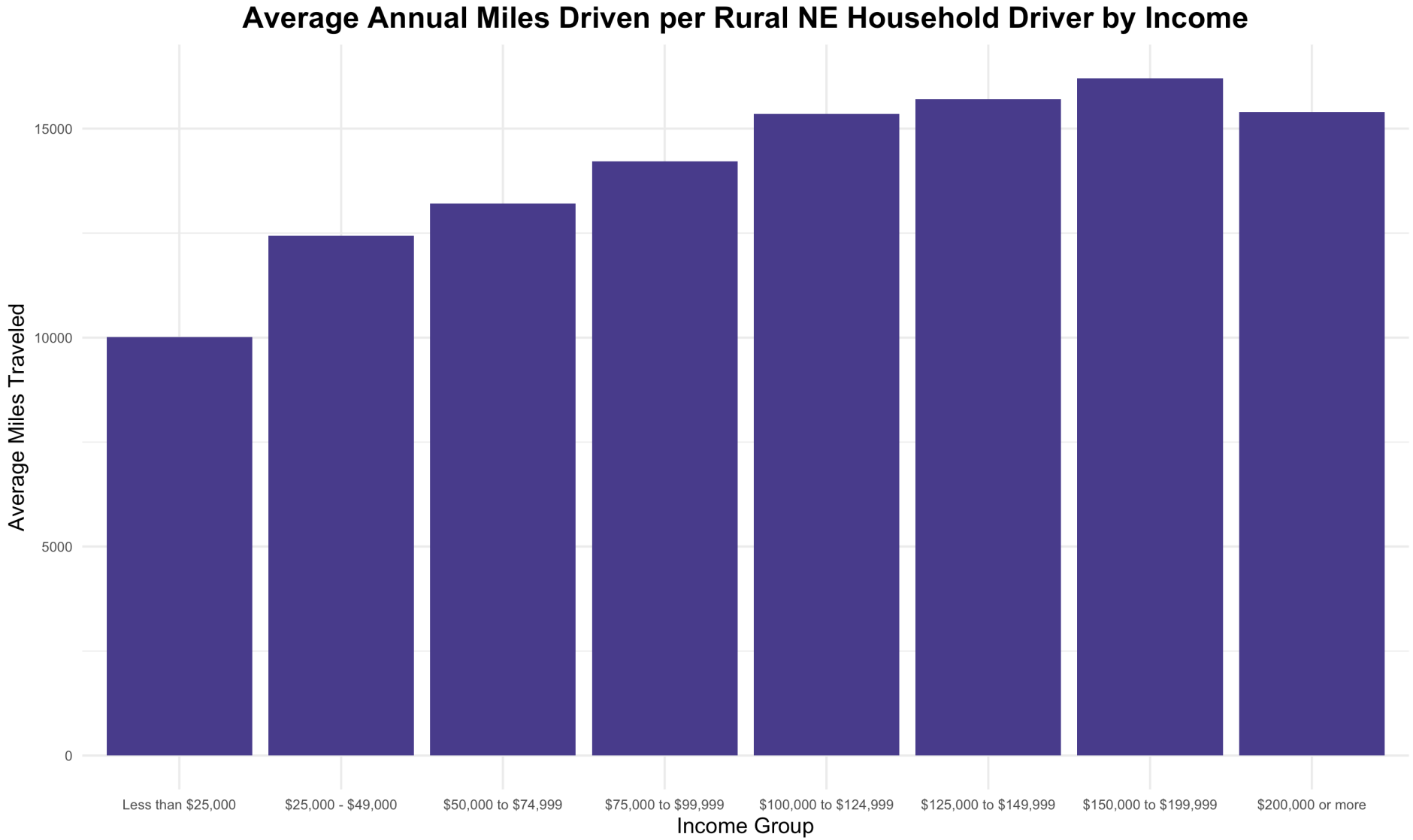
Wealthier Vermonters Consume More Heating Fuels and Electricity than Lower-Income Vermonters



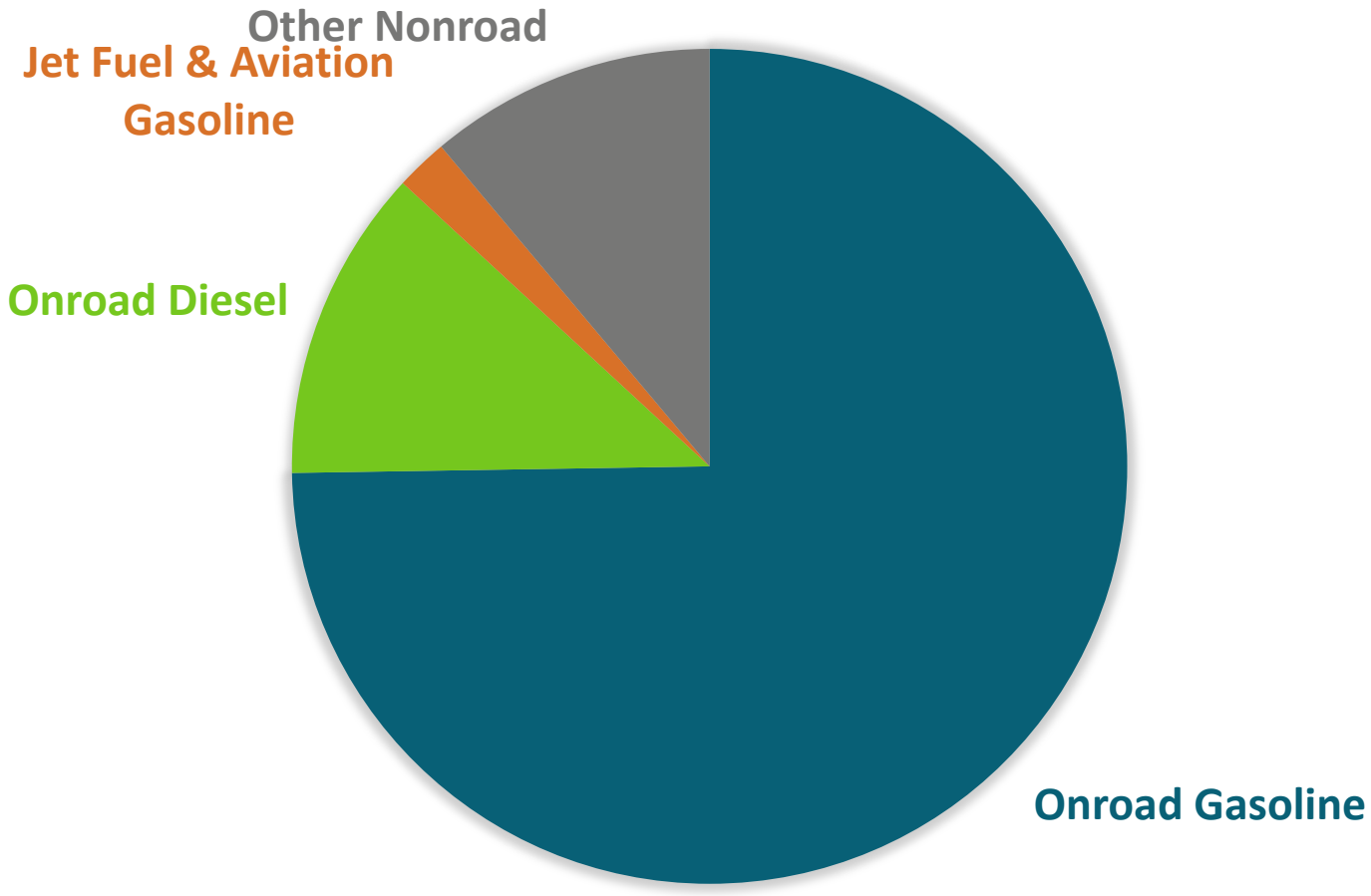
Upper-Income VTers: Higher Avg. Vehicle Fuel Expenditures; Rural Drivers Higher than Urban



Upper-income Rural NE Drivers Drive More Miles On Avg. than Lower-income Rural NE Drivers

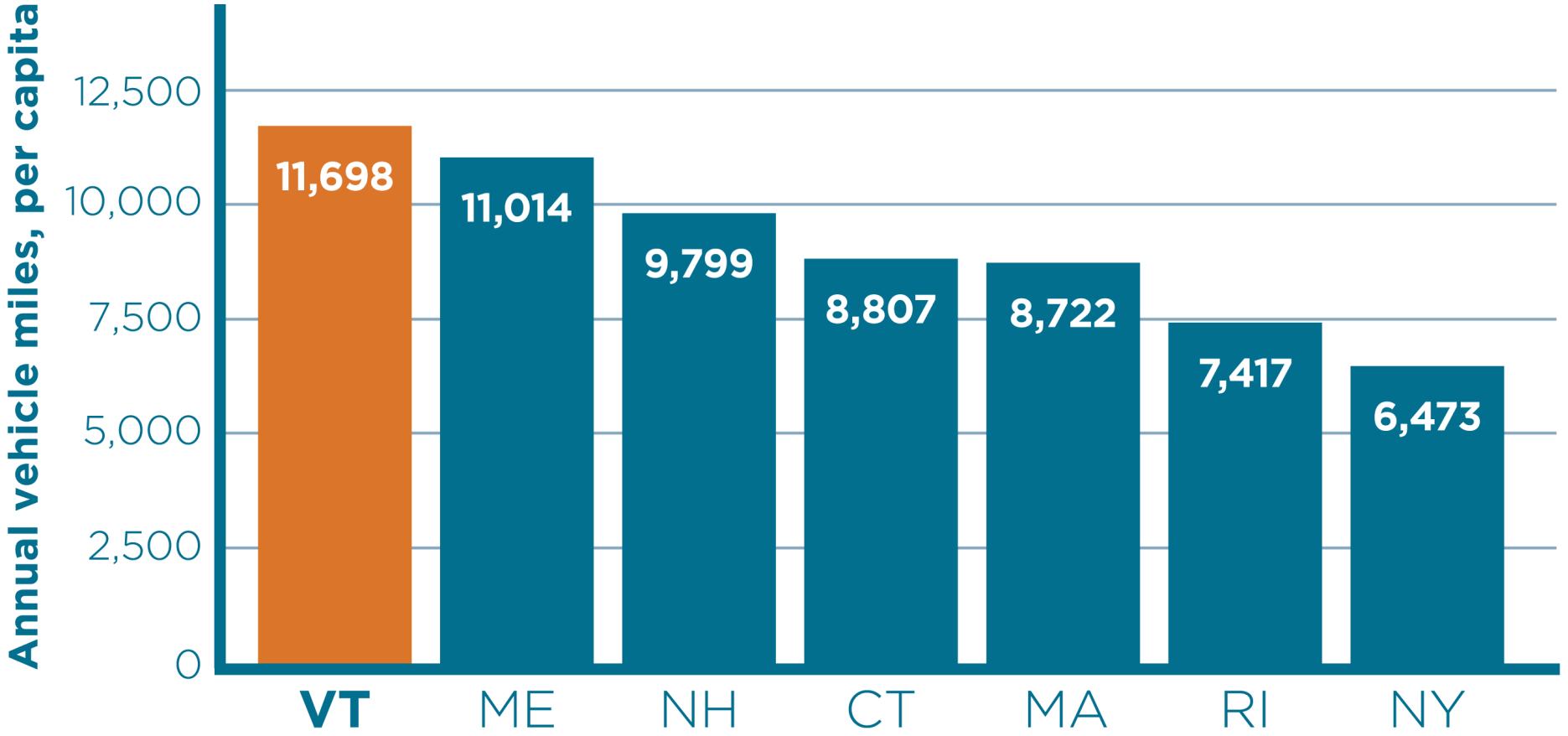


Sources of VT's Transportation GHG Emissions



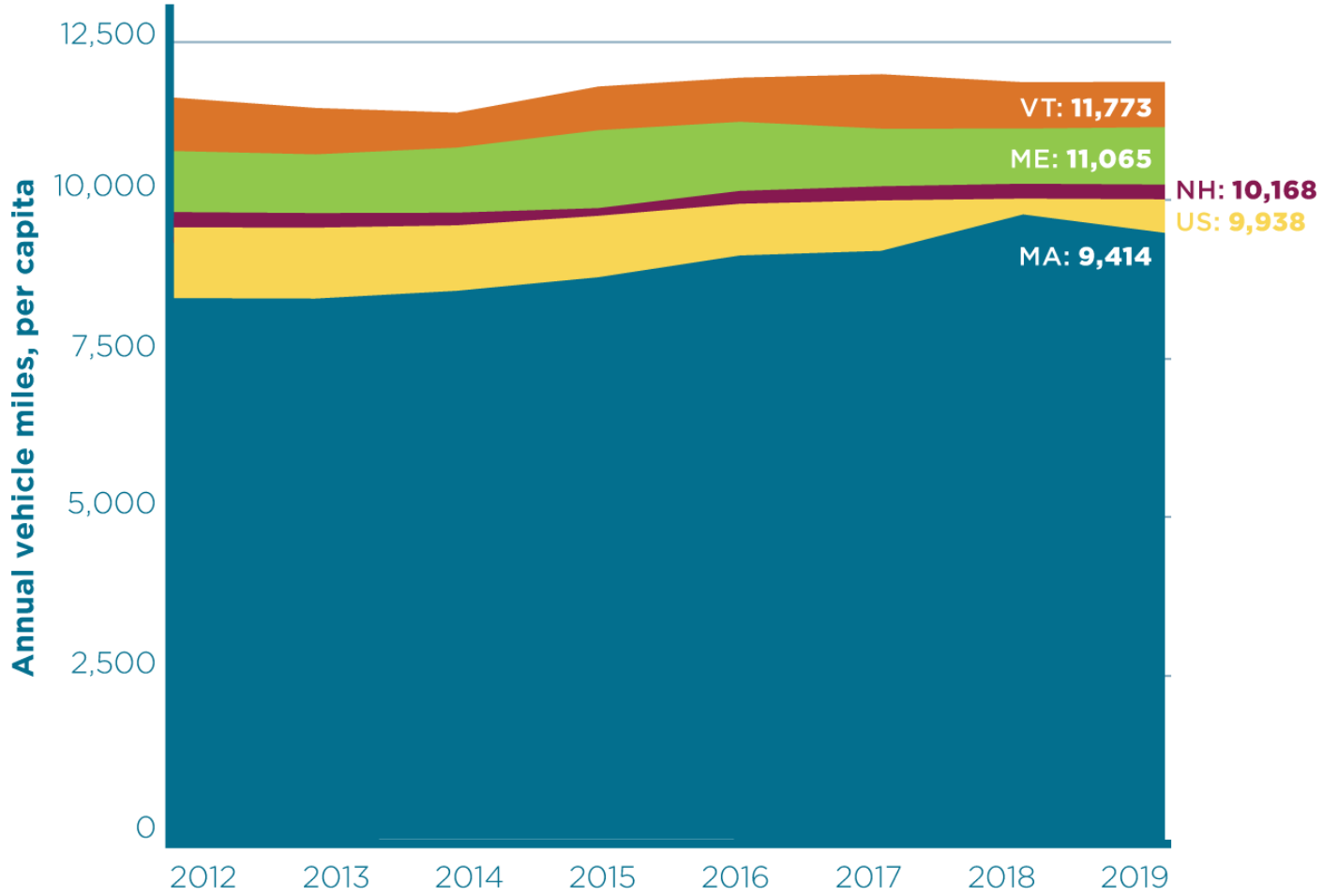
Vermont Has the Highest Vehicle Miles Traveled (VMT) Per Capita in the Region

