Assessing Vermont's climate responsibility: A comparative analysis of per capita emissions

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Energy Action Network
Updated April 2024

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Acknowledgements

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Thank you to Linda McGinnis, Leigh Seddon, Ken Jones, Bill Regan, Cara Robechek, and Collin Smythe for reviewing this work and providing feedback.

Executive Summary

A jurisdiction's relative role in causing the climate crisis – and its responsibility to act in response to it – often comes up in policy debates at both the local and national level. Opponents of climate action in small states, including Vermont, often argue that their states' emissions are "too small to make a difference." At the federal level, opponents justify inaction by arguing that the United States is not the problem relative to countries that now produce higher annual totals of emissions, like China and India. However, comparing *total* greenhouse gas (GHG) emissions from a small state, like Vermont, to those of a much larger jurisdiction, misses the point that there is a collective responsibility to act and that each jurisdiction should do its part to reduce the pollution it creates.

This paper explores Vermont's climate responsibility in the context of comparing GHG emissions data on a per capita basis, as well as on a cumulative basis. The purpose of this research is to analyze how Vermont's emissions stack up against those of other jurisdictions, in order to better understand the state's relative responsibility. In this paper, we also draw on concepts from moral philosophy and economics to understand climate responsibility as a collective action problem and a public goods dilemma.

Key Findings:

- Vermont's Global Warming Solutions Act (GWSA) establishes that the state will do its part in helping the United States meet the goals of the Paris Agreement. However, **Vermont has made the least progress toward the 2025 target of the Paris Agreement of any state in the Northeast.**
- When it comes to a state's responsibility to act, comparing emissions on a per capita basis is more appropriate than comparing total statewide emissions because it accounts for differences in population size. In terms of statewide emissions, Vermont produces the smallest total amount of climate pollution in the Northeast. However, when expressed on a per capita basis, **Vermont's emissions are among the highest in the region** (second highest in New England and third highest in the Northeast).
- Looking globally, **Vermont's per capita emissions are more than two times higher than the global average**.
- Cumulative GHG emissions offer a way to account for a jurisdiction's historical climate responsibility. **Vermont's cumulative emissions are higher than those of over 70 countries**, many of which have much larger populations. Additionally, Vermont's cumulative per capita emissions are among the highest in the world.

- **Climate responsibility should be viewed through the lens of justice and equity.** It is not just about the amount that a jurisdiction has contributed to climate change, but also the relative ability that a jurisdiction has to advance climate action, which is often determined by access to technological and financial resources.
- It is helpful to understand the climate crisis as a collective action problem, where some jurisdictions may try to act as "free-riders." **Effective mitigation of GHG emissions can only be achieved by a collective effort.** When one jurisdiction doesn't do its part, it can create a domino effect and stall effective action elsewhere.

The paper argues that Vermont has just as much (if not more) of a responsibility to act to address climate change as its neighbors in the United States and across the globe. Not only has Vermont been responsible for more climate pollution on a per capita basis than many other states and countries, it also benefits from having the technology, resources, and expertise to reduce emissions in ways that can save consumers money over time and strengthen the state economy.

Vermont has a responsibility to do its part in reducing emissions within the state *and* to serve as an example for other states and jurisdictions, rather than free-riding and letting the burden fall onto others. That means implementing strong policies and programs designed to rapidly scale back Vermont's emissions in line with science-based targets and to facilitate a just and equitable transition to a clean energy economy.

I. Introduction

When assessing the climate responsibility of a state and its residents relative to other jurisdictions, it is important to make an apples to apples comparison. That's where per capita greenhouse gas emissions come in. Analyzing emissions on a per capita basis accounts for differences in population, allowing us to make a consistent comparison between the residents of different states or jurisdictions. This helps illuminate the difference between the opportunity that a whole state has to reduce total emissions, on the one hand, vs. the responsibility that the people of every state have to collectively do their part to reduce their per capita (and total) emissions, on the other.

New York, for example, has a population almost 30 times larger than Vermont's, and this difference in population translates into vastly different total emissions levels: in 2019, New York emitted around 194 million metric tons of CO_2 equivalent ($MMTCO_2e$),[1] while Vermont emitted just under 9 million metric tons.[2] However, Vermont's *per capita* emissions in 2019 were over 40% higher than New York's.

Arguments against climate action in many states and jurisdictions, including Vermont, are often grounded in a belief that jurisdictions with comparatively low total emissions bear less responsibility than states or countries that have higher total emissions. A different, yet related, perspective sees climate action in states like Vermont as inconsequential, justifying inaction with the assertion that our statewide emissions are too small to have any real impact in addressing the global climate problem. After all, Vermont's total statewide greenhouse gas (GHG) emissions on an annual basis are the lowest in the United States, accounting for only about 0.1% of total national emissions in 2019.

Yes, Vermont is the second smallest state by population. However, the fact that one state has fewer people than another does not absolve the smaller state from the responsibility to do its part to reduce the climate pollution that it creates. Any and every time a jurisdiction fails to do its part, it creates a practical "emissions gap" that needs to be made up by others. Such decisions can also contribute to an ever-increasing action gap by making inaction more socially acceptable for other jurisdictions.

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[1] OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990," 2023, https://data.ny.gov/Energy-Environment/Statewide-Greenhouse-Gas-Emissions-Beginning-1990/5i6e-asw6.
[2] Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023, https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2020_Final.pdf.

This paper explores Vermont's climate responsibility by comparing emissions data on both a regional and a global scale. For this analysis, GHG emissions inventory data were compiled for the nine states that make up the Northeastern region of the United States (Vermont, Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Rhode Island). 2019 emissions data were used for the purpose of this analysis, as it is the most recent year for which GHG inventory data were available for all nine states.

The second half of the report extends the comparison beyond the Northeastern U.S., exploring Vermont's climate responsibility through the lens of global climate justice and equity, given both current and historical emissions. This is followed by a discussion of collective action problems and considerations for how Vermont – and other jurisdictions – might confront questions of moral and practical responsibility in the context of public goods dilemmas and the free rider problem, as well as an overview of the benefits of the energy transition for Vermonters and the state as a whole. Finally, the report concludes with a summary of the key takeaways and implications for Vermont.

II. The policy context: Vermont's emissions reduction commitments

In 2020, Vermont's legislature passed the Global Warming Solutions Act (Act 153). The GWSA established legally binding emissions reduction obligations for Vermont, specifically:

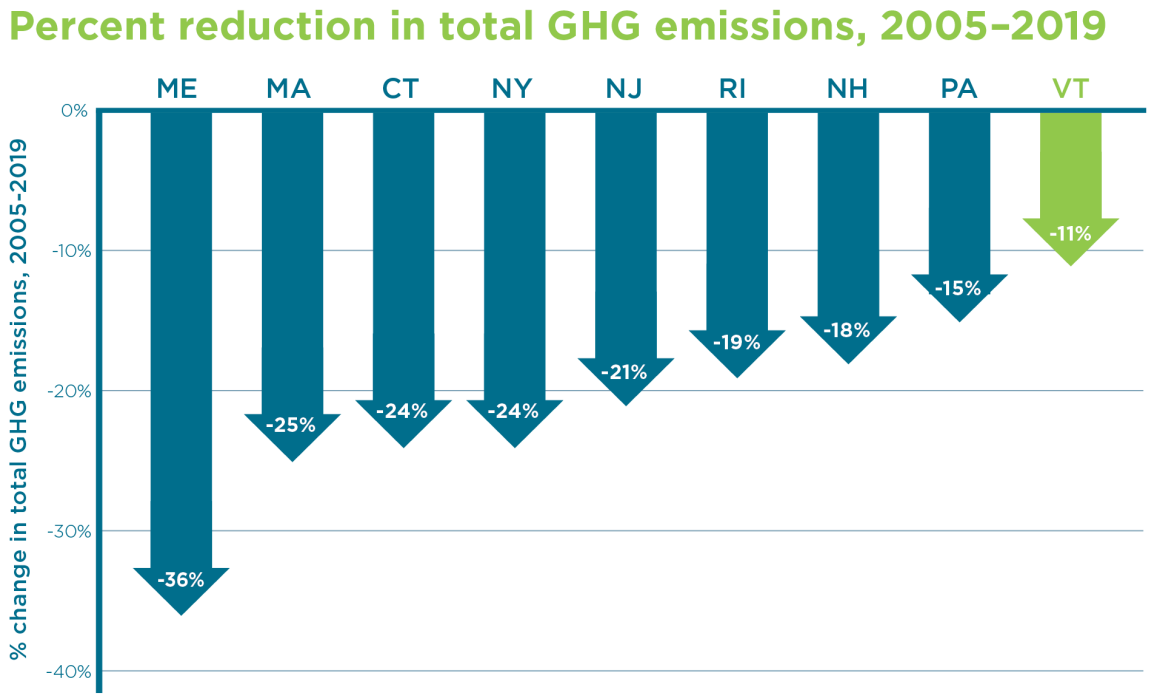
- 26% below 2005 levels by 2025
- 40% below 1990 levels by 2030
- 80% below 1990 levels by 2050

The significance of the 2025 obligation is that it mirrors the commitment the United States made in the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement. Vermont's 2025 target merely says that Vermont will do its part – taking responsibility for reducing the emissions created within our state borders – in meeting our national commitment.

The U.S. commitment in the Paris Agreement (also known as our "nationally determined contribution") is based on the approach of "common but differentiated" responsibilities. This means that while the global community collectively has a common responsibility to reduce climate pollution, the amount of reduction from each country can and should differ based on various factors, including that some countries have historically emitted

much more than others (and therefore have a greater responsibility) and that some countries have greater technological and financial resources to reduce emissions (and therefore have a greater opportunity).

Altogether, the Paris Agreement aims to limit global temperature increases to well below 2 degrees Celsius (or 3.6 degrees Fahrenheit) above pre-industrial levels by the end of this century and to "pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius [or 2.7 degrees Fahrenheit]".[3] The international scientific community, as represented by the Intergovernmental Panel on Climate Change (IPCC), established these targets to limit the global damages from temperature increases. For example, every 0.5 degree C (0.9 degrees F) of global temperature rise is estimated to "cause clearly discernible increases in the frequency and severity of heat extremes, heavy rainfall events, and regional droughts."[4]



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022.

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[3] UNFCCC, "Key aspects of the Paris Agreement," https://unfccc.int/most-requested/key-aspects-of-the-paris-agreement.

[4] World Resources Institute, "10 Big Findings from the 2023 IPCC Report on Climate Change," 2023, https://www.wri.org/insights/2023-ipcc-ar6-synthesis-report-climate-change-findings.

