

1 **Buildings & Thermal Pathways for Mitigation**

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3 **Heating reforms can make housing more affordable and less polluting**

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5 The infrastructure of Vermont consists not just of public facilities like roads and bridges, but is
6 predominantly made up of buildings. The heating and cooling requirements of those buildings
7 impose substantial energy costs and produce nearly a third of the state’s GHG emissions.¹ This
8 Chapter tackles thermal costs and emissions problems through three main strategies: improving
9 the thermal integrity of **buildings**, lowering the carbon intensity of **heating fuels**, and improving
10 the performance of **equipment** we use for space and water heating.

11

12 Importing fossil fuels to heat our buildings is a significant drain on Vermont’s economy. In 2022,
13 for example, Vermont spent nearly \$1.2 billion on fossil heating fuels, the vast majority of which
14 left the state economy.² It also exposes Vermont families and businesses to global fuel-price
15 volatility and disproportionately burdens lower-income Vermonters with energy related expenses.

16

17 Vermont’s thermal challenge is in part due to the age of the housing stock, which is dominated by
18 homes built before 1975, before more modern building codes began to address energy issues.

19 Indeed, over a quarter of Vermont homes were built before 1939.³ Energy use in homes
20 dominates the thermal sector, but commercial and industrial buildings produced roughly 14% of
21 the state's GHG emissions in recent years.⁴ Vermonters rely on a variety of resources to heat
22 water and buildings. Heat in Vermont comes predominantly from fossil fuels (72%) with smaller
23 fractions from wood heat (24%), electricity (3%), and some alternative fuels.

24

25 Replacing carbon intensive fossil-fueled heat with lower carbon alternatives can greatly lower
26 costs over time and contribute to Vermont’s meeting its climate commitments. It will also

¹ Vermont Agency of Natural Resources, “Vermont Greenhouse Gas Emissions Inventory and Forecast: 1990-2021.” (2024)

² Energy Action Network, Annual 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.

³ Vermont Housing Needs Assessment, Vermont Housing Finance Agency (“VHFA Housing Needs Assessment”), February 2020, p. 2.

⁴ “Vermont Greenhouse Gas Emissions Inventory and Forecast 1990-2017” May 2021

27 stimulate Vermont’s economy because more of the money Vermonters spend on heating will stay
28 in state.⁵ Moreover, by focusing on the most burdened households and businesses, Vermont can
29 pair up clean fuel options and weatherization programs to deliver low-carbon building solutions
30 to those who need them the most.

31

32 **Affordability and the Ability to Pay**

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

36

37 **The first challenge is affordability.** The fossil status quo, where Vermonters routinely spend
38 between \$750 million and \$1 billion to import climate-damaging heating fuels, is part of the
39 state’s housing affordability problem.

40

41 Vermont’s annual fuel bills are obviously expensive. But weatherizing homes and transitioning
42 away from fossil heat requires investments in buildings, heat pumps, pellet stoves and the like.
43 Many climate-friendly options will lower costs over time, but some of the solutions require up-
44 front investments to be made. The challenge is often one of timing: how to finance investments
45 now in order to lower energy bills over time?

46

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

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55 This Chapter contains recommendations that would provide one or more stable sources of
56 revenue to incentivize investments in buildings and heating systems that would pay off in

⁵ 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.

57 savings over time. Those policies -- including weatherization at scale, thermal efficiency
58 programs, energy performance standards and cap-and-invest options -- can be implemented
59 gradually. They can be designed to leverage program revenues to maximize private investments.
60 And they can be designed to include cost caps to minimize near-term impacts on the price of
61 fossil fuels and promote affordability.

62

63 **The second challenge is the ability to pay.** Programs to reduce climate pollution should be
64 designed to minimize adverse effects on low-income households, especially Vermonters most
65 burdened by energy and housing-related costs.