Vehicle miles traveled per capita, 2015



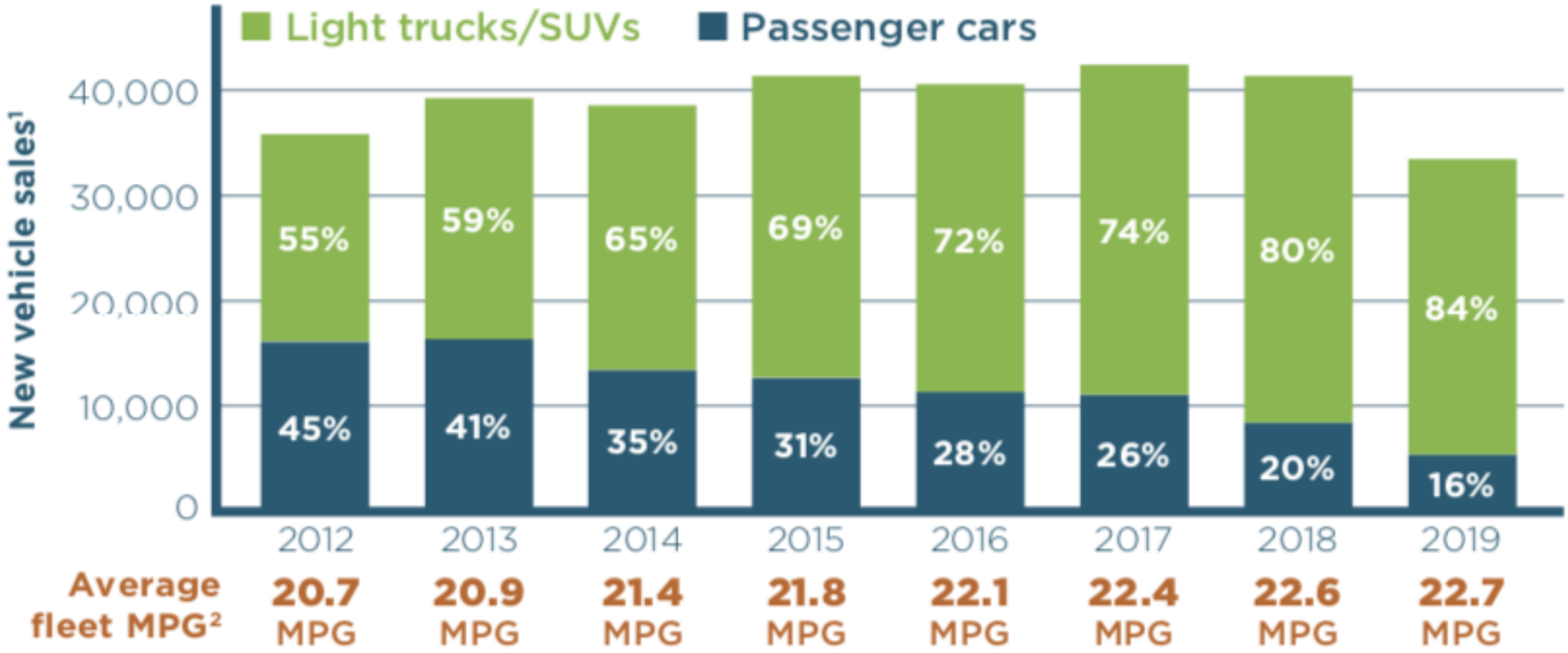
Vermont Has the Highest Vehicle Miles (VMT) Per Capita in Northern New England

Vehicle miles traveled per capita

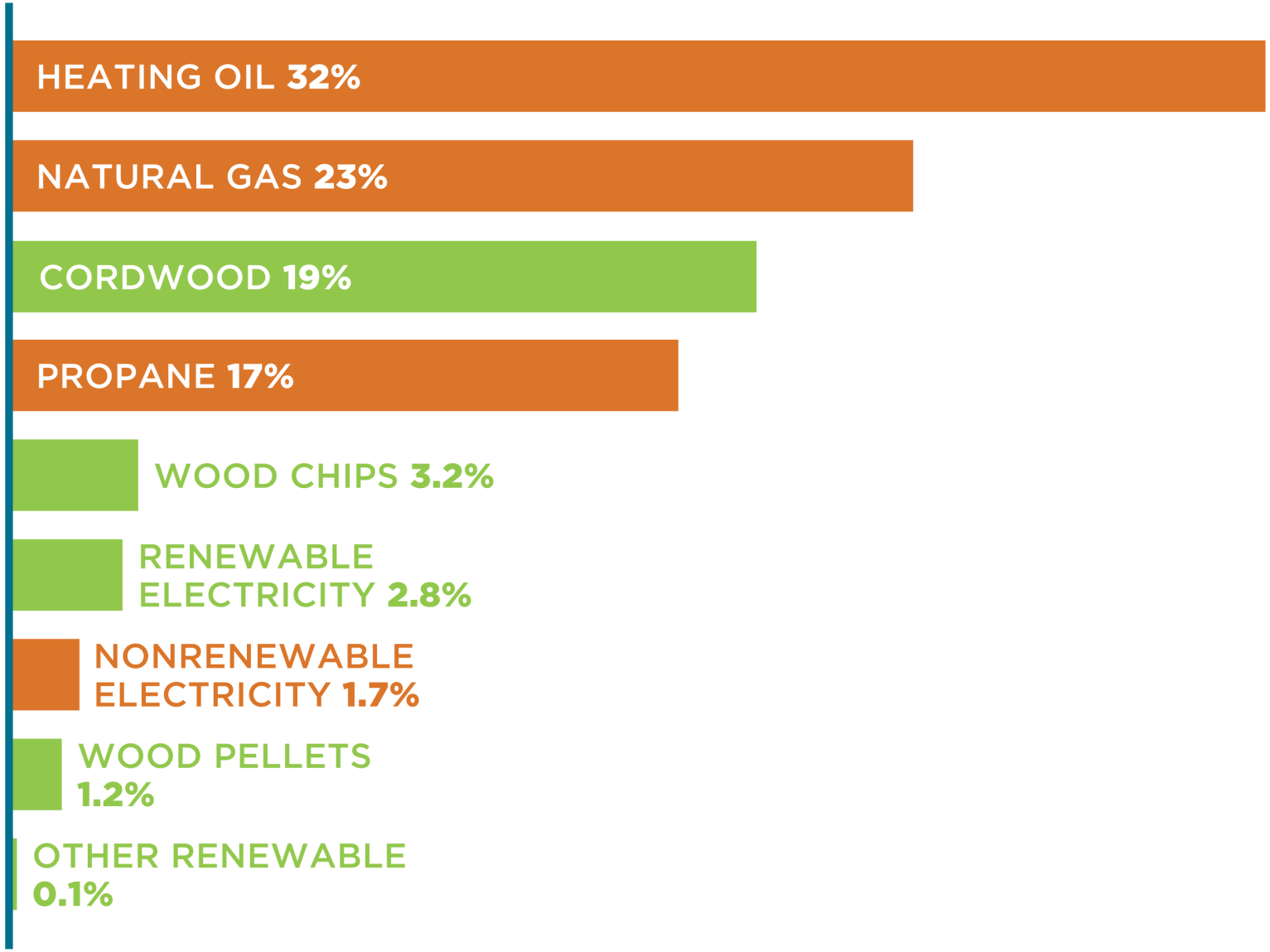


Source: Federal Highway Authority: Highway Statistics; US Census Bureau

As cars get more efficient, we're buying bigger cars

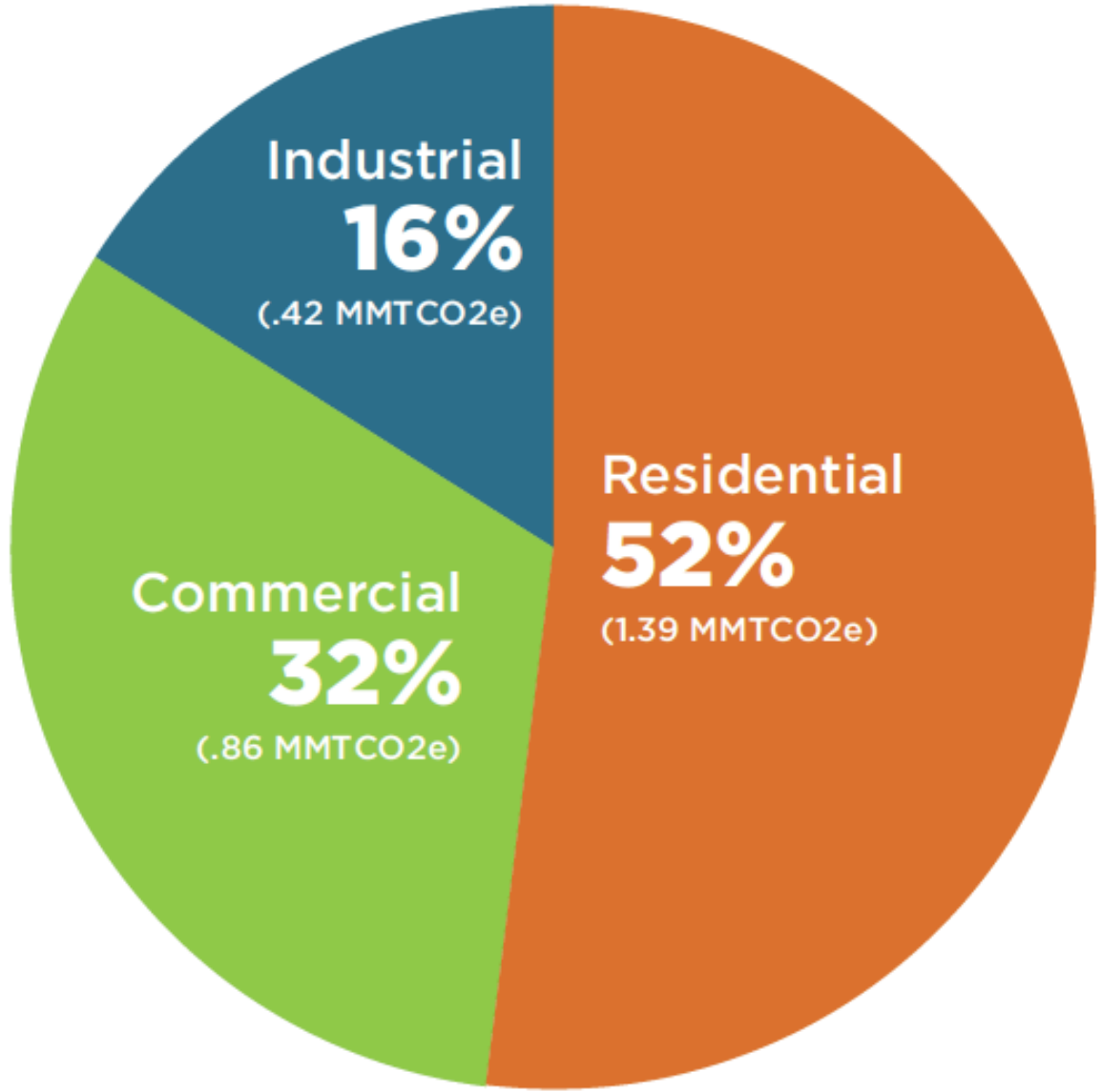


Vermont heating energy sources



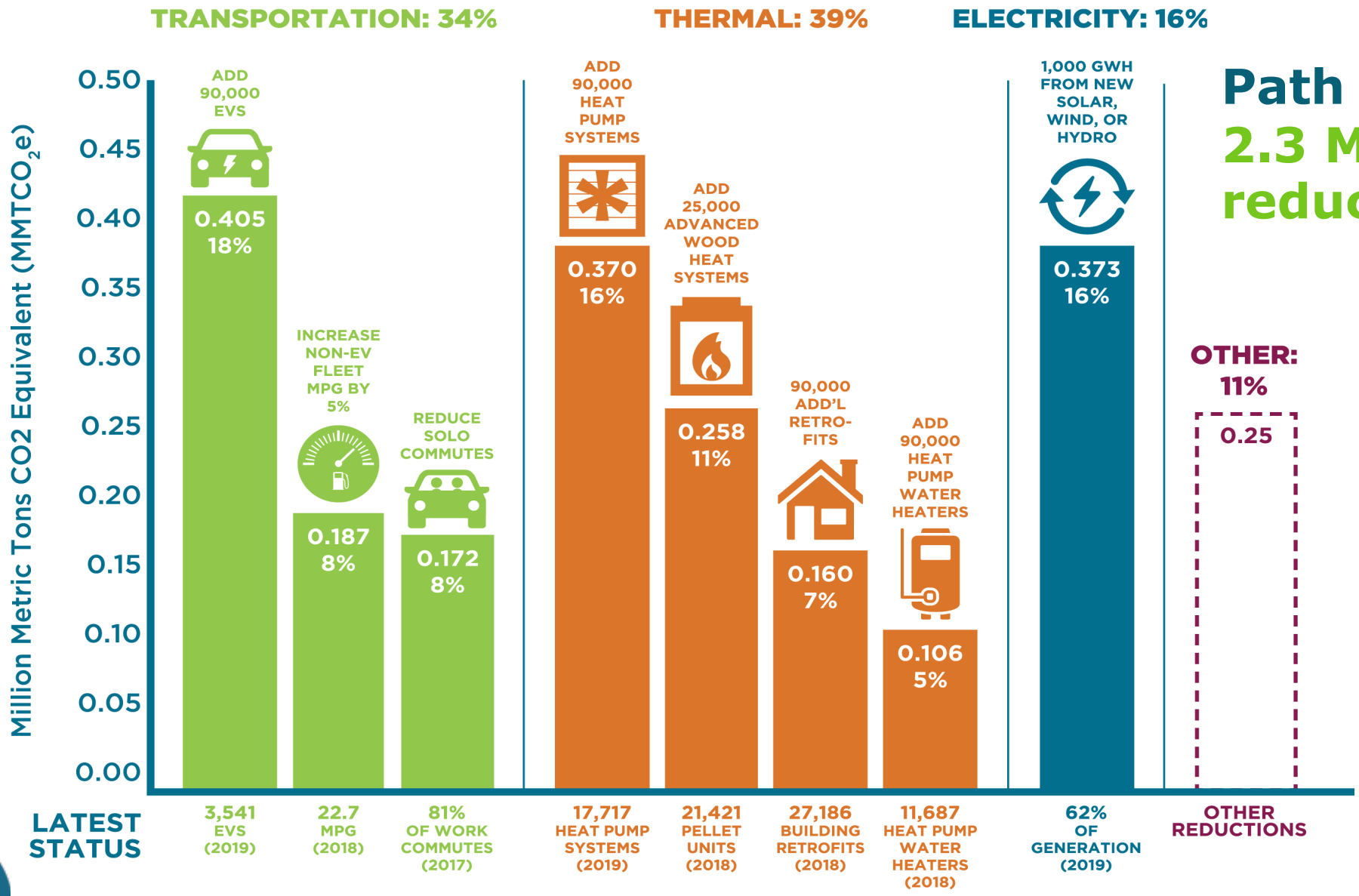
GHG Emissions from Thermal Fuel Use In VT