In total, 25 states (known as the U.S. Climate Alliance) have committed to achieving the goals of the Paris Agreement, including nearly all states in the Northeastern region of the U.S., aside from New Hampshire.[5] Of the states in the Northeast, **Vermont has made the least progress toward the 2025 target of the Paris Agreement**, having achieved only an 11% reduction in statewide GHG emissions below 2005 levels, as of 2019.[6]

It should be noted, however, that each state started from a different baseline, presenting different opportunities for progress. For instance, a significant factor in Maine's emissions decline has been reductions in high-carbon fossil fuel use in their electricity sector. Vermont had less opportunity to achieve reductions in the same way, because our electricity portfolio was much less carbon intensive to begin with.

The GWSA does not assert that Vermont alone can solve global warming. No single state and no single country can do that. What the GWSA does establish is that Vermont shall do its part in helping to meet the science-based international commitment made by the United States.

Of course, we can always look at others and what they are doing or not doing. But as the Secretary-General of the U.N. Antonio Guterres has said, "Demanding others move first only ensures humanity comes last."[7]

III. Two views of Vermont's emissions: Total vs. per capita

There are two ways in which a jurisdiction's climate impact is most commonly expressed: total emissions and per capita emissions. Total emissions accounting can use either a production-based approach — including only emissions produced within the borders of a state or country — or a consumption-based approach, in which emissions are adjusted for trade to account for all goods and services consumed within a jurisdiction. Consumption-based approaches often utilize lifecycle analysis to account for the emissions resulting from production through use and disposal.

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[5] United States Climate Alliance, https://usclimatealliance.org/.

[6] Note that while the methodologies are broadly similar and we took steps to allow for more consistent comparisons between states, state GHG accounting methodologies may not be exactly the same.

[7] The Washington Post, "World is on brink of catastrophic warming, U.N. climate change report says," March 20, 2023, https://www.washingtonpost.com/climate-environment/2023/03/20/climate-change-ipcc-report-15/.

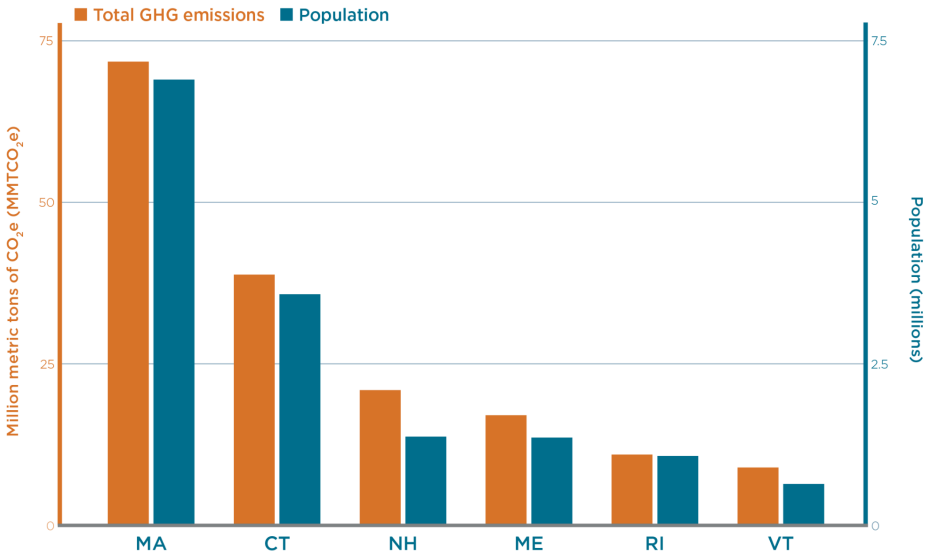
In this report, we rely on production-based emissions, with one exception: for the majority of the U.S. states included in the analysis, emissions in the electric power sector are calculated based on in-state electricity *consumption* (as accounted for via electricity purchases, often in the form of Renewable Energy Credit, or REC, purchases), rather than in-state generation. However, unlike some consumption-based methodologies, these emissions include only those produced at the point of electricity generation and do not include full lifecycle emissions.[8] Emissions data for electricity consumption were available for all the states included in this report except New Jersey (which only reports emissions from in-state electricity generation). Because most states in the Northeast, including Vermont, report consumption-based electricity emissions in their official GHG inventories, that approach is adopted here in order to make a direct comparison.

Per capita emissions are calculated as total annual emissions divided by the population in that year, resulting in an estimate of the average quantity (usually in metric tons) of GHGs emitted per person.

So where does Vermont stand?

In terms of **total statewide emissions**, Vermont has the lowest GHG emissions of any state in the Northeast. In fact, Vermont's total GHG emissions are the lowest in the country, after Washington, D.C. In 2019, Vermont was responsible for approximately 8.8 million metric tons of climate pollution.[9] But this primarily states the obvious: Vermont is a state with a relatively small population, with approximately 624,000 residents in 2019, the 2nd lowest in the U.S.

Total GHG emissions and population of New England states, 2019



Source: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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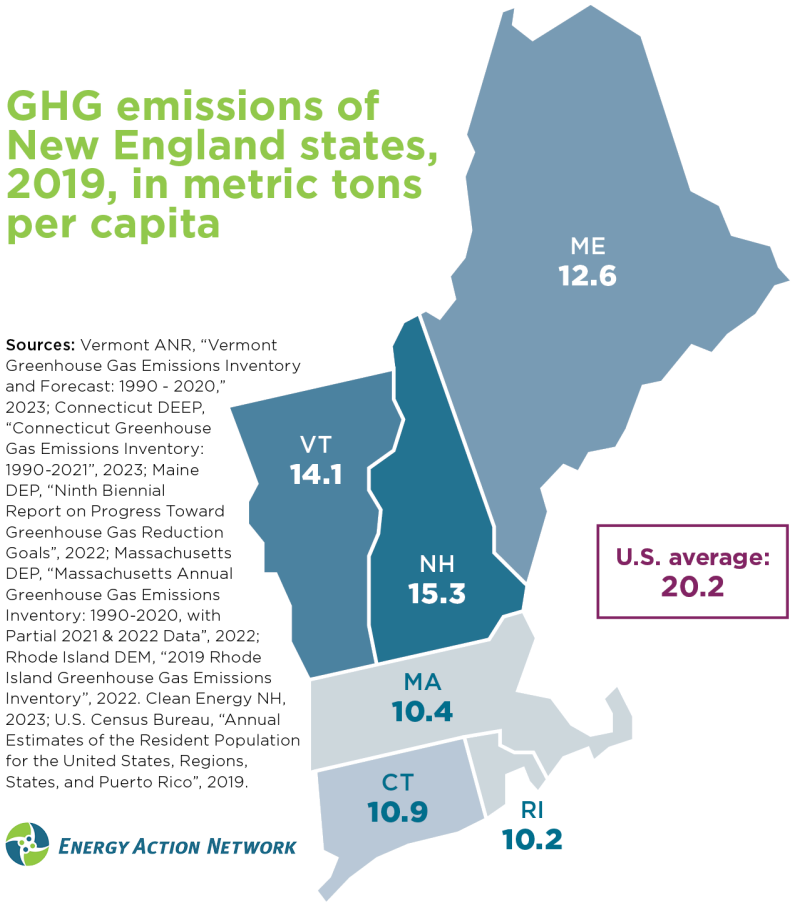
[8] Note: this is done to avoid double counting of the same emissions across jurisdictions.
[9] Vermont Agency of Natural Resources, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023.

Looking at emissions on a per capita basis, however, reveals a very different picture. That same year, **Vermont had the second highest GHG emissions per capita in New England, behind only New Hampshire.**[10] Rhode Island and Massachusetts had the lowest per capita emissions, each coming in at around 10 metric tons of CO_2e per person.



Among its counterparts throughout the entire Northeast, Vermont had the third highest per capita emissions, only lower than Pennsylvania and New Hampshire. In 2019, Pennsylvania had the highest per capita GHG emissions in the Northeast (18.8 metric tons CO_2e), while Vermont's emissions were about 25% lower (14.1 metric tons CO_2e).

Compared to the other regions of the United States, states in the Northeast tend to have relatively low per capita emissions. While Vermont's per capita emissions are among the highest in the Northeast, they are about 20% lower than the average per capita emissions of the United States as a whole. In 2019 the United States emitted approximately 20.2 metric tons of climate pollution per capita.[11]

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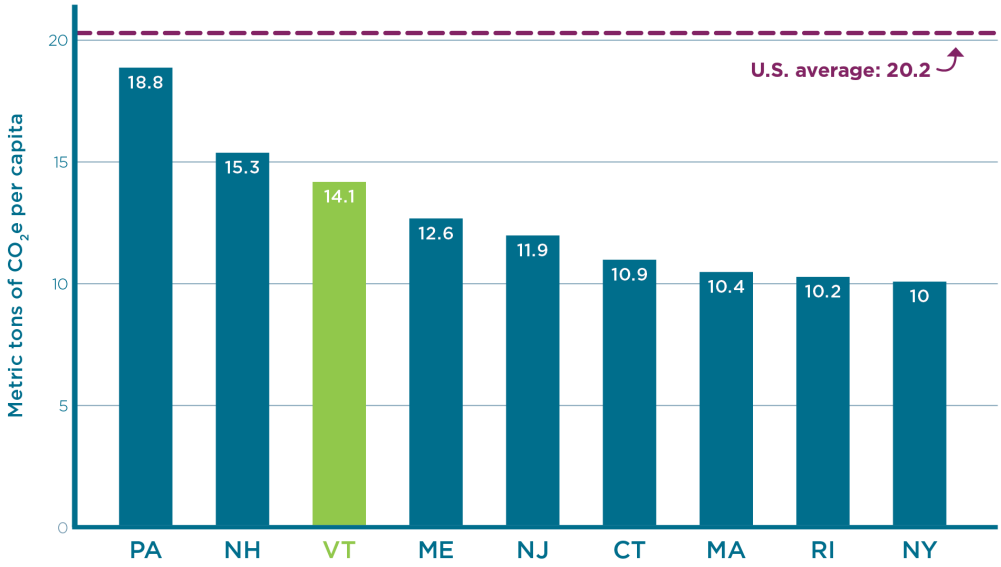
[10] Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

[11] U.S. EPA, "Inventory of Greenhouse Gas Emissions and Sinks: 1990-2019," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico," 2019.

