

Vermont Climate Action Plan 2025

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Letter from the Council

The destabilization of the climate, primarily driven by the burning of fossil fuels, is causing increasing costs and harms to Vermonters and people around the world. Vermont is experiencing this disruption in many ways, especially from the increasing frequency and severity of extreme weather. In this context, we recognize a responsibility to work together, both to respond to the effects that climate disruption is having on Vermont and do our part to reduce the pollution that is at the source of the problem.

This revised Climate Action Plan (CAP), a requirement of Vermont’s Global Warming Solutions Act (GWSA), provides important recommendations for how Vermont can adapt our communities and built environment to a warming planet; work to protect natural and working lands from the damage created by climate change; support and enhance the resilience of

Vermont’s landscape and communities amidst a changing climate; and do our part to reduce climate pollution toward meeting our legal commitments. Our recommendations were selected in consideration of multiple criteria, including cost-effectiveness, equity, and feasibility.

We recognize a particular urgency to this work because of the degree to which climate disruption is already harming Vermonters. Of the 62 federally declared disasters since 1953, 31 were made between 2011 and 2024 alone, with 2011, 2023 and 2024 having particularly high numbers of declarations. Lamoille and Washington counties accounted for the some of the highest numbers of disaster declarations in the 2011-2024 period.¹

We also recognize that this work will not get easier in the years ahead. Important federal programs and resources that Vermont relied on after the passage of our initial Climate Action Plan in 2021, both for disaster response and for pollution reduction, are now ending or, at best, facing an uncertain future as we look ahead to the 2025-2029 period that this plan is designed

¹ <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

to cover. This will put additional pressure on state-specific action and necessitate a continuation and deepening of multi-state and regional collaboration.

Many carefully researched reports provide underlying data and analysis that underpin our work and help point the way forward. Additionally, the Council benefitted from robust public participation in the development of this plan. In particular, we sought feedback on early drafts of our recommendations via 12 input sessions (three virtual, nine in-person) across Vermont, attended by over 400 people.² We also appreciated and incorporated information provided via more than 125 submitted written comments.

We are grateful for the dozens of devoted subcommittee members; the many committed participants, from members of the public to technical consultants, who attended our meetings and events; and the thousands of Vermonters who were able to engage with us in this process. Many of you spent countless hours helping us develop Vermont's initial Climate Action Plan – thank you.

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<https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/CAPSpringInputSessionsSummaries.pdf>

Land Acknowledgement

Kwai Nedobak, Hello friends,

For four years we have gathered on zoom, greeting each other in a tick-tack-toe screen of videos, making decisions about the land we live on and the people we live with. We (The Vermont Climate Council) gathered from places far and wide, from hill and dale, and from many corners of Vermont. We join this meeting from the cities of Brattleboro, Montpelier and Burlington, the rural areas of Calais, Essex Town, West Hartford, Middlesex, Swanton, and Worcester, the glacial terraces of Wantastiquet, the Kingsbury Branch of the Winooski River and so many more places. Here is a collection of our words and reflections.

Today, we took time to step on the land in all of these places and, using every sense we had, we gave honor and acknowledged the beautiful land around us. The first thing many honored was the warmth of the sunshine on our faces and that no coats were needed.

Today, the land is breathing early spring, and the smell of the earth is brought to us by a mild north wind. The gentle breeze is everywhere. The Gluskobe and the Wind Eagle story reminds us that we need the wind, for things will shrivel and die without it because the sun is so strong. Today, we honor and acknowledge the wind and the sun and the balance they have found together. We are grateful.

Some cold spots remain covered in shrinking snow piles in Montpelier, Calais, and West Hartford. A poor man's fertilizer, it's sometimes called. These late snow falls contain and deliver nitrogen and other plant nutrients to the soil as the snow slowly melts. We honor and acknowledge the role and beauty of the snow that we still see on April 14th and how this cycle continues.

The gentle winds have brought us music today in the form of swaying trees, bird songs of many kinds, insects buzzing in the green grass, busy squirrels, a female bear exploring, a phoebe singing her famous song, and the brown crunchy leaves still here from last fall blowing in the wind. There is a view of three mallard ducks that dive and shake, cleaning themselves in the water. The splashing is a wonderful noise to behold. We honor and acknowledge all the sounds of the music we witnessed today. It is a true chorus - teaching us how to work with one mind and heart for the good of the earth.