RCI Total: 2.68 MMTCO2e



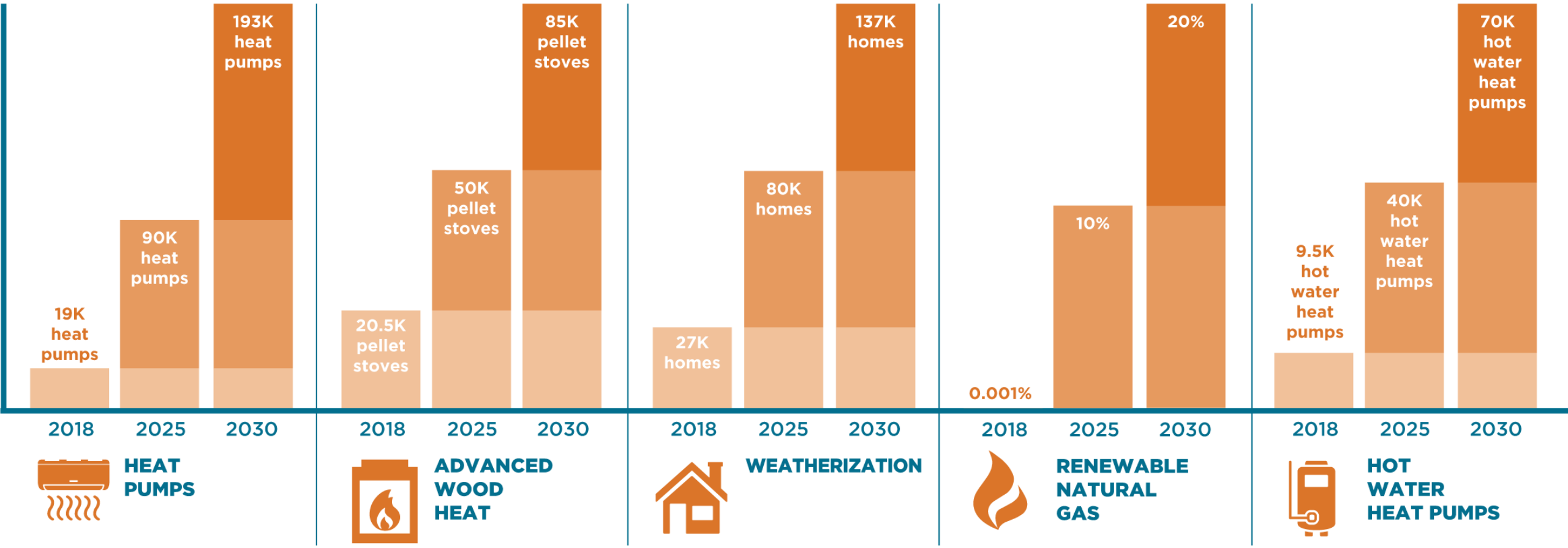
Source: Vermont Department of Environmental Conservation, 2019 Greenhouse Gas Emissions Inventory Brief (1990–2016)

Path to Paris:
2.3 MMTCO2e reduction by 2025



Draft Modeled Thermal Pathways: 2025 and 2030

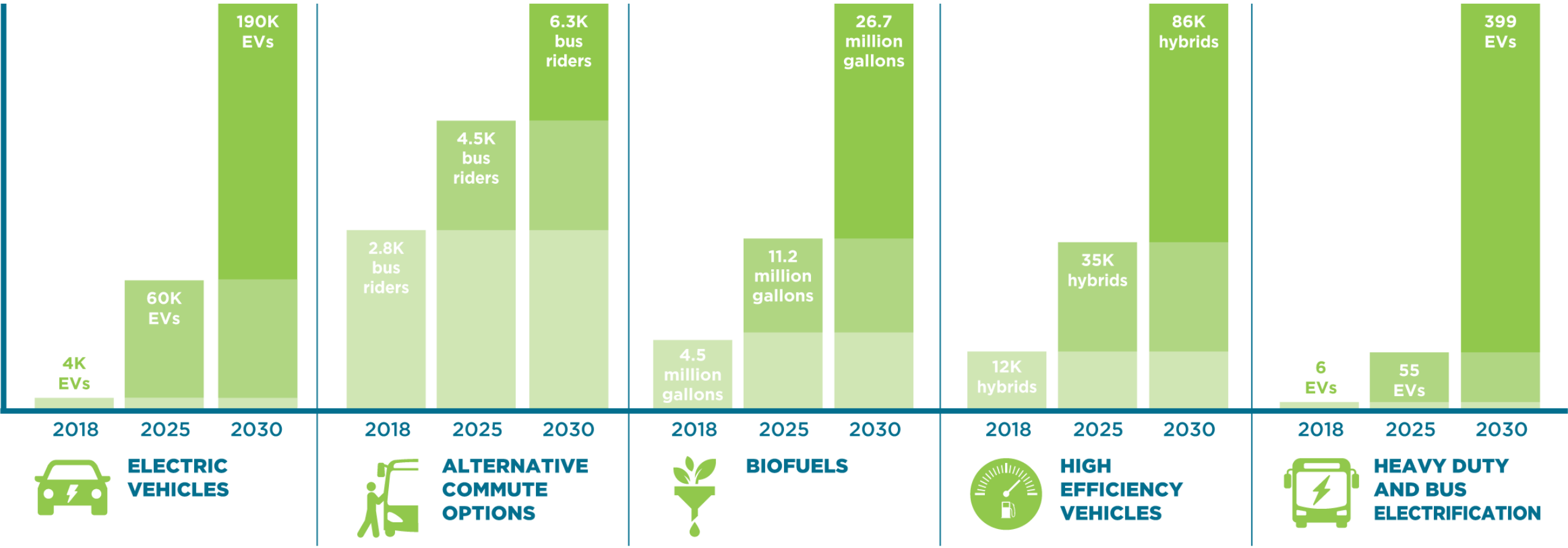
Thermal goals for 2025 and 2030



Source: EAN Pathways Analysis

Draft Modeled Transportation Pathways: 2025 and 2030

Transportation goals for 2025 and 2030

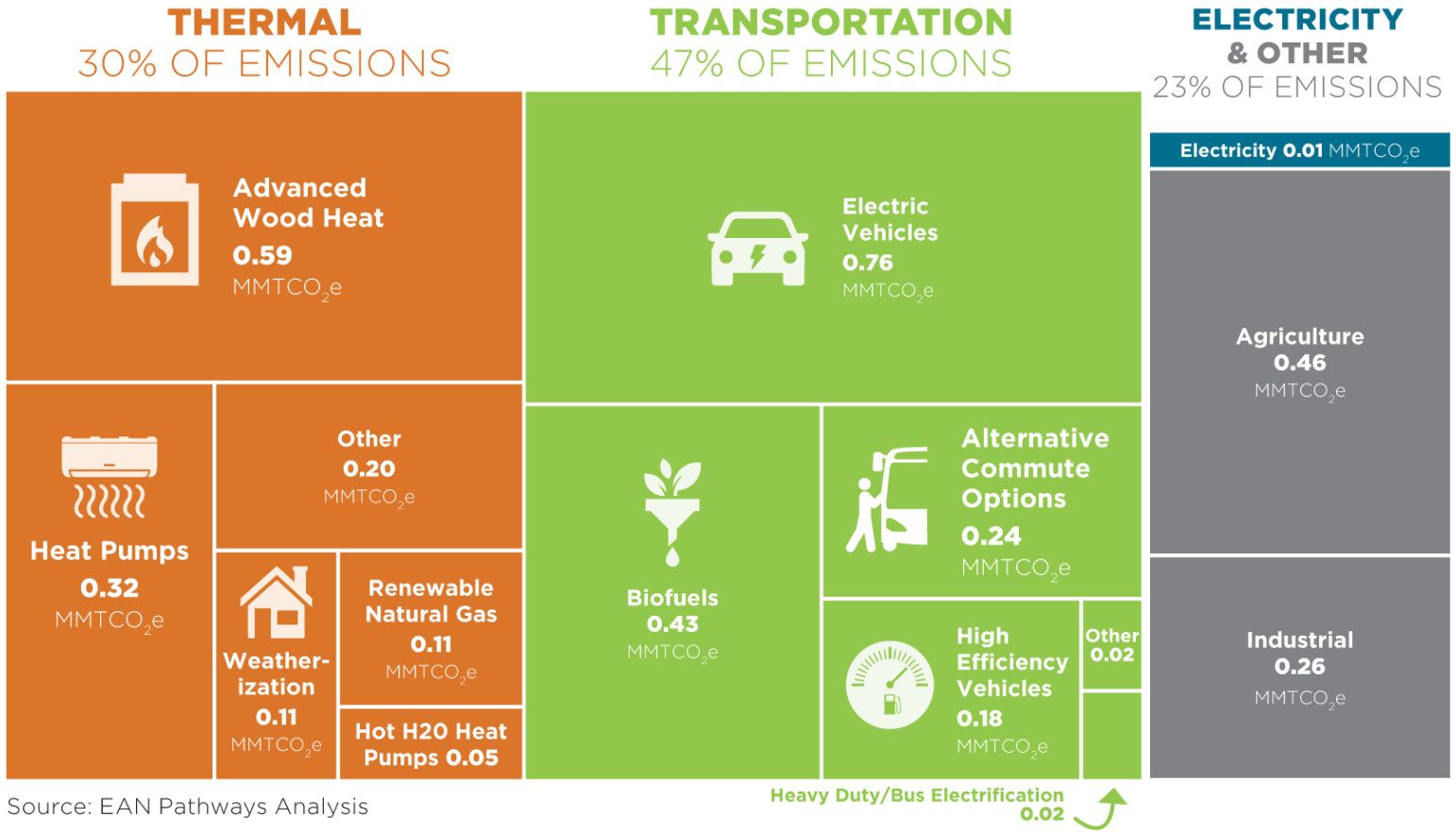


Source: EAN Pathways Analysis

Draft Findings
EAN's GWSA Pathways Analysis: 2030

Modeled emission reductions for 2030

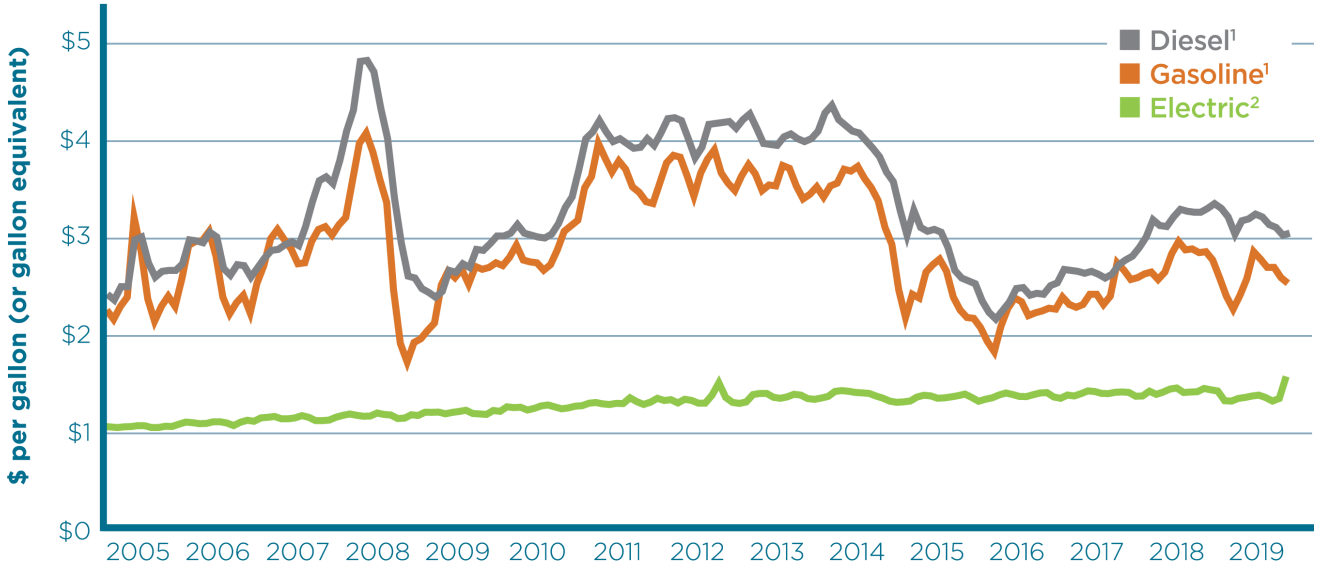
Total reductions of 3.83 $MMTCO_2e$ for Vermont to meet its statutory emission goals