Per capita GHG emissions of Northeast states, 2019



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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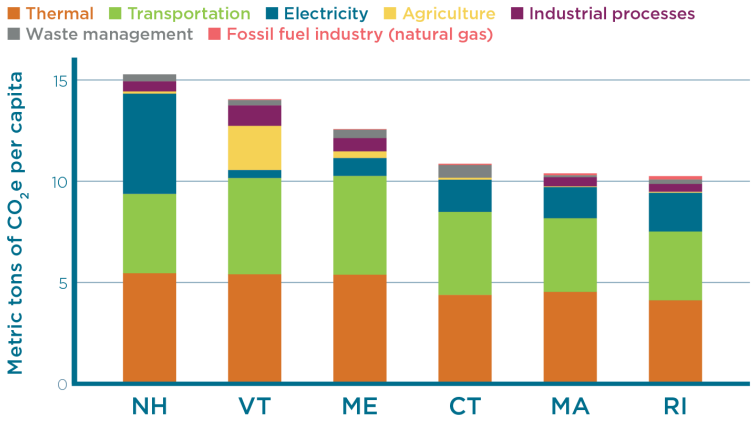
IV. Highest emitting sectors in Vermont and New England

The graph on the right shows per capita emissions for each of the six New England states, broken down by sector. The two highest-emitting sectors in Vermont are transportation, thermal (also known as the Residential, Commercial, and Industrial (RCI) fuel use sector), followed by agriculture. The transportation and thermal sectors combined account for 72% of Vermont's GHG emissions, and per capita emissions in both of those sectors are among the highest in the region.

Per capita GHG emissions by sector, 2019



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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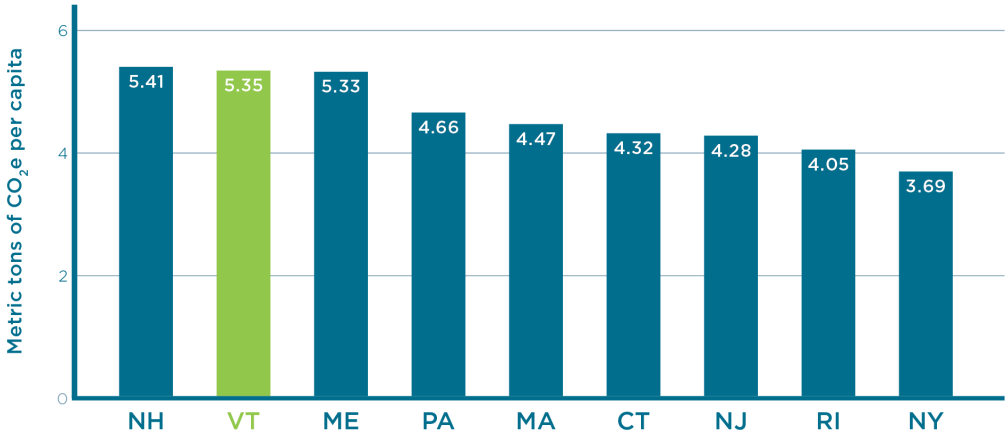
Vermont also has, by far, the highest agriculture-related emissions on a per capita basis in New England and in the Northeast as a whole, the majority of which can be attributed to enteric fermentation and associated methane releases from livestock. On the other hand, Vermont has the lowest emissions per capita in the electric power sector, largely due to the fact that over 90% of our electricity is purchased from fossil-free sources.

A. Transportation emissions

The transportation sector has historically been the largest source of GHG emissions in Vermont. However, in 2020, transportation emissions fell below thermal sector emissions as a result of impacts of the pandemic. The transportation sector was responsible for 2.85 MMTCO$_2$e in 2020, equivalent to 36% of Vermont's overall emissions.

Prior to 2020, the transportation sector was responsible for around 40% of total emissions. In 2019, per capita emissions from VT's transportation sector were about 5.35 metric tons of CO$_2$e per person, the second highest in New England after New Hampshire. In this section of the report, we explore several factors that contribute to Vermont's higher transportation emissions.

Per capita GHG emissions in the transportation sector, 2019



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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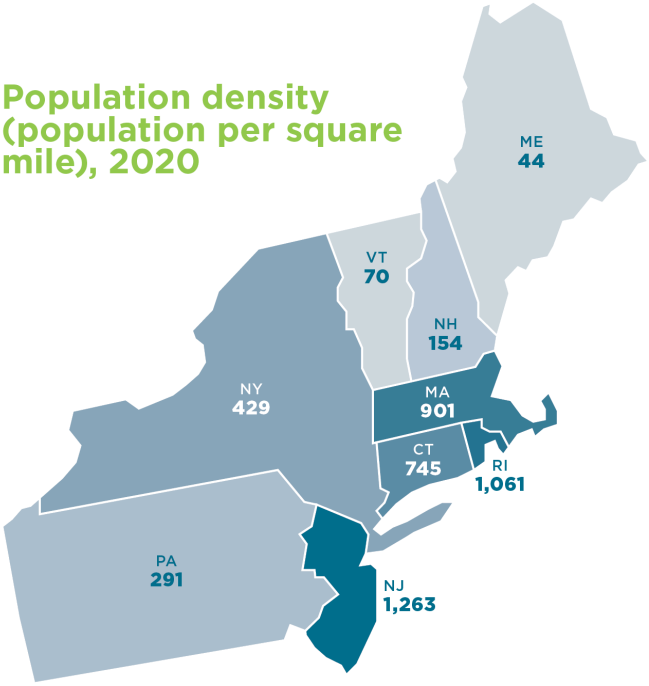
Population density (population per square mile), 2020



Source: United States Census Bureau Quickfacts, 2020.

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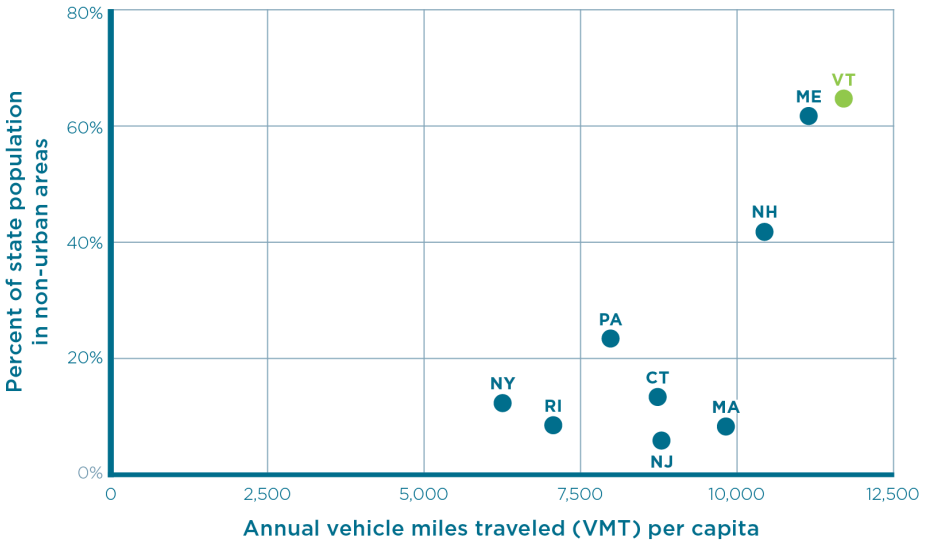
For one, Vermont is a more rural, sparsely populated state than our neighbors in the region. We have a small population, the majority of which reside outside of urban centers. Vermont has the second lowest population density among the nine northeastern states highlighted in this analysis, with only 70 residents per square mile of land area.[12] That is significantly lower than New Jersey, the state with the highest population density in the Northeast, with over 1,200 residents per square mile.

Vermont also ranks lowest in the region when it comes to the share of the population that is located within urban areas. Significantly more Vermonters live in suburban or rural areas (65%) than in urban areas. In fact, Vermont is one of only two states in the Northeast where greater than 50% of the population is located in non-urban areas (the other being Maine).[13]

Percent of population located in non-urban areas and annual VMT per capita, 2019



Sources: For vehicle miles traveled: Federal Highway Administration, Highway Statistics, 2019. For emissions per capita: EAN, 2023. **Note:** Non-urban areas includes all areas outside of FHWA-defined small urban areas (population of 5,000–49,999) and urbanized areas (population of 50,000 +).

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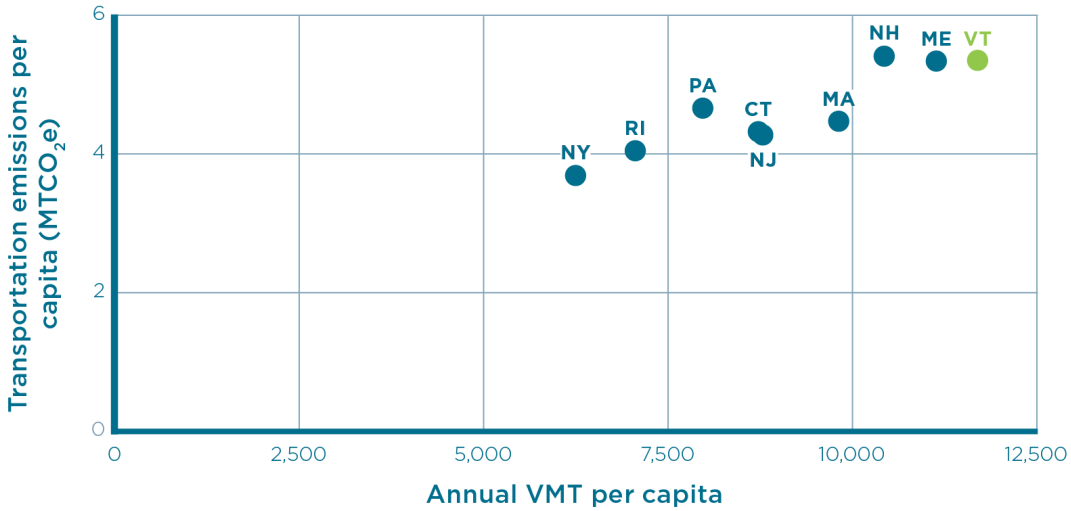
[12] U.S. Census Bureau, 2020, https://www.census.gov/quickfacts/fact/table/RI,ME,NY,CT,NH,VT/PST045222.
[13] Federal Highway Administration, Highway Statistics, 2019, https://www.fhwa.dot.gov/policyinformation/statistics/2019/.