Getting outside allowed us to feel and witness firsthand the cycles of seasons that the world around us is embarking on once again. We see the beautiful pale green and reds of the buds returning and the color of flowers: purple, white, yellow, green, and red. There is an almost spicy smell in the air from the new growth emerging. Last year's Queen Anne's lace seeds smell like coriander; smells are everywhere. The smell of the river waking up again is back and smells like life. A lone Canada goose sitting on a collection of stones in the middle of the river awaits a partner so their cycle together can continue too. There are different textures everywhere: fuzzy moss, smooth rocks, and rough tree bark - they all remind us that life continues. We honor and acknowledge these beautiful cycles and work to allow them to always be here with us.

We are also reminded of our work and why we have gathered today. The wispy cirrus clouds are dancing northward across the blue sky. There is a lot of pollution collecting against the mountains to the east. Cars and trucks are sliding up the slight incline of the road next to a former farm field. We see it, we smell it, and we taste the pollution. We grieve the changes and strive to return to a place of balance. Braiding together different diversities, knowledges, and patience to achieve our goals. We honor and acknowledge those who shared their wisdom before us, and we gather and hope for the strength to continue.

We also would like to take the time to acknowledge those that came before us. N'dakinna is the homelands of many various Abenaki tribes as well as that of the Mohican. We acknowledge those who had their homelands stolen from them, those who had their homeland abused but

continued to care for the land. Despite all odds, they are here today and still working to continue to care for the land they love and call mother. Aki, the birthing place of all living things.

Ktsi wlini Ktsniwaskw (thank you creator!!)

Executive Summary

The Vermont Climate Council adopted its Initial Climate Action Plan in late 2021. In the nearly four years since the Plan was finished Vermont has experienced – and in many cases Councilors have personally lived through – a series of climate disasters, with many Vermonters still reeling from the disastrous flooding events across the state in the summers of 2023 and 2024. And while these flood events were particularly prominent, Vermonters are also experiencing other impacts of our changing climate including increased wildland fire activity in Vermont as well as air quality impacts from much larger wildfires burning elsewhere, impacts on livelihoods of farm and forest sector, algal blooms that limit access to a number of lakes and ponds and impact drinking water quality, and winter ice storms and rain-on-snow events that damage electric infrastructure causing some Vermonters to lose power for days. On top of this, there have been more days with high heat for which most Vermont homes are ill-equipped, putting the health of vulnerable Vermonters at risk. These are the consequences of climate pollution; they are relentless and will continue to worsen.

In enacting the Global Warming Solutions Act (GWSA or Act 153) in 2020, the General Assembly reaffirmed and made binding Vermont’s responsibility to reduce harmful climate emissions. The GWSA created the Vermont Climate Council (the Council) and directed the Council to prepare a Climate Action Plan, to be updated every four years, that identifies and analyzes the strategies and programs necessary to three milestone dates: 2025, 2030, and 2050.

The next milestone is to achieve GHG emission levels no less than 40% below Vermont’s 1990 emissions by January 1, 2030; the proposed actions the Council presents in this update to Vermont’s Climate Action Plan are intended to match the scope and ambition necessary to meet this milestone and address other obligations created by the GWSA related to creating a more resilient Vermont and supporting a just transition in the way these actions would be implemented.

Council’s Charge and Work

The 23-member Council, comprised of eight administration officials and 15 members appointed by the Legislature to represent various sectors and interests, is charged with:

- Identify, analyze and evaluate strategies and programs to reduce GHG emissions, to achieve the State's GHG reduction requirements, and to prepare the State's communities, infrastructure and economy to adapt to current and future effects of climate change;
- Adopt and then update at least once every four years the Vermont Climate Action Plan at least every 4 years, that sets forth specific initiative, programs and strategies to reduce GHG emissions consistent with the GWSA and help build resilience in Vermont's communities, infrastructure and the economy; and
- Put in place a system for tracking the state's progress towards meeting the GHG emissions reduction requirements, evaluating the cost-effectiveness and impact of initiatives, programs and strategies included in the Plan, better understanding the effect of climate change on wildlife, climate and natural resources of the State, and supporting the efforts to improve Vermont's landscape-level resilience and ability to adapt to the current and anticipated effects of climate change.

