



17. Buildings and Thermal Pathways for Mitigation

Heating Reforms Can Make Housing More Affordable and Less Polluting

The infrastructure of Vermont consists not just of public facilities like roads and bridges, but is predominantly made up of buildings. The heating and cooling requirements of those buildings impose substantial energy costs and produce nearly a third of the state's GHG emissions.⁽¹³⁰⁾ This chapter tackles thermal cost and emissions problems through three main strategies: improving the thermal integrity of buildings, lowering the carbon intensity of heating fuels, and improving the performance of equipment we use for space and water heating.

Importing fossil fuels to heat our buildings is a significant drain on Vermont's economy. In 2024, Vermont families and businesses spent \$767 million on fossil fuels for heat, the vast majority of which left the state's economy.⁽¹³¹⁾ Dependence on fossil fuels also exposes Vermont families and businesses to global fuel-price volatility; between 2021 and 2022, for example, the cost of heating fuels jumped from \$694 million to \$930 million, a 34% increase. The cost of heat disproportionately burdens lower-income Vermonters with high energy-related expenses relative to their incomes.

130 Vermont Agency of Natural Resources. [Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2022](#). July 2025.

131 Energy Action Network. [Annual Progress Report 2023](#). pg. 7. The following year \$1.7 billion spent on fossil fuel left the state. Energy Action Network. [Annual Progress Report 2024](#). p.7.

Vermont's thermal challenge is in part due to the age of the housing stock, which is dominated by homes built before 1975, before more modern building codes began to address energy issues. Indeed, over a quarter of Vermont homes were built before 1939.⁽¹³²⁾ Energy use in homes dominates the thermal sector, but commercial and industrial buildings produced roughly 14% of the state's GHG emissions in recent years.⁽¹³³⁾ Vermonters rely on a variety of resources to heat water and buildings. Heat in Vermont comes predominantly from fossil fuels (72%) with smaller fractions from wood heat (24%), electricity (3%), and some alternative fuels.

Replacing carbon intensive fossil-fueled heat with lower-carbon alternatives can greatly lower costs over time and contribute to Vermont meeting its climate commitments. It will also support Vermont's economy because more of the money Vermonters spend on heating will stay in the state.⁽¹³⁴⁾ Moreover, by focusing on the most burdened households and businesses, Vermont can pair up clean fuel options and weatherization programs to deliver low-carbon building solutions to those who need them the most.

Affordability and the Ability to Pay

While the policy recommendations discussed in this chapter would lower the state's total cost of heat and total climate emissions, they must be designed and applied to address two financial challenges.

Affordability

Vermonters routinely spend over \$750 million each year on fossil heating fuels, a cost that contributes to the state's housing affordability challenge. Vermont's annual fuel bills are obviously expensive. While many climate-friendly options will lower costs over time, some of the solutions require significant investments to be made. Weatherizing homes and transitioning away from fossil heat requires investments in buildings, heat pumps, pellet stoves and the like. The challenge is often one of timing: How to finance investments now in order to lower energy bills over time? The economic analyses that have been done to date show long-term savings from reduced fossil fuel bills but vary considerably in their assumptions about the cost of clean heat measures and resulting shorter-term cost impacts.⁽¹³⁵⁾ For this reason, we recommend including clear cost caps or price caps in the design of the thermal policies included in this CAP.

132 Vermont Housing Finance Agency. [VHFA Housing Needs Assessment](#) p. 2. June 2024.

133 Vermont Agency of Natural Resources. [Vermont Greenhouse Gas Emissions Inventory and Forecast 1990-2017](#). May 2021.

134 Energy Action Network. [Annual Progress Report 2024](#). p.7. Fossil fuel spending: Vermont Department of Taxes, 2024; VGS, 2024. Dollar recirculation share: Ken Jones, EAN Senior Fellow for Economic Analysis, 2024.

135 See, for example, [The Analysis of Buildings/Thermal Energy Sector Emissions Reduction Policies for Vermont](#), November 2023.; and Vermont Public Utility Commission. [Report to the Vermont Legislature: Second Checkback Report on the Clean Heat Standard Under Act 18 of 2023, Section 6\(i\)](#), January 2025.