Having a predominantly rural population means that Vermonters rely more on personal vehicles to get around and tend to have longer commutes to work, school, or the grocery store. This trend can be observed in state-level data on average annual vehicle miles traveled (VMT), published each year by the Federal Highway Administration. **Average VMT per capita in Vermont was 11,739 miles in 2019, more than any other state in the Northeast.**[14] The vast majority of our transportation emissions come from light-duty gasoline vehicles. While there were 8,875 electric vehicles registered in Vermont by the end of 2022, they represented only about 1.5% of the entire light-duty vehicle fleet. In comparison there were 591,273 light-duty gasoline vehicles registered in Vermont as of 2022, comprising over 98% of the total.[15]

Per capita emissions in the transportation sector have typically been strongly correlated with VMT per capita, given the high degree of dependence on fossil fueled vehicles, especially for single-occupancy trips. Strategies and policy levers aimed at transitioning away from fossil fueled vehicles, in addition to reducing vehicle miles traveled and single-occupancy trips, can help mitigate climate pollution in Vermont's transportation sector.

Per capita transportation emissions and annual vehicle miles traveled (VMT), 2019



Sources: For vehicle miles traveled: Federal Highway Administration, Highway Statistics, 2019. For emissions per capita: EAN, 2023.

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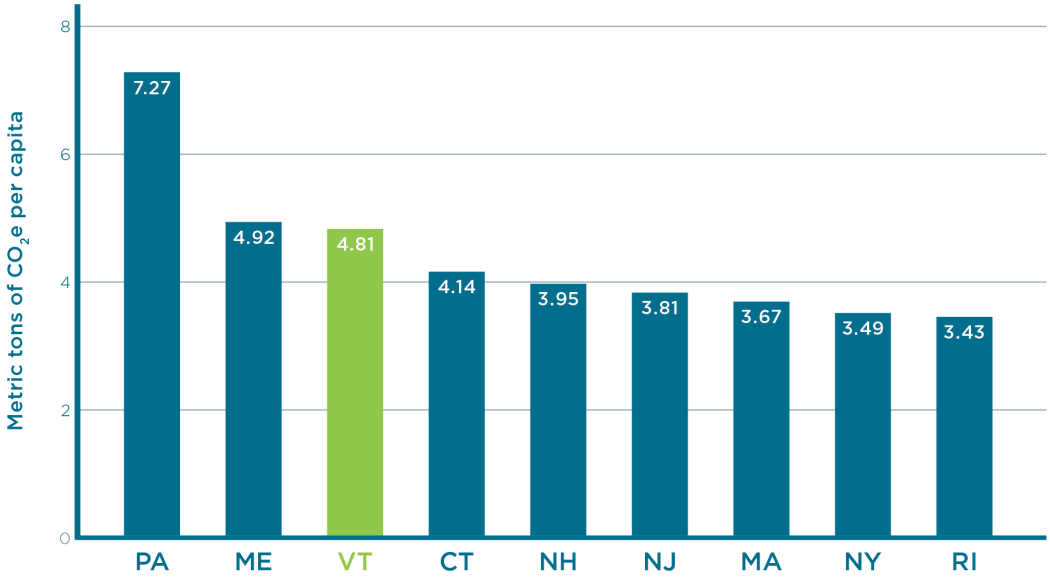
[14] Federal Highway Administration, Highway Statistics, 2019, https://www.fhwa.dot.gov/policyinformation/statistics/2019/.
[15] Drive Electric VT, 2023.

B. Thermal emissions

The thermal sector consists of the direct emissions from residential, commercial, and industrial fuel use. This primarily includes energy used to heat homes and businesses. In 2019, the thermal sector in Vermont was responsible for 3 million metric tons of GHG emissions, accounting for 36% of statewide emissions. This equated to per capita emissions of 4.8 metric tons of CO_2e per person—the third highest in the Northeast after Pennsylvania and Maine.

Per capita GHG emissions in the thermal sector, 2019



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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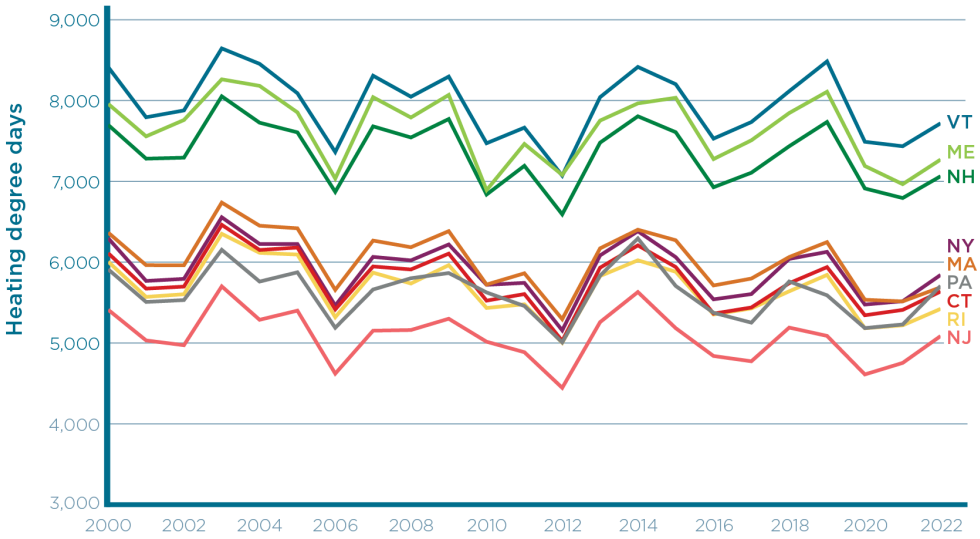
Vermont's thermal emissions have historically tracked closely with trends in heating degree days (HDD), which is a measure of how much and for how long the outside air temperature was below a certain level. HDDs are often used to quantify energy demand, and it is therefore a useful metric for understanding differences in thermal emissions between jurisdictions.[16] Between 2000 and 2022, Vermont's annual heating degree days have consistently been the highest in the region (i.e. VT experiences the coldest

[16] Heating degree days are calculated as the difference between the daily average temperature and a standard temperature (often 65° Fahrenheit). To get annual heating degree days, the daily values are summed over a year. Because of this, annual HDDs are often in the thousands.

winters).[17] Vermont's colder winters, combined with high reliance on fossil fuels for heating, is a key factor contributing to the state's high per capita emissions in the thermal sector.

Vermont's per capita emissions in the thermal sector have to do with not only the *amount* but also the *type* of fuel used. Some heating fuels have higher carbon intensity values than others, meaning that they produce more climate pollution per unit of heat generated. Fuel oil, for example, has an emissions factor of about 163 pounds of CO_2 per million British thermal units (MMBtu), whereas the lower-emitting fossil gas (also known as utility gas or natural gas) has an emissions factor of 117 pounds of CO_2 per MMBtu.[18] The carbon intensity of Vermont's electricity portfolio is significantly lower, at approximately 20 pounds of CO_2 per MMBtu.[19]

Annual heating degree days by state, 2000-2022



Source: National Centers for Environmental Information, Climate at a Glance Statewide Time Series, 2023.

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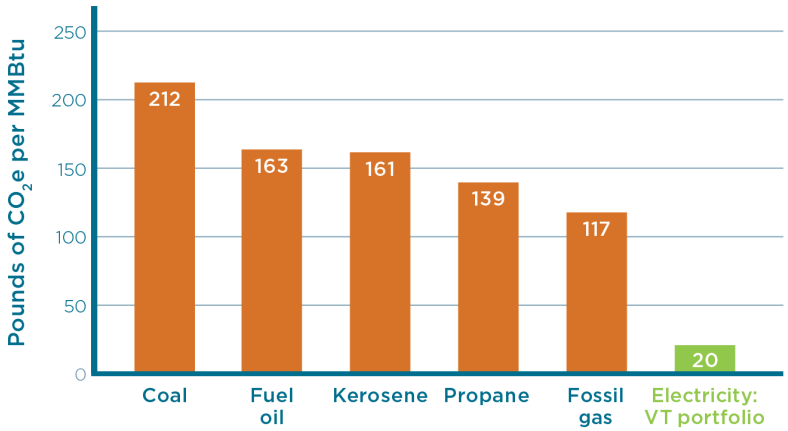
CO_2e emissions factors by fuel type



Sources: For VT electricity: as reported on an annual consumption basis in the Vermont Agency of Natural Resources,"Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023. For New England's electricity portfolio: EAN, "Assessing the GHG impact of beneficial electrification in Vermont," 2023. For fossil fuel emissions: EIA, Carbon Dioxide Emissions Coefficients, 2023.

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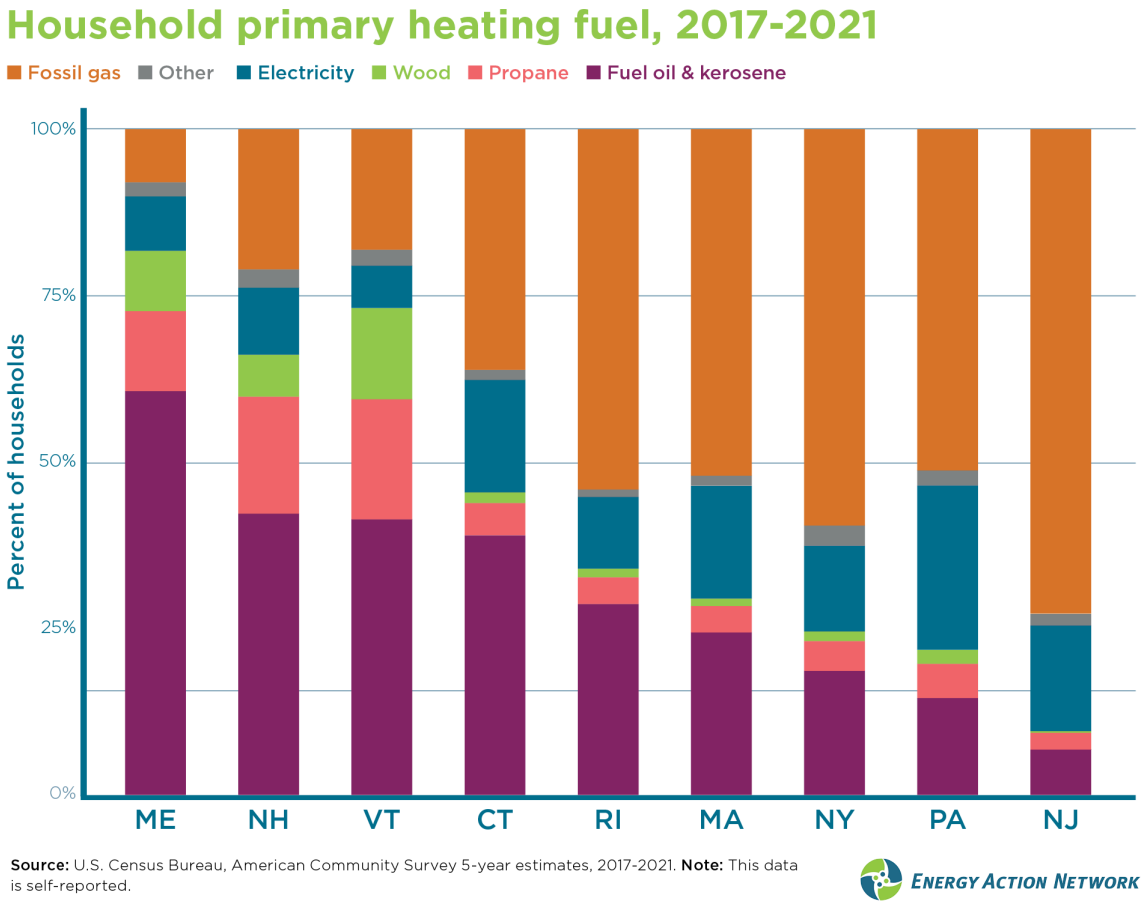
[17] National Centers for Environmental Information, Climate at a Glance Statewide Time Series, 2023, https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/time-series/6/hdd/ann/12/2000-2023?base_prd=true&begbaseyear=1901&endbaseyear=2000.