The GWSA also established four Subcommittees and charged them to assist in the work needed to develop the Climate Action Plan. The four Subcommittees specifically identified in the GWSA are: Rural Resilience and Adaptation; Cross-Sector Mitigation; Just Transitions; and Agriculture and Ecosystems. The GWSA also allowed the Council to create additional Subcommittees to advise the Council. To address the technical complexity and data needed for this effort, the Council created a fifth Subcommittee: Science and Data.

The core function of the Subcommittees is to evaluate and recommend draft initiatives, programs, and strategies for the Council to review, refine and compile into Vermont's Climate Action Plan. As described in the GWSA, Subcommittee recommendations should also:

- Prioritize the most cost-effective, technologically feasible, and equitable GHG emissions reduction pathways, adaptation and preparedness strategies;
- Provide for GHG emissions reductions that reflect the relative contribution of emissions from different sectors;

- Minimize negative impacts on marginalized and rural communities and individuals with low and moderate incomes;
- Ensure that all regions of the state benefit from GHG emissions reductions;
- Support economic sectors and regions of the state that face the greatest barriers to emissions reductions, especially rural and economically distressed regions and industries;
- Support industries, technology, and training that will allow workers and businesses in the state to benefit from GHG reduction solutions;
- Support the use of natural and working lands to reduce GHG, sequester carbon and increase resilience; and
- Maximize the state's involvement in interstate and regional initiatives and programs designed to reduce GHG emissions, and build upon state, national, and international partnerships and programs.

To ensure the Subcommittees had the right composition to accomplish their charges, members were recruited both from within the Council as well as other members of the public in an effort to have relevant expertise necessary to create the work as well as geographic representation from across Vermont and members that could speak to specific challenges faced by marginalized and rural communities and individuals with low and moderate incomes.

The recommendations put forward in this Plan reflect the collective work of these Subcommittees. Subcommittee recommendations were handed off to the Council in December 2024, at which point the full Council began to vet, discuss, revise and prioritize this work in order to arrive at the set of necessary actions needed to fulfill the requirements of the GWSA. The recommendations are organized around four areas:

- Emissions reductions;
- Building resilience and adaptation in Vermont's natural and working lands;

- Building resilience and adaptation in Vermont’s communities and built environment; and
- Cross-cutting pathways (Education, Workforce, and Financing).

Throughout the development of these recommendations, the Just Transitions Subcommittee supported the work by providing input and feedback on how the strategies and initiatives should be framed to benefit and support all residents of the State of Vermont fairly and equitably. The strategy to do so has been centered on creating space for equity-centered discussions in every meeting, tackling structural challenges by enhancing the representation of black, indigenous, and people of color (BIPOC), low-income, rural, and other frontline communities, and promoting widespread public engagement. Despite the underrepresentation and power imbalance of the Council and its Subcommittees, efforts have focused on diversifying membership. The Climate Council is dedicated to collaborating with everyone living in Vermont to ensure that equity is woven into every step of the climate action plan.

The Council acknowledges that to realize the transformative change that is needed to meet the goals of the GWSA, ongoing engagement with Vermonters is essential - both to receive broad-based input on possible approaches and better understand the barriers to implementation. One important lesson from the Initial Climate Action Plan was the need to involve Vermonters continuously and include their input throughout the entire update process. To achieve this in the Climate Action Plan update, engagement started in early 2024 and continued until the Plan was finished. Community input was shared with the Climate Council every three months via the [Vermont Voices on Climate engagement summaries](#). This state agency-led engagement also aims to influence ongoing climate-related programs and systems in Vermont, beyond this update to the Climate Action Plan.

The Vermont Climate Council hosted events throughout the development of the Climate Action Plan to share information, answer questions, hear new ideas, consider community priorities, and receive feedback on work-to-date. These sessions focused on different themes from the various subcommittees and at key moments, community-based organizations and Regional

Planning Commissions supported and collaborated on these events. The timing intentionally lined up with key decision-making and drafting periods of the planning process.

More than 850 public participants took part in a virtual or in-person input session. In addition to events, approximately 250 Vermonters or Vermont-based organizations submitted 119 written comments by email or through the Public Comment Portal during the public input process.