66

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

73

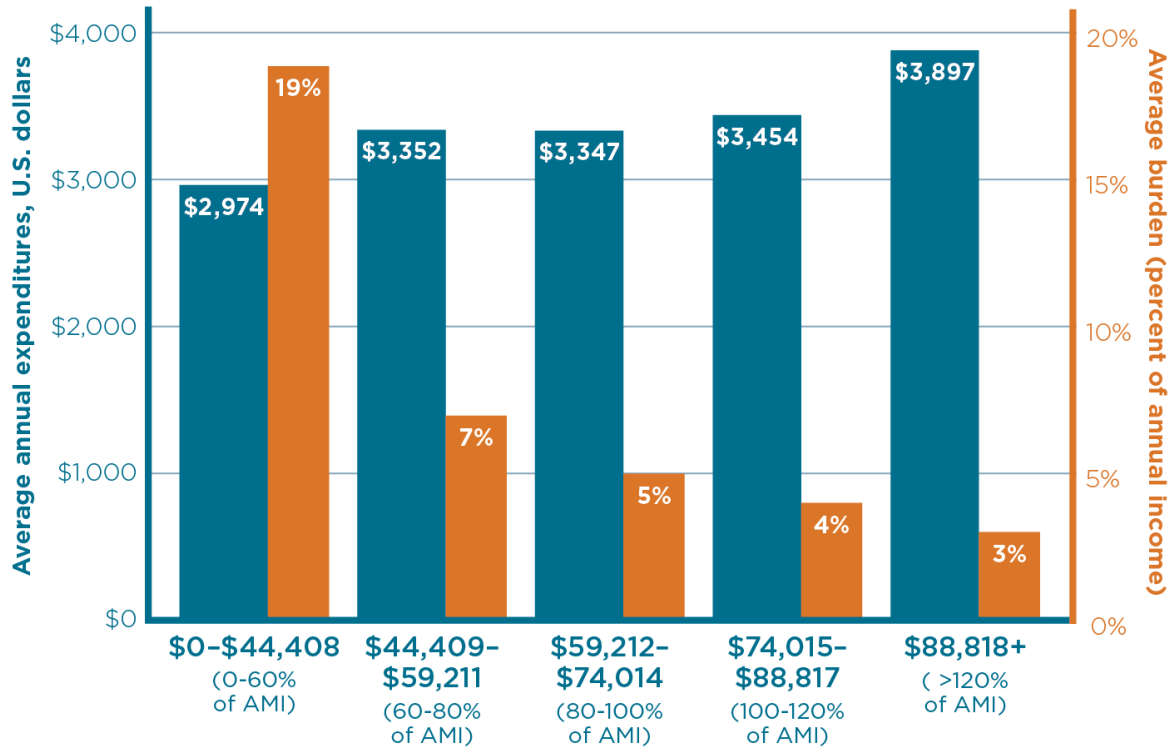
74 Focusing just on household heating and electricity bills, a more recent analysis shows that the
75 percentage of household income spent on those bills is at its highest level (19% of household
76 income) for households in the lowest-income quintile [one-fifth of households, who earn less
77 than 60%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

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⁶ "What is the impact of energy burden in Vermont?" ("Energy Burden in Vermont") Rebecca Foster, Director Efficiency Vermont, October 13, 2019.

⁷ US Census Bureau, 2018-2022 American Community Survey 5-year Public Use Microdata Samples, reported in Energy Action Network, Annual Progress Report for Vermont (2024), p.13.

Vermont combined average household heating and electricity fuel costs and burden by income level, 2018–2022



Source: U.S. Census Bureau, 2018-2022 American Community Survey 5-year Public Use Microdata Samples. **Notes:** Income categories are based on 2018-2022 median household income in Vermont of \$74,014. 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.



81

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

86

87 **Specific affordability and climate policies are needed for the rental sector**

88

89 The challenges of the thermal transition are even greater, and somewhat more complicated in the
 90 rental sector. Of Vermont’s roughly 340,000 homes, about a quarter of them (80,000) are used or

91 intended for renters.⁸ While the median construction year for owned homes in Vermont is the
92 mid-1970s, the median construction year for Vermont rental housing is significantly older: 1964.
93 In addition to the number of relatively old rental properties, a large portion of the Vermonters
94 who rent, roughly 80%, are categorized as low-income, according to Efficiency Vermont and
95 VHFA.⁹ Efficiency and other heating programs in the rental sector must also overcome the so-
96 called “landlord-tenant” problem in cases where tenants are required to pay the heat and utility
97 bills but can’t make investments in weatherization or heating equipment that would lower the
98 unit’s total energy burden over time.

