



VERMONT LEGISLATIVE
Joint Fiscal Office

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Issue Brief

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JFO's Brief Report on the Climate Action Plan

Executive Summary

Vermont's Global Warming Solutions Act (GWSA) of 2020 (Act 153) established rigorous requirements for reductions in greenhouse gas emissions over the next 30 years and laid out objectives for building resilience, promoting adaptation, and sequestering and storing carbon. In accordance with the Act, in December 2021 the Climate Action Plan (CAP) put forth a broad suite of actions needed to meet the objectives of the GWSA. However, the specifics of those actions remain unclear.

The lack of specifics in the CAP limits what analysis can be done. Nevertheless, the Joint Fiscal Office (JFO) was charged with producing a report for legislators that analyzes the “economic, budgetary, and fiscal costs and benefits of the Plan” (see JFO's charge in Appendix 1). In partial fulfillment of that charge, this report offers a brief overview of the CAP, with a focus on emission reduction requirements, and raises key points for legislators to consider. They include:

- The Global Warming Solutions Act of 2020 requires that greenhouse gas emissions be reduced and that Vermont adapt to climate change.
 - The State can meet the greenhouse gas reductions required in statute only if an ambitious suite of actions, such as the illustrative actions presented in the CAP, is implemented.
- If emissions are reduced as outlined in the CAP, Vermont's economy and people are expected to reap net benefits of approximately \$6.4 billion over 30 years, primarily in avoided costs, relative to the business-as-usual case.
 - Through 2030, additional annual investments are estimated to outweigh annual savings.
- Policy design will heavily influence how different types of people will be affected by changes that achieve statewide emission reductions as well as resilience and adaptation.
- Relying on voluntary public participation to make the switch to new technologies and investments introduces challenges and uncertainty.
- The CAP identifies actions in specific sectors of the economy—transportation, buildings, electricity, agriculture, and other non-energy sectors—and may miss overarching elements of change.
- The transportation and building (thermal) sectors require adoption of extensive initiatives that are not yet fully formulated.
- The scope and size of necessary incentives and subsidies to ensure broad public participation are yet to be determined.
- Future sustainable funding sources and their allocations will have to be identified.

Discussion of these points follows a brief overview of background information below.

Background

Vermont's Global Warming Solutions Act of 2020 established increasingly substantial requirements to reduce greenhouse gas emissions over the next 30 years and laid out objectives for building resilience, promoting adaptation, and sequestering and storing carbon.

Acronyms used in this report:

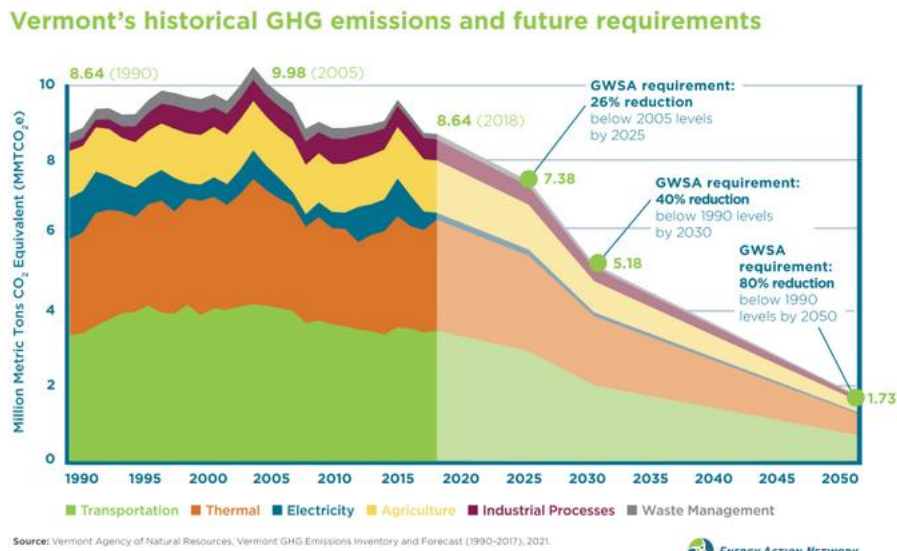
CAP: Climate Action Plan

EVs: electric vehicles

TCI-P: Transportation Climate Initiative Plan

The required greenhouse gas reductions will become more significant over time (see Figure 1). The 2030 requirements are more challenging than the 2025 requirements, highlighting the need for more near-term action to ramp up to meet the 2030 requirements. Delay will jeopardize the chances of achieving the required emissions reductions. The State can be sued if individuals perceive that not enough is being done to meet the requirements.¹

Figure 1. Greenhouse Gas Emissions as Required in the Global Warming Solutions Act



Vermont's greenhouse gas emissions since 1990 – showing where the state needs to go in order to comply with the Global Warming Solutions Act.