After April's engagement on the draft plan, the Council and Steering Committee met many times in May and June to consider input from public meetings and public comment and revise the Plan. Detailed considerations and changes can be found in the public engagement chapter.

Priority Actions

In the following chapters, the Council presents a significant and broad set of recommendations intended to guide climate action over the next four years. At the heart of our efforts is a commitment not only to fulfill the obligations of the GWSA, but also to ensure Vermont remains a vibrant, healthy place for current and future generations. Recognizing the breadth of the work that includes more than 250 recommended actions, in this update to the Plan the Council has highlighted 52 priority actions as well as a short list of 10 highest priority actions. Creating a short list of highest priority actions was done in direct response to public input. These highest priority actions intentionally address investments needed to both reduce climate pollution and help Vermont communities become more resilient. This plan emphasizes actions that:

- Support Vermonters in adopting more efficient and less climate polluting sources of home heat and transportation, with particular attention to the needs of Vermonters living on low and moderate incomes.
- Make investments in resilience, preparedness, and community development that will reduce climate impacts, help Vermonters recover more quickly and save money and lives as Vermont faces future climate hazards.
- Invest in building the workforce essential to robust climate action.

- Identify sustainable, long-term funding to support the significant investments needed to fulfill the vision of this plan and the GWSA.

Over the next four years, as the recommendations in this Plan are advanced, the Council encourages the legislative and executive branches to be mindful of the following in designing the policies and programmatic solutions:

- Minimize the financial hardship for low- and middle-income Vermonters through the intentional design, prioritization, and pacing of the programs recommended in the plan, including how revenue needed to support these programs is raised and invested/distributed.
- Ensure balanced investments in both the efforts needed to reduce climate pollution and adaptation measures to strengthen resilience against current climate impacts.
- When evaluating the costs of programs and policies, take into account the costs of not acting, including Vermonters' continued dependency on price-volatile fossil fuels for home heat and transportation and the cost of rebuilding following all-but-certain future climate disasters.
- Ensure adequate funding to underwrite state agency capacity, create the administrative framework, and undertake the work needed to advance the actions in this updated Climate Action Plan.
- Identify revenue sources that don't work against Vermonters' adoption and implementation of key climate actions, such as adoption of electric heating and transportation options, by raising the cost of electricity.
- Ensure necessary supporting investments are being funded and implemented (e.g., residential electric panel upgrades, expanded availability of electric vehicle charging infrastructure, etc.)
- Support and develop enough trained workers in the state to implement the actions.

This updated plan includes immediate actions as well as critical steps to advance more complex and far-reaching solutions which will serve Vermont in the medium and long term. Similarly, the plan urges the legislature and administration to find funding sources that can be deployed

immediately towards climate action, while concurrently taking action to secure sustainable, long-term funding for climate action. As we undertake this work, we recognize that Vermont has a history of innovation to draw and build upon. The can-do ethos of Vermonters sees not only challenges but opportunities -- including the opportunity to act together and nimbly as a small state.

While the Legislature, the Agency of Natural Resources, and other agencies of state government will need to work to advance the actions put forward in this plan through legislative action and rulemaking, the Council will continue to:

- Monitor and track the progress of implementation of the Climate Action Plan;
- Identify and champion additional work needed to ensure the Plan actionable;
- Convene Climate Council meetings on a quarterly basis to engage with the public; and
- Bring Subcommittees together as needed to support the work of the Climate Council.

These efforts and other related work will be reflected in the next update to the Climate Action Plan, scheduled to be delivered in July 2029.

Acknowledgements

The Vermont Climate Council expresses its deepest thanks and appreciation to all the people and organizations who contributed to this Plan.

