**(11) Pathways for Mitigation**

**Buildings**

**Summary Statement**

Vermont’s buildings pose a significant challenge to equitably meeting Global Warming Solutions Act (GWSA) emission reduction requirements. The state’s housing stock is dominated by homes built before 1975, with over a quarter of them built before 1939.[[1]](#footnote-2) These buildings produce over a third of the state’s GHG emissions and represent roughly 35 percent of our energy expenditures.[[2]](#footnote-3) Commercial and industrial buildings produced nearly 14% of the state's GHG emissions in 2017.[[3]](#footnote-4) Importing fuel to heat our buildings is a significant drain on Vermont’s economy. It also exposes Vermont families and businesses to substantial global fuel-price volatility, and disproportionately burdens lower-income Vermonters with energy related expenses.[[4]](#footnote-5)

Replacing carbon intensive fossil fueled heating sources with available, lower carbon alternatives will significantly mitigate these challenges and contribute to Vermont meeting its climate goals. It will also stimulate Vermont’s economy because more of the money Vermonters spend on heating will stay in state. According to the Vermont Agency of Commerce and Community Development, in 2018, Vermont spent over $769 million on fossil fuels for heating. The Energy Action Network (EAN) reports that, 67% of those expenditures left the Vermont economy entirely.[[5]](#footnote-6) By spending energy dollars on relatively lower carbon-intensive electricity and wood, a greater share of that money will stay in-state and help employ Vermonters and strengthen our economy.[[6]](#footnote-7)

In addition to increasing reliance on fuels with a lower carbon intensity, improving the efficiency of Vermont’s buildings will help reduce the heating demands facing Vermonters. Thermal modernization of our buildings is a key to reducing GHG emissions and it is important this is done in a way that recognizes the economic challenges faced by the most vulnerable Vermonters in keeping homes, businesses, and other buildings heated and comfortable. With a focus on the most burdened households and businesses, Vermont can begin to address its climate challenges and pair up clean fuels options and weatherization programs to deliver comprehensive low-carbon building solutions.

**Ability to Pay – Burdened Vermonters**

Taking these steps can be expected to benefit the Vermont economy broadly but must also be designed to minimize adverse effects on low-income households and those who are most burdened by energy and housing-related costs. The expressions “energy burden” and “housing burden” describe the percent of household income that one spends on energy or on housing.[[7]](#footnote-8) While a central goal of the GWSA is to reduce GHG emissions, it will be critical to understand the effects of various GHG reduction policies on all Vermonters, especially those who struggle with the costs associated with housing and energy use.

Efficiency Vermont has studied energy burden in the state and determined that, on average, Vermonters spend about 10 percent of their income, or roughly $5,800 annually, on *energy* expenses. However, the actual burden that Vermonters face ranges statewide from 6% to as much as 20%.[[8]](#footnote-9)

When one considers the cost of housing and energy, Vermonters face an even greater challenge. According to the Vermont Housing Finance Agency, over 35% of all Vermont households (90,000) in the state are “cost-burdened” by their *housing* costs, meaning that either rent or mortgage, insurance, taxes and utilities consume at least 30% of their income.[[9]](#footnote-10) Furthermore, of these cost-burdened Vermont households, over a third (39,000) spend in excess of 50% of their income for housing.[[10]](#footnote-11)

**Renters**

Of Vermont’s roughly 330,000 homes, about a quarter of them (80,000) are used by or intended for renters.[[11]](#footnote-12) Chittenden County has the highest rate (36%) of rental housing in the state. While the median construction year for owned homes in Vermont is the mid-1970s, Vermont rental housing is significantly older. The median year built for rental homes is 1964.

In addition to the number of relatively old rental properties, a large portion of the Vermonters that rent, roughly 80%, are categorized as low-income, according to Efficiency Vermont and the Vermont Housing Finance Agency.[[12]](#footnote-13) One quarter of all renters pay between 30-49% of their income for housing, and another quarter pays 50% or more of their income for housing, i.e., rent and the cost of utilities.

Given the age and quality of Vermont’s buildings, the cost of fuels, and the number and income status of Vermonters who rent, it is critical that GWSA buildings and thermal policies incorporate equity into all recommendations. These solutions will need to minimize adverse effects on low-income households and those most burdened by high energy bills.