[18] EIA, Carbon dioxide emissions coefficients by fuel, 2022, https://www.eia.gov/environment/emissions/co2_vol_mass.php.

[19] EAN, "Assessing the GHG Impact of Beneficial Electrification in Vermont,"

Only about 18% of Vermont households reported using pipeline fossil gas as their primary heating fuel, among the lowest shares in the Northeast (it's even lower in Maine, at only 8% of households).[20] Instead, a far higher percentage (59%) of Vermonters rely on "delivered" fuels (including fuel oil, propane, and kerosene) for heating, all of which have higher carbon intensities than fossil gas (and far higher than electricity). Vermont also has the lowest percentage of households that rely on electricity for heating (6%), despite the fact that electricity is both the least polluting and, if using heat pumps, one of the least expensive heating options. The states that rely more on fossil gas and electricity as primary heating fuels tend to have lower per capita emissions in the thermal sector. Over time, **the states that achieve the lowest thermal sector emissions will likely be those that do the most to transition their heating to efficient electric technology via heat pumps.**



Source: U.S. Census Bureau, American Community Survey 5-year estimates, 2017-2021. **Note:** This data is self-reported.

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2023, https://www.eanvt.org/wp-content/uploads/2023/01/Assessing-the-GHG-Impact-of-Strategic-Electrification-in-Vermont-EAN-Research-Brief-Revised-Jan-2023.pdf.

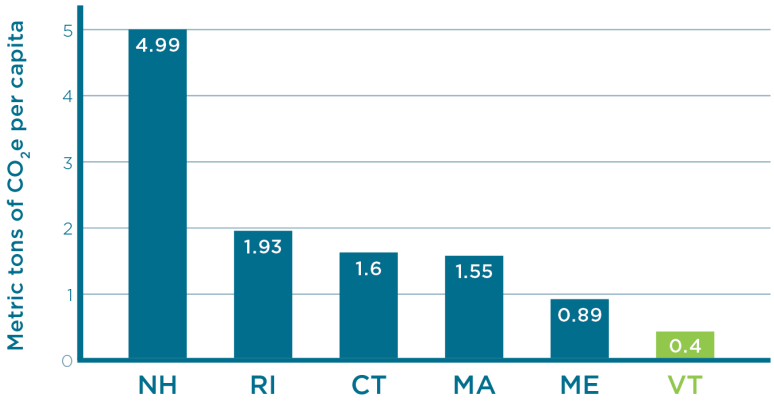
[20] U.S. Census Bureau, American Community Survey, 2017-2021, https://data.census.gov/.

C. Electricity emissions

While Vermont's per capita transportation and thermal emissions are both among the highest in the region, the state's per capita emissions from electricity consumption are the lowest in New England.

On the other hand, New Hampshire's per capita electricity emissions are more than ten times higher. This is largely driven by the fact that New Hampshire has the weakest Renewable Portfolio Standard in the region, as shown in the graph below.

Per capita GHG emissions in the electricity sector, 2019



Sources: Vermont ANR, "Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990 - 2020," 2023; Connecticut DEEP, "Connecticut Greenhouse Gas Emissions Inventory: 1990-2021", 2023; Maine DEP, "Ninth Biennial Report on Progress Toward Greenhouse Gas Reduction Goals", 2022; Massachusetts DEP, "Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2020, with Partial 2021 & 2022 Data", 2022; OpenData NY, "Statewide Greenhouse Gas Emissions: Beginning 1990", 2023; Rhode Island DEM, "2019 Rhode Island Greenhouse Gas Emissions Inventory", 2022. Clean Energy NH, 2023; New Jersey DEP, "New Jersey Greenhouse Gas Inventory," 2022; Pennsylvania DEP, "Pennsylvania Greenhouse Gas Inventory Report," 2022; U.S. Census Bureau, "Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico", 2019.

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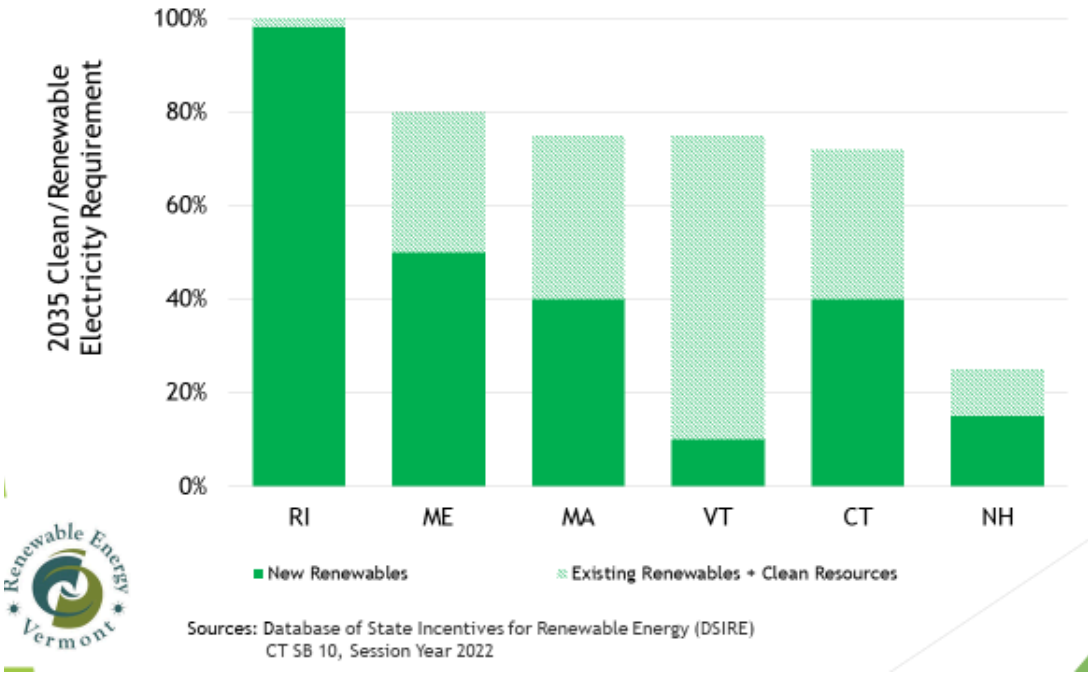
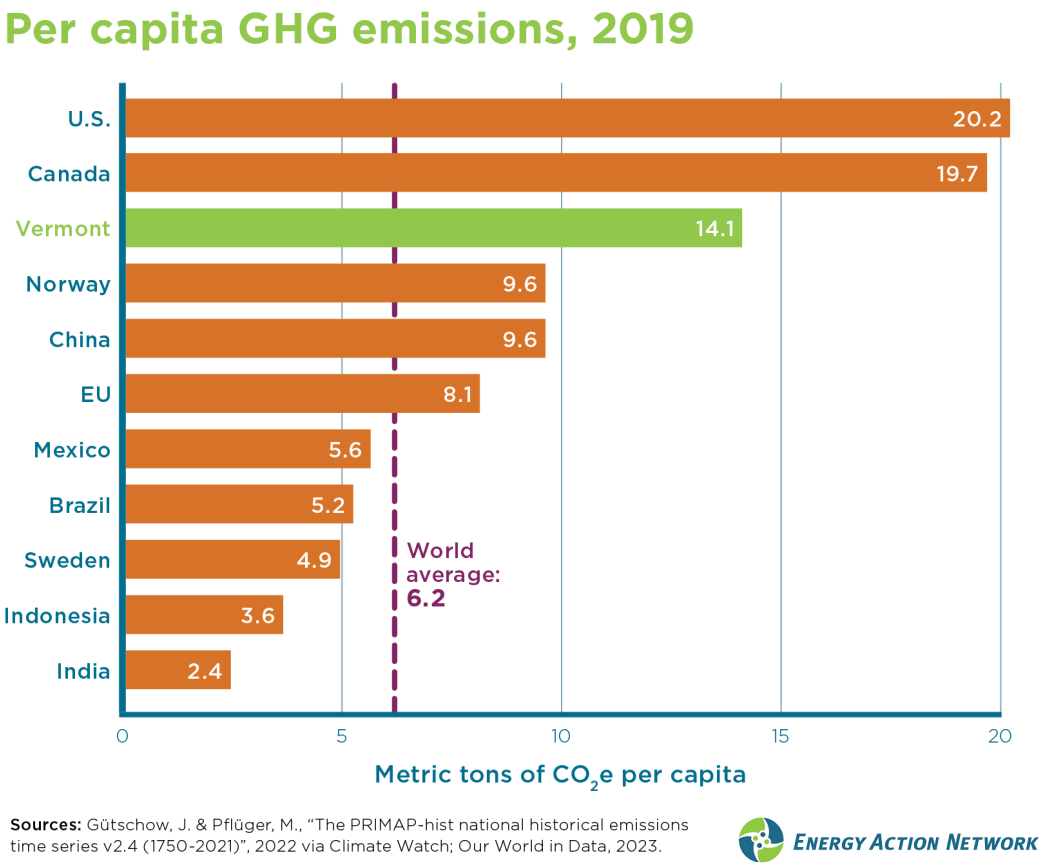


Sources: Database of State Incentives for Renewable Energy (DSIRE)
CT SB 10, Session Year 2022

V. Vermont's emissions within the global context

Vermont not only has a legal responsibility to meet the emissions reductions obligations established by the 2020 Global Warming Solutions Act, we also have a moral responsibility—one that is grounded in principles of equity and global climate justice. Looking beyond our neighbors in the Northeast and throughout the United States, Vermont is responsible for significantly more climate pollution on a per capita basis than most other countries around the world. **In 2019, Vermont's per capita emissions of 14.1 metric tons per person were more than two times higher than the global average of 6.2 metric tons**,[21] and significantly more than residents of major world economies such as China (9.6 $MTCO_2e$), Brazil (5.2 $MTCO_2e$), and India (2.4 $MTCO_2e$).[22]



Sources: Gütschow, J. & Pflüger, M., "The PRIMAP-hist national historical emissions time series v2.4 (1750-2021)", 2022 via Climate Watch; Our World in Data, 2023.

