# What the latest fossil fuel sales data tell us about Vermont's economy and emissions

Presentation for the House Energy & Digital Infrastructure Committee

Jared Duval, Executive Director

Energy Action Network

May 2, 2025

RESEARCH PAPER

**Fossil Fuel Sales in Vermont: What the Latest Data Mean for the State Economy, Vermont Consumers, and GHG Emissions Reduction Commitments**

**April 2025**

ENERGY ACTION NETWORK

Energy Action Network (EAN) is an independent non-profit organization that conducts data tracking, research, and analysis on behalf of all Vermonters. We are dedicated to providing transparent, timely, and high quality information and analysis to support fact-based energy and climate conversations in Vermont.

# The Good News

- Overall, statewide fossil fuel consumption has been trending downward (albeit slowly… and largely supported by federal funding that is now going away or facing uncertainty).

- Vermont's GHG pollution has been trending downward (an estimated 16-21% reduction below 2005 levels as of 2024).

- As of the end of 2024. Vermonters have helped cut pollution and, often, to reduce energy costs by:
  - **Registering nearly 18,000 electric vehicles (EVs)**
  - **Comprehensively weatherizing over 40,000 homes**
  - **Installing over 20,000 heat pump water heaters**
  - **Installing over 70,000 cold climate heat pump units**

# The Good News

- **A key opportunity to lower energy bills and provide greater price stability for Vermonters is by increasing access to and adoption of solutions that reduce or end dependence on fossil fuels.**
- Efficient energy solutions that can significantly lower monthly and lifetime costs include **electric vehicles, weatherization, heat pump water heaters, heat pump systems, and advanced wood heating systems.**

# The Bad News

- **2024 was the 3rd year in a row that statewide fossil fuel costs exceeded $2 billion** (and, adjusted for inflation, every year since 2017 except 2020 saw statewide fossil fuel costs over $2 billion, as measured in 2024 dollars).

- Vermonters' exposure to and dependence on price-volatile fossil fuels has led to large cost increases in recent years.

  - **VT faced over $1 billion more in annual fossil fuel costs comparing 2022 to 2020 – a cost increase of nearly $1,800 per Vermonter.**

  - VT faced a 38% cost increase in fossil fuels comparing 2022 to 2021.

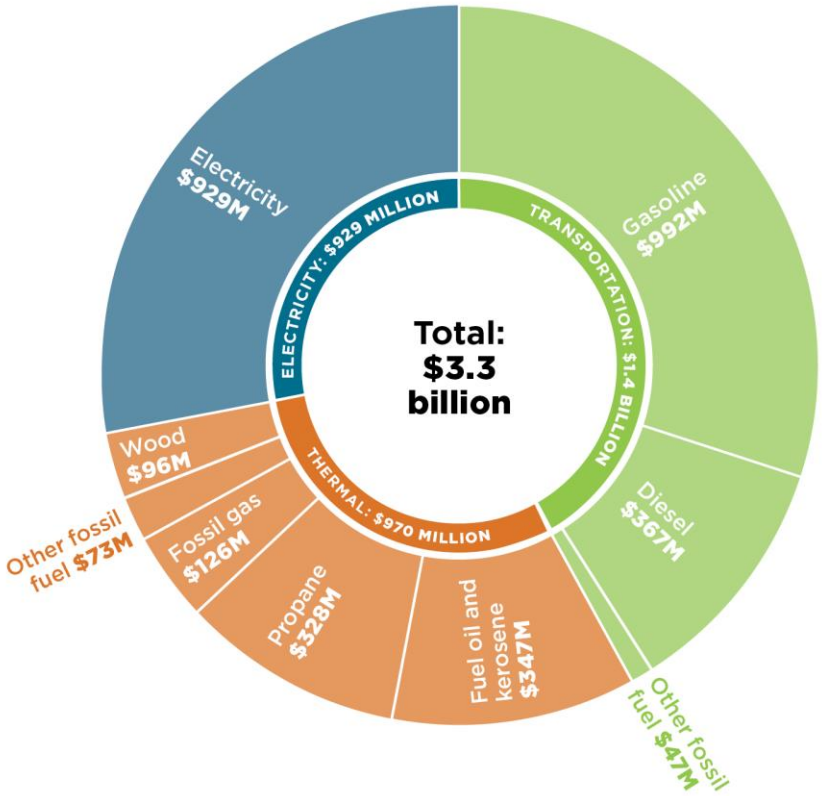
# The Bad News

- **Vermont almost certainly did not meet the first emissions reduction deadline (January 1, 2025) of the GWSA**.

- Based on currently available data, EAN estimates that 2024 statewide GHG emissions in Vermont were likely between 7.75 – 8.29 MMTCO2e (or 8.02, ± 0.27 MMTCO2e). **This translates to falling 18-39% short of Vermont's first statewide emissions reduction obligation under the GWSA.**

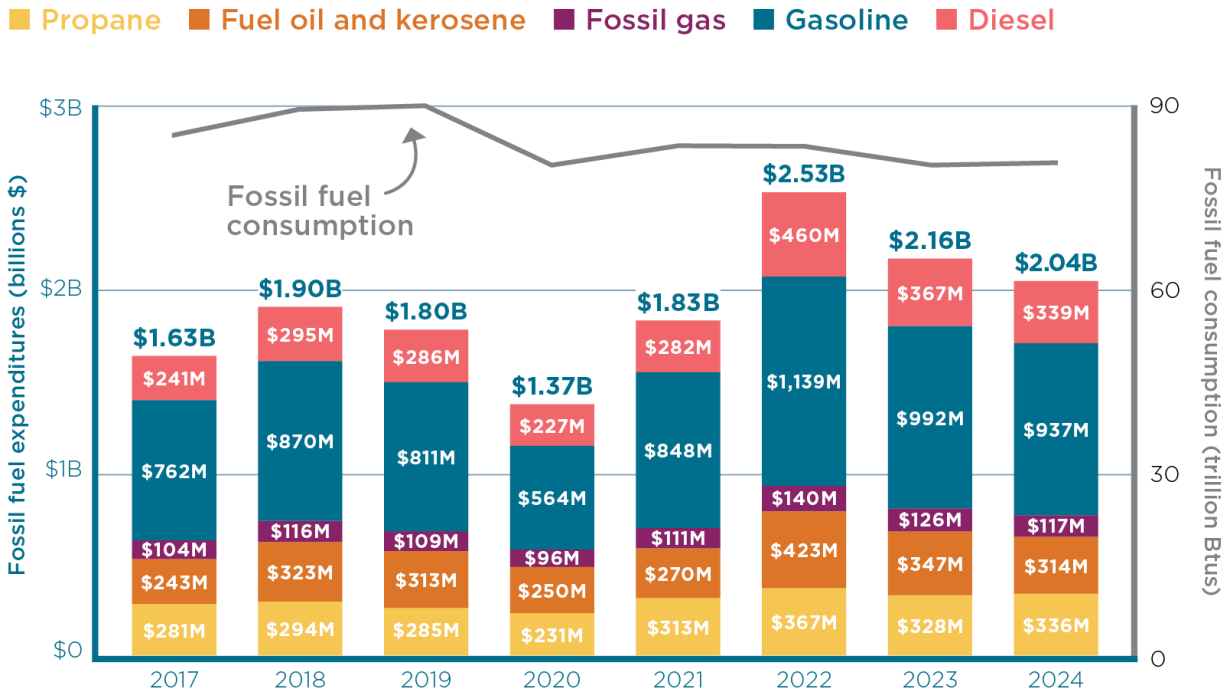
# Economic Analysis

# Total Vermont energy expenditures by sector and fuel, 2023



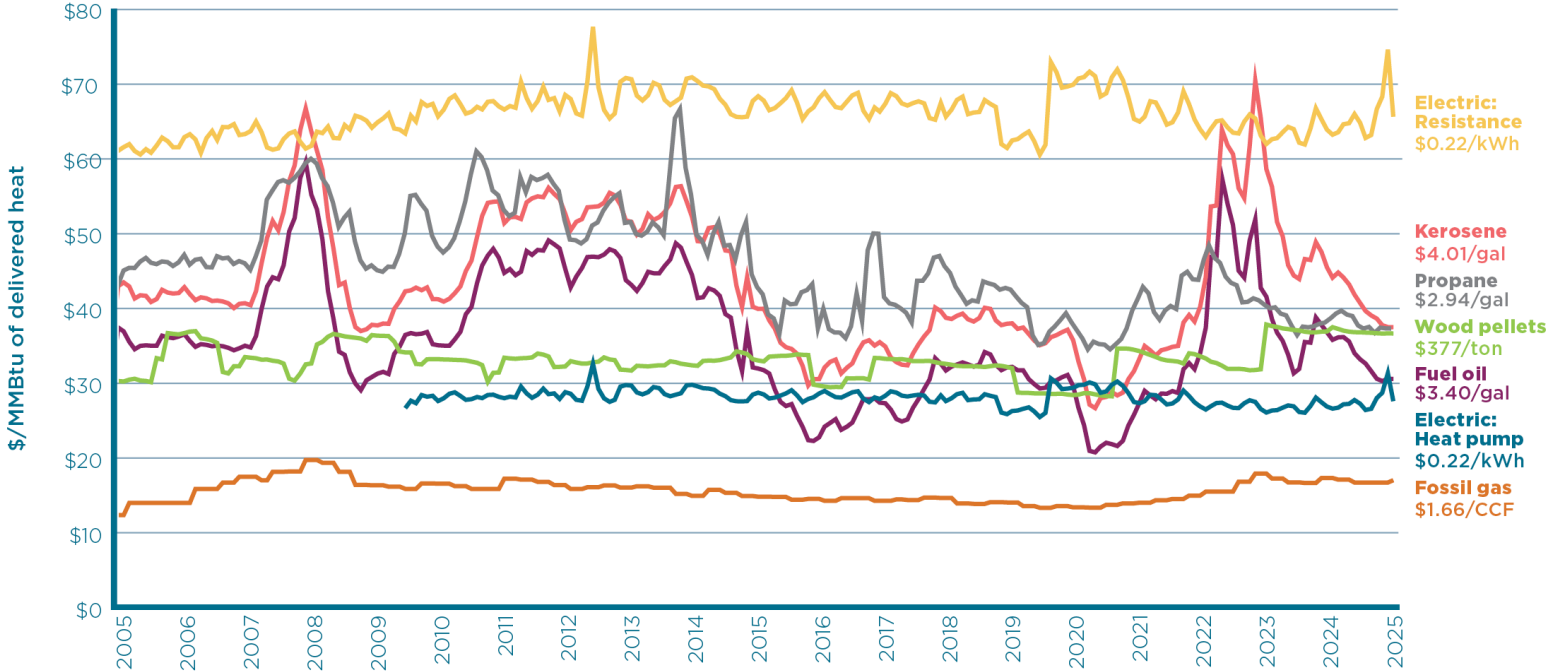

**Sources:** Gasoline and diesel sales volumes from Vermont Joint Fiscal Office, 2025; fuel oil, kerosene, and propane sales volumes from Vermont Department of Taxes, 2025; fossil gas sales volumes and prices from VGS, 2025; fuel prices from Vermont Department of Public Service and EIA; electricity expenditures from Vermont Department of Public Service; wood and other fossil fuel expenditures from EIA.