Vermont has more than three 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) on:

* Developing and periodically updating building energy codes
* Explaining the importance of code enforcement and seeking to ensure codes are being enforced
* Training architects, engineers, and builders on energy-efficient new construction and renovation practices
* Benchmarking buildings to increase awareness of building performance
* Including training on the economic and comfort advantages of energy efficient buildings in realtor training
* Offering weatherization, energy efficiency, and clean energy rebates, incentives, and services through Efficiency Vermont, electric and gas utility companies serving Vermont, and the Weatherization Assistance Program delivered by Community Action Agencies throughout the state
* And much, much more.

These initiatives should be continued and potentially expanded and enhanced in the future. However, it is clear from multiple analyses completed by EAN and others that aggressive, bold new initiatives are needed in addition to what is already underway in order to meet the GHG reduction requirements established in the GWSA.

Presented below are two major pathways recommended for reducing GHG emissions from buildings in Vermont and the strategies and actions recommended for achieving the pathways. In keeping with the GWSA’s focus on ensuring equitable access to affordable energy for all Vermonters, these pathways, strategies, and actions will both reduce GHG emissions from energy used in new and existing buildings and will address inequities in energy costs, energy burdens, and those underserved by current offerings.

**Pathway 1 – Reduce energy use in buildings by at least 25% through cost-effective and affordable weatherization and energy efficiency improvements, as well as through use and enforcement of energy codes.**

Vermont has extensive experience delivering weatherization, fuel assistance, housing, funding, and financing programs to improve energy efficiency of our building stock and increase affordability for low-income households. A leading example is the work Vermont has done to weatherize existing buildings. However, many more buildings need to be weatherized. Likewise, a workforce capable of delivering the amount of weatherization services required needs support to expand.

**Strategy 1 - Develop and implement a multi-year statewide Weatherization at Scale initiative**

Weatherization at Scale has been under development by a Working Group convened by the Energy Action Network in 2020. The working group will issue a detailed report describing the proposed initiative in November 2021. Weatherization at Scale builds upon Vermont’s deep technical expertise delivering weatherization services to nearly 30,000 homes during the past several decades. Modeling conducted for this Climate Action Plan indicates that at least 70,000 additional homes need to be weatherized by 2030 to contribute to meeting the GWSA reduction requirements for that year. The Weatherization at Scale initiative identifies feasible strategies for recapitalizing Vermont’s weatherization investment to fund 120,000 home retrofits by 2030, with an emphasis on serving low to moderate income households first. This work should include energy efficiency measures as well as electrical, health, or safety measures needed to comply with codes as well as upgrades to infrastructure such as wiring and service panels to enable electric vehicle charging, use of heat pumps, and other beneficial electrification opportunities.