However, gains from early action must be balanced with the importance of designing and implementing policies with care to protect those who are most at risk of carrying heavy energy burdens during the transition. Significant upheaval is likely to occur in how Vermonters heat their homes, travel around the State, generate and use electricity, and manage lands. Job displacement, job creation, and regional impacts will occur. The distribution of those impacts will, in large part, be determined by policy design.

The CAP, released by the Vermont Climate Council in December 2021, outlined an illustrative bundle of actions, all of which are needed to achieve the required greenhouse gas reductions.² Few specifics were included on how to achieve all actions, and the design and implementation of those actions must be worked out in coming years. Reductions in the transportation sector remain especially uncertain because of the demise of the multistate, regional Transportation Climate Initiative Plan (TCI-P). In the buildings sector, much relies on the successful implementation of the Clean Heat Standard, a policy that was vetoed in the 2021-2022 legislative session. Because the transportation and building/thermal sectors comprise about 75

¹ The ability to sue the State does not exist in other areas of climate action, such as building resilience and adaptation.

² The actions include targets for EVs, heat pumps, weatherized homes, expanding electricity generation, and the like designed to achieve the emissions requirements and objectives.

percent of Vermont emissions, uncertainty in those sectors highlights the risk of not achieving the required emission reductions.

The overall long-term effect on the economy from changing the way Vermont uses different energy sources and adapts to climate change as laid out in the CAP is likely to be positive, as discussed in further detail later in this report. However, that result is predicated on the timely implementation of thoughtful policies. Without such policies, the transition will likely have divergent economic impacts on different types of people, could negatively impact the State's overall economy, and could create legal risk.

Discussion of Key Points

The Global Warming Solutions Act of 2020 requires that Vermont reduce its greenhouse gas emissions and adapt to climate change.

Vermont's Global Warming Solutions Act, Act 153 of 2020, set requirements for reducing greenhouse gas emissions in Vermont as follows:

- 25 percent below 2005 levels by 2025;
- 40 percent below 1990 levels by 2030; and
- 80 percent below 1990 levels by 2050, or zero emissions when combined with sequestration.

The State can meet the greenhouse gas reductions required in statute only if an ambitious suite of actions, such as the illustrative actions presented in the CAP, is implemented. To meet the required reductions, the CAP collection of actions or an equivalent bundle of actions must be implemented in its entirety in the near term. Missing any of the pieces will open the State of Vermont to lawsuits by citizens who anticipate that the actions adopted will not be enough to achieve the required reductions.

In fact, meeting the 2025 requirements will require significant shifts in both consumer behavior and investment decisions. The 2030 requirements are even more stringent than those for 2025 and will require additional action. To achieve future emission reduction requirements, Vermont must take near-term action.

The Vermont Climate Council hired a consulting firm to perform a technical analysis of the actions in the CAP. Cadmus and its subcontractor Energy Futures Group produced the final Pathways Report in February 2022 confirming that the required reductions would be achieved if all actions published in the CAP, or an equivalent suite of actions, were to be implemented.

If emissions are reduced as outlined in the CAP, Vermont's economy and people are expected to reap net benefits of approximately \$6.4 billion over 30 years, primarily in avoided costs, relative to the business-as-usual case. Through 2030, however, annual investments are estimated to outweigh annual savings.

According to the Pathways Report, implementing all actions in the CAP would lead to a net benefit of approximately \$6.4 billion for Vermont's economy and people over the next 30 years.³ The net benefit is the difference between new and avoided costs associated with implementing the actions in the CAP.