# Fossil fuel price volatility has led to large cost swings for Vermont, despite relatively flat consumption




**Sources:** Gasoline and diesel sales volumes from Vermont Department of Taxes via the Joint Fiscal Office; fuel oil, kerosene, and propane sales volumes from Vermont Department of Taxes; fossil gas sales volumes and prices from VGS; other fuel prices from Vermont Department of Public Service and EIA. **Note:** This estimate only includes Vermont sales of gasoline, diesel, propane, fuel oil and kerosene, and fossil gas. It does not include sales of aviation gasoline or jet fuel from the transportation sector or of fossil fuel-based electricity generation (less than 10% of Vermont's electricity portfolio).

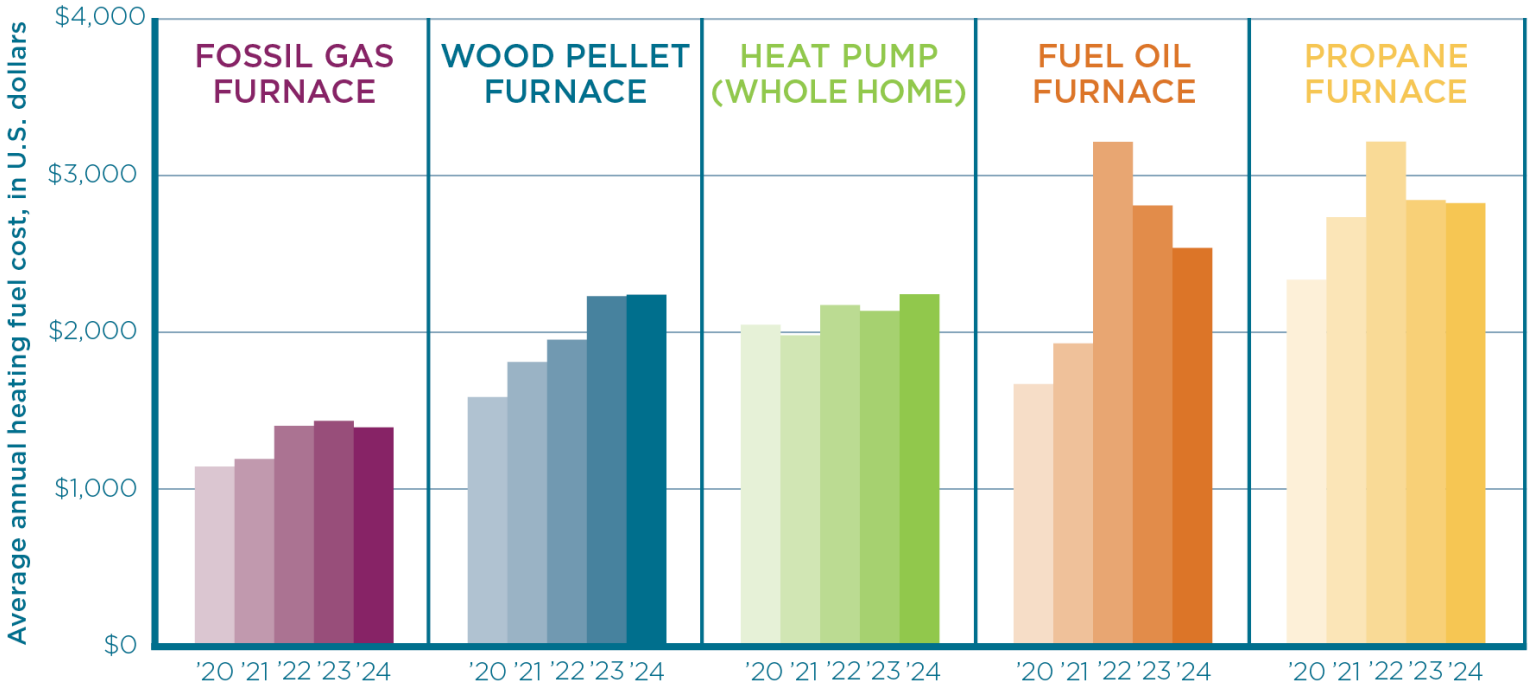
# Cost comparison of different heating fuel options over time (adjusted for inflation, December 2024 dollars)




**Sources:** Fuel oil, propane, and kerosene prices: VT Department of Public Service, Retail Prices of Heating Fuels. Fossil gas: VGS. Electricity: EIA. Wood pellets: Biomass Energy Research Center; 2024 prices estimated based on a small sample of VT suppliers and average prices collected by Maine and New Hampshire. **Notes:** Electricity prices presented here are a statewide average but vary by utility territory. The reason propane is usually more expensive per MMBtu than fuel oil but less expensive on a per gallon basis is because propane has a lower energy content per gallon (66% of the energy of fuel oil per gallon). Prices reflect data through December 2024. Prices shown are in December 2024 dollars, using the U.S. BLS Consumer Price Index.

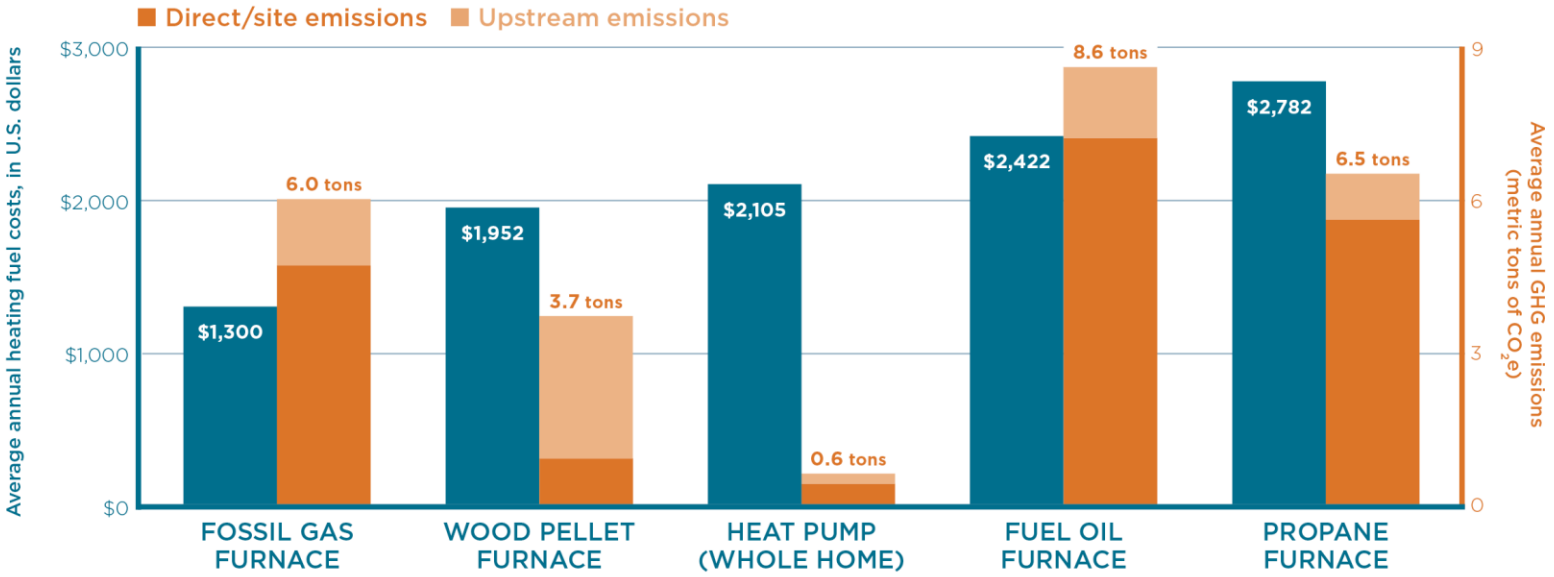
# Fuel oil and propane are more expensive and price-volatile than other heating fuels

## Average VT household heating fuel costs, 2020-2024



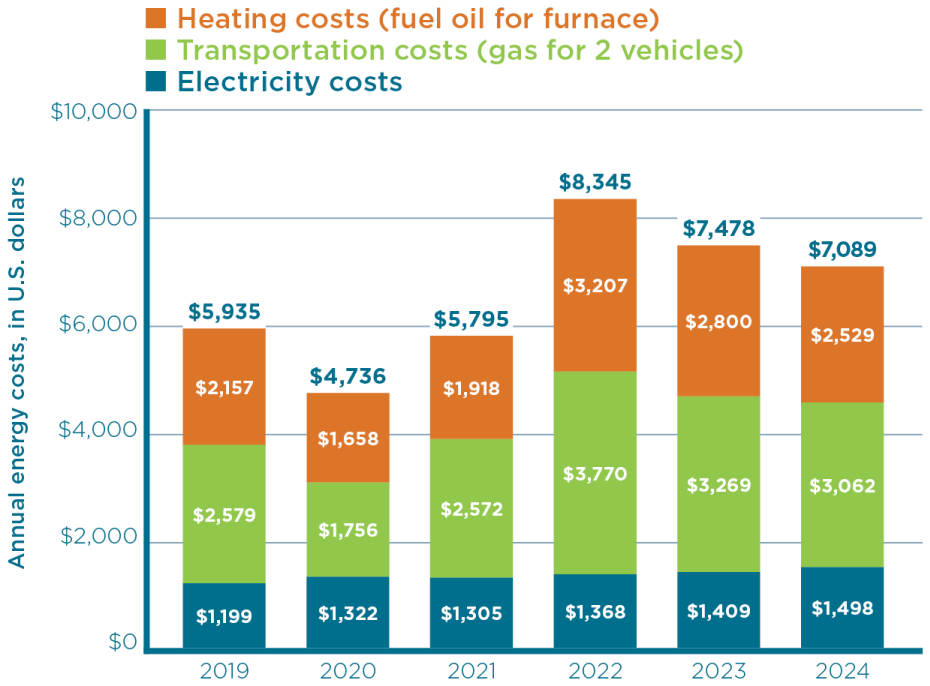

**Sources:** Average monthly fuel prices: EIA; Vermont Department of Public Service, Retail Prices of Heating Fuels; VGS. Average efficiency rates of heating equipment: Efficiency Vermont Technical Reference Manual (TRM), 2024. Annual fuel costs assume average household heating load of 83 MMBtu, adjusted to account for annual population-weighted heating degree days from NOAA Climate Prediction Center.