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| **Lead Implementer: Legislature, designated state agencies** | |
| **Action 1 - Adopt legislative or administrative recommendations to weatherize 120,000 homes by 2030 (as recommended by the Weatherization at Scale Working Group)** | **Impact –** Modeling indicates that at least 70K additional homes need to be weatherized by 2030 to meet the GWSA requirements for the Buildings/Thermal Sector |
| **Equity –** TheWeatherization at Scale initiative targets those most vulnerable and historically underserved as a focus of the State’s efforts to weatherize 120,000 homes by 2030. Specifically, an On-Bill Repayment pilot would prioritize homes with the highest energy burden, and scale incentives based on income. Aligning the initiative costs and benefits with those with low to moderate incomes and frontline and impacted communities will ensure that those who most need to reduce energy costs, increase comfort, improve health, and enhance housing durability will be prioritized. |
| **Cost-Effectiveness –** Expected to be high, but awaiting modeling results from Cadmus/EFG |
| **Timeline to Implement – One calendar year to allow for legislative action and any required rule enactment** | **Co-Benefits**   * Reduces energy bills * Increases comfort * Improves health |
| **Technical Feasibility** - Yes |
| **Action 2 – Through Legislation, require the Administration to incorporate implementation of the Weatherization at Scale Working Group recommendations into implementation of the Vermont Climate Action Plan** | **Impact** – Same as above |
| **Equity -** Same as above |
| **Cost-Effectiveness -** Same as Action 1 |
| **Timeline to Implement – During upcoming legislative session (No later than May 2022)** | **Co-Benefits** - Same as Action 1 |
| **Technical Feasibility** -Yes |
| **Action 3 - Appoint an Executive-level member of the Administration to coordinate weatherization workforce development efforts to: ensure the scaling up of workforce that will be needed to achieve GWSA requirements; to increase coordination among the wide variety of public and private entities involved in worker recruitment, training, placement, and retention; and to avoid duplication of effort across state government (enabling cross-cutting action)** | **Impact** – Enables achievement of weatherization target in Action 1 |
| **Equity** – Can improve equity as long as priority is placed on measures that address unemployed/underemployed/ displaced workers |
| **Cost-Effectiveness** - N/A |
| **Timeline to Implement – 1st quarter 2022** | **Co-Benefits** – Same as Action 1 |
| **Technical Feasibility** - Yes |
| **Action 4 - Authorize implementation of a plan for coordinating and enhancing financial navigation services for Vermonters with low and moderate-incomes who could benefit from the State’s energy savings programs, consistent with recommendations from the WWG, and in consultation with the Office of Economic Opportunity, Efficiency Vermont, Neighborworks of Western VT, and Community Action Agencies, among others** | **Impact -** Enables achievement of the weatherization target in Action 1 |
| **Equity** – This action is specifically targeted to low/middle income households |
| **Cost-Effectiveness** – N/A |
| **Timeline to Implement – 1st quarter 2022** | **Co-Benefits**   * Provides support and assistance to those most in need |
| **Technical Feasibility** - Yes |
| **Action 5 - Require electric and gas utilities to offer their customers on-bill financing tariffs** | **Impact** - Enables achievement of weatherization target in Action 1 |
| **Equity –** Facilitates performance of retrofits in low/middle income households |
| **Cost-Effectiveness –** TBD based on program design |
| **Timeline to Implement - During upcoming legislative session (No later than May 2021)** | **Co-Benefits** – Creates a new funding mechanism that does not require personal debt |
| **Technical Feasibility** - Yes |

**Strategy 2 - Institute a rental property efficiency standard (RPES)**

Addressing rental property thermal efficiency is a complementary strategy to Weatherization at Scale that specifically seeks to ensure that the market for rental property contributes to meeting the GWSA GHG emissions reduction requirements. Expecting to equitably improve the efficiency of Vermont’s rental housing cannot wait for efficiency investments to occur at the time of sale. Nor can Vermont expect building energy performance labeling alone to spur sufficient improvements in the efficiency of rental housing. Renters, by definition, are not in a position to invest in improving the efficiency of buildings owned by others, even with improved access to information or incentives. And because the typical lease has the renter assume responsibility for energy costs, landlords have limited motivation to make such investments in the absence of an efficiency standard. Addressing rental property thermal efficiency by providing support to landlords for a period of years can help them reduce emissions without creating undue harm to tenants, many of whom are vulnerable Vermonters. It not only emphasizes solutions that mitigate the high energy burden experienced by low to moderate income households living in rented properties. It recognizes that landlords are best positioned to make basic improvements to the efficiency of the buildings they lease.

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| **Lead Implementer: Legislature, designated state agency** | | |
| **Action 1 – Authorize the adoption of efficiency standards for rental properties, beginning with expanding the definition of “fit for human habitation” in 9 V.S.A. § 4457(a) by developing and passing legislation requiring owners of [a TBD minimum number of units] of rental housing to ensure that the efficiency of their rental units meets minimum standards [TBD efficiency code level] by December 31, 2030** | **Impact –** Complementary policy to Weatherization at Scale (Strategy 1/Action 1) |
| **Equity** – Designed to benefit the approximately 80% of VT renters who are characterized as low income |
| **Cost-Effectiveness –** Not modeled yet. Will depend on specifications in the rental property efficiency standard |
| **Timeline to Implement - During upcoming legislative session (No later than May 2022)** | **Co-Benefits**   * Creates a new mechanism and technical assistance for landlords to improve livability and affordability for their tenants * Reduces energy bills * Increases comfort * Improves health * Creates local jobs |
| **Technical Feasibility** - Yes |

**Strategy 3 - Improve the energy performance of all new buildings in Vermont**

New construction offers either an opportunity for gains in building efficiency, or a potential lost opportunity for new housing stock that will exist for decades. High efficiency construction techniques are well established and are easier to implement and more effective than building retrofits. High efficiency/low leakage building envelopes are also better suited to support non-combustion technology such as heat pumps.