While it's a tough challenge, we know it can be done. Vermont has a long and successful track record of earned energy savings through Efficiency Vermont and other utility efficiency programs, the Weatherization Assistance Program, Tier 3 of the Renewable Portfolio Standards, and the cap-and-invest policy of the Regional Greenhouse Gas Initiative. These programs have saved Vermonters billions of dollars, based on moderate but persistent year-after-year investments in energy efficiency and weatherization. In this CAP we recommend an extension of this type of investment program, targeted to reducing fossil fuel costs and emissions.

Our recommendations would provide one or more stable sources of revenue to help Vermonters to invest in buildings and heating systems that would pay off in savings over time. Such policies—including weatherization at scale, thermal efficiency programs, energy performance standards and cap-and-invest options—can be implemented gradually. They can be designed to leverage program revenues to maximize private investments. And they can be designed to include cost caps to minimize near-term impacts on the price of fossil fuels and promote affordability.

Ability to Pay

Programs to reduce climate pollution should be designed to minimize adverse effects on low-income households, especially Vermonters most burdened by energy and housing-related costs.

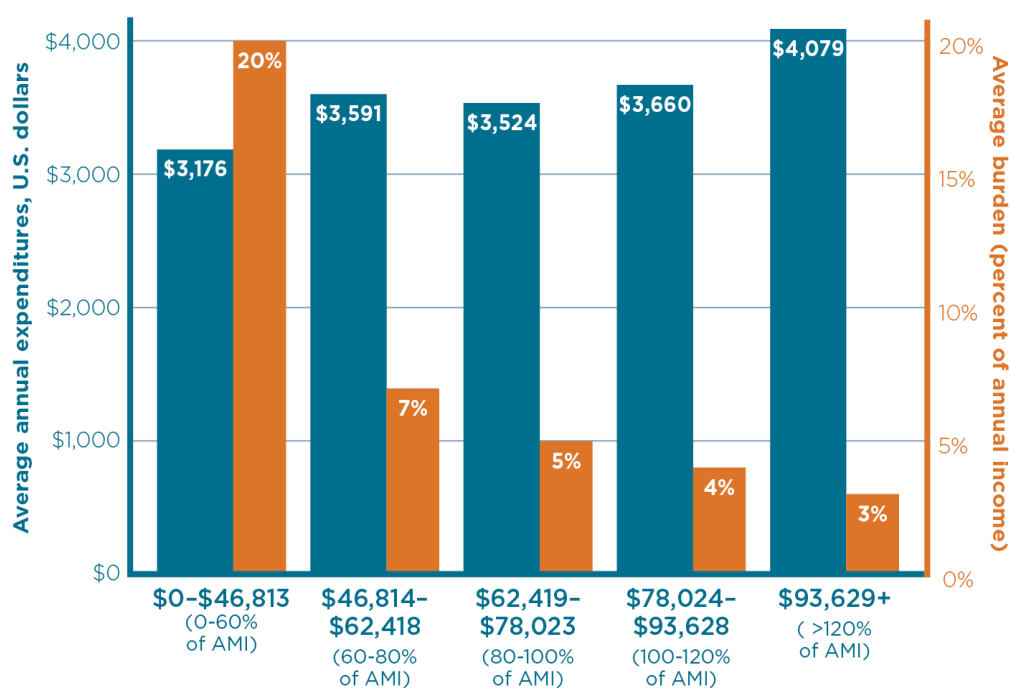
While a central goal of the GWSA is to reduce GHG emissions, we must also limit the effects of various GHG reduction policies on all Vermonters, especially those who struggle with the cost burdens associated with housing and energy use. In 2019, Efficiency Vermont studied energy burdens in the state and determined that, on average, Vermonters spent about 10% of their income, or roughly \$5,800 annually, on energy expenses. However, the actual energy burden that Vermonters face ranges statewide from 6% to as much as 20%.⁽¹³⁶⁾

Focusing just on household heating and electricity bills, a more recent analysis shows that the percentage of household income spent on those bills is at its highest level (19% of household income) for households in the lowest-income quintile (the one-fifth of households, who earn less than 60% of the Area Median Income). The percentage is 7% to 4% in the middle-income categories and hits a low of 3% among the richest one-fifth of households.⁽¹³⁷⁾ This is true even though average energy consumption is higher in higher-income households.