# Average annual VT household heating fuel costs and GHG emissions, 2020–2024



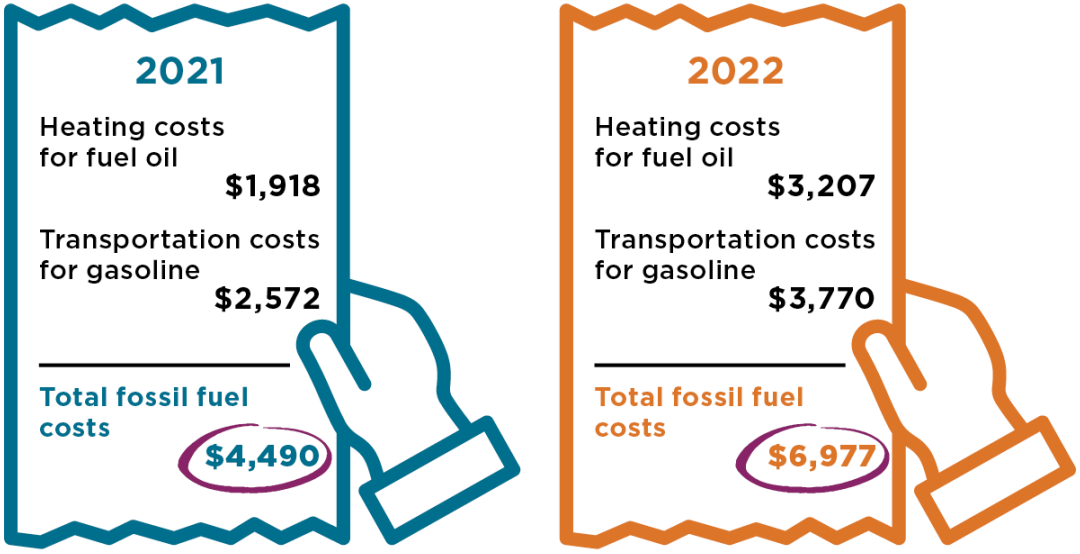

**Sources:** Average monthly fuel prices: EIA; Vermont Department of Public Service, Retail Prices of Heating Fuels; VGS. Average efficiency rates of heating equipment: Efficiency Vermont Technical Reference Manual (TRM), 2024. Direct/site emissions factors: VT Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast, 1990-2021," 2024. Upstream emissions factors: ERG, prepared for VT ANR, "Vermont Energy Sector Life Cycle Assessment," 2024. Annual fuel costs assume average household heating load of 83 MMBtu, adjusted to account for annual population-weighted heating degree days from NOAA Climate Prediction Center.

# Annual energy costs for an example VT household, 2019–2024




**Sources:** Transportation costs estimated for a household with 2 gasoline vehicles based on VT average annual VMT from the Federal Highway Administration, average MPG assumption from the 2021 Vermont Transportation Energy Profile, and average annual gasoline prices for New England from EIA. Heating costs for a fuel oil furnace estimated based on average Vermont heating load of 83 MMBtu (adjusted based on annual heating degree days), average fuel oil furnace efficiency from the Efficiency Vermont Technical Reference Manual (TRM), 2024, and average VT fuel oil prices from the Department of Public Service. Electricity costs estimated based on average monthly electricity consumption and average annual electricity prices from EIA.

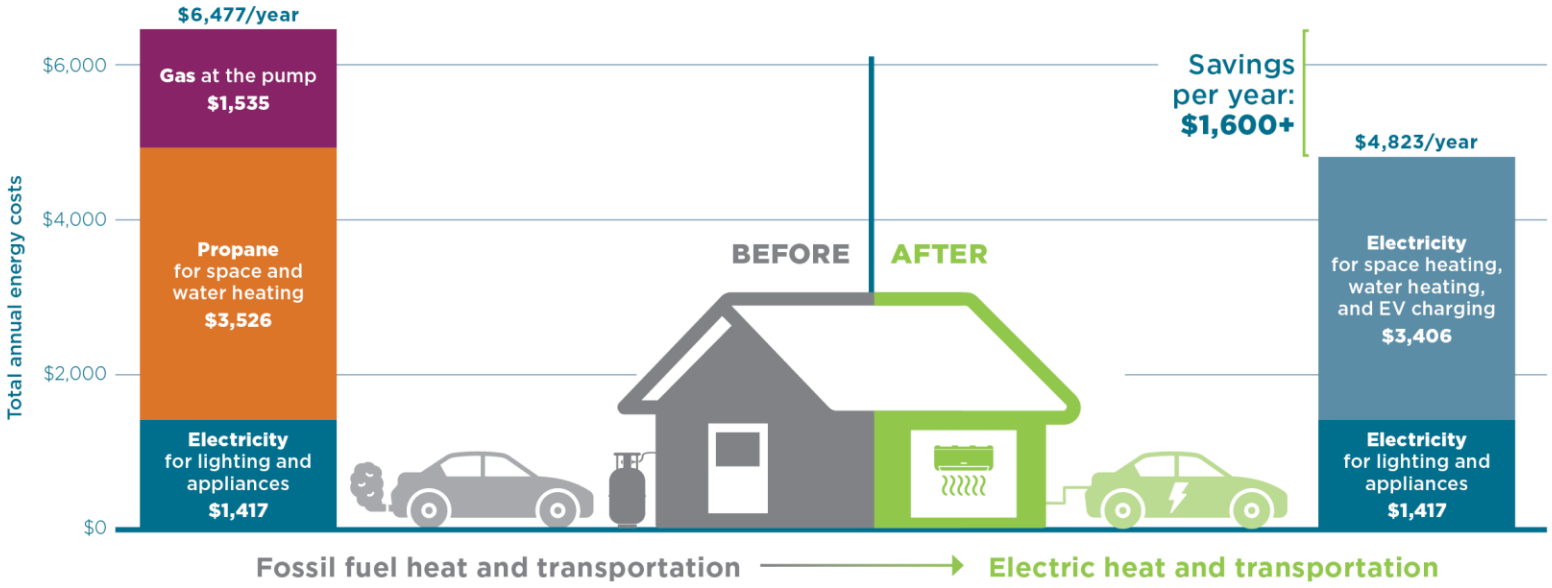
# Fossil fuel costs spiked in 2022: Example cost impacts for a Vermont household




**Sources:** Transportation costs estimated for a household with 2 gasoline vehicles based on VT average annual VMT from the Federal Highway Administration, average MPG assumption from the 2021 Vermont Transportation Energy Profile, and average annual gasoline prices for New England from EIA. Heating costs for a fuel oil furnace estimated based on average Vermont heating load of 83 MMBtu (adjusted based on annual heating degree days), average fuel oil furnace efficiency from the Efficiency Vermont Technical Reference Manual (TRM), 2024, and average VT fuel oil prices from the Department of Public Service.

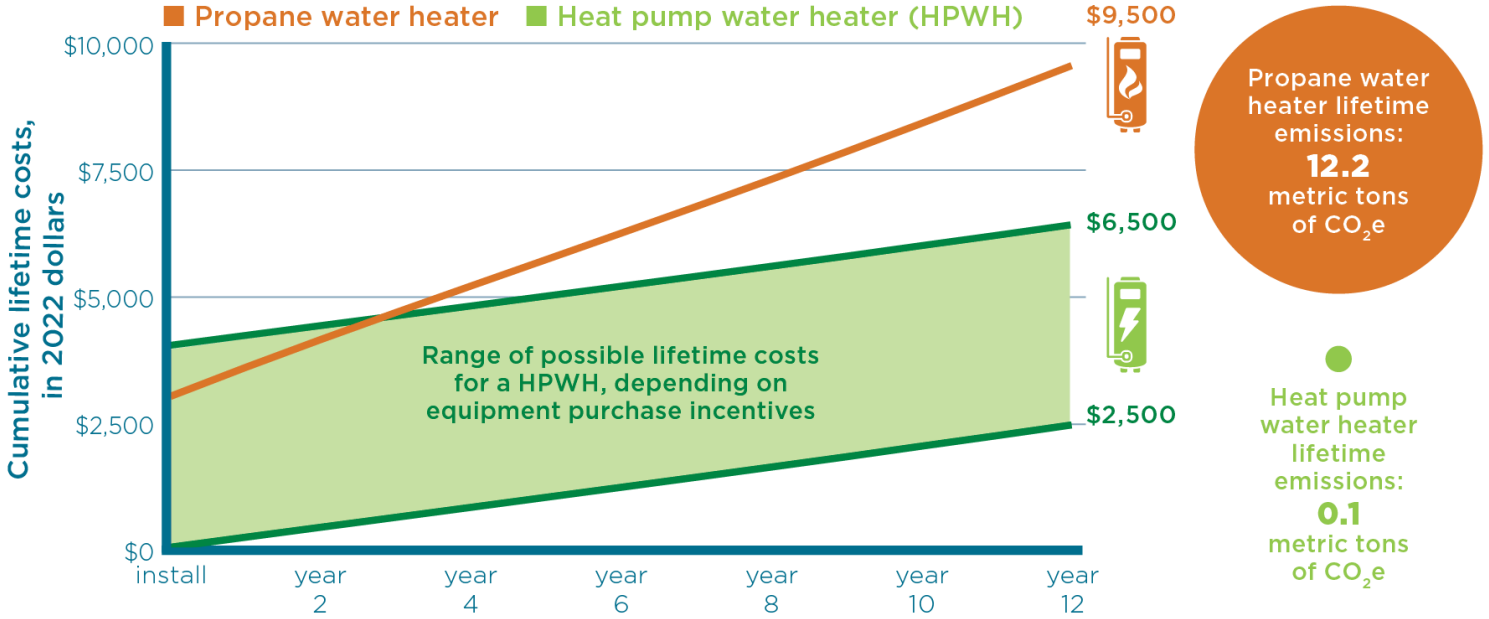
# Electrification can bring down overall energy costs, even as electricity bills increase

## Estimated annual costs for a sample VT single-family household




**Sources:** Energy bill savings calculated based on the average monthly prices for propane, gasoline, and electricity in 2024, from the Vermont Department of Public Service and EIA. Electricity costs for lighting and appliances reflect statewide average annual household electricity expenditures (Efficiency Vermont, "Vermont Energy Burden Report," 2023). Annual transportation fuel costs calculated using average fuel efficency of 23.4 MPG for vehicles registered in VT from the 2021 Vermont Transportation Energy Profile and VT average annual vehicle miles traveled (VMT) of 11,084 miles/year from the Federal Highway Administration. **Note:** Actual energy cost savings will depend on a number of factors, including a household's electricity rate. Several Vermont utilities offer lower electric rates for managed EV charging, providing additional savings to households with access to those rates. Upfront equipment/vehicle costs vary based on model and incentive eligibility; because of this variance, upfront costs are not quantified here. Savings estimates are for a one car household. Estimated savings would be higher for households replacing multiple gas vehicles with electric vehicles.