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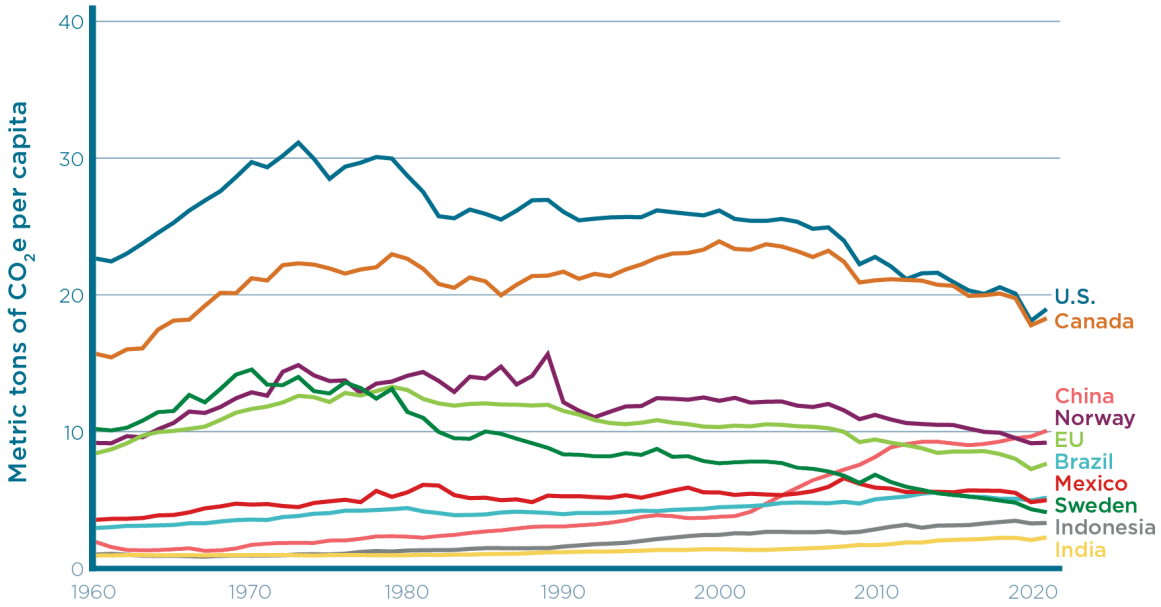
[21] Our World In Data, 2023, https://ourworldindata.org/co2-emissions.
[22] Gütschow, J. & Pflüger, M., "The PRIMAP-hist national historical emissions time series v2.4 (1750-2021)", 2022 via Climate Watch, https://www.climatewatchdata.org/ghg-emissions?breakBy=countries&calculation=PER_CAPITA&end_year=2021&regions=&source=PIK&start_year=1850.

Per capita GHG emissions, 1960-2021



Source: Gütschow, J. & Pflüger, M., "The PRIMAP-hist national historical emissions time series v2.4 (1750-2021)", 2022 via Climate Watch.

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In addition to creating far more GHG emissions on a per capita basis today, places like Vermont also bear a far greater historical responsibility for climate pollution, due to having intensively used fossil fuels for nearly two centuries. Per capita GHG emissions in wealthier countries like the United States and Canada have consistently been higher than many other countries since 1960. Similarly, when it comes to *cumulative* GHG emissions, these same countries have been responsible for a far higher share of the total greenhouse gases in the atmosphere over time and, thus, have contributed far more to the global warming we see today. **The United States's cumulative emissions since 1850 represent more than 20% of the global total: by far the largest share of any country in the world.**[23]

Although GHG emissions data is not available for Vermont as far back as 1850, we applied Vermont population data to U.S. emissions and population data to generate a rough and likely conservative estimate of Vermont's emissions between 1850 to 1989. We then merged that data with actual 1990-2020 emissions data from the Agency of Natural Resources in order to estimate Vermont's cumulative emissions from 1850-2020.[24]

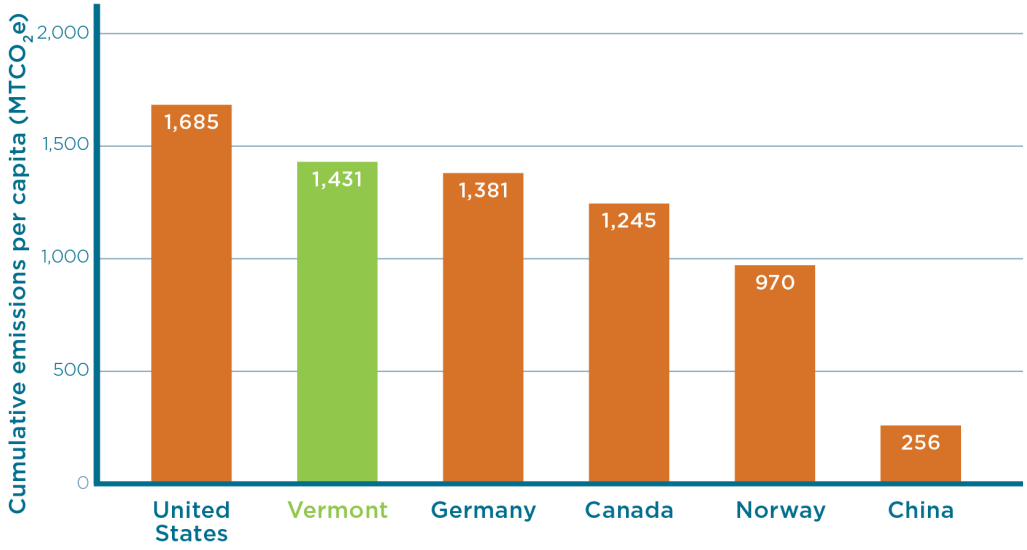
[23] Carbon Brief, "Analysis: Which countries are historically responsible for climate change?", 2021, https://www.carbonbrief.org/analysis-which-countries-are-historically-responsible-for-climate-change/.

[24] Specifically, we applied the nearly ⅔ (.64%) ratio between Vermont's emissions as a share of U.S. emissions (.133%) and VT's population as a share of U.S. population (.208%) that was present between 1990-2020 to the period

We estimate that since 1850 Vermont has emitted a total of approximately 892 million metric tons of CO_2e. That puts the state's cumulative total emissions higher than those of ***over 70 countries,*** many of which have populations far larger than Vermont's.

Based on Vermont's population in 2020, our cumulative *per capita* emissions are among the highest in the world, at 1,431 metric tons of CO_2e per person.[25] Using 2021 cumulative emissions data from Climate Watch, paired with population data from that same year, we found that the United States has emitted approximately 1,685 metric tons of CO_2e per person since 1850, whereas that number for China was only 256 metric tons per person.

Cumulative GHG emissions adjusted for population, 1850-2020



Sources: For VT cumulative emissions: EAN analysis based on state and national data; Vermont Agency of Natural Resources, Vermont Greenhouse Gas Inventory and Forecast, 1990-2020, 2023; Vermont Department of Health, Vermont Population Estimates, 2023. For country-level cumulative emissions: Gütschow, J. & Pflüger, M., "The PRIMAP-hist national historical emissions time series v2.4 (1750-2021)", 2022 via Climate Watch.

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Cumulative emissions offer a way to quantify how much a country or region has contributed to greenhouse gas concentrations in our atmosphere over time and, thus, to the climate destabilization we are seeing today across the globe. The data show that not only do residents of Vermont contribute more to global climate pollution today, but that

1850-1989 (while adjusting, as appropriate, for state and national population changes over time using U.S. Census data). To be clear, this may undercount Vermont's historical emissions if there was closer to a 1:1 ratio between VT's emissions as a share of U.S. emissions and VT's population as a share of U.S. population during earlier time periods.

[25] This approach of applying current population totals to cumulative emissions to arrive at a per capita figure implicitly assigns responsibility for past emissions in a jurisdiction to those living in that jurisdiction today.

we are also responsible for more historical climate pollution than residents of other states and countries.

This fact is central to the climate justice conversation, as less developed countries and countries in the Global South, whose cumulative emissions are only a fraction of those of the U.S. and Europe, tend to experience the worst effects of climate change — a trend that is expected to intensify with further climate destabilization.[26] According to the International Institute for Environment and Development, 69% of worldwide deaths caused by climate-related disasters throughout the last 50 years were in the least developed countries (LDCs).[27] These frontline communities also have fewer resources to mitigate climate pollution, to adapt to climate change, and to recover from climate-related disasters.

VI. Climate responsibility as a collective action problem

When it comes to acting in the face of the climate crisis, every state and country needs to decide how they will respond. There are important ethical questions around who holds responsibility, both for having caused the climate destabilization we are experiencing today and for acting to reduce climate pollution to prevent even worse outcomes in the future. After all, the climate challenge is not something that is limited solely to the realm of hard science – it also raises questions of social science and moral philosophy.

In particular, both the cause of and the response to the climate crisis illuminate unique types of collective action problems. In their simplest formulation, collective action problems arise when there is a conflict between individual and group interests. In these situations, what may be in the selfish interest of individuals – for instance, over-using a public resource – can lead to worse outcomes for the larger community, or society, than would have been achieved through cooperative use and careful management of a resource.