Source: EAN Pathways Analysis

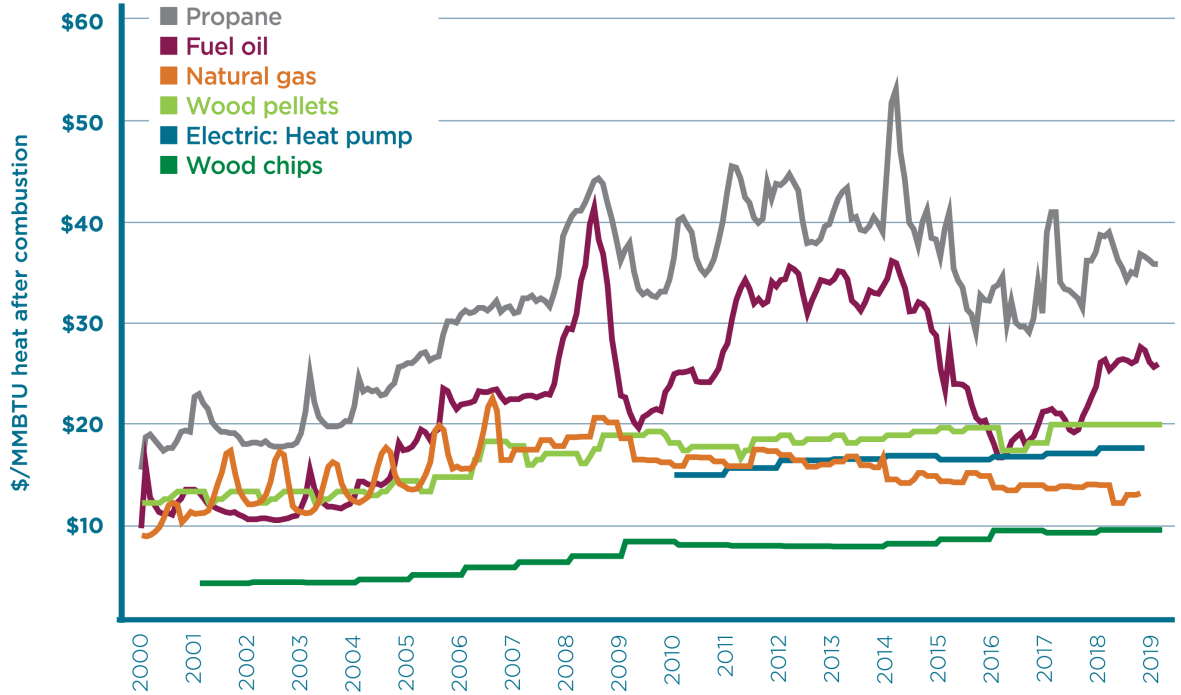
Key Findings of GWSA Pathways Analysis

- Meeting our emissions reductions targets is possible – we have the technology and know-how.
- To do so, we will need to follow best-practice demonstrated by other countries, provinces, and states. Broadly:
  - Dis-incentivize polluting fuels and equipment
  - Incentivize clean energy and equipment
  - Use performance standards and consumer protection regulations to phase out the sale of inefficient and polluting equipment.
- Doing so can mean significant cost-savings for Vermonters and improvement of the Vermont economy.

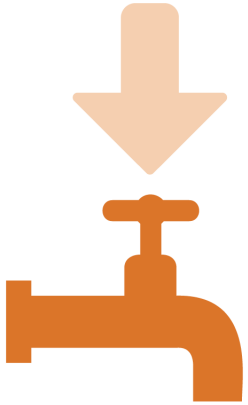


Electric vehicles are less expensive to drive than gas vehicles

Renewable heating options are usually lower cost and more price stable than fossil fuel options



Economic impacts of EAN's Path to Paris: 2020 - 2035



DECREASE in out-of-state spending:

$1.115 billion

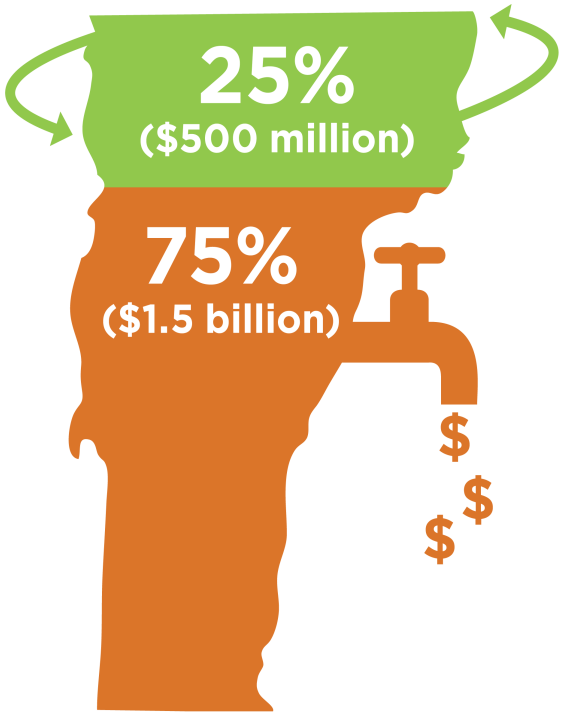
INCREASE in in-state investment:

$323 million

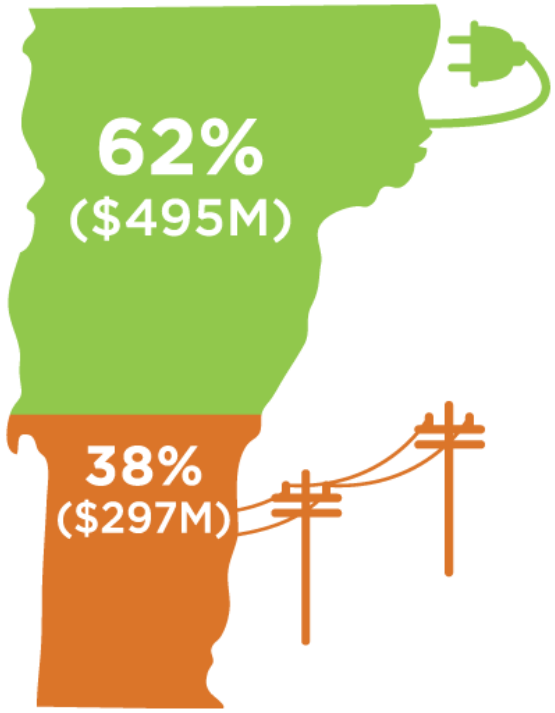
Net consumer savings:

$792 million

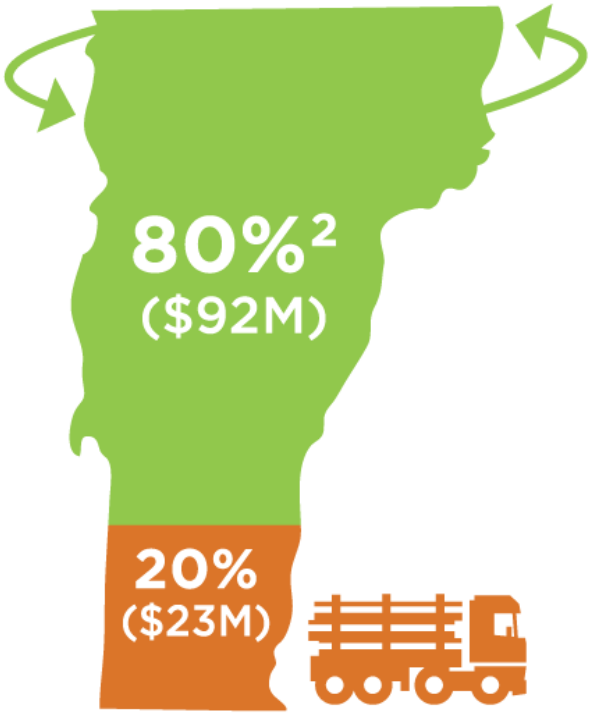
FOSSIL FUELS



ELECTRICITY



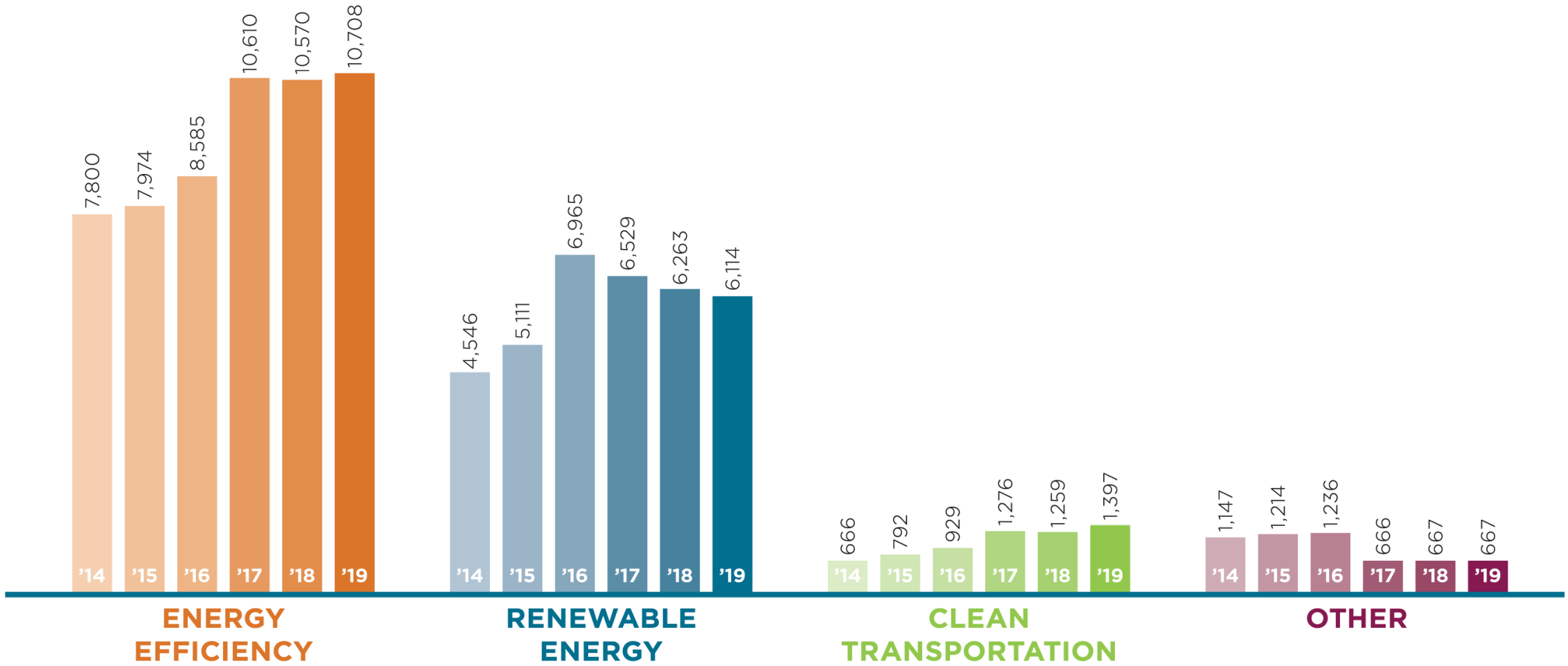
WOOD



Recirculates in the VT economy

Leaves the VT economy

Vermont clean employment growth by technology, 2014–2019



Vermont median hourly wages for clean energy jobs

	RENEWABLE ENERGY			ENERGY EFFICIENCY		
	Entry	Mid	High	Entry	Mid	High
Electricians	$13.57	$19.43	$28.89	$18.91	$25.47	$32.95
HVAC workers	$13.10	$20.77	$32.66	$18.43	$25.15	$35.05
Installation, maintenance, and repair technicians	$13.10	$20.77	$32.66	$14.84	$20.72	$30.23
Sales representatives	$17.60	$28.71	$56.74	$30.55	$39.57	$68.70
Engineers	$24.99	$37.21	$56.61	$23.78	$39.38	$57.98

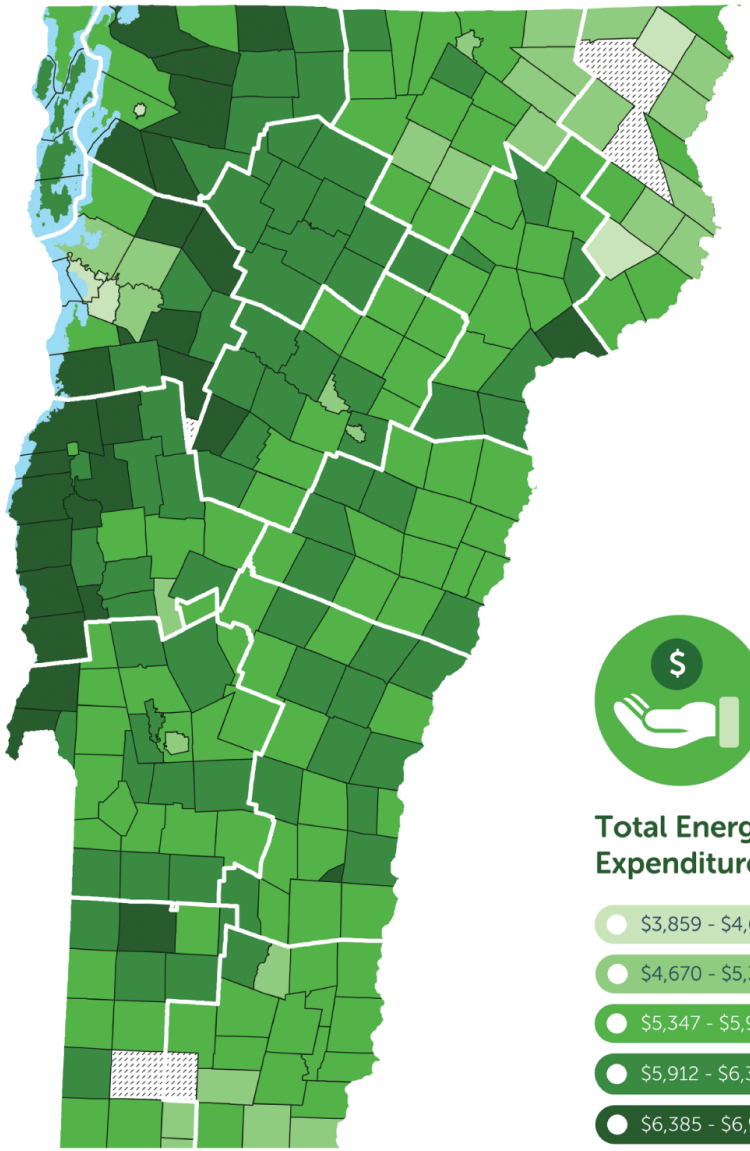
What is Energy Burden?