# Lifetime costs of propane water heater vs. heat pump water heater (installed cost + fuel)

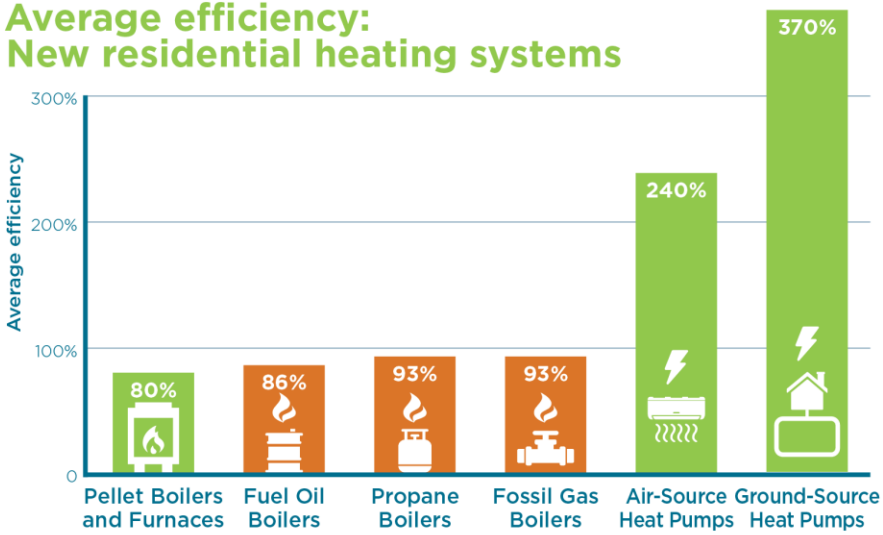



**Sources:** Annual energy load and efficiency assumptions from the Efficiency Vermont 2023 Technical Reference Manual; Propane emissions factor from EPA; Electricity emissions factors assume a linear reduction over time, reaching zero emissions by 2035 in accordance with Vermont's Renewable Energy Standard. Prices shown are in 2022 dollars and reflect projections from EIA's 2023 Annual Energy Outlook for 2024-2035. **Note:** While installed costs of propane water heaters can vary, there is greater variation in heat pump water heater installed costs due to the availability of incentives. Different installed costs for heat pump water heaters reflect federal tax credits and state-level incentives for various income levels, including Switch and Save and Weatherization Assistance Program incentives that can bring the upfront cost as low as $0.

ENERGY ACTION NETWORK

# Modern electric equipment is more energy efficient

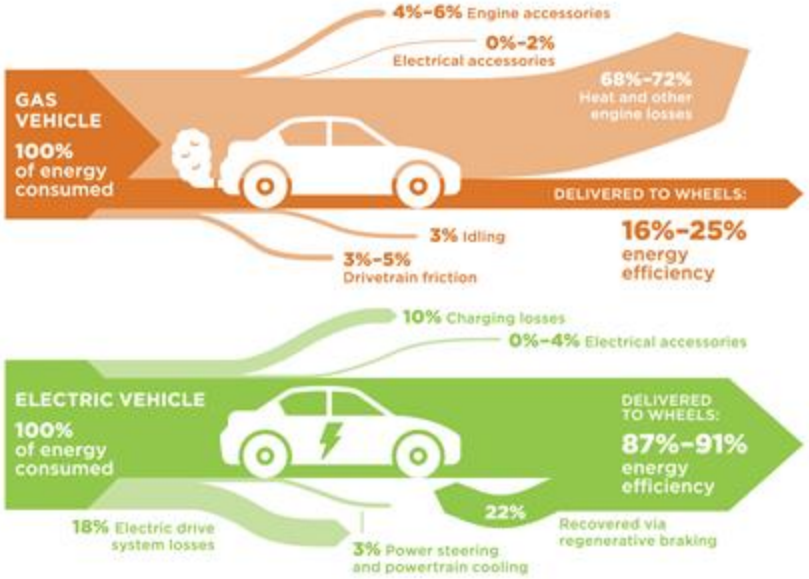
## Average efficiency: New residential heating systems




**Sources:** Pellet stoves, air-source heat pumps, and fuel oil, propane, and fossil gas boiler efficiencies: Vermont Public Utility Commission, "TAG Tier III Annual Report," 2021. Ground-source heat pumps: US Energy Information Agency, "Updated Buildings Sector Appliance and Equipment Costs and Efficiencies," 2023. **Notes:** Heating efficiency refers to the average rate at which an appliance converts energy from fuel to heat output, expressed as a percentage. Heat pumps are capable of achieving efficiency rates greater than 100% because the energy input is used to transfer—rather than generate—heat. Efficiency rates for air-source heat pumps can vary considerably depending on outdoor air temperature. The efficiency presented here is an average over the course of the heating season.

ENERGY ACTION NETWORK

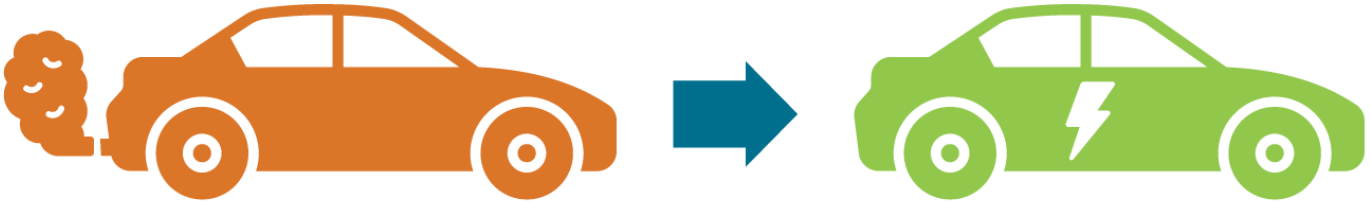
## Efficiency of energy use: Gas vehicles vs electric vehicles




**Source:** fueleconomy.gov. **Note:** Estimates shown are combined city and highway driving.

# Cost comparison of different transportation fuels over time in VT (adjusted for inflation, June 2024 dollars)

# Lifetime cost savings of switching to an electric vehicle



**Estimated savings on fuel and maintenance: ~ $9,500**

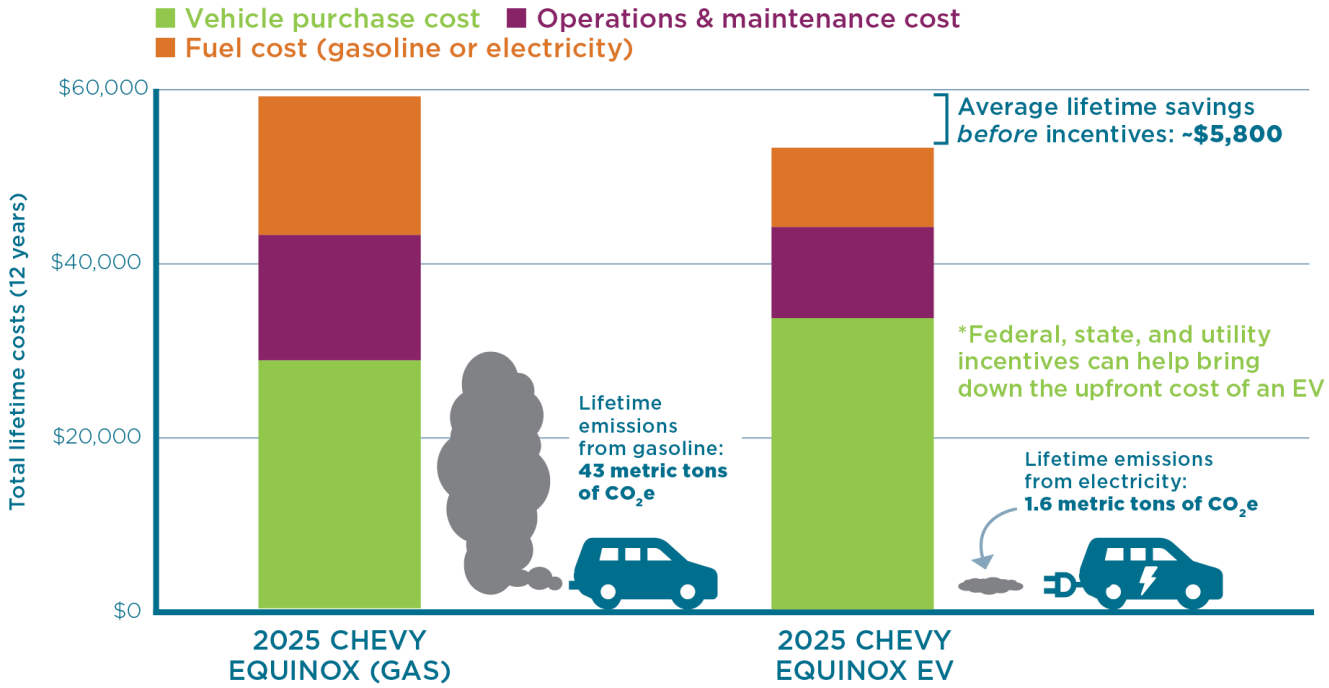
**+**

**Avoided social costs from reduced fuel-related GHG emissions over the life of the vehicle: ~ $7,000**

**Sources:** Annual mileage assumed to be 11,084 based on 2022 data for Vermont from Federal Highway Administration; Fuel economy assumptions from the 2021 Vermont Transportation Energy Profile; Gasoline and electricity prices are 2023 averages for Vermont from EIA; gasoline emissions factors from EIA and EPA; electricity emissions intensity assumed to decrease linearly to 100% carbon-free by 2035; Social Cost of GHG values from the EPA (2023), using a 2% discount rate. Calculation based on a vehicle lifetime of 8 years, per assumptions in the 2023 Vermont Tier III Technical Reference Manual. **Note**: Upfront vehicle costs vary based on make/model and incentive eligibility; because of this variance, upfront vehicle costs are not quantified here. All costs and savings presented in 2024 dollars.