In 2006, British economist Nicholas Stern led a review of the economics of climate change and found a particular type of collective action problem present with climate pollution. The Stern review concluded that, "The problem of climate change involves a fundamental failure of markets: those who damage others by emitting greenhouse gases generally do not pay." Given the scale of pollution and the resulting consequences, Stern

[26] United Nations, "On the Frontlines of Climate Crisis, Worlds Most Vulnerable Nations Suffer Disproportionately," 2023, https://www.un.org/ohrlls/news/frontline-climate-crisis-worlds-most-vulnerable-nations-suffer-disproportionately.
[27] International Institute for Environment and Development, "2020 in review: climate impacts in the least developed countries," 2021, https://www.iied.org/2020-review-climate-impacts-least-developed-countries.

stated that "Climate change is a result of the greatest market failure the world has seen."[28]

When costs are created that are borne by society at large and/or by future generations rather than by the person, countries, or generations responsible for creating the pollution, the result is what economists call an "externality." But, of course, what may be "external" in a narrow economic sense is nevertheless internal to us in a societal, global, and intergenerational context. After all, humanity writ large still ends up paying the price, whether that be in the form of preventable disasters, impacts to health, or in myriad other ways across the world and across generations, as the "social cost of carbon" seeks to account for.[29]

When it comes to the challenge of *reducing* climate pollution to try to avoid such damaging impacts, perhaps the most relevant type of collective action problem is known as a "public goods dilemma." Public goods dilemmas occur in situations where, when all individuals in a group or across society contribute, everyone is better off. In many of these situations, however, some individuals decide not to do their part, acting as "free riders" – essentially seeking the benefit of collective action without contributing to it, thereby putting more onus on other members of the group or society.[30] When enough individuals or actors become free-riders, the result is ultimately self-defeating, as common efforts become impossible to achieve.

Effective mitigation of greenhouse gas emissions can only be achieved by a collective effort. No state - no country, even – can individually reduce climate pollution enough to avert the worst consequences of an even more destabilized climate. The obvious and appropriate response is for each country and state to do their part and take responsibility for reducing the pollution that they create, in line with scientific guidance and considering the current and historic responsibility of that state or country.

However, in this context it can be especially appealing for some states or countries to argue (whether explicitly or implicitly) that their contribution to climate pollution doesn't matter, essentially sitting out on a common effort and becoming a "free-rider." This

[28] LSE, "The Economics of Climate Change: The Stern Review," 2006, https://www.lse.ac.uk/granthaminstitute/publication/the-economics-of-climate-change-the-stern-review/.
[29] The National Academy of Sciences defines the social cost of carbon as: "An estimate, in dollars, of the present discounted value of the future damage caused by a metric ton increase in carbon dioxide (CO2) emissions into the atmosphere in that year or, equivalently, the benefits of reducing CO2 emissions by the same amount in that year." (National Academies of Sciences, Engineering, and Medicine. Valuing Climate Changes, 2017). Note: This is also how it is defined in Vermont's 2021 Climate Action Plan.
[30] Olson, M. The Logic of Collective Action, 1965.

argument is often heard in Vermont energy and climate debates: not only that we shouldn't act, but that it's OK not to do our part because we are too small to matter and/or our inaction will be too small to be noticed by others.

While there are many examples of ways in which free riders can take advantage of public goods dilemmas – for instance, people who listen to public radio without donating to help continue its production or people who eat at a potluck without bringing anything to share – one example may be particularly appropriate to consider, given Vermont's history and culture: a barn raising.

Barn raisings allow communities to do something together that no individual - no matter how strong or talented – can do on their own: construct and raise a barn into place. Barn raisings, common in Vermont and other rural areas in the 18th and 19th centuries, are types of collective actions. When lifting a barn wall into place, for instance, many hands make for lighter work.

However, if one or more people decide to "free ride" – in this case, to step away from and drop the load of their section when lifting – the weight becomes heavier for everyone else.

Beyond the immediate practical effect of making the load heavier, there is also the negative social effect of the bad example, potentially motivating others to step back in a domino-like fashion. And if enough step back, that can be potentially dangerous to their fellow community members or ruinous to the barn, making it impossible to complete the task. In a scenario like this, every choice and example matters. The reasons for such choices are not entirely rational. As Dan Kahan argues in his article, "The Logic of Reciprocity," emotion is also at play.

> "When they perceive that others are behaving cooperatively, individuals are moved by honor, altruism, and like dispositions to contribute to public goods even without the inducement of material incentives. *When, in contrast, they perceive that others are shirking or otherwise taking advantage of them, individuals are moved by resentment and pride to retaliate*. In that circumstance, they will withhold beneficial forms of cooperation *even if doing so exposes them to significant material disadvantage*."[31] (italics added)

[31] Kahan, D. The Logic of Reciprocity: Trust, Collective Action, and Law, 2002.

Photo credit: Kim D. French

Climate action among states and jurisdictions is like a modern-day global barn raising. No one jurisdiction can reduce enough pollution on their own to achieve the desired end result. To have the best chance of success and to meet our basic moral responsibility as members of the global community, we all should do our part - for both practical, social, and moral reasons. Whenever a state or country opts out and shirks their responsibility – even if they aren't the biggest or strongest – that choice makes the entire effort that much more difficult for everyone else. Furthermore, that example further weakens already strained social dynamics based on honor, trust, and reciprocity, threatening constructive social action that would benefit all.

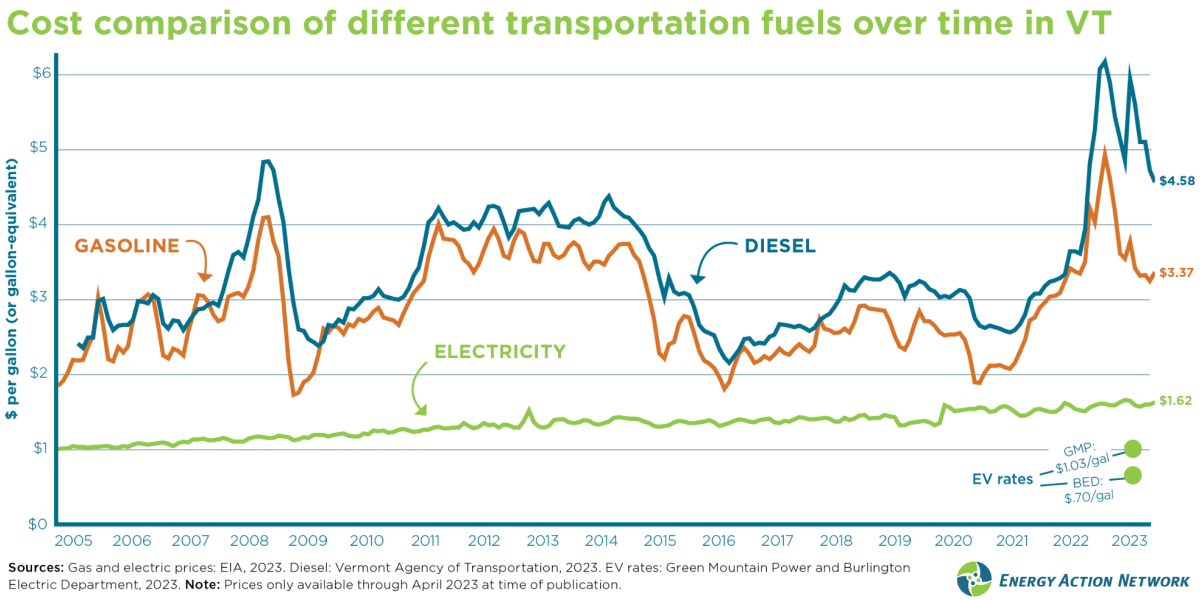
VII. Benefits of climate action

Aside from a legal obligation and a moral responsibility for Vermont to do our part to reduce climate pollution, transitioning away from fossil fuels also has the potential to deliver significant economic and health benefits to Vermont and Vermonters.

A. Household and Individual Savings

Fossil fuels are usually higher cost and subject to far more price volatility than cleaner and more efficient energy options, such as using electricity for electric vehicles and heat

pumps. Specifically, gasoline has been over $3 a gallon in Vermont since the summer of 2021. During that same time, the equivalent cost of charging an electric vehicle in Green Mountain Power (Vermont's largest electricity provider) territory has been about $1 per gallon (for residential and commercial customers signed up for the EV rate).



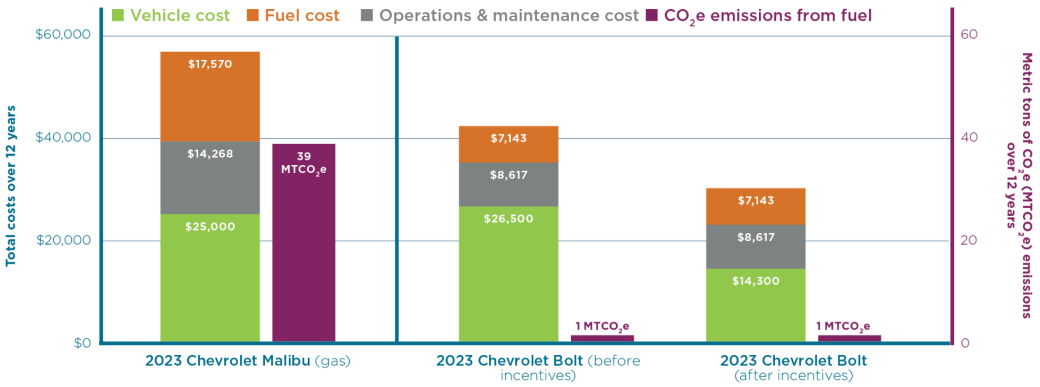
Beyond the cost savings on fuel, EVs also offer significant savings on *maintenance* compared to gas vehicles, given that they have fewer moving parts and don't require oil changes, engine tune-ups, spark plug changes, and more.[32]

While many electric vehicles have higher manufacturer's suggested retail prices (MSRPs) than comparable gas models, once available federal, state, and utility incentives are factored in, the actual upfront purchase cost of a new or used EV is often lower than that of a comparable gas vehicle.[33]

Altogether, EVs offer significant fuel and maintenance savings over their lifetime as compared to fossil vehicles and, with incentives, are often less expensive to purchase up-front than gas vehicles.

[32] U.S. Department of Energy, "FOTW #1190, Battery-Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles", 2021.
[33] EAN Annual Progress Report for Vermont, 2023. Pages 24-25.

Lifetime costs and tailpipe emissions of comparable gas vs electric passenger cars



Sources: For vehicle costs: Drive Electric Vermont, 2023; and Chevrolet.com, 2023. For gasoline emissions: EIA, "Carbon Dioxide Emissions Coefficients". For electricity emissions: "Assessing the GHG Impact of Beneficial Electrification in Vermont," EAN, 2023. For fuel prices: Vermont Public Service Department, 2022, and GMP, 2023. For O&M costs: U.S. Department of Energy, "FOTW #1190, Battery-Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles", 2021. **Notes:** Fuel costs are based on the 2022 average of $3.98/gallon of gasoline, and the March 2023 Green Mountain Power rate of $0.18/kWh of electricity. CO_2e value for VT electricity is 71 lbs/MWh. CO_2e value for gasoline is 19.4 lbs/gallon. Equipment costs represent the base MSRP for 2023 models. Fuel/charging costs can be even lower than presented with the use of EV charging rates offered by some utilities.