Quantity of energy consumed
x price of energy = Spending on energy

$$\frac{\text{Spending on energy}}{\text{Income}} = \text{Energy burden}$$

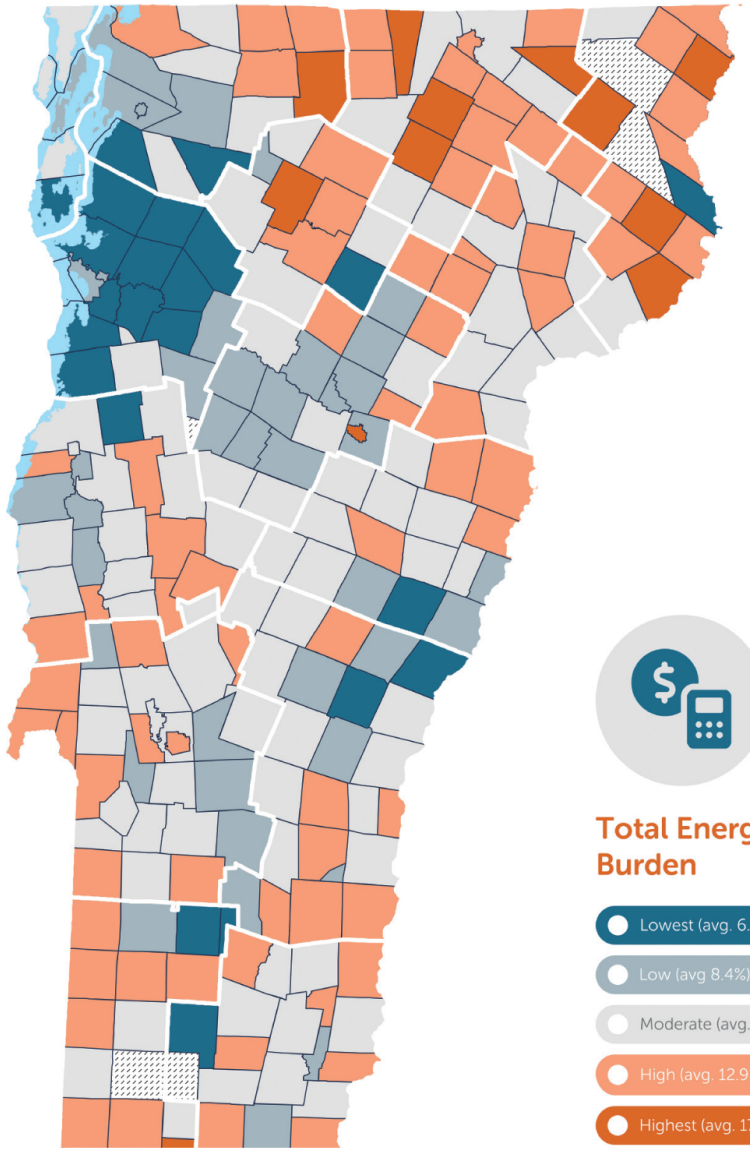
Energy burden measures the percent of income used for energy spending. This measurement allows us to acknowledge that energy spending does not affect everyone equally.

Energy Security and Justice Program of Vermont Law School's Institute for Energy and the Environment. *Energy costs and burdens in Vermont: Burdensome for whom?* 2014.



Total Energy Expenditure

- $3,859 - $4,669
- $4,670 - $5,346
- $5,347 - $5,911
- $5,912 - $6,384
- $6,385 - $6,949

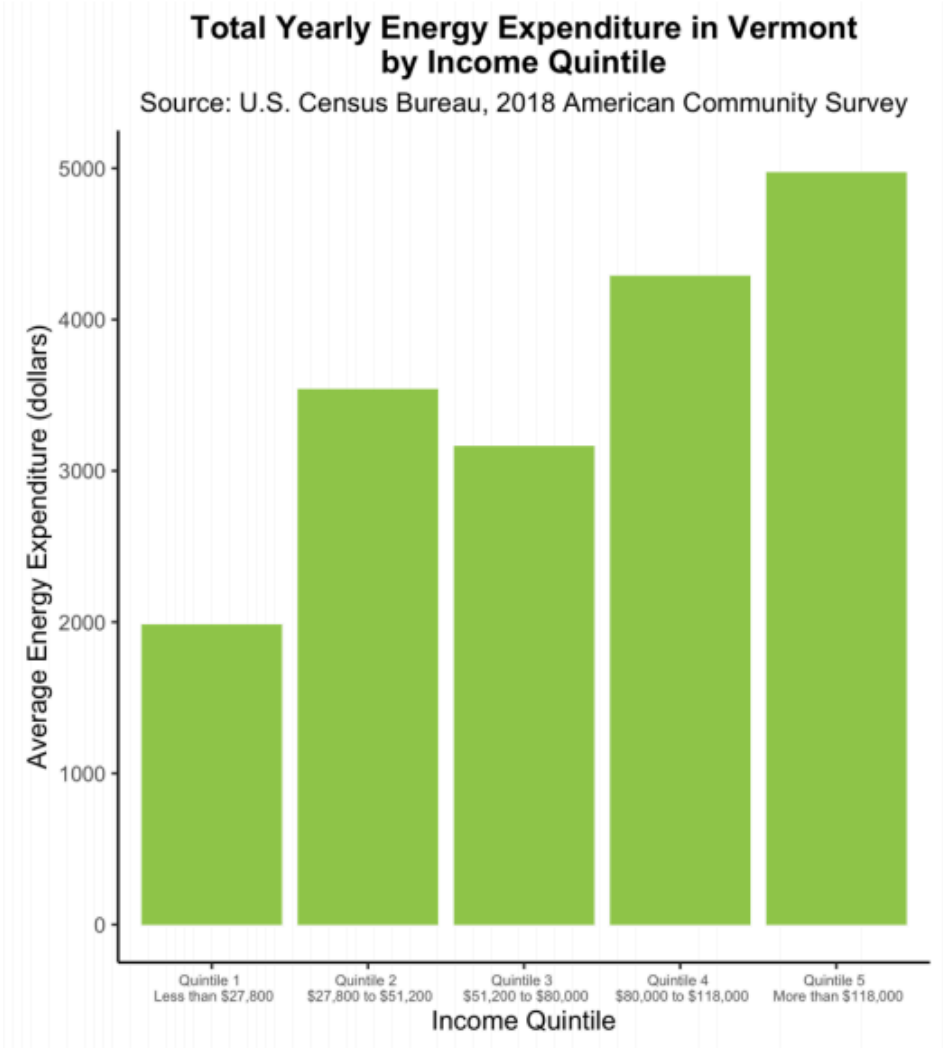


Total Energy Burden

- Lowest (avg. 6.7%)
- Low (avg 8.4%)
- Moderate (avg. 10.1%)
- High (avg. 12.9%)
- Highest (avg. 17.4%)

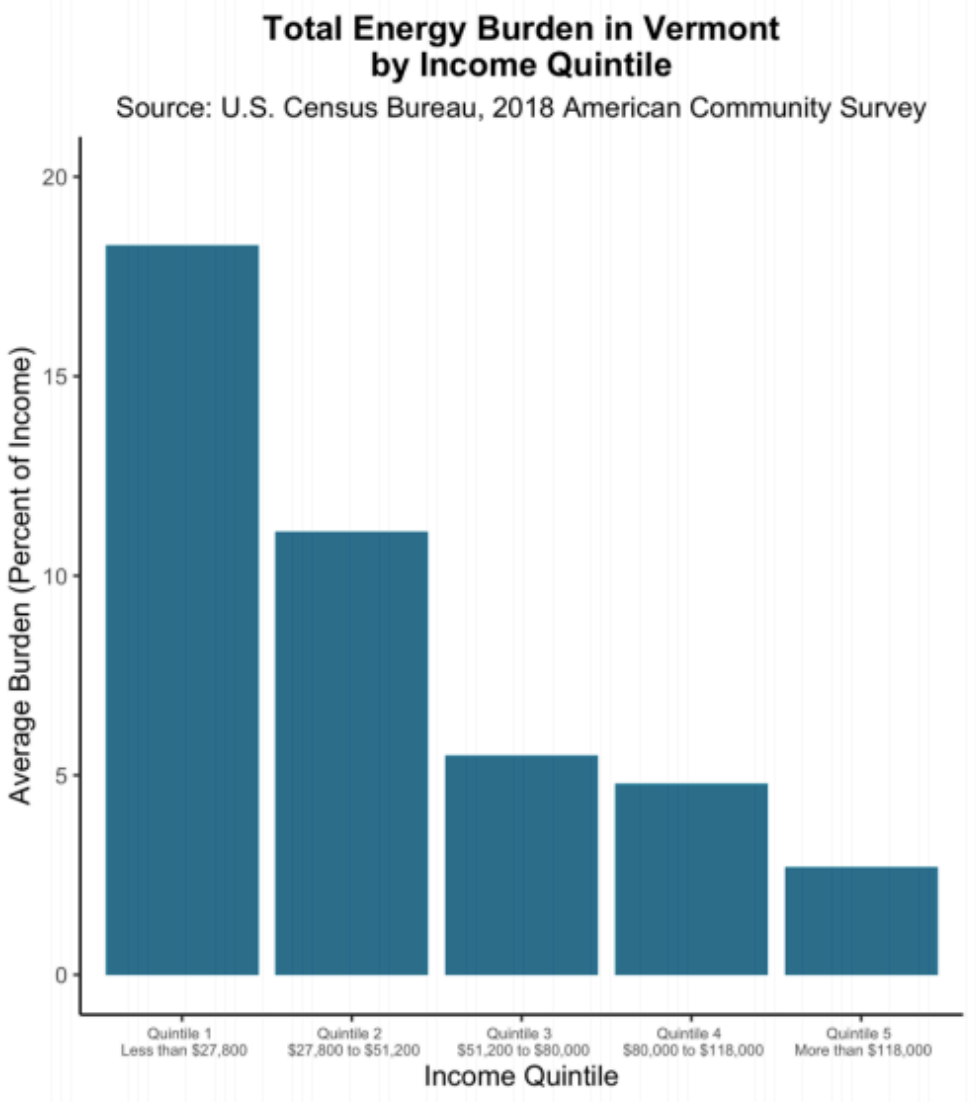
Source: Efficiency Vermont

Energy Burden and Income

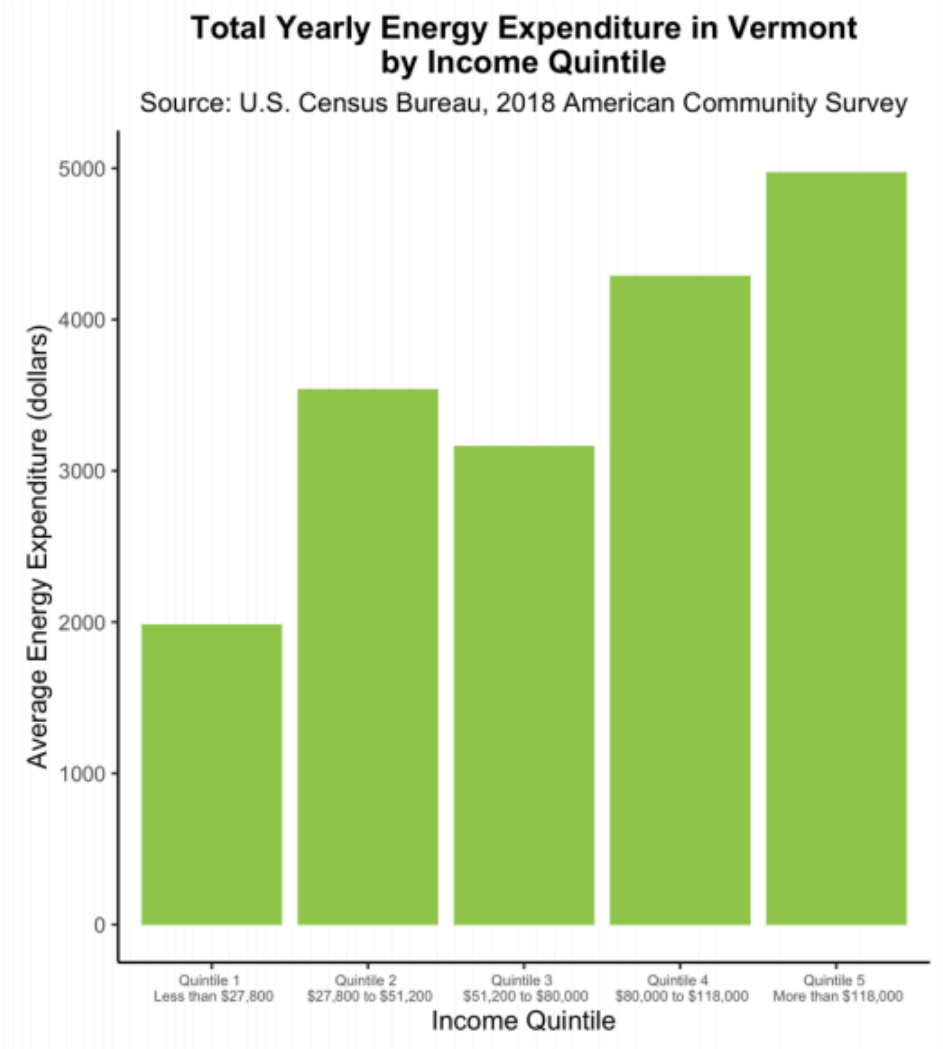


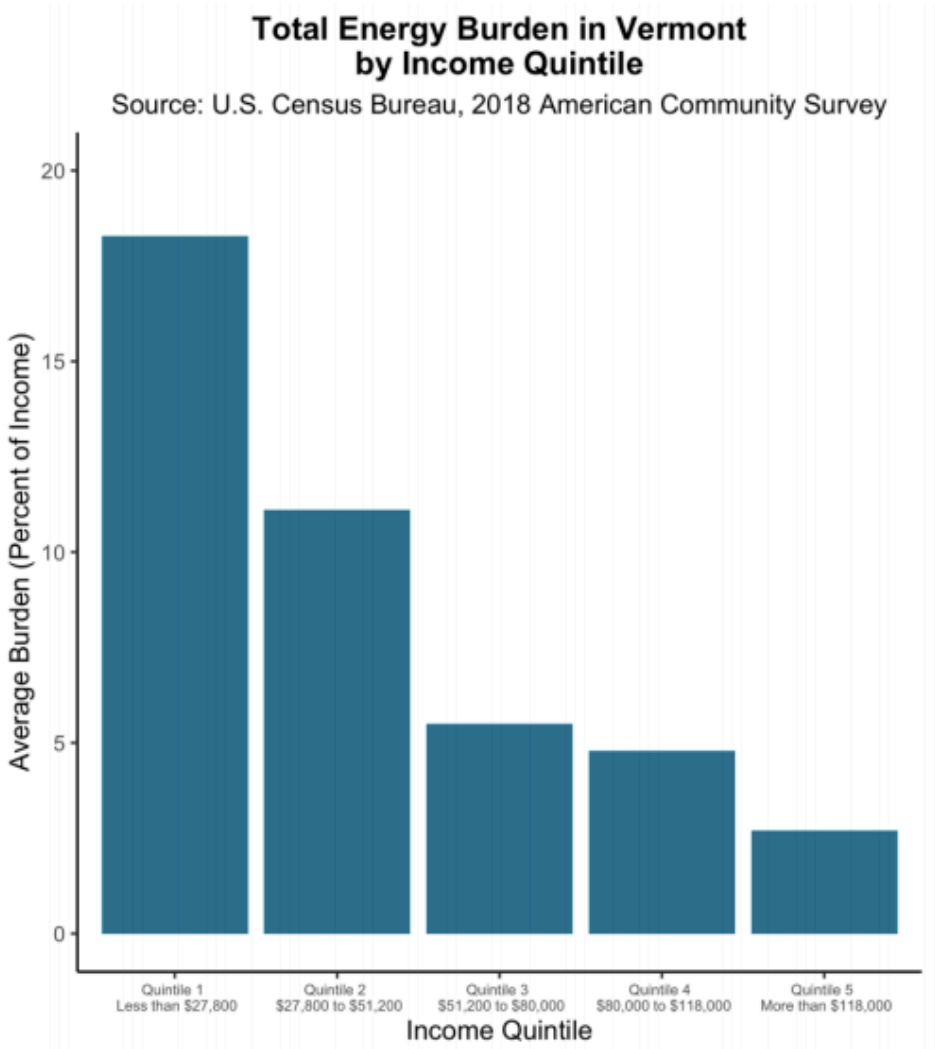
Lower-income Vermonters purchase much less energy than upper income Vermonters…