ENERGY ACTION NETWORK

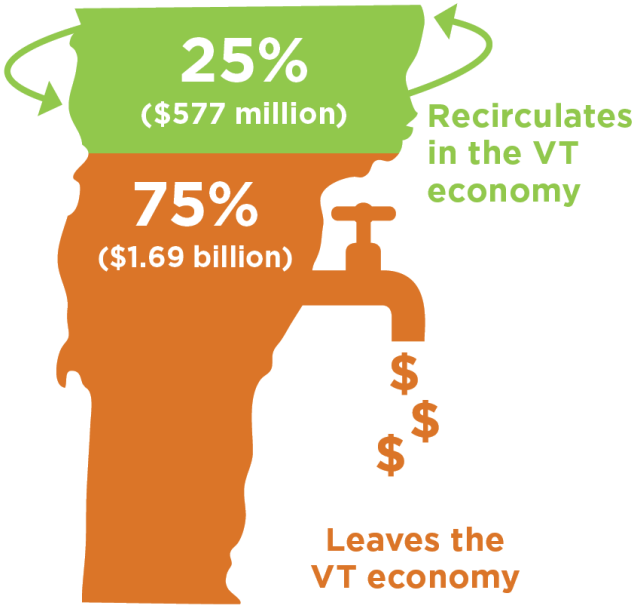
# Lifetime costs and GHG emissions of comparable gas vs. electric vehicles in Vermont




**Sources:** Vehicle costs represent the base MSRP for 2025 models. Gasoline emissions factor from EIA; electricity emissions factor calculated based on Vermont's 2021 GHG Emissions Inventory (VT ANR). Fuel costs calculated based on 2024 average gasoline prices for New England and average VT electricity prices from EIA. Operations and maintenance costs estimated based on AAA 2024 Your Driving Costs study. Operating costs and fuel costs are calculated based on VT average annual mileage of 11,084 miles from the Federal Highway Administration.
**Notes:** Charging costs for EVs can be even lower than presented with the use of EV charging rates offered by some VT utilities. Vehicle efficiency rates are from manufacturer reporting; however, actual efficiency rates are often lower in colder temperatures. For the latest information about EV incentives, visit driveelectricvt.com.

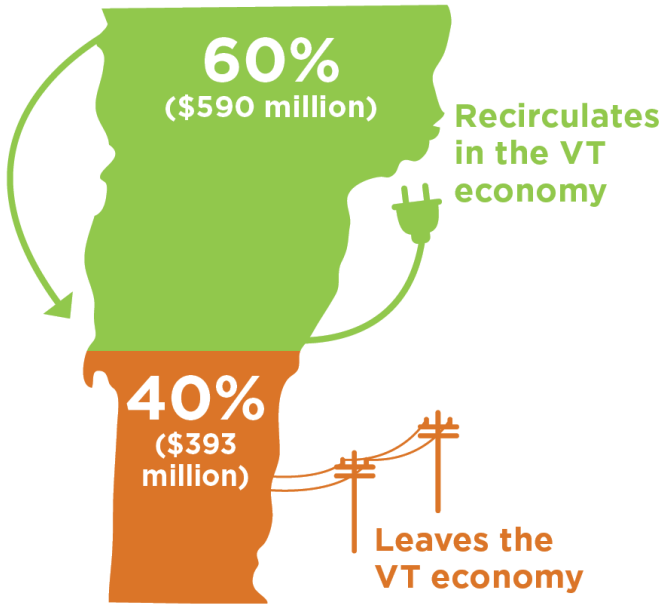
# Fossil fuels are a drain on Vermont's economy

## Vermont fossil fuel spending, 2023




**Sources:** Fossil fuel spending: Vermont Department of Taxes, 2024; VGS, 2024. Dollar recirculation share: Ken Jones, Senior Fellow for Economic Analysis, 2024. **Note:** This graph includes spending on thermal and transportation fuels only.

## Vermont electricity spending, 2023

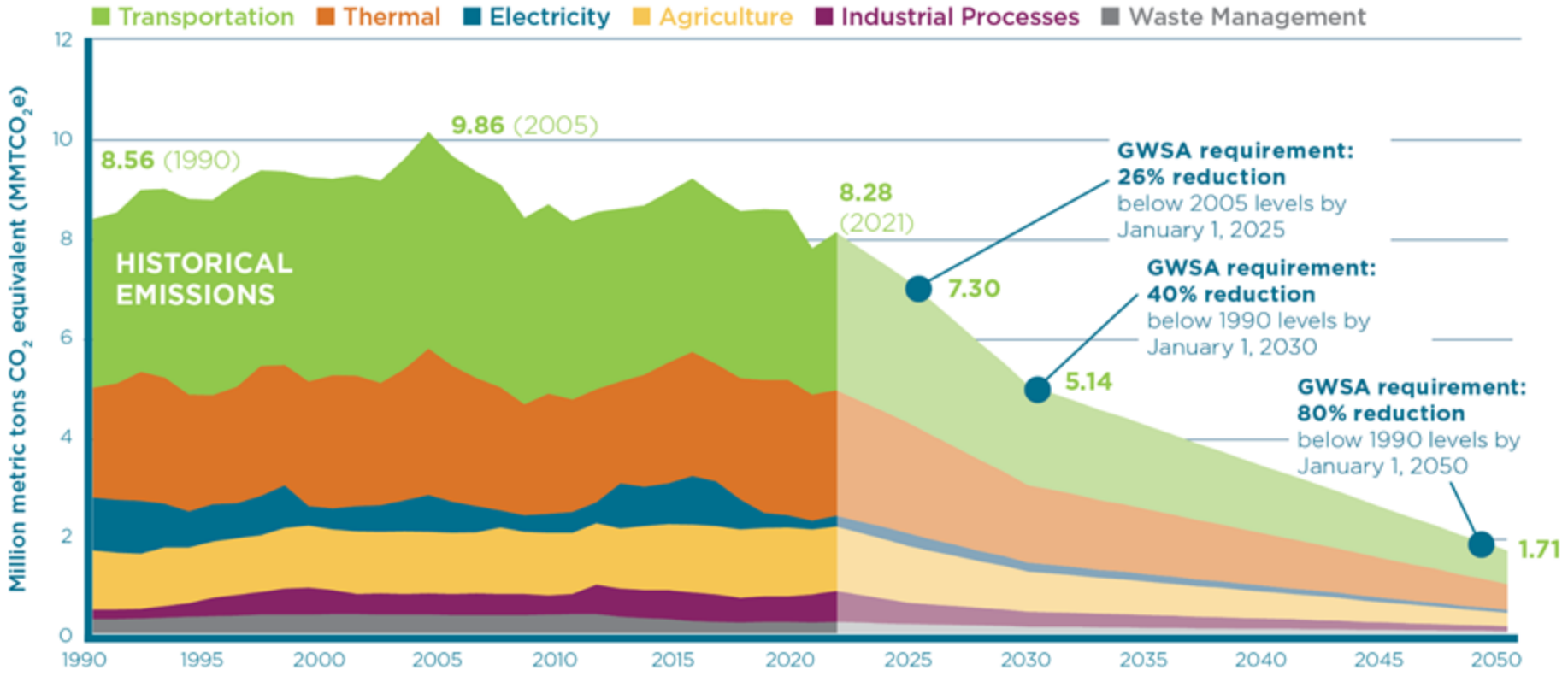



**Sources:** Electricity spending: Vermont electric utilities. Dollar recirculation share: Ken Jones, Senior Fellow for Economic Analysis, 2024. **Note:** Dollar recirculation share was updated in January 2025 to reflect out-of-state transmission costs.