136 “[What is the impact of energy burden in Vermont?](#)” Rebecca Foster, Director, Efficiency Vermont, last modified October 13, 2019.

137 US Census Bureau, 2018-2022 [American Community Survey 5-year Public Use Microdata Samples](#). Energy Action Network. [Annual Progress Report 2024](#). p.13.

FIGURE 17.1: Vermont combined average household heating and electricity fuel costs and burden by income level, 2019–2023.⁽¹³⁸⁾



Source: U.S. Census Bureau, 2019-2023 American Community Survey 5-year Public Use Microdata Samples.

Notes: Income categories are based on 2019-2023 median household income in Vermont of \$78,024. Energy burden refers to the share of annual household income spent on energy. Costs include fuel only and are not inclusive of equipment and maintenance costs.

The important lesson to be drawn from these numbers is that thermal programs can be designed equitably if they raise revenues in proportion to consumption and target bill assistance and investment supports to the households with the highest energy burdens. We recommend that the thermal energy policies set out in this CAP be implemented in line with these principles.

Specific Affordability and Climate Policies Are Needed for the Rental Sector

The challenges of the thermal transition are even greater, and somewhat more complicated, in the rental sector. Of Vermont's roughly 340,000 homes, about a quarter of them (80,000) are used or intended for renters.⁽¹³⁹⁾ While the median construction year for owned homes in Vermont is the mid-1970s, the median construction year for Vermont rental housing is significantly older: 1964. In addition to the number of relatively old rental properties, roughly 80% of the Vermonters who rent are categorized as low-income

138 Energy Action Network, Annual Progress Report for Vermont 2025. (Energy Action Network, 2025), 6.

139 Vermont Housing Finance Agency. [VHFA Housing Needs Assessment](#) p. 1. June 2024.

earners, according to Efficiency Vermont and Vermont Housing Finance Agency.⁽¹⁴⁰⁾ Efficiency and other heating programs in the rental sector must also overcome the so-called “landlord-tenant problem” in cases where tenants are required to pay the heat and utility bills but can’t make investments in weatherization or heating equipment that would lower the unit’s total energy burden over time.

The Thermal Challenge Is Substantial, but Vermont Has Strong Institutions and Experience to Draw Upon

Vermont has decades of experience developing policies and designing and implementing weatherization, energy-efficiency and clean-energy initiatives that reduce energy use in buildings throughout the state—including residential, commercial, and industrial buildings of all sizes and types. Substantial work has been done (and is ongoing), including delivering weatherization, energy-efficiency and clean-energy rebates, incentives and services through Efficiency Vermont, electric and gas utility companies and the Home Weatherization Assistance Program. These initiatives should be continued and potentially expanded and enhanced in the future.

However, it is clear from multiple recent analyses that significant, additional initiatives are needed beyond what is already underway to meet the GHG reduction obligations established in the GWSA and to do more to reduce Vermont’s dependence on high-cost, price-volatile fossil heating fuels.

Continued and accelerated progress is possible and necessary. Summarized below are the seven major pathways recommended in this CAP for reducing GHG emissions from thermal uses and buildings in Vermont.

Pathway 1: Adopt a broad, sector-wide approach to reduce greenhouse emissions from thermal uses in buildings

A variety of approaches could be taken, but the essential purpose of this recommendation is to create an overall structure and a steady pace of emissions reduction consistent with GWSA obligations that can be measured and supported over time. Among the options available, we recommend continued examination of a modified clean heat performance standard, designed for gradual implementation and containing a price cap to provide assurance that costs on fossil fuels will be moderate and at or below preapproved levels.

140 Sears, J., Lucci, K. Efficiency Vermont. [Vermont Energy Burden Report](#). October 2019 Vermont Housing Finance Agency.