Energy Burden and Income

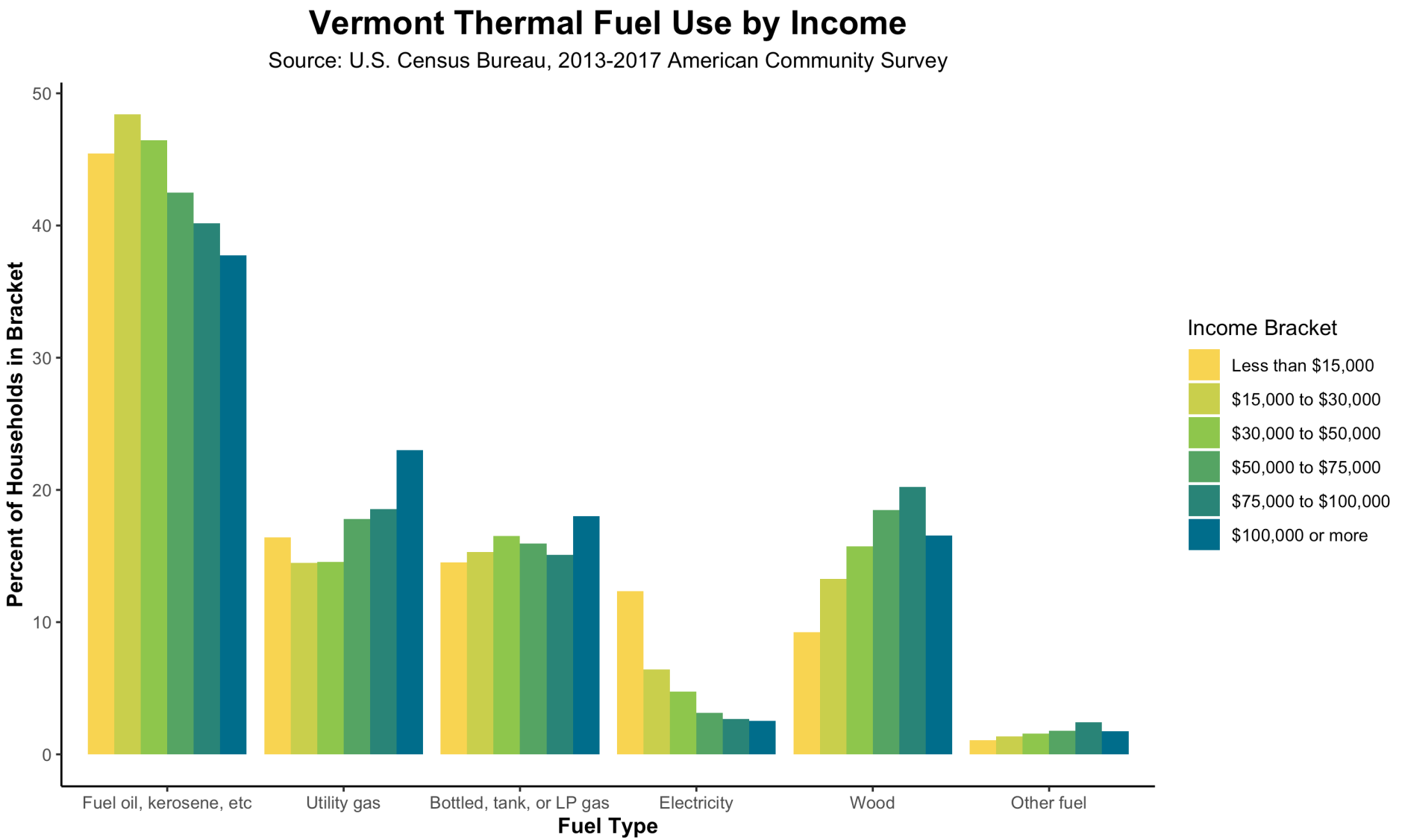


… but spend a far greater proportion of their income on energy than do upper income Vermonters


Total Yearly Energy Expenditure in Vermont
by Income Quintile
Source: U.S. Census Bureau, 2018 American Community Survey
Average Energy Expenditure (dollars)
0
1000
2000
3000
4000
5000
Quintile 1
Less than $27,800
Quintile 2
$27,800 to $51,200
Quintile 3
$51,200 to $80,000
Quintile 4
$80,000 to $118,000
Quintile 5
More than $118,000
Income Quintile

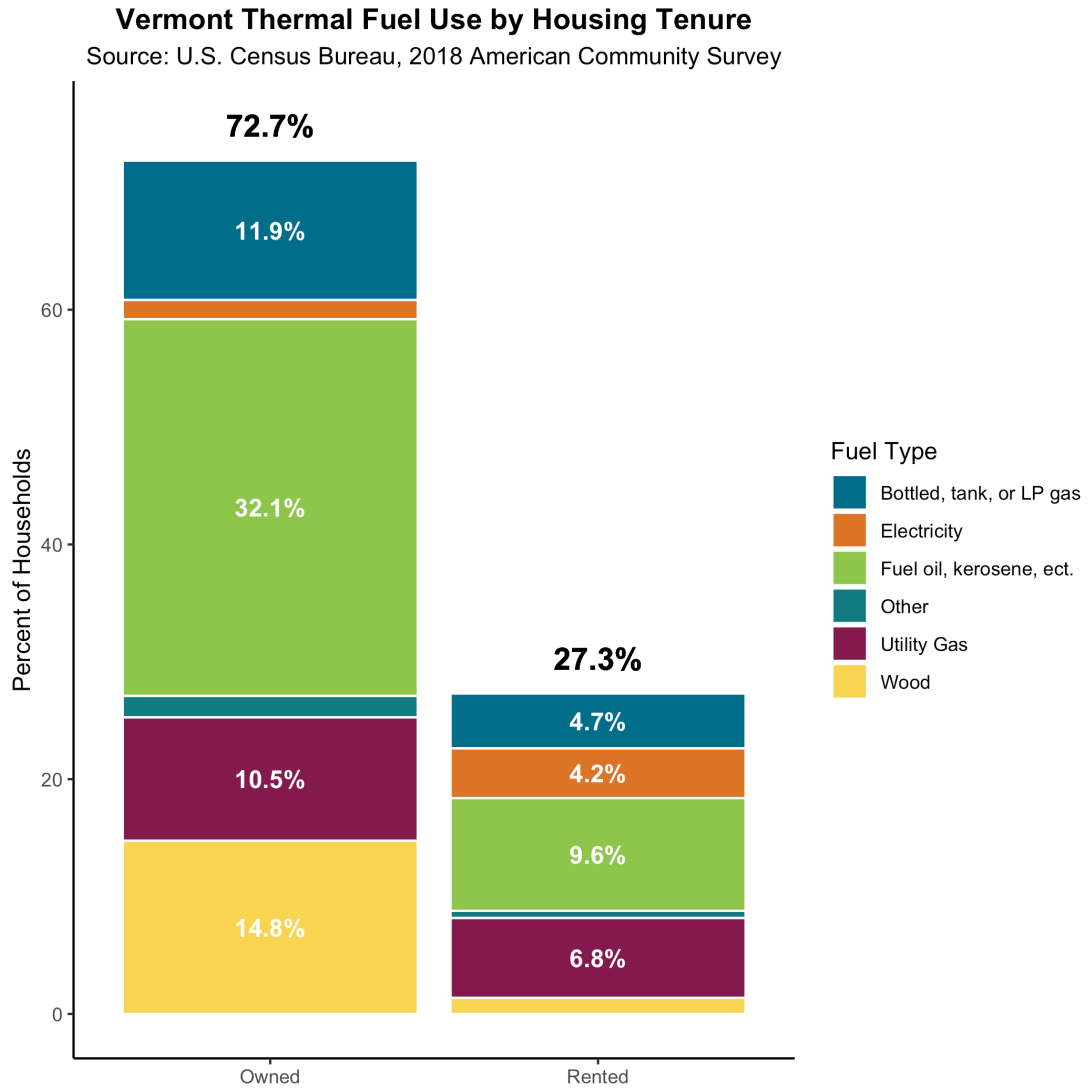

Total Energy Burden in Vermont
by Income Quintile
Source: U.S. Census Bureau, 2018 American Community Survey
Average Burden (Percent of Income)
0
5
10
15
20
Quintile 1
Less than $27,800
Quintile 2
$27,800 to $51,200
Quintile 3
$51,200 to $80,000
Quintile 4
$80,000 to $118,000
Quintile 5
More than $118,000
Income Quintile

Income-Based Thermal Fuel Use Inequities



Lower-income households use fuel oil and electricity disproportionately more frequently and utility gas and wood disproportionately less frequently than higher-income households.

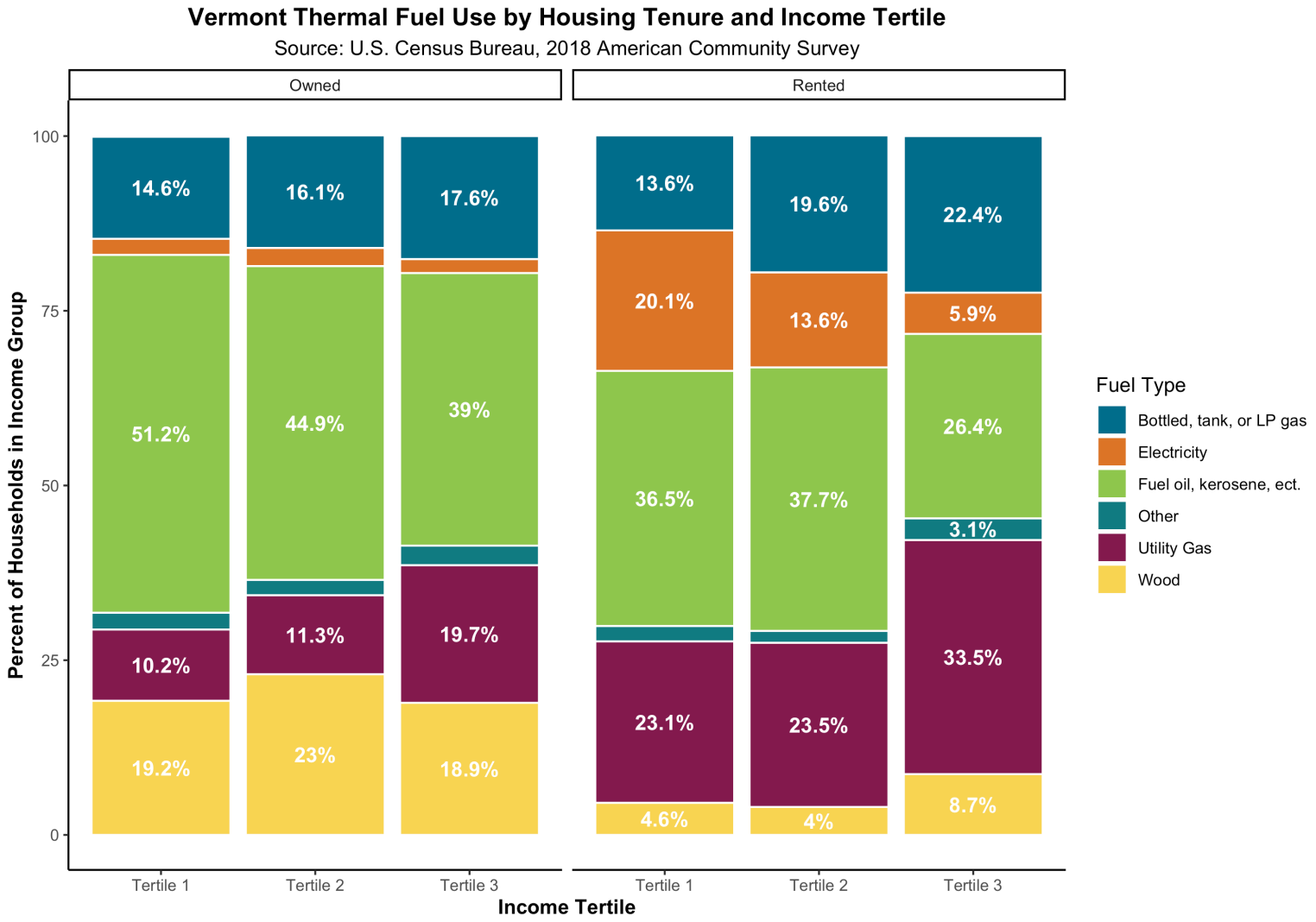
Renting as a Barrier to Affordable Fuel



- **Split incentives discourage energy upgrades in low-income households**
- **Renters use wood disproportionately less than homeowners**
- **Renters use electricity (resistance) disproportionately more than homeowners**