ENERGY ACTION NETWORK

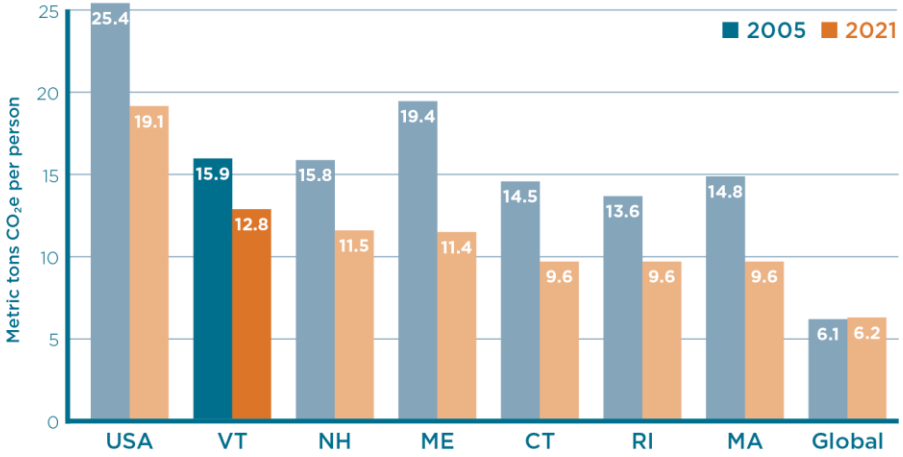
# Emissions Analysis

# Vermont's historical GHG emissions and future requirements



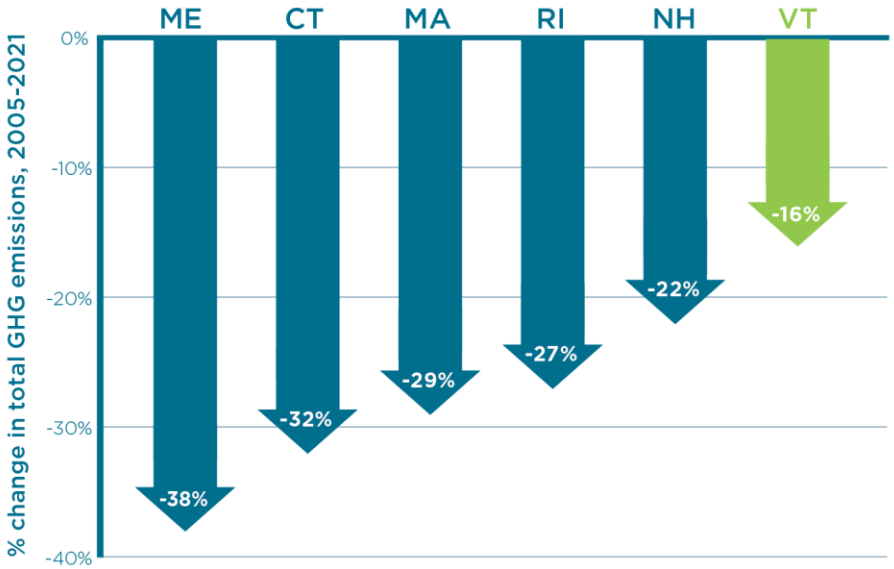

*Emissions data from VT ANR*

## Per capita GHG emissions, 2005 vs. 2021




**Sources:** U.S. EPA, "Inventory of Greenhouse Gas Emissions and Sinks: 1990-2022," 2024; Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024; New Hampshire DES, "State of New Hampshire Priority Climate Action Plan," 2024; Maine DEP, "Tenth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals," 2024; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021," 2024; Rhode Island DEM, "2022 Rhode Island Greenhouse Gas Inventory," 2024; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2021," 2024; Gütschow, et al., "The PRIMAP-hist national historical emissions time series v2.6 (1750-2023)," 2024 via Climate Watch; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia, and Puerto Rico," 2024.

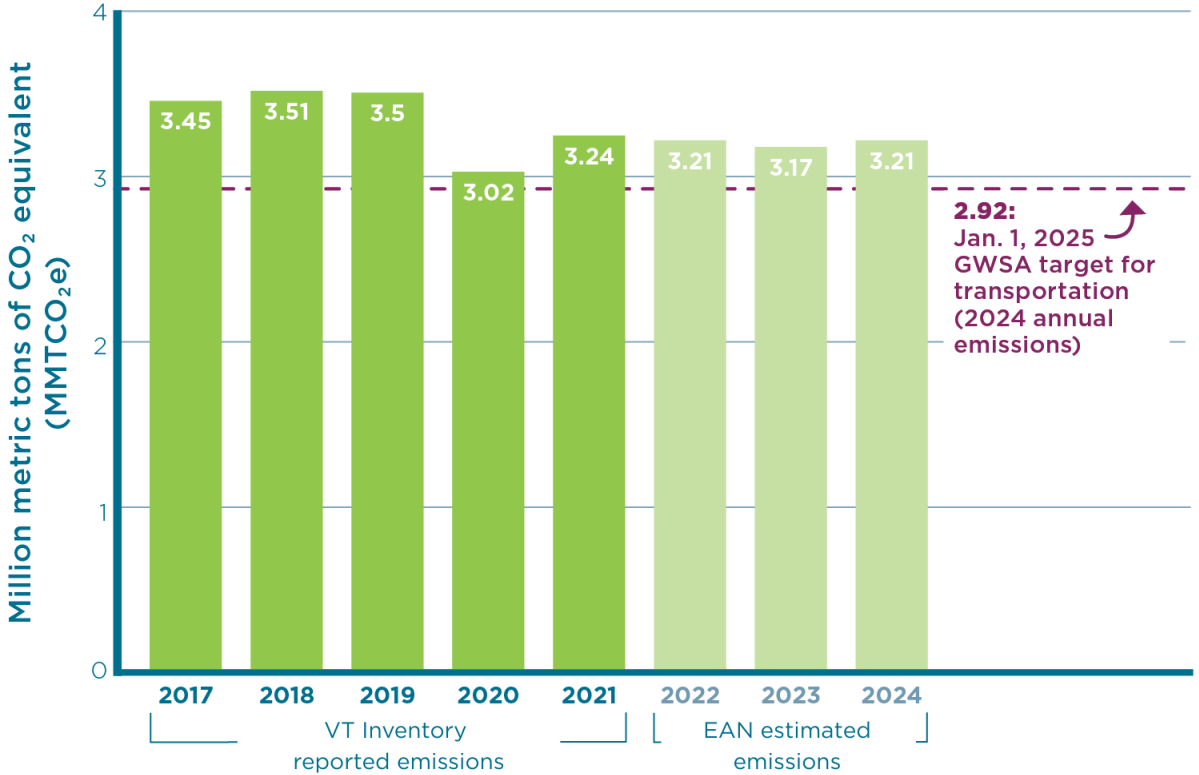
## Percent reduction in total GHG emissions, 2005–2021




**Sources:** Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021," 2024; Maine DEP, "Tenth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals," 2024; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2021," 2024; Rhode Island DEM, "2022 Rhode Island Greenhouse Gas Inventory," 2024; New Hampshire DES, "State of New Hampshire Priority Climate Action Plan," 2024; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia, and Puerto Rico," 2024.

ENERGY ACTION NETWORK

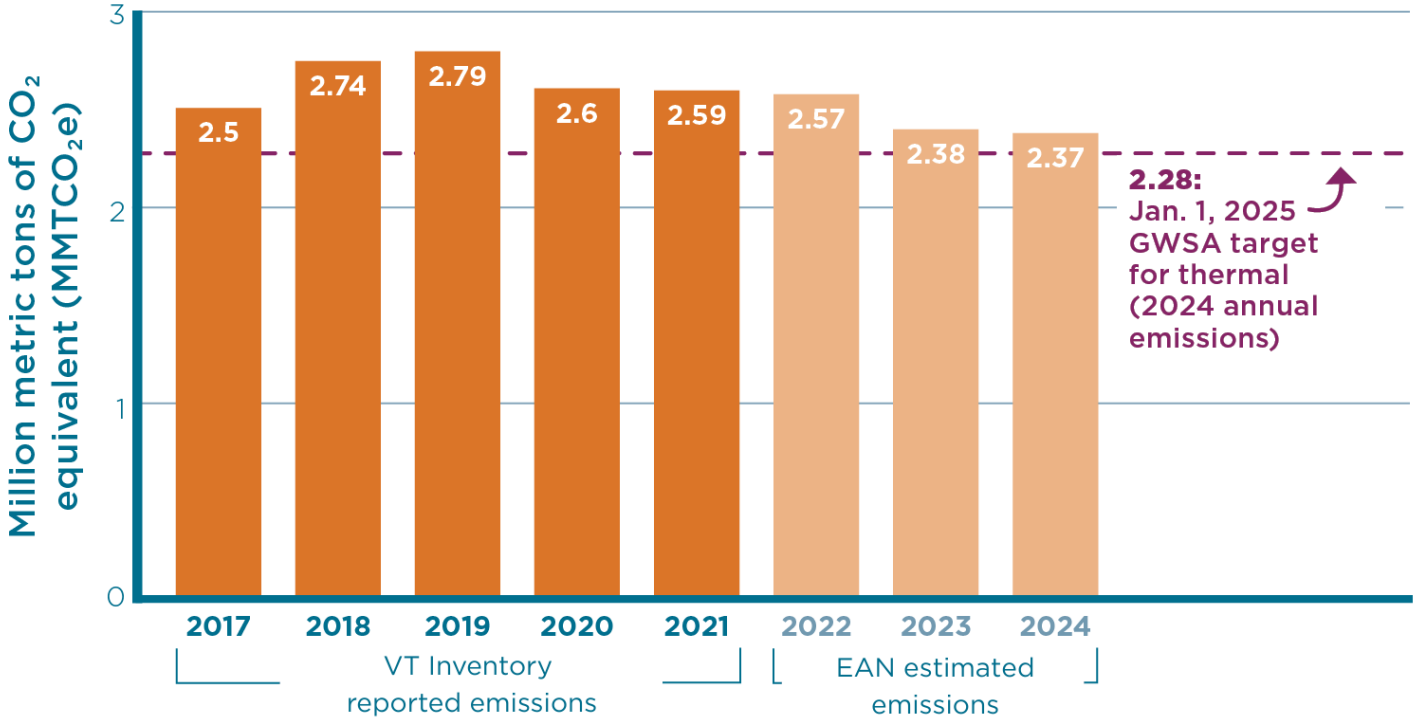
# Vermont GHG emissions in the transportation sector




**Sources:** 2017-2021 emissions: Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024. 2022-2024 emissions estimated by EAN based on data from the Vermont Department of Taxes and EIA GHG emissions factors.

ENERGY ACTION NETWORK

# Vermont GHG emissions in the thermal (RCI) sector




**Sources:** 2017-2021 emissions: Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024. 2022-2024 emissions estimated by EAN based on data from the Vermont Department of Taxes and EIA GHG emissions factors.

ENERGY ACTION NETWORK

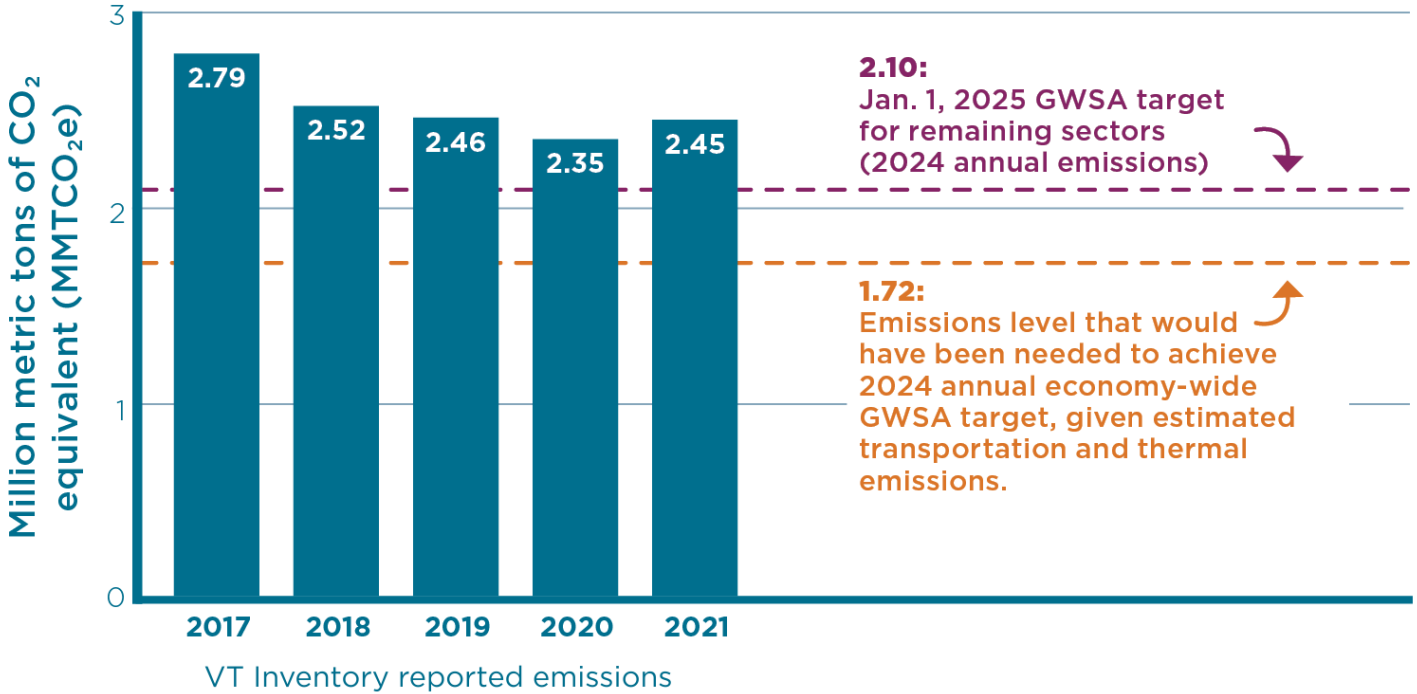
# VT GHG emissions from the transportation and thermal sectors: Historical and projected