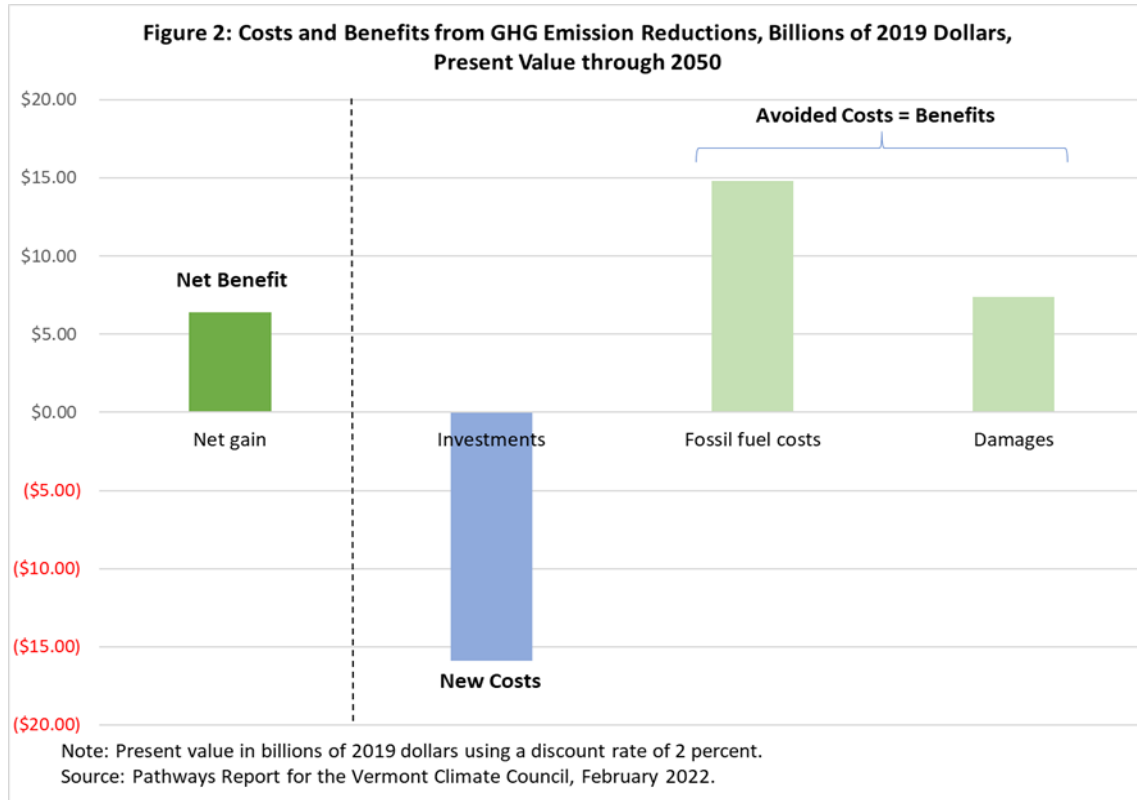
The Pathways Report estimates that implemented actions from the CAP would lead to an additional \$15.9 billion in present value costs above the business-as-usual case;⁴ those new costs include more efficient buildings and heating systems, EVs and EV charging infrastructure, practices to reduce the emissions of greenhouse gases from agriculture and industrial processes, and investments in increased renewable electric generating stations and transmission and distribution systems. The additional costs are more than offset by

³ This gain is stated in 2019 dollars and is based on using a two percent discount rate.

⁴ Present value refers to 2019 dollars using a two percent discount rate.

avoiding \$14.8 billion in fossil fuel purchases and \$7.4 billion in economic, health, and environmental damages. The avoided costs stem from the expected increasingly negative impacts on public health and damage from severe weather events if mitigation and adaptation measures are not adopted across the State.

The net benefit calculations are illustrated in Figure 2:



Through about 2030, however, increased costs and investments in transportation, residential and commercial buildings, and electric generation are not likely to be fully offset by fossil fuel savings. The Pathways Report states that annual net investments will be \$35 million to \$235 million higher than the business-as-usual case through 2030. In later years, fossil fuel savings and avoided damages will more than offset additional investments, with most of those investments in electricity generation.