If the Legislature chooses not to adopt a thermal performance standard in the near term, it should create a distinct source of stable funding for heating initiatives. Two options are expanding the current weatherization fund or creating a thermal energy benefits charge on fossil fuel sales, as recommended in the Public Utility Commission's second checkback report to the Legislature.⁽¹⁴¹⁾ Such a source of funding will be essential to make progress on the thermal transition until a more comprehensive performance standard or cap-and-invest program is in place.

We also recommend continued examination of Vermont's joining a multi-state cap-and-invest program that could include coverage of emissions from both the transportation and thermal sectors. Furthermore, we recommend adoption of a rule requiring reporting of fossil fuel sales by fuel dealers to provide the basic information that governmental decisionmakers would need to design effective programs to reduce fossil fuel emissions. This information is needed whether the Legislature and regulatory agencies choose to adopt the broad-based programs we recommend or more targeted programs to reduce climate pollution.

Pathway 2: Focus on buildings directly

We recommend implementing the recommendations of the Weatherization at Scale Coalition to close the gap between the state's long-term weatherization goals and existing pace of weatherization. To improve the thermal quality of new construction we recommend improvements in building codes and building code compliance. We support increased funding for modern, energy-efficient mobile homes in alignment with the Act 47 Mobile Home Task Force recommendations. And we recommend a study by the Department of Public Service on possible energy efficiency standards for multi-family rental properties, keyed to well-established energy conservation standards.

Pathway 3: Focus on the efficiency and emissions of heating equipment

We recommend that the Agency of Natural Resources, in consultation with the Department of Public Service, study the feasibility of adopting emission standards for new water heating and/or space heating equipment in Vermont. A second set of recommendations addresses the problem of refrigerants with high global warming impacts and supports action by the Agency of Natural Resources to lower their leakage rates and, possibly, their use.

141 Vermont Public Utility Commission. [Report to the Vermont Legislature: Second Checkback Report on the Clean Heat Standard Under Act 18 of 2023, Section 6\(i\)](#). January 2025.

Weatherizing Homes and Supporting Vermonters



As Vermont works to adapt to climate change, comprehensive weatherization of buildings enhances the resilience of the state's aging housing stock, supporting current and future generations to live in health, safety, and comfort. Impacts of a changing climate—such as flooding, excessive heat, increased humidity leading to mold, more frequent power outages from storms, and more—directly affect Vermonters, especially those in precarious housing situations. Weatherization projects reduce the amount of fuel needed to heat homes, allowing Vermonters to keep money in their pockets while keeping harmful pollution out of the air.

[Read more](#)

Pathway 4: Focus on GHG reduction through increased installations of high-efficiency electric space and water heating equipment

We recommend development of a long-term sustainable source (or sources) of funding to ensure equitable access for all Vermonters to electric heat pumps as replacements for fossil fuel heating equipment. We also recommend improvements in the rules governing low-income heating assistance to permit households with multiple heating sources to qualify for financial support from the Low Income Home Energy Assistance Program. And we recommend that utilities and their regulators adopt standards and programs to support geothermal networks and to ensure that electric water-heating loads can be managed to reduce grid impacts and peak-load power system costs.

Pathway 5: Focus on heating fuels

We recommend the adoption of a performance-based clean fuels standard to reduce the GHG intensity of fuels used for thermal purposes. This recommendation is consistent with one of the major recommendations of the Public Utility Commission in their recent report⁽¹⁴²⁾ to the Legislature and could advance one of the implementation options proposed by the Legislature in the Affordable Heat Act.

Pathways 6 and 7: Utilities and Workforce

In Pathways 6 and 7, this Plan examines two broad issues affecting a number of specific policy and regulatory areas. The Legislature should direct the PUC, or the PUC of its own volition should, open a proceeding to examine how the performance metrics of regulated utilities could be adjusted to better align with the goals of the GWSA. We also recommend a coordinated effort among multiple agencies, educational institutions and employers to ensure the training and availability of the skilled workforce that we know will be needed to achieve the energy transition required to meet Vermont's goals for a modern, climate-responsible energy sector.

¹⁴² Vermont Public Utility Commission. [Report to the Vermont Legislature: Second Checkback Report on the Clean Heat Standard Under Act 18 of 2023, Section 6\(i\)](#). January 2025.