| | | Transportation emissions ($MMTCO_2e$) | Thermal (RCI) emissions ($MMTCO_2e$) | Transportation + thermal total ($MMTCO_2e$) |
|---|---|---|---|---|
| VT INVENTORY REPORTED EMISSIONS | 2017 | 3.45 | 2.50 | 5.95 |
| | 2018 | 3.51 | 2.74 | 6.24 |
| | 2019 | 3.50 | 2.79 | 6.29 |
| | 2020 | 3.02 | 2.60 | 5.62 |
| | 2021 | 3.24 | 2.59 | 5.83 |
| EAN ESTIMATED EMISSIONS | 2022 | 3.21 | 2.57 | 5.78 |
| | 2023 | 3.17 | 2.38 | 5.55 |
| | 2024 | **3.21** | **2.37** | **5.57** |
| **2024 GWSA Targets** | | **2.92** | **2.28** | **5.20** |
| **Gap between 2024 estimate and 2024 GWSA sectoral targets** | | **0.28** | **0.09** | **0.37** |

**Sources:** 2017-2021 emissions: Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024. 2022-2024 emissions estimated by EAN based on data from the Vermont Department of Taxes, VGS, and EIA GHG emissions factors.

ENERGY ACTION NETWORK

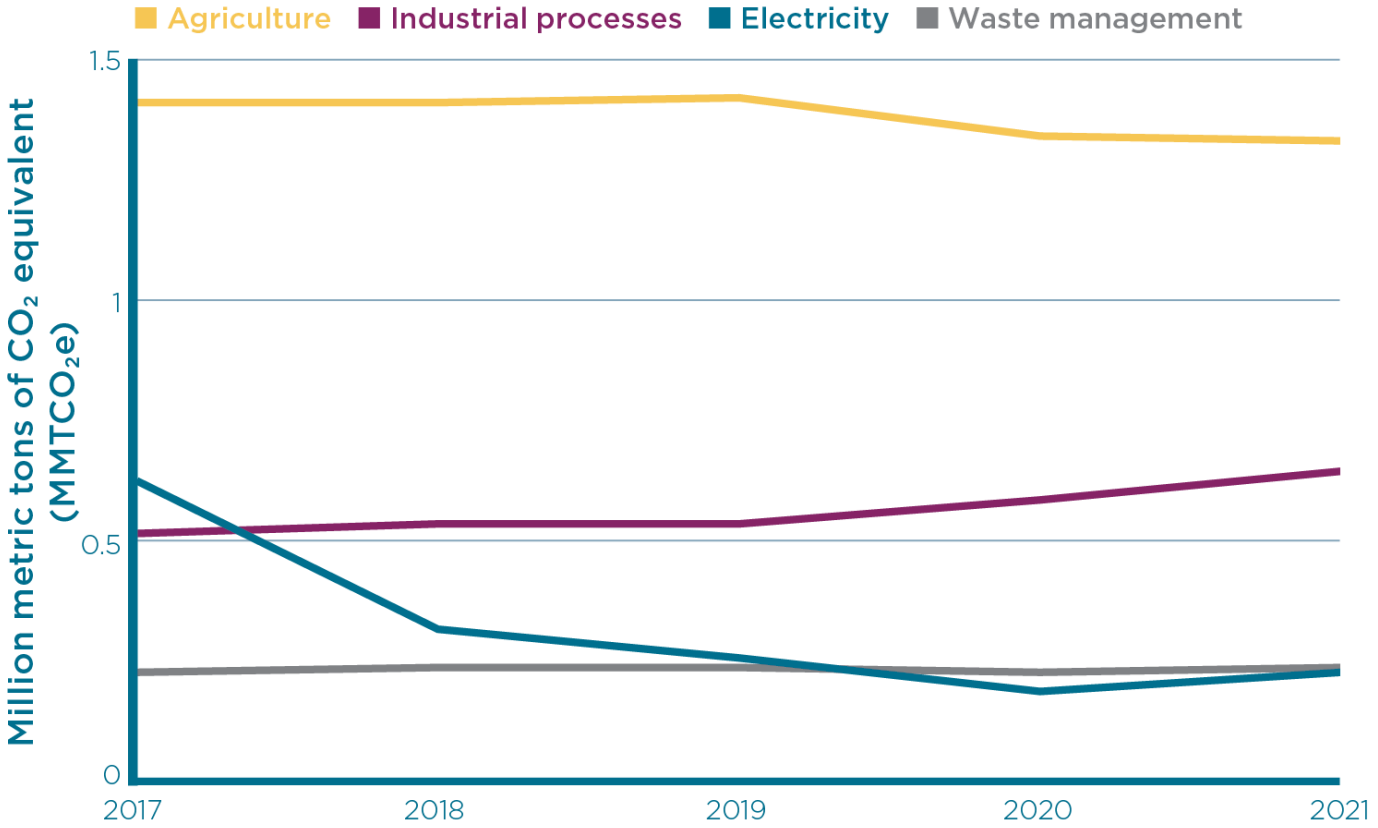
# Vermont GHG emissions in remaining sectors




**Sources:** 2017-2021 emissions: Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024. 2022-2024 emissions estimated by EAN based on data from the Vermont Department of Taxes and EIA GHG emissions factors.

ENERGY ACTION NETWORK

# GHG emissions from other sectors




**Source:** Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021," 2024.

ENERGY ACTION NETWORK

# Vermont 2024 GHG emissions estimates vs. GWSA targets by sector ($MMTCO_2e$)

| | 2024 estimated emissions | Jan. 1, 2025 GWSA target |
|---|---|---|
| Transportation | 3.21 | 2.92 |
| Thermal | 2.37 | 2.28 |
| Agriculture | 1.33 (± 0.09) | 1.18 |
| Industrial processes | 0.64 (± 0.10) | 0.44 |
| Waste management | 0.23 (± 0.003) | 0.19 |
| Electricity | 0.22 (± 0.08) | 0.26 |
| Fossil fuel industry | 0.03 | 0.03 |
| **Total GHG emissions** | **7.75–8.29** | **7.30** |

**Notes:** Transportation and thermal GHG emissions estimated by EAN using fuel sales data from the Vermont Department of Taxes, JFO, and VGS. Emissions from other sectors were carried forward from the 2021 Vermont GHG Inventory, with possible ranges estimated based on observed year-to-year variation in each sector between 2019 and 2021.

ENERGY ACTION NETWORK

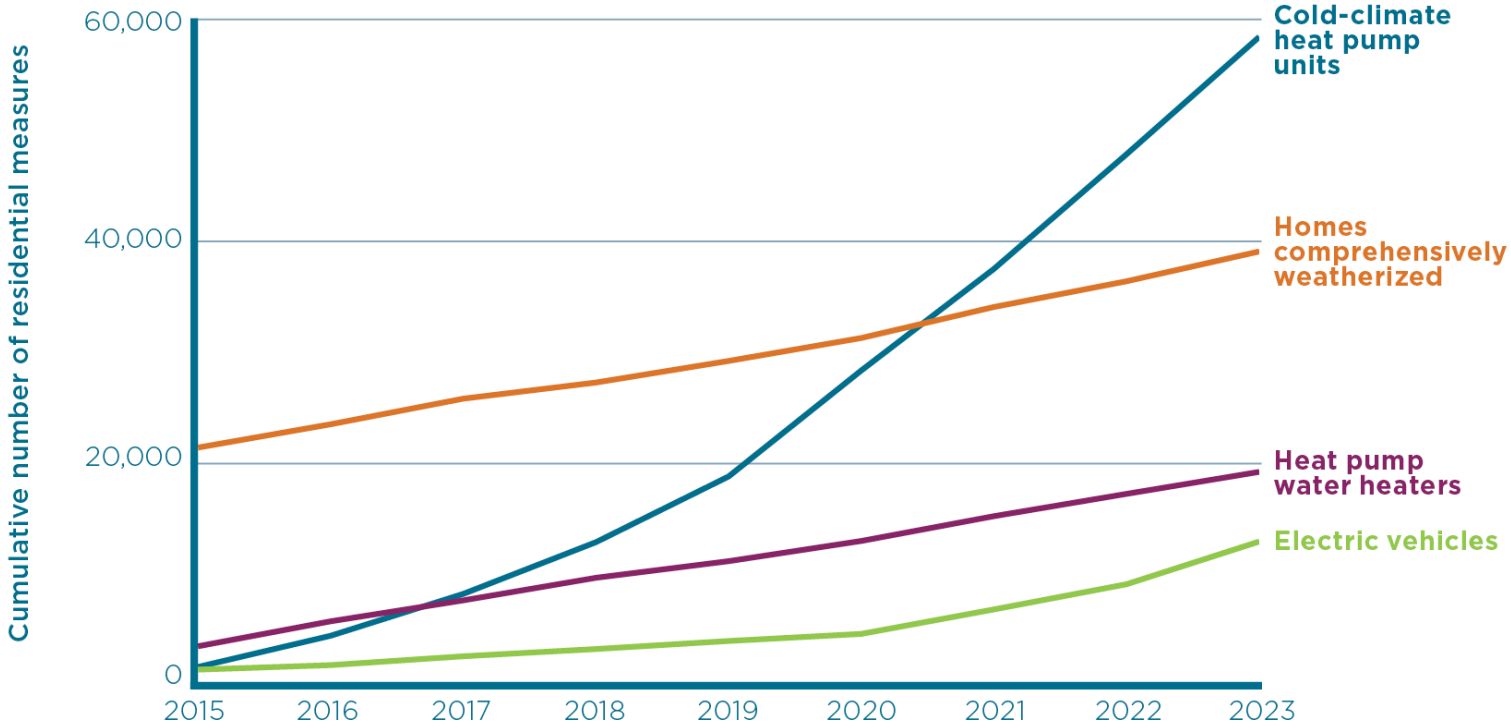
# The Good News

- Many states and countries have shown that **it is possible to reduce energy costs while reducing pollution with proven policies and regulation**.