Considerations Regarding Policy Design and Implementation

The overall effect on Vermont will be positive, but adopting actions described in the CAP, or other similar climate change mitigation and resilience actions, will create winners and losers. The Pathways Report does not provide details on specific policies needed to reduce greenhouse gas emissions and adapt to climate change or how to mitigate the negative impacts of those policies. Those details will be critical to looking at how different types of households or businesses will experience the transition to a cleaner Vermont.

Policy design will heavily influence how different types of people will be affected by changes that achieve statewide emission reductions as well as resilience and adaptation.

Some households and businesses will likely bear disproportionately heavy burdens unless policies are in place to ease the transition. Households with low incomes, those who live in rural parts of the State, and those who depend heavily on transportation for their livelihood would likely see negative impacts from

actions laid out in the CAP.⁵ Many of those same households may not have the resources needed to invest in new technology such as EVs and heat pumps. Businesses that sell fossil fuels and traditional vehicles or heavily depend on fossil fuels in their daily work could also be left behind if subsidies or incentives do not materialize to aid in the transition.⁶

Beyond effects on specific types of households, all Vermonters lose if the policies enacted and implemented do not achieve the required emission reductions. To achieve success, all Vermonters must be engaged in reducing greenhouse gas emissions and adapting to climate change.

Relying on voluntary public participation to make the switch to new technologies and investments introduces challenges and uncertainty.

Strategies and actions presented in the CAP rely heavily on voluntary public participation and engagement. Potential upfront costs and significant behavioral shifts will be two of the key challenges of relying on individual-level acceptance and investment.

Many of the proposed actions require significant initial investments, which, despite the potential for long-term cost savings, may be too expensive in the short term for many Vermonters. For households with lower incomes, financial support will likely be needed to encourage those investments; the source of that support will need to be determined.

The actions presented in the CAP require significant behavioral shifts. Because changing behavior is not mandatory, public engagement is essential for the success of the CAP. One tool to increase public adoption is incentives; both the CAP and the Pathways Report cite the importance of incentives, but the necessary level of incentives for sufficient buy-in is still unclear. Not knowing the appropriate size and scope of incentives needed may lead to a more costly, longer, and less-efficient path as policies adjust over time. The Agency of Transportation's EV incentives optimization study is underway and should be completed by the end of 2022.

The CAP identifies actions in specific sectors of the economy—transportation, buildings, electricity, agriculture, and other non-energy sectors—and may miss overarching elements of change.

The CAP employs a fragmented approach that focuses on five individual sectors—transportation, buildings, electricity, agriculture, and other non-energy sectors. Categorizing actions by sector offers a targeted approach in some regards, but it may also lead to inefficient strategies compared to an economy wide approach. The sectoral approach was driven by the GWSA sector proportionality objective in meeting emission reductions.

A sector-specific strategy may create inconsistencies when targeting emissions reductions and the best allocation of resources. For example, most proposed transportation sector emission reductions come from fleet electrification. Assuming the feasibility of prompt and significant grid expansion, those emission reductions may not account for the increased burden on the electric grid and associated emissions. Because increases in emissions in one sector would then need to be cancelled out by reductions in another sector, the sectors are all closely intertwined.

For efficiency, the feasibility and capacity to change each sector should be considered in relation to

⁵ One glimpse of the different impacts across different parts of the state comes from the Energy Burden analysis of Efficiency Vermont, available at <https://www.encyvermont.com/news-blog/whitepapers/vermont-energy-burden>.

⁶ Act 154, the environmental justice act which was signed by the Governor in May 2022, may significantly influence how climate change investments are distributed across the state. The bill states that no segment of Vermont's population should, "because of its racial, cultural, or economic makeup, bear a disproportionate share of environmental burdens or be denied an equitable share of environmental benefits."

emissions in all sectors. With increasing reliance on electrification, the grid and related infrastructure must be capable of supporting new levels of base and peak demand. Costs of expansion will need to be determined, and increasing reliance on the grid will likely require added security measures as well.

Finally, the interplay between broadband and housing will play an important role as control of energy demand shifts to consumers where they live.

Three Areas of Concern

JFO has identified three areas of concern as the State moves forward following the release of the CAP: uncertainty in the major approaches for the transportation and thermal (building) sectors, uncertainty in the size and scope of subsidies and incentives, and uncertainty surrounding funding sources.