Vermont Climate Council Members:

Cabinet Members

- *Chair Sarah Clark, Agency of Administration
- *Secretary Julie Moore, Agency of Natural Resources
- Secretary Anson Tebbetts (Designee Ryan Patch), Agency of Agriculture Food and Markets
- Eric Forand, Department of Public Safety, Director of Vermont Emergency Management
- Secretary Joe Flynn (Designee Michele Boomhower), Agency of Transportation
- Commissioner Kerrick Johnson, Department of Public Service
- Commissioner Lindsay Kurrle, Agency of Commerce and Community Development, Secretary
- Secretary Jenney Samuelson (Designee Shayla Livingston), Agency of Human Services

Members Appointed by the Senate Committee on Committees

- *Jared Duval, member of a Vermont-based organization with expertise in energy and data analysis, Science & Data Subcommittee Co-Chair
- *Kelly Klein, member to represent the small business community, Just Transitions Subcommittee Co-Chair
- Jaiel Pulskamp, member to represent the farm and forest sector, Agriculture & Ecosystems Subcommittee Co-Chair
- David Mears, member with expertise in the design and implementation of programs to increase resilience to and respond to natural disasters resulting from climate change, Rural Resilience & Adaptation Co-Chair
- Peter Sterling, member to represent the clean energy sector
- Dahlia Cohn, member to represent Vermont youth

- Will Eberle, member to represent the Vermont Community Action Partnership

Members Appointed by the House of Representatives

- *Liz Miller, member to represent distribution utilities
- Richard Cowart, member with expertise and professional experience in the design and implementation of programs to reduce greenhouse gas emissions, Cross-Sector Mitigation Subcommittee Co-Chair
- Dr. Lesley-Ann Dupigny-Giroux, member with expertise in climate change science
- Chris Campany, member to represent the municipal governments
- Brian Dunkiel, member to represent Vermont manufacturers
- Matt Cota, member to represent the fuel sector
- *Johanna Miller, member to represent a statewide environmental organization
- Stephanie Moffett-Hynds, member to represent rural communities

Note: The asterisk next to certain names indicates they are a member of the Steering Committee.

Also, a special thank you to Dr. Mark Levine who stepped down as Health Commissioner and served as a designee to the Agency of Human Services to the Climate Council in March 2025

Other Councilors who have since resigned but supported this Plan development include: David Deen, Bram Klepner, Allie Webster, Paula Melton, and Denise Bailey.

SUBCOMMITTEES: [Co-Chairs, Members and Staff Support](#)

- Rural Resilience and Adaptation Subcommittee
- Agriculture and Ecosystems Subcommittee
- Cross-Sector Mitigation Subcommittee
- Science and Data Subcommittee
- Just Transitions Subcommittee
- Cross-Cutting Subcommittee

CONSULTANTS

Thank you to staff from Consensus Building Institute for meeting facilitation and supporting public engagement. Thank you to the Stockholm Environment Institute (SEI) for providing reporting on Business as Usuals and Scenario Modeling to the Climate Council.

STAFF

Thank you specifically to the staff of the Climate Action Office in the Agency of Natural Resources for supporting the Council during this Plan update and drafting key chapters in the Plan. Additional thanks to the staff of the Agency of Natural Resources (ANR), Department of Environmental Conservation (DEC), Fish and Wildlife Department (FWD), Forests, Parks and Recreation (FPR), Agency of Transportation (AOT), Public Service Department (PSD), Agency of Agriculture and Farm Markets (AAFM), Vermont Emergency Management (VEM), Agency of Commerce and Community Development (ACCD), Department of Children and Families (DCF) and Agency of Administration (AOA), and Agency of Human Services (AHS).

Public Engagement

Why engagement matters

The breadth and scale of a climate action plan impact all Vermonters in various ways. It is crucial to ensure that diverse voices, perspectives, and lived experiences are welcomed and valued throughout the process. It is especially important to prioritize the needs and considerations of frontline and impacted communities.

CALL OUT BOX: Frontline and impacted communities include those who:

- Are highly exposed to climate risks, such as health impacts, flooding, and extreme temperatures;
- Experience oppression and racism, are excluded from opportunities, or have less resources to adapt to climate and economic change;
- Bear the brunt of pollution and negative effects from today's fossil fuel and extractive economies; and
- Are more likely to experience a job transition as Vermont addresses climate change.

To reach Vermonters from all walks of life, we need to adopt new and different engagement approaches, recognizing that not everyone has the time, means, or ability to attend a typical government public meeting—yet it is still important to hear from them. These new approaches include:

- **Meeting people where they are:** One approach involves speaking with people in places they already frequent. Meeting people where they are means having conversations that are accessible and transparent, and providing information or resources that are of interest to them.
- **Getting creative with communications and working with community partners:** Another involves collaborating with community partners on engagement and using creative communication methods to spread the message and reach larger audiences.
- **Redesigning traditional public meetings:** Finally, recognizing that public meetings are still important avenues for sharing information, we can modify the design of those events to better welcome all.