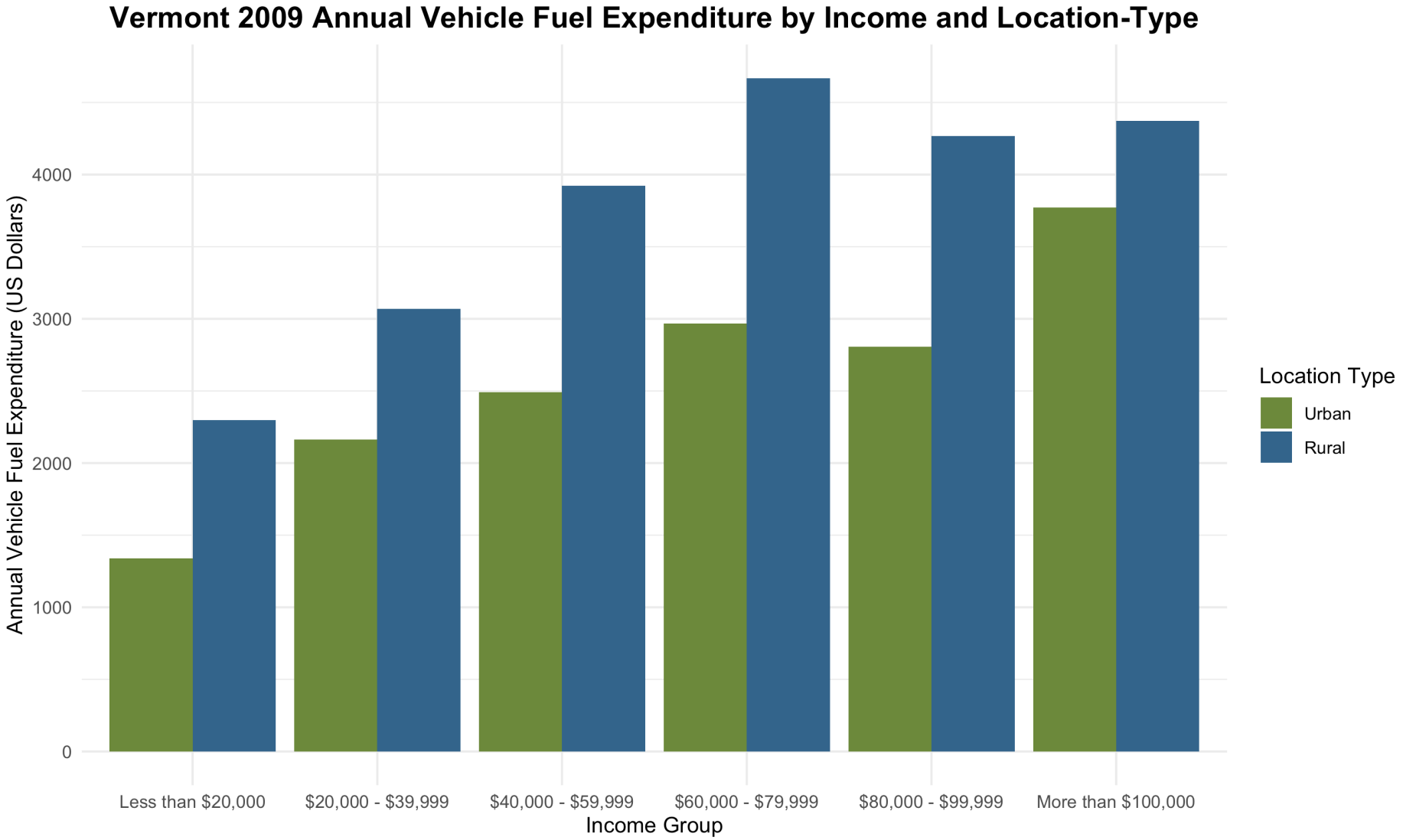
Renting as a Barrier to Affordable Fuel

Tertile 1: Less than $39,560
Tertile 2: $39,560 to $85,000
Tertile 3: More than $85,000

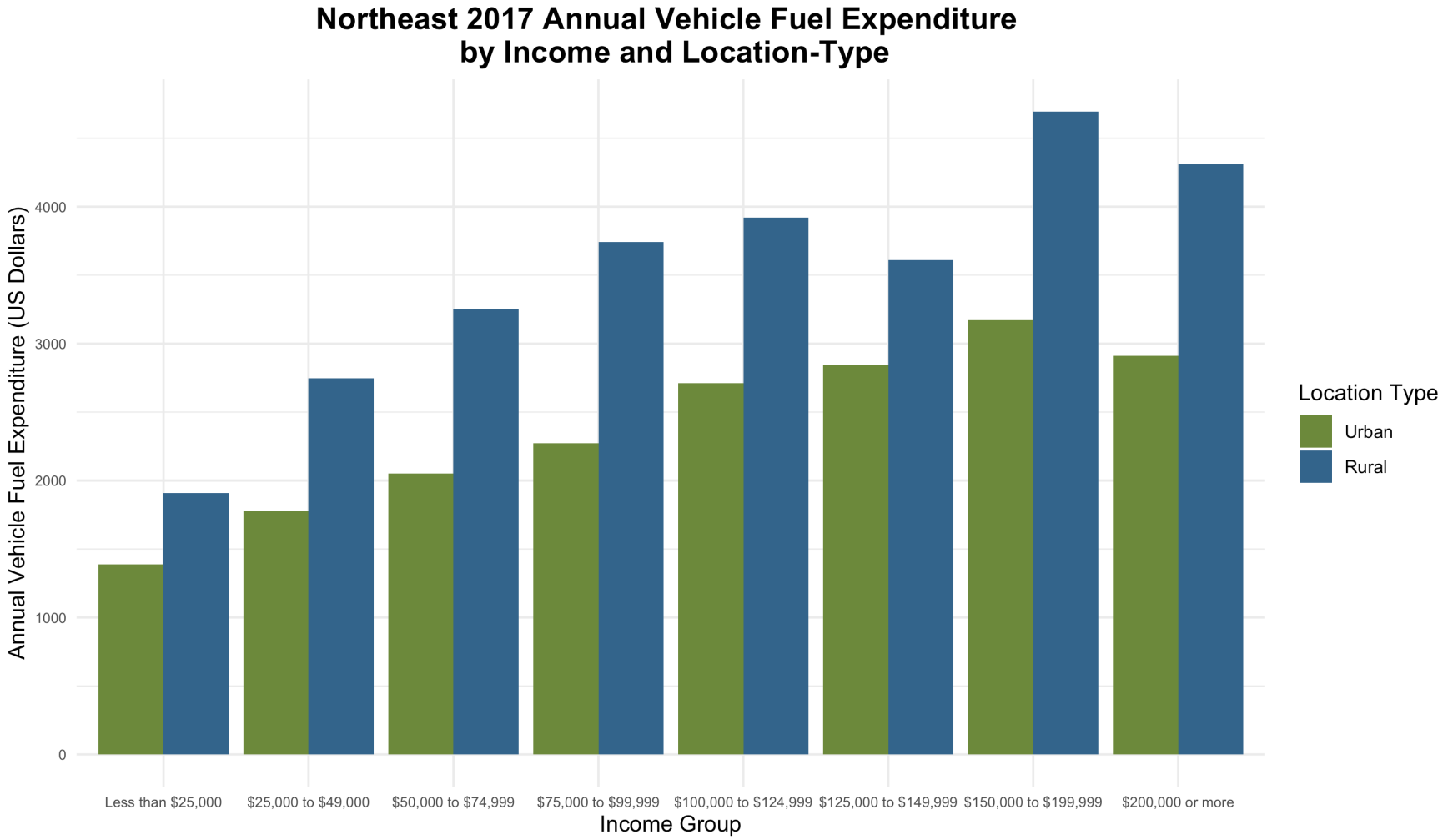


Low-income households purchase the least amount of energy, have the highest energy burden, and suffer the most intensely from energy burden.

Upper-Income VTers: Higher Avg. Vehicle Fuel Expenditures; Rural Drivers Higher than Urban

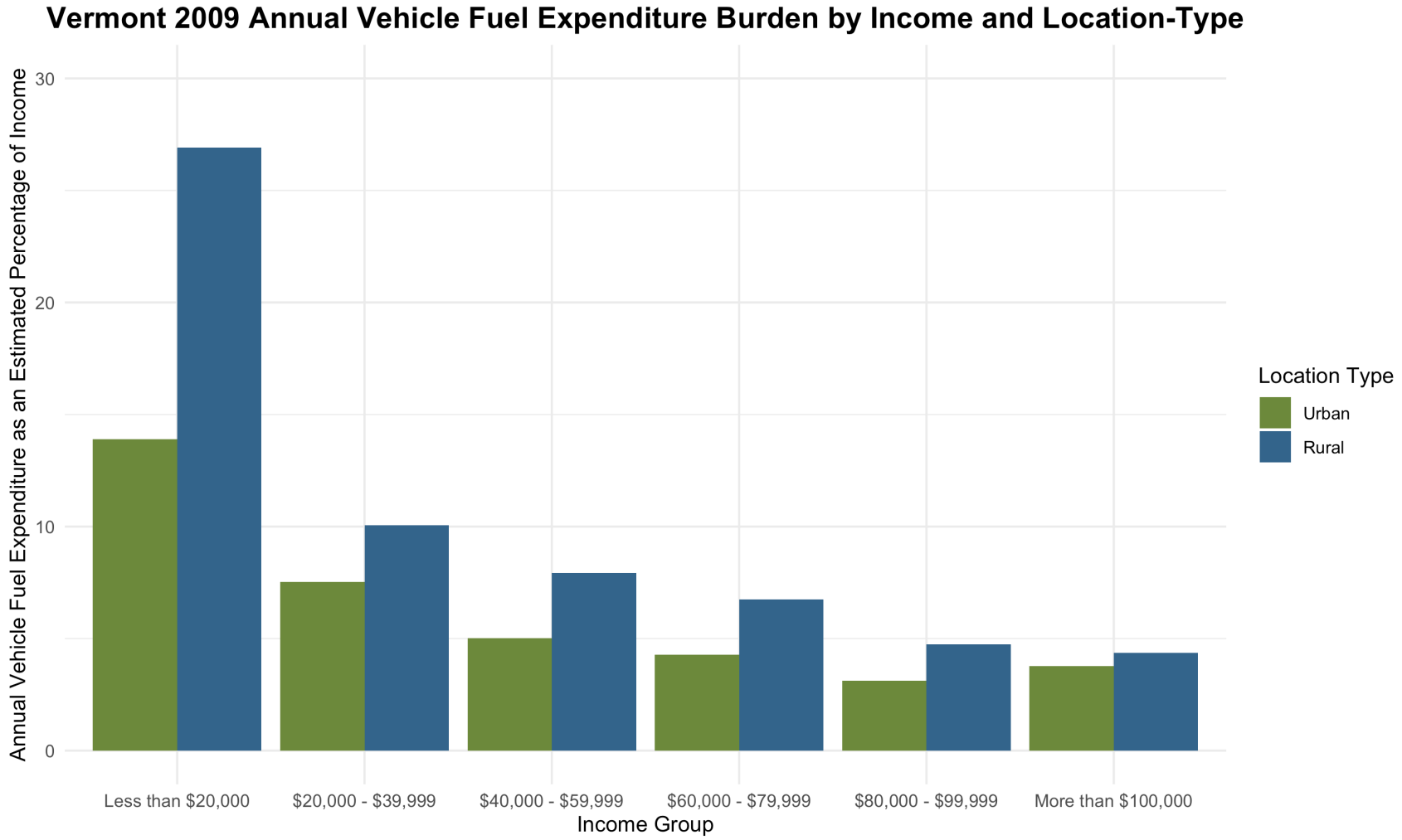


Upper-Income Northeasterners Have Higher Avg. Vehicle Fuel Expenditures; Rural Drivers Higher than Urban

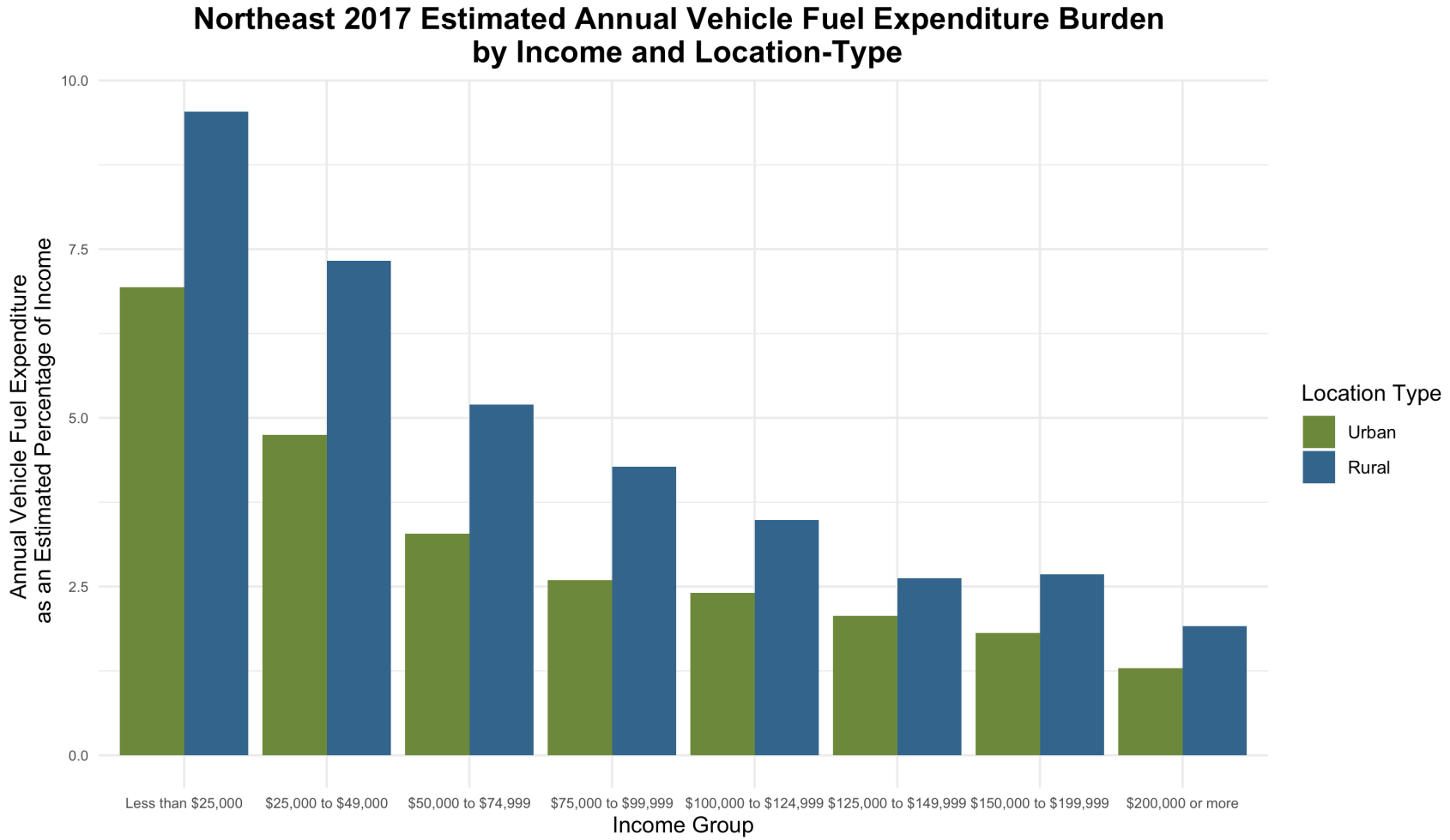


Source: US Department of Transportation, 2017 National Household Travel Survey

Lower-income VT'ers Spend a Higher Share of Income on Vehicle Fuel than Upper-income VT'ers