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| **Lead Implementer: Public Service Department** | |
| **Action 1 - Regularly update the statewide residential building energy code, resulting in achieving a net zero building energy code by 2030** | **Impact -** Complementary policy to Weatherization at Scale (Strategy 1/Action 1) |
| **Equity** - Compliance with and enforcement of building energy codes results in more energy efficient buildings and are strategies for protecting those with low to moderate incomes from high energy burdens |
| **Cost-Effectiveness** - Not modeled |
| **Timeline to Implement – Next update scheduled for September 2023; every three years after that** | **Co-Benefits**   * Ensures new construction will incorporate new energy efficient and clean energy options as best practices and technology continuously improve * Reduces energy bills * Increases comfort * Improves health * Creates local jobs |
| **Technical Feasibility** - Yes |
| **Action 2 - Develop and fund a state-level Energy Code Circuit Rider initiative that provides code training and enforcement assistance to municipalities throughout Vermont to ensure awareness of and compliance with existing and future building energy codes** | **Impact** - Complementary policy to Weatherization at Scale (see Strategy 1/Action 1) |
| **Equity –** Does not directly address equity. However, improved building efficiency resulting from increased code compliance and enforcement will reduce energy use, decrease energy bills, and increase comfort and health. |
| **Cost-Effectiveness** – N/A |
| **Timeline to Implement - by September 2023** | **Co-Benefits**   * Provides technical assistance and support needed especially by small municipalities that do not have the capacity and staffing to achieve this on their own. |
| **Technical Feasibility** - Yes |

**Pathway 2 - Reduce building-related carbon emissions by reducing the carbon content of the fuels they use**

Today, over 70 percent of Vermont’s thermal energy use is fossil-based. About 40 percent of this is fossil gas and propane, while nearly a third is heating oil. For the last decade, Vermont has spent roughly $2 billion a year on fossil fuels, with 75 percent of those dollars leaving the state. In order to meet GWSA emission reduction goals, Vermont needs to transition away from its current carbon-intensive building heating practices to lower carbon alternatives. It also needs to do this equitably, recognizing economic effects on both energy users, the workforce currently providing these services, and on our overall economy.

**Strategy 1 - Implement a Clean Heat Standard**

A Clean Heat Standard (CHS) is being developed by the Clean Heat Standard Working Group with a detailed final report expected by the end of 2021. A CHS is a mechanism for encouraging fossil fuel providers serving Vermonters to decarbonize the fuels they supply. A CHS is a *performance standard* that would be applied to the providers of fossil heating fuels, requiring them to deliver a gradually-increasing percentage of low emission heating services to Vermont customers. A CHS creates a competitively neutral basis for all major suppliers of heating fuels in Vermont to drive the market toward greater adoption of low-carbon fuels. As a performance standard, a CHS enables suppliers to choose the most beneficial ways to transition from current practices. It also allows energy consumers to exercise choices in how they transition to less carbon-intensive ways of heating. Low emissions choices for clean heating include advanced wood heat, biofuels, biogas, district heating, heat pumps, heat pump water heaters, and solar thermal.

To ensure that it does not negatively affect energy-burdened Vermonters, a CHS should incorporate policies to minimize adverse effects on low-income customers, and potentially on other customer segments for which there may be equity concerns. This should include a minimum requirement that fuel suppliers provide (directly or in partnership) incentives and programs that assist low-income Vermonters in making energy upgrades such as weatherization and heat pumps or other initiatives that improve energy affordability for low-income households. In addition, the CHS should ensure that fuels and measures that reduce larger amounts of GHG emissions (on a life cycle basis) are valued higher than those that result in smaller reductions. And because the CHS provides a path for fuel deliverers to comply and transition into the provision of cleaner energy services, the CHS design is fair to traditional fuel suppliers and their employees.