Read on to see how these approaches were incorporated in the Climate Action Update process. To succeed at these engagement activities, we must invest the necessary time and energy to build and maintain ongoing relationships, and to ensure engagement is inclusive and accessible. This round of public engagement learned from and improved upon the initial Climate Action Plan engagement in 2021. However, we recognize that there is still much work to be done to amplify the voices of those disproportionately affected by climate change impacts and to expand our reach further to Vermont communities we have not yet engaged with.

Engagement for the 2025 Climate Action Plan Update

One important lesson from the first Climate Action Plan was the need to involve Vermonters continuously and include their input throughout the entire update process. To achieve this in the Climate Action Plan update, engagement started in early 2024 and continued until the Plan was finished. Community input was shared with the Climate Council every three months via the [Vermont Voices on Climate](#) engagement summaries. This engagement also aims to influence ongoing climate-related programs and systems in Vermont beyond the creation of the Climate Action Plan. To support this, the Vermont Voices on Climate summaries are regularly shared with the Inter-Agency Advisory Board to the Climate Action Office, the Civil Rights and Environmental Justice Unit, and other key partners.

Boots on the ground outreach

Starting in early 2024, the Climate Action Office, with help from Vermont engagement experts at the Consensus Building Institute, attended events across the state to respond to questions, hear concerns, and listen to ideas—all in service of building trust and engaging Vermonters in state climate action. Conversations covered many topics depending on the interests of the community member engaged—a few examples include flood recovery, home heating, health, and public transportation.

Table 1: Events Attended

January 2024	
Community Dinner at Islamic Society of Vermont	Burlington
February 2024	
Northeast Organic Farmers (NOFA) Conference	Burlington
June 2024	
Vermont Afghan Alliance Lunch	Burlington
Capstone Community Action's annual gathering "Community Impact"	Hyde Park
Memory Lane Car Show	Essex Junction
Juneteenth Celebration	Winooski
Juneteenth Celebration	Burlington
3 rd Annual "Summer Jam" free family day	Bennington

Lamoille Pride Event	Morrisville
July 2024	
Wellness Day	Barton
Vermont Council on Rural Development Community Forum	Johnson
Memphremagog Festival	Newport
Old North End Ramble	Burlington
August 2024	
Farmacy Distribution Day with Addison County Relocalization Network (ACORN)	Middlebury
Abenaki Land Link Harvest Festival	South Burlington
Vermont State Fair (2 days)	Rutland
First African Landing Day	Burlington
All Brains Belong Community Health Education Fair	Montpelier
October 2024	
Missisquoi Festival	Swanton
Intervale Fair Share Distribution Day	Burlington
November 2024	
Deer Check	West Enosburg
Vermont Maple Conference	Randolph
December 2024	
Youth Climate Leadership Academy	Fairlee
January 2025	
Free Ice Fishing Day	Barnard

Partnering with community-based organizations

Over the past year, the Climate Action Office has worked to build relationships with various community-based organizations and Community Action Agencies (also known as CAP Agencies) around the state. In addition to working with many of them to attend events listed above, partnership has resulted in focus groups, small-group facilitated conversations, and inviting their constituents to climate-related events. Much of this work focuses on engaging frontline and impacted communities. These events often provided compensation and/or food and were held in familiar and accessible locations.

Table 2: Focus Groups hosted for the Climate Action Plan 2025 Update

January through March 2024	
Six introductory focus groups were held with linguistically diverse communities (Arabic speakers, French and Lingala speakers, Spanish speakers, Somali Bantu community, and Nepali Bhutanese community). These laid the foundation for the October 2024 focus group below.	Winooski, Burlington, Montpelier, and virtually
October 2024	
Community leaders within linguistically diverse Vermont communities	Winooski
November 2024	
Capstone Community Action focus group with weatherization clients and other program participants	Barre
January 2025	
Caregiver support group with Sunrise Family Resource Center	Bennington
April 2025	
Elder Caucus with Northeast Kingdom Organizing	Barton
University of Vermont Eco-Reps	Burlington
Youth Input Session in partnership with Vermont Energy Education Program	Virtual

An additional focus group was planned in collaboration with Bhutanese-Nepali community members, but had to be cancelled due to emergency.