99
100 **The thermal challenge is substantial, but Vermont has strong institutions and**
101 **experience to draw upon**

102
103 Vermont has decades of experience developing policies and designing and implementing
104 weatherization, energy efficiency, and clean energy initiatives that reduce energy use in
105 buildings throughout the State – including residential, commercial, and industrial buildings of all
106 sizes and types. Substantial work has been done (and is ongoing), including: delivering
107 weatherization, energy efficiency, and clean energy rebates, incentives, and
108 services through Efficiency Vermont, electric and gas utility companies, and the Home
109 Weatherization Assistance Program.

110
111 These initiatives should be continued and potentially expanded and enhanced in the future.
112 However, it is clear from multiple recent analyses that significant, additional initiatives are
113 needed beyond what is already underway to meet the GHG reduction obligations established in
114 the GWSA and to do more to reduce Vermont’s dependence on high-cost, price-volatile fossil
115 heating fuels.

116
117 **Continued and accelerated progress is possible and necessary**

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⁸ VHFA Housing Needs Assessment, p. 1

⁹ “Vermont Energy Burden Report,” Justine Sears and Kelly Lucci, October 2019; Vermont Housing Finance Agency.
<https://www.housingdata.org/profile/rental-housing-costs/renter-cost-burden>

119 Summarized briefly below are the seven major pathways recommended in this Plan for reducing
120 GHG emissions from thermal uses and buildings in Vermont.

121

122 **In Pathway 1 we recommend adoption of a broad, sector-wide approach** to reduce
123 greenhouse emissions from thermal uses in buildings. A variety of approaches could be taken,
124 but the essential purpose of this recommendation is to create an overall structure and a steady
125 pace of emissions reduction consistent with GWSA obligations that can be measured and
126 supported over time. Among the options available, we recommend continued examination of a
127 modified clean heat performance standard, designed for gradual implementation, and containing
128 a price cap to provide assurance that costs on fossil fuels will be moderate and at or below
129 preapproved levels. We also recommend continued examination of Vermont's joining a multi-
130 state cap-and-invest program that could include coverage of emissions from both the
131 transportation and thermal sectors. Furthermore, we recommend a rule requiring reporting of
132 fossil fuel sales by fuel dealers to provide the basic information that governmental
133 decisionmakers would need to design effective programs to reduce fossil fuel emissions. This
134 information is needed whether the legislature and regulatory agencies choose to adopt the broad-
135 based programs we recommend or more targeted programs to reduce climate pollution.

136

137 **Pathway 2 focuses on buildings directly.** We recommend ramping up implementation of the
138 Weatherization at Scale Initiative to close the gap between the state's long-term weatherization
139 goals and existing pace of weatherization. To improve the thermal quality of new construction
140 we recommend improvements in building codes and building code compliance. We support
141 increased funding for modern, energy-efficient mobile homes in alignment with the Act 47
142 Mobile Home Task Force recommendations. And we recommend a study by the Department of
143 Public Service on possible energy efficiency standards for multi-family rental properties, keyed
144 to well-established energy conservation standards.

145

146 **In Pathway 3 this Plan focuses on the efficiency and emissions of heating equipment.** We
147 recommend that the Agency of Natural Resources, in consultation with the Department of Public
148 Service, study the feasibility of adopting emission standards for new water heating and/or space
149 heating equipment in Vermont. A second set of recommendations addresses the problem of

150 refrigerants with high global warming impacts, and supports action by the Agency of Natural
151 Resources to lower their leakage rates and possibly, their use.

152

153 **Pathway 4 focuses on GHG reduction through increased installations of high-efficiency**
154 **electric space and water heating equipment.** We recommend development of a long-term
155 sustainable source (or sources) of funding to ensure equitable access across all Vermonters to
156 electric heat pumps as replacements for fossil fuel heating equipment. We also recommend
157 improvements in the rules governing low-income heating assistance to permit households with
158 multiple heating sources to qualify for LIHEAP’s financial support. And we recommend that
159 utilities and their regulators adopt standards and programs to ensure that electric water heating
160 loads can be managed to reduce grid impacts and peak-load power system costs.

161

162 **In Pathway 5 we focus on heating fuels,** recommending adoption of a performance-based clean
163 fuels standard to reduce the greenhouse gas intensity of fuels used for thermal purposes. This
164 recommendation is consistent with one of the major recommendations of the Public Utility
165 Commission in their recent report to the legislature and could advance one of implementation
166 options proposed by the legislature in the Affordable Heat Act.

167

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

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