- That Vermont did not meet our first obligation under the GWSA is not because it was not possible to do so – it is because we have failed to implement the policies that could help to significantly cut pollution while cutting costs.

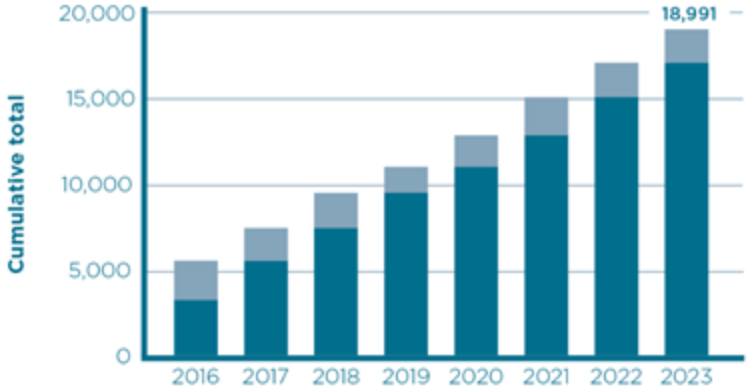
- It is still possible to meet future GWSA obligations – if Vermont is willing to learn from and join with other states that are advancing cost-effective and equitable policies and regulations to reduce climate pollution, such as Washington, Oregon, California, Maryland, and Quebec.

# Adoption of key climate solutions in Vermont, 2015–2023




**Sources:** Cold-climate heat pumps and heat pump water heaters: Efficiency Vermont, Burlington Electric Department, and VGS; Electric vehicles: Vermont Department of Motor Vehicles via Drive Electric Vermont; Weatherization: Vermont Department of Public Service. **Notes:** Data include residential measures only. The heat pump totals represent the number of outdoor units installed, not the number of individual indoor heads. Individual homes may have multiple outdoor units.

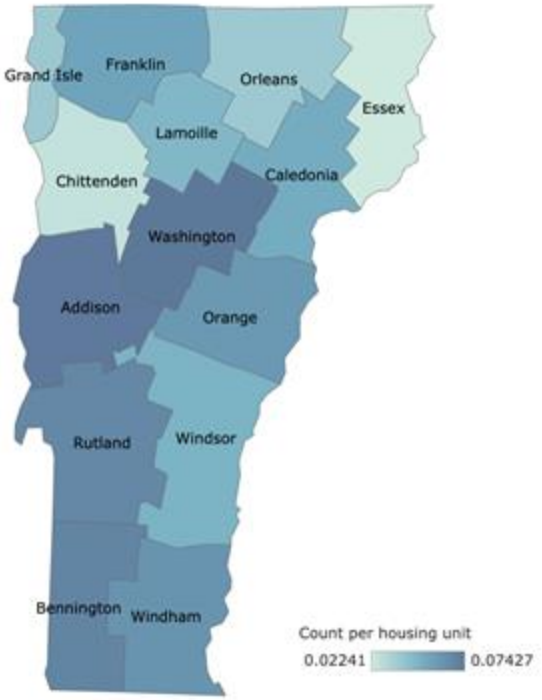
## Residential heat pump water heaters



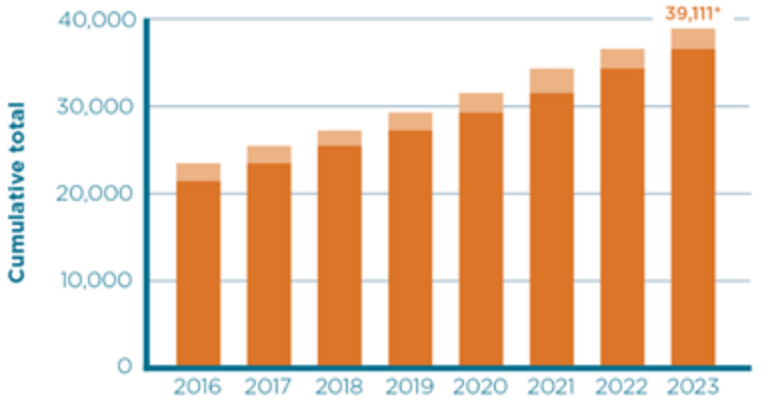


## Heat pump water heaters by county as of 2022

Click on a county to filter



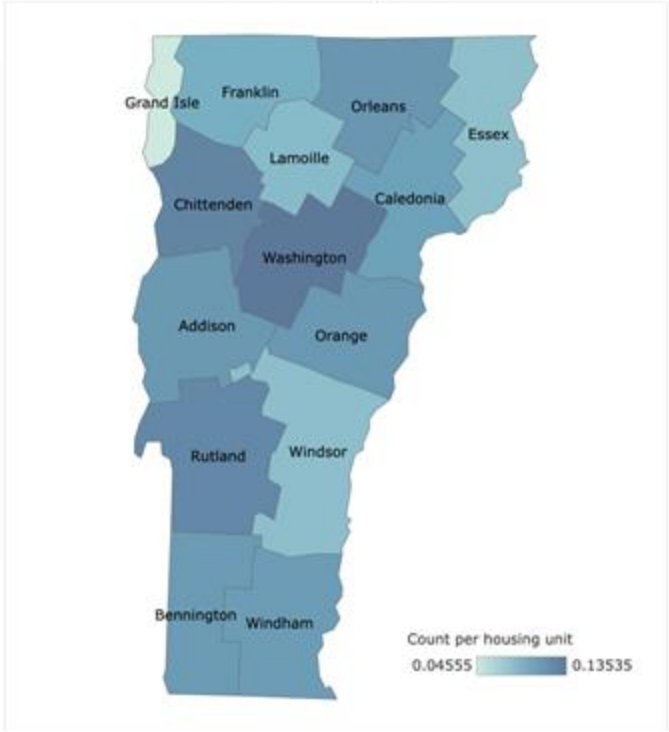
## Housing units comprehensively weatherized



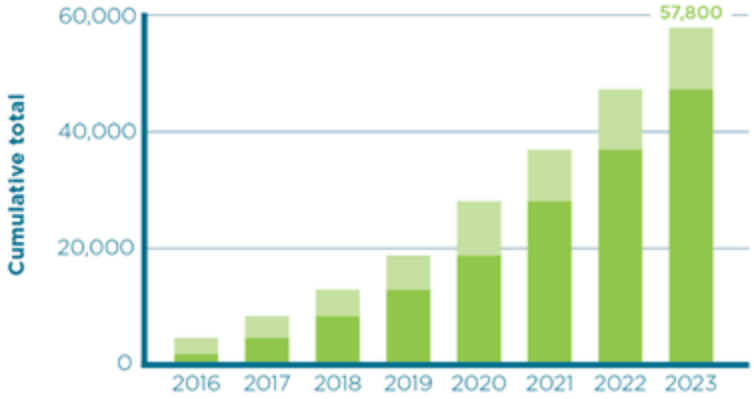


## Weatherization by county as of 2022

Click on a county to filter



## Residential cold-climate heat pumps





## Cold-climate heat pumps by county as of 2022

Click on a county to filter

# Vermont annual fossil heating fuel sales, 2017–2024

| | Propane sales (gallons) | Fuel oil and kerosene sales (gallons) | Fossil gas sales (MMcf) | Total heating fuel sales (MMBtu) |
|---|---|---|---|---|
| 2017 | 101,115,761 | 99,362,266 | 11,917 | 35,341,722 |
| 2018 | 105,436,808 | 110,998,437 | 13,750 | 39,245,846 |
| 2019 | 111,456,386 | 110,734,494 | 13,882 | 39,896,753 |
| 2020 | 96,921,572 | 106,671,034 | 13,043 | 37,135,946 |
| 2021 | 110,749,640 | 97,417,453 | 13,255 | 37,339,928 |
| 2022 | 114,011,323 | 94,404,752 | 13,463 | 37,436,851 |
| 2023 | 110,861,003 | 85,250,902 | 12,519 | 34,905,058 |
| 2024 | 112,281,270 | 83,959,361 | 12,465 | 34,799,365 |
| **% change (2017–2024)** | **+11%** | **-15.5%** | **+4.6%** | **-1.5%** |

**Sources:** Propane, fuel oil, and kerosene sales: Vermont Department of Taxes; Fossil gas sales: VGS; Conversion factors for energy content: EIA

# Vermont annual transportation fuel sales, 2017–2024

| | Gasoline (gallons) | Diesel (gallons) | Total transportation fuel sales (gallons) |
|---|---|---|---|
| 2017 | 314,008,812 | 92,567,655 | 406,576,467 |
| 2018 | 316,293,411 | 93,619,893 | 409,913,304 |
| 2019 | 314,728,037 | 94,451,800 | 409,179,837 |
| 2020 | 262,417,698 | 89,223,250 | 351,640,948 |
| 2021 | 285,699,809 | 90,634,829 | 376,334,638 |
| 2022 | 285,555,157 | 88,728,013 | 374,283,170 |
| 2023 | 286,129,171 | 84,595,962 | 370,725,133 |
| 2024 | 288,854,333 | 85,822,235 | 374,676,568 |
| **% change (2017–2024)** | **-8.0%** | **-7.3%** | **-7.8%** |

**Source:** Gasoline and diesel sales volumes from the Vermont Department of Taxes via the Joint Fiscal Office. Diesel volumes include on-road diesel and non-road (dyed) diesel.

Thank you!

# Questions?

jduval@eanvt.org

Paper available online at:

https://eanvt.org/research-and-reports/