Summaries of these focus groups and others can be found in the [Vermont Voices on Climate](#) engagement summaries.

Climate Action Plan Events

The Vermont Climate Council, Climate Action Office, and Consensus Building Institute hosted events throughout the entire Climate Action Plan process to share information, answer questions, hear new ideas, consider community priorities, and receive feedback on work-to-date. These sessions focused on different themes from the various subcommittees and at key moments, community-based organizations and Regional Planning Commissions supported and collaborated on these events. The timing intentionally lined up with key decision-making and drafting periods of the planning process. Locations were chosen to cover a broad geographic range and reach areas that had not hosted an event during the drafting of the first 2021 Climate Action Plan.

Below are a few methods used to increase the accessibility and inclusivity of these events, recognizing that there is still much to be done.

- Spreading the word to community-based organizations and community partners with whom relationships have been built.
- Availability of language interpretation. This includes automatically including a question in the registration form for participants to indicate whether language access services are needed.
- Only hosting events in physically accessible facilities.
- Offering multiple ways of providing input (physical and virtual meeting options with various activities such as writing, small group conversation, and smartphone polling).
- Offering printed hand-outs of the PowerPoint slides.
- Hanging flyers in known community gathering places such as laundromats, general stores, hardware stores, gas stations, cafes, and town halls.

Table 3: Public meetings hosted for the Climate Action Plan 2025 Update

April 10	Virtual
April 14	Hardwick
April 15	Hinesburg
April 16	St. Albans

April 17	Bennington
April 23	Rockingham
April 28	Barre
April 30	Rutland
May 1	Virtual