The transportation and building sectors require adoption of extensive initiatives that are not yet fully formulated.

Together, the transportation and buildings sectors account for almost 75 percent of Vermont's greenhouse gas emissions and must be the focus of policy initiatives to curb emissions. The CAP relied heavily on the TCI-P, a regional plan that would have led to reduced emissions over time. However, two weeks before the CAP was released, several participating states pulled out of the regional agreement, leading to the demise of the TCI-P. The Vermont Climate Council is now considering other approaches with a report due in the fall of 2022, but much uncertainty remains.

For the buildings sector, the CAP proposed adopting a Clean Heat Standard. During the 2021 – 2022 legislative session, the General Assembly passed legislation to establish a Clean Heat Standard. The legislation was vetoed, however; as of the end of the biennium, Vermont has no substantial climate change policy for the buildings sector.

The veto of the Clean Heat Standard postpones needed actions to meet the emission reduction requirements and may jeopardize the State's ability to meet those requirements in 2025 and 2030. Future legislatures will need to address the delay in large-scale climate action and create a path for emission reductions in the buildings and transportation sector.

The scope and size of necessary incentives and subsidies to ensure broad public participation are yet to be determined.

The scope and size of subsidies needed to support widespread adoption of electrification (EVs, heat pumps) and adaptation (weatherization, etc.) require further investigation. This is particularly true for households with low and moderate incomes and those who live in rural areas that are reliant on transportation. Buy-in from all household types and regions is necessary to reach the emission reductions, and substantial investments will be necessary to address equity during the transition.

Future sustainable funding sources and their allocations will have to be identified.

Finally, sustainable funding sources to support mitigation, adaptation, and public engagement in the long term—especially after federal funds from the American Rescue Plan Act (ARPA) dry up—will need to be determined. Federal funds from ARPA must be obligated by December 31, 2024, and expended by December 31, 2026, suggesting that other consistent sources of funding will be necessary to continue investing to curb fossil fuel use in the middle and later years of the decade as the requirement for emission reductions becomes stricter.

Next Steps for the Joint Fiscal Office

JFO intends to investigate what incentives, subsidies, and statewide infrastructure are needed to encourage households to embrace new technologies such as EVs, heat pumps, weatherization, energy demand management, and other measures. Examples of existing, successful programs in other states as well as in Vermont will inform our analysis and will allow us to begin to estimate the cost of such policies to make widespread adoption happen.

Appendix #1: JFO's Charge from the Global Warming Solutions Act

Charge – Act 153 of 2020

(b) Upon the adoption of the Action Plan (Plan) pursuant to 10 V.S.A. § 592, the Joint Fiscal Office of the General Assembly (JFO) shall prepare, or hire a consultant to prepare, an analysis of the economic, budgetary, and fiscal costs and benefits of the Plan. JFO shall submit the analysis to the House Committees on Energy and Technology, on Natural Resources, Fish, and Wildlife, on Appropriations and on Transportation, to the Senate Committees on Finance, on Appropriations, on Natural Resources and Energy, and on Transportation, and to the Joint Carbon Emissions Reduction Committee.

Appendix #2: Resources

- Act 153 of 2020, The Global Warming Solutions Act. JFO charge is in Sec. 5(b), <https://legislature.vermont.gov/Documents/2020/Docs/ACTS/ACT153/ACT153%20As%20Enacted.pdf>
- Energy Futures Group and Cadmus. Vermont Pathways Analysis Report 2.0, February 11, 2022. https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2022-03/Pathways%20Analysis%20Report_Version%202.0.pdf
- Vermont Climate Council. Initial Vermont Climate Action Plan, December 2021. <https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2021-12/Initial%20Climate%20Action%20Plan%20-%20Final%20-%202012-1-21.pdf>
- Vermont Climate Council. Cross-Sector Mitigation Subcommittee on Transportation. Memo of January 18, 2022. https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Transportation%20Policy%20Next%20Steps%20Memo_1_18_22.pdf
- Transportation Task Group, Vermont Climate Council. Cross-Sector Mitigation Subcommittee on Transportation. Memo of February 17, 2022. <https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Transpo%20in%20CAP-Draft%20process%20and%20PE.pdf>