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| **Legislature** | |
| **Action 1 - Adopt legislation authorizing the Public Utilities Commission to administer a Clean Heat Standard** | **Impact –** TBD based on program design; potentially high if required emissions reductions are indexed to building/thermal sector share of GWSA reduction requirements |
| **Equity** – Can be designed to mitigate the disproportionate energy burdens and negative distributional effects of existing heating fuel costs. Sets a minimum requirement for incentives or programs to directly serve low and moderate income Vermonters. Works in concert with complementary programs, such as low-income weatherization and fuel assistance programs, to assist in the transition to cleaner heating solutions. |
| **Cost-Effectiveness** – TBD based on program design |
| **Timeline to Implement -** During upcoming legislative session (No later than May 2022) | **Co-Benefits**   * Creates a predictable and stable marketplace as fossil fuel businesses transition to clean energy services * Provides choice in how to meet GWSA requirements * Reduces energy bills * Improves health * Creates local jobs |
| **Technical Feasibility** - Yes |

**Strategy 2 – Transition the water heater market in Vermont to ensure the availability of water heaters whose total cost of ownership is lower than other models, and which can be controlled by electric utilities to help manage their power grids at low cost**

The electrification of energy uses currently powered by fossil fuels represents one of Vermont’s greatest opportunities to avoid building- and thermal-related GHG emissions. In addition to reducing emissions from combustion and saving consumers money, electrification is a low-cost and underused opportunity for utilities to actively manage and optimize their grid operations to avoid unnecessary investments. Vermonters replace approximately 25,000 water heaters a year.[[13]](#footnote-14) If their new water heaters were controllable, Vermonters could get the hot water they want and save money while helping electric utilities manage their operations and avoid carbon emissions.

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| **Department of Public Service** | |
| **Action 1 - With neighboring states, require electric water heaters for sale to have modular demand response communications ports** | **Impact –** Complementary policy to establishing a Clean Heat Standard. Would enable the transition off fossil-fuel water heaters to state-of-the art, energy efficient water heaters whose heating can be timed to off-peak times of electricity use. | |
| **Equity** – Appliance standards do not typically address equity directly. However, the programs developed to implement such a standard can (and should) be. For example, any incentives created to stimulate market demand for controllable water heaters could be income sensitive and could prioritize equipment switch-outs in frontline and impacted communities. | |
| **Cost-Effectiveness –** Deemed to be high but awaiting modeling results from Cadmus/EFG. | |
| **Timeline to Implement – Initiate discussion with neighboring states no later than July 2022** | **Co-Benefits** – An initial step towards creation of a stable and predictable marketplace as fossil fuel businesses and equipment suppliers transition to clean energy services | |
| **Technical Feasibility** - Yes | |

1. Vermont Housing Needs Assessment, Vermont Housing Finance Agency (“VHFA Housing Needs Assessment”), February 2020, p. 2. [↑](#footnote-ref-2)
2. Energy Action Network “Annual Progress Report for Vermont ANNUAL 2020/2021,” p. 24 (EAN 2021); see also, <https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2017_Final.pdf> [↑](#footnote-ref-3)
3. “Vermont Greenhouse Gas Emissions Inventory and Forecast 1990-2017” May 2021 https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/\_Vermont\_Greenhouse\_Gas\_Emissions\_Inventory\_Update\_1990-2017\_Final.pdf [↑](#footnote-ref-4)
4. Energy Action Network Clean Heat Working Group. October 2021. Review Draft "Clean Heat for a Cooler Planet: The Clean Heat Standard" [↑](#footnote-ref-5)
5. EAN 2021, p. 25 [↑](#footnote-ref-6)
6. For wood heat, an average of 80 cents per dollar stays in state. EAN 2021, p. 25 [↑](#footnote-ref-7)
7. “What is the impact of energy burden in Vermont?” (“Energy Burden in Vermont”) Rebecca Foster, Director Efficiency Vermont October 13, 2019. [↑](#footnote-ref-8)
8. Ibid [↑](#footnote-ref-9)
9. VHFA Housing Needs Assessment, p. 2 [↑](#footnote-ref-10)
10. U.S. Census Bureau 2017 American Community Survey 5-year estimates from housingdata.org [↑](#footnote-ref-11)
11. VHFA Housing Needs Assessment, p. 1 [↑](#footnote-ref-12)
12. “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>. [↑](#footnote-ref-13)
13. EAN 2021, p. 25 [↑](#footnote-ref-14)