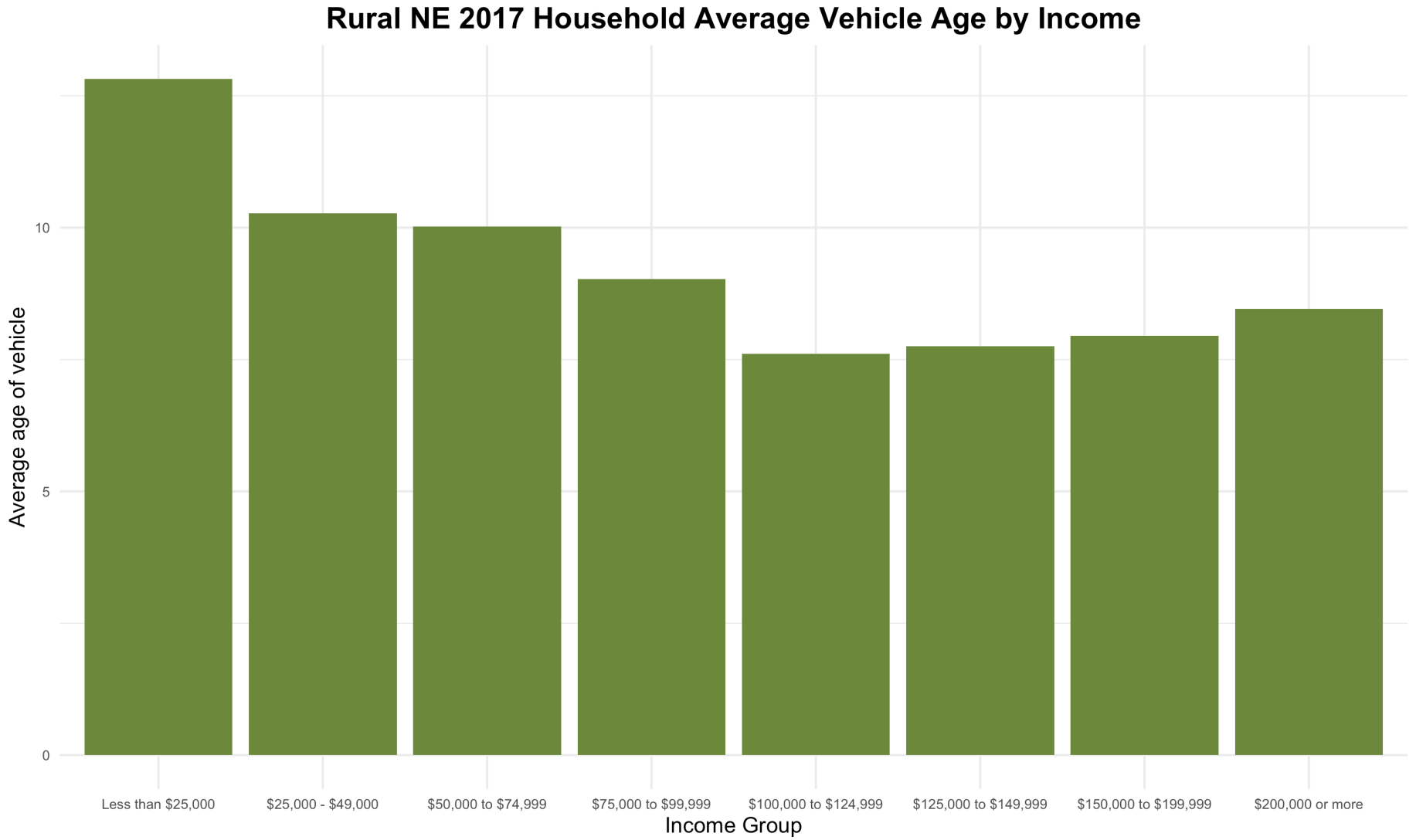


Lower-income Rural NE'ers Spend a Higher Share of Income on Vehicle Fuel than Upper-income Rural NE'ers

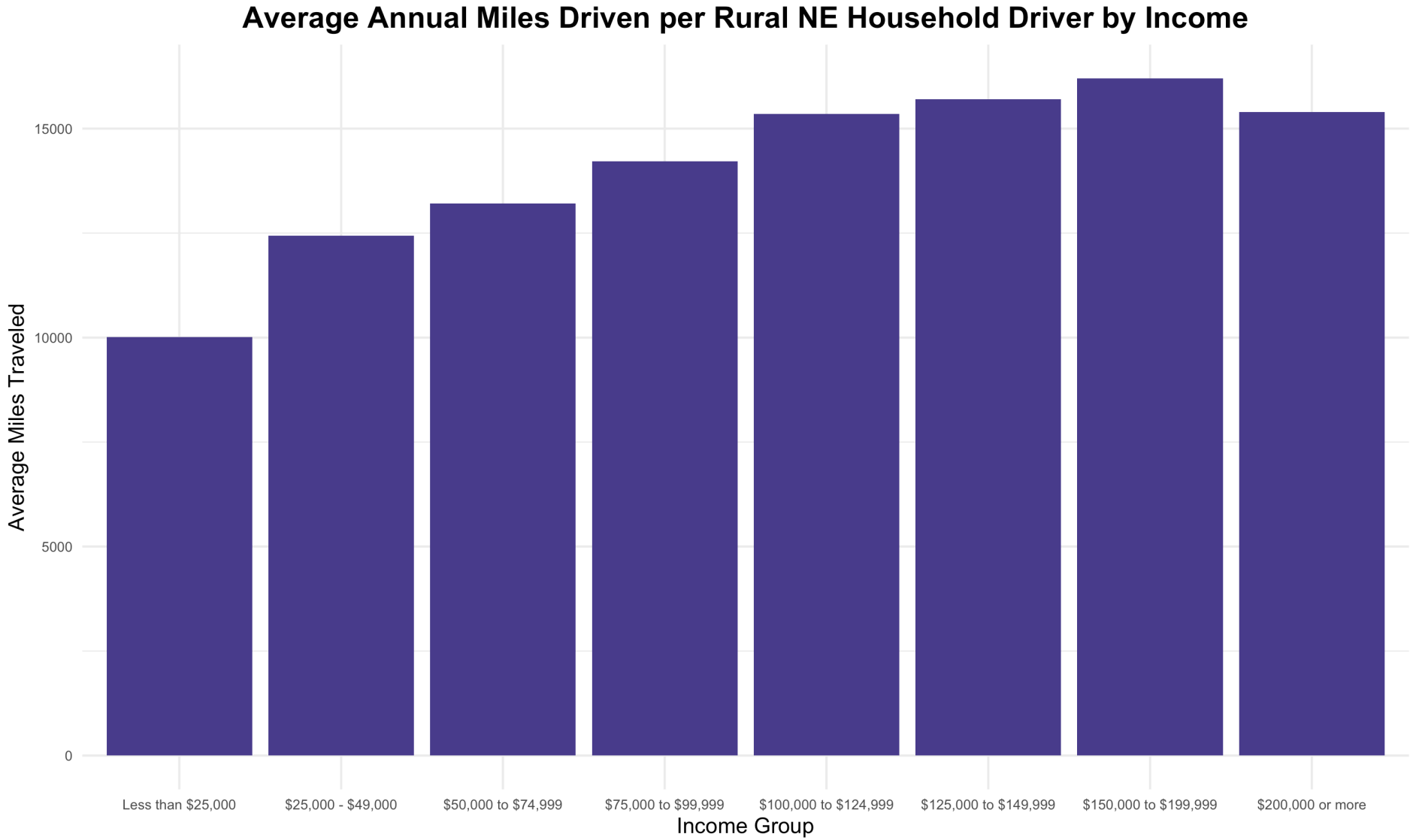


Source: US Department of Transportation, 2017 National Household Travel Survey

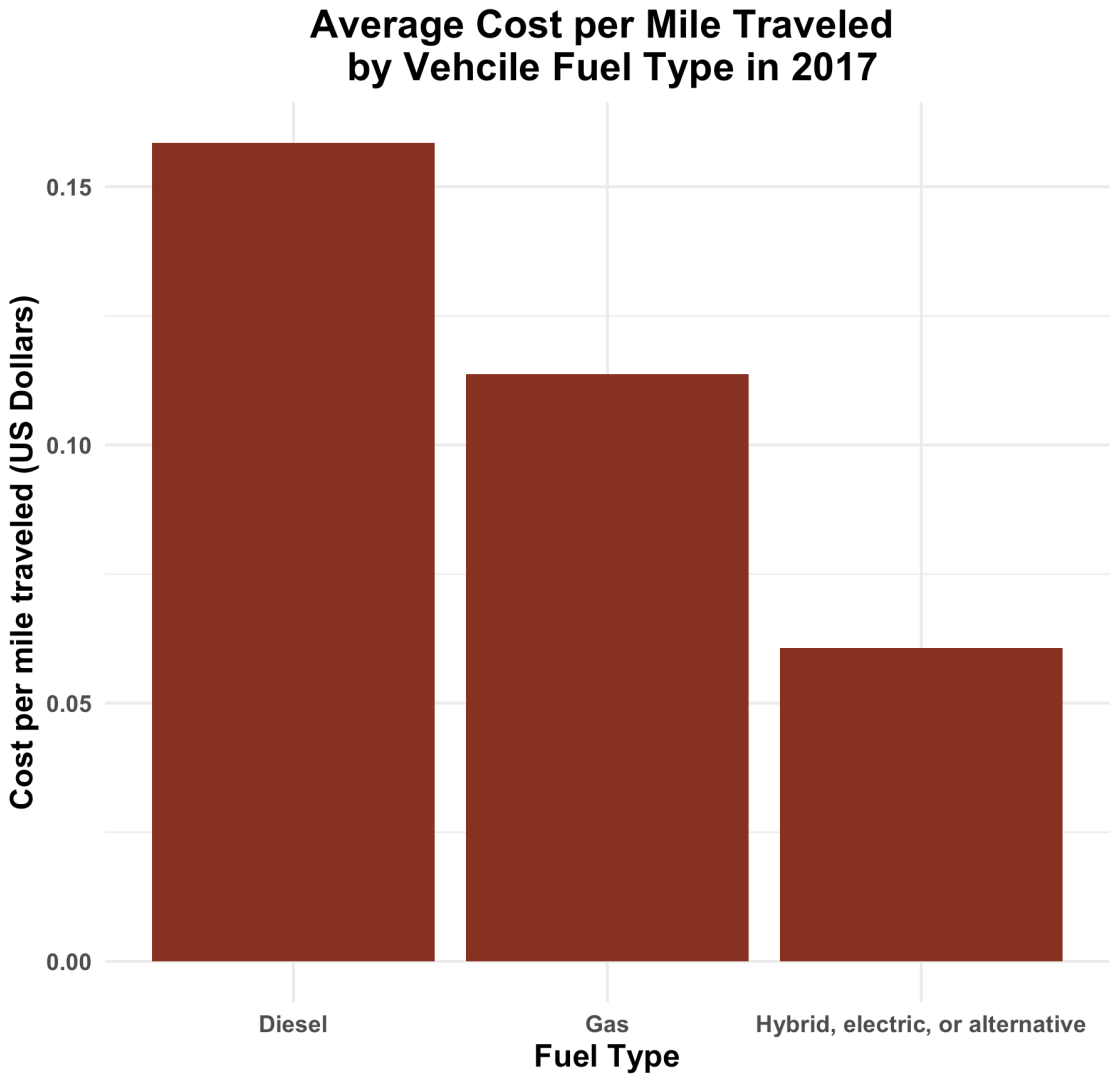
Lower-income Rural NE'ers Tend to Drive Older Vehicles Than Upper-income Rural NE'ers



Upper-income Rural NE Drivers Drive More Miles On Avg. than Lower-income Rural NE Drivers



Electric and Hybrid Vehicles are Much Less Expensive to Drive, per Mile Traveled



Source: US Department of Transportation, 2017 National Household Travel Survey

MSRP vs. Actual Price, Before and After Incentives

Electric vehicle incentives

	NISSAN LEAF (ELECTRIC)		NISSAN SENTRA (GAS)
	Standard incentive	**Low income incentive**	
Starting Price	$31,600	$31,600	$19,310
Federal Tax Credit	-$7,500	-$7,500	-$0
State Incentive	-$2,500	-$4,500	-$0
OEM Discount	-$6,000	-$6,000	-$0
Utility Incentive	-$1,500	-$2,500	-$0
Price after Incentives	**$14,100**	**$11,600**	**$19,310**

Six Initial Takeaways re: Transportation Equity

- 1. Upper-income Vermonters consume more transportation fuel than lower-income Vermonters
- 2. However, lower-income Vermonters spend a far higher share of their income on transportation fuels
- 3. The lowest-income rural NE drivers drive vehicles about 12 years old (vs. upper-income, at approx. 8 years old)
- 4. Upper-income rural NE drivers (>$100k household income) drive many more miles than the lowest-income NE drivers (<$25k hh income) -- 15k miles/yr. vs. 10k miles/yr.
- 5. Electric and hybrid vehicles are much less expensive to drive per mile (fuel and maintenance savings).
- 6. After incentives, many EVs are already less expensive up-front than comparable gas models

Key Takeaways

- We can meet our emissions reduction requirements with proven and available technologies and best practices.
- To do so, we will need a major focus on moving beyond fossil fueled **transportation and heating**
- Doing so is a major opportunity to **strengthen the Vermont economy, create good-paying jobs, save Vermonters money, and improve equity.**

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