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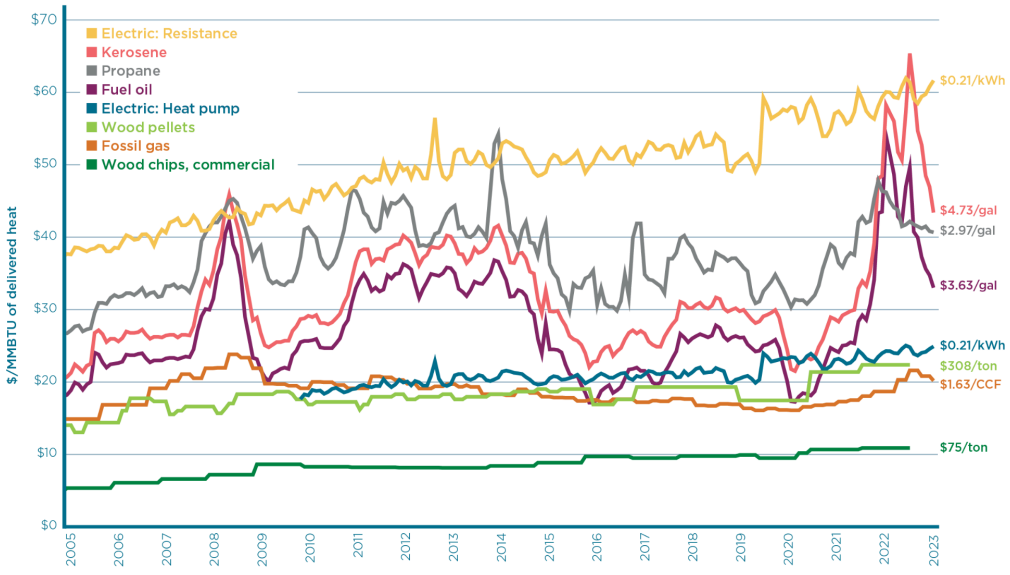
The story is similar when it comes to options for space and water heating. Fossil heating fuels like propane, fuel oil, and kerosene are high cost and price volatile. Switching to fossil-free heating equipment, such as cold-climate heat pumps and advanced wood heat, can lower a household's energy costs while providing much more stable heating prices.

Cost comparison of different heating fuel options over time



Sources: Fuel Oil, Propane, Kerosene: VT Department of Public Service, Fuel Price Report 2023. Fossil gas: VGS, 2023. Electricity: EIA, 2023. Wood Chips, Wood Pellets: Biomass Energy Research Center, 2023. **Notes:** Electricity prices presented here are a statewide average. Electricity prices vary by utility territory. The reason propane is 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. Propane's energy content is only 66% that of fuel oil, by gallon (EIA). Prices reflect data availability at time of publication: through November 2022 for wood fuels and through May 2023 for all others.

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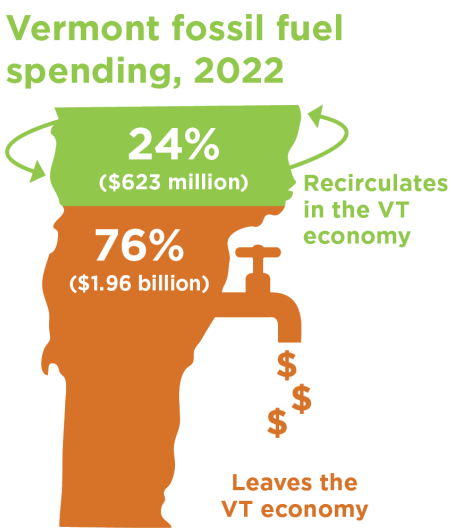
Of course, the total cost (inclusive of equipment purchase and maintenance) is as relevant in the heating sector as it is in the transportation sector. Unfortunately, equipment pricing – both for fossil fuel-based equipment and for renewable energy equipment – is particularly variable, making statewide comparisons difficult. Nevertheless, many cleaner heating options are or can be more affordable up-front and over time than fossil equipment, especially given the federal, state, and utility incentives that are increasingly available (and incredibly important, especially to ensure an equitable energy transition).

B. Statewide economic benefit

Moving away from fossil fuel dependence is not just beneficial for Vermont consumers, but also for local jobs and the state economy.

100% of the fossil fuels used in Vermont are imported from out of state, the result being that more than three quarters of the money we spend on fossil fuels drains out of the state economy. In 2022 alone, nearly $2 billion of the approximately $2.6 billion in total fossil fuel spending in Vermont left the state economy.



Sources: Fossil fuel spending: Vermont Department of Taxes, 2023; VGS, 2023. Dollar recirculation share: EAN Senior Fellow for Economic Analysis, Ken Jones, 2023. **Note:** This graph includes spending on thermal and transportation fuels only.

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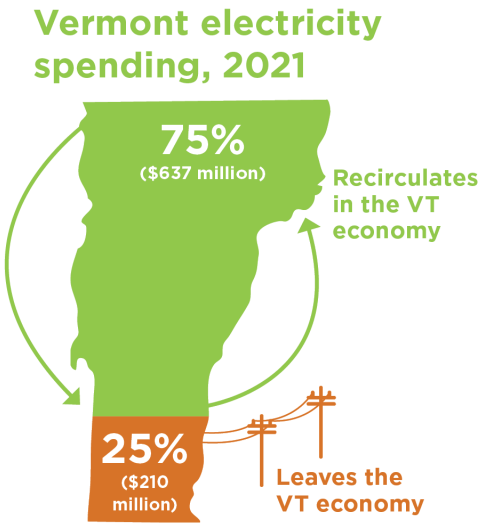

Sources: Electricity spending: Vermont Department of Public Service, 2021 Electric Utility Resource Survey; Dollar recirculation share: EAN Senior Fellow for Economic Analysis, Ken Jones, 2023.

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The ratio is essentially reversed when we use electricity to meet our energy needs. For example, by driving electric cars or heating with high-efficiency electric heat pumps, 75%

of the dollars we spend stay and then recirculate in Vermont. This is because most of the cost of delivering electricity is bound up in local labor and infrastructure, whereas most of the cost of fossil fuels goes to importing a global commodity product.

Using electricity instead of fossil fuels for energy in Vermont creates a positive feedback loop that strengthens our local economy, helping support working families by paying the salaries of Vermont lineworkers, tree-trimmers, and local clean power producers, among others.

One way to understand the magnitude of the combined opportunities that the energy transition presents is in the Vermont Pathways Analysis Report 2.0. The Pathways report adds up the projected savings and costs associated with acting to meet Vermont's greenhouse gas emissions reduction requirements via the pathways recommended in the Initial Vermont Climate Action Plan that was adopted by the Vermont Climate Council in 2020. The Pathways report estimates nearly $15 billion in savings from avoided fuel consumption, primarily from moving away from fossil fuels. However, much of that savings is offset by new costs related to additional electricity generation, transportation investments, and building upgrades that will be needed. Nevertheless, the Pathways report projected **$6.4 billion in net economic savings and avoided global damages** between 2022 and 2050 as a result of following the pathways in Vermont's Climate Action Plan. [34]

C. Health benefits

In addition to being the primary source of global climate pollution, burning fossil fuels also worsens local air quality. Fossil fuels produce toxic and carcinogenic air pollution, including particulate matter that can exacerbate respiratory diseases. The health impact of climate pollution is an important equity issue. Disadvantaged communities, particularly low-income and majority Black and Brown communities, tend to experience disproportionate health impacts from climate pollution throughout the United States. Transitioning away from fossil fuels for transportation, as well as for heating and cooling

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[34] Cadmus/EFG, Vermont Pathways Analysis Report 2.0, 2022. https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2022-03/Pathways%20Analysis%20Report_Version%202.0.pdf
Note, this estimate was derived with a Social Cost of Carbon that is lower than recent research suggests it should be, leading to a lower total value of avoided global damages than would otherwise be the case. For a summary of recent research related to the social cost of greenhouse gases, see: Evelyn Hatem, "Toward a True Cost of Climate Pollution: How Vermont Can Better Incorporate the Latest Research on the Social Costs of Greenhouse Gases," 2023.

homes and businesses, can result in significant health benefits, reducing harmful air pollution and particulate matter.

VIII. Conclusion

Whether looking at GHG emissions on a per capita basis today or on a cumulative basis over the last 170 years, it is evident that Vermont has just as much (if not more) of a responsibility as other states or jurisdictions to advance the transition away from fossil fuels, in order to do our part in the global effort to avoid the most devastating effects of climate change. This responsibility not only stems from Vermont's relative emissions footprint, but is also rooted in its role as a member of a global community that relies on norms of cooperation and reciprocity. Vermont, like any other jurisdiction, has a role to play in upholding the expectation that all members do their part in this global effort.

Vermont also has a significant opportunity to act by virtue of having the tools, the technology, and the know-how at our disposal to advance climate solutions. Additionally, because Vermont already has a relatively clean electricity portfolio, transitioning to fossil-free heating and transportation equipment has the potential to be particularly effective as an emissions reduction strategy when compared to jurisdictions with more carbon intensive electricity.

Transitioning away from fossil fuels is not just about mitigating global climate change — it's also about delivering benefits to Vermont households and the state economy. If done right, the energy transition can increase affordability, promote improved health outcomes, and support local workers and the Vermont economy.

Vermont and other jurisdictions have to decide whether we will do our part or whether we will shirk our responsibility and try to act as free riders in the global effort to confront climate destabilization. While our answer alone will not determine the outcome of the climate challenge, it will be known by us and to our children and our neighbors in other states and countries. The answer to this question is a matter of morality and ethics that can be informed by an understanding of the logic of collective action. Will we meet our responsibility and do our part in this urgent all-in global effort? Or will we sit on the sidelines at this generation-defining moment in history?

About EAN

Energy Action Network (EAN) is a diverse network of over two-hundred non-profits, businesses, public agencies, and other organizations working together in a collective impact framework and supported by a core staff to further the Network's mission. EAN works to achieve Vermont's climate and energy commitments in ways that create a more just, thriving, and sustainable future for Vermonters. EAN is dedicated to producing the highest quality research and analysis on a wide range of issues related to meeting Vermont's energy and climate commitments.

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