Climate Action Plan Update Virtual Event Participants

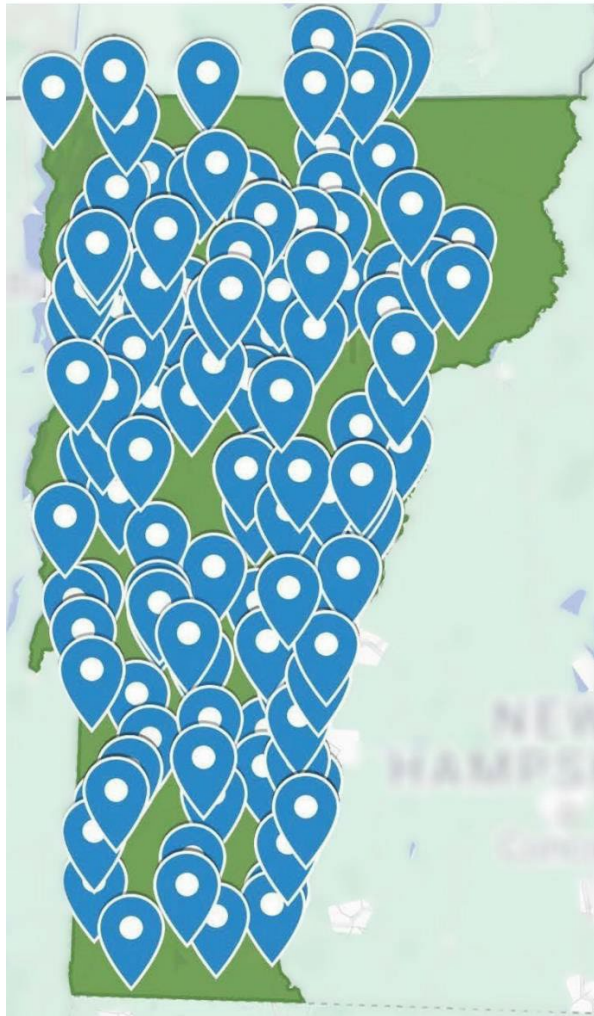


Figure 1

Climate Action Plan Update In Person Events

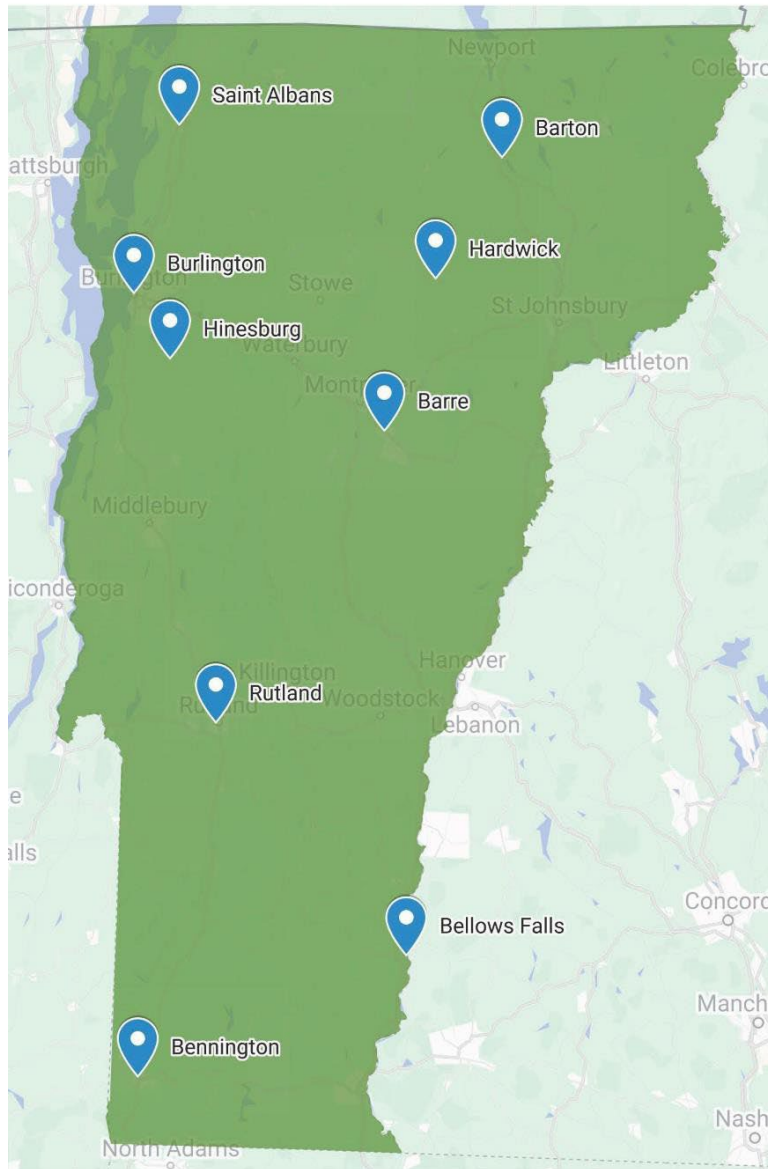


Figure 2

[View summaries of fall and spring input sessions.](#)

TIMELINE

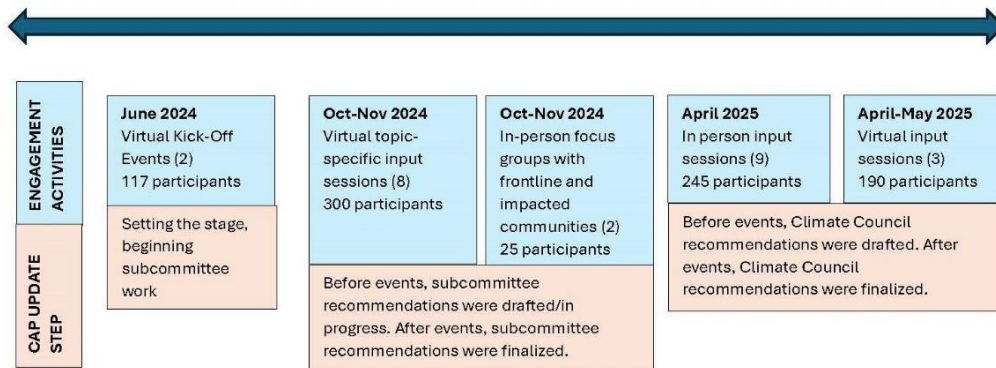


Figure 3

Participation

More than 850 public participants took part in a virtual or in-person input session. This figure may include some double-counting for Vermonters who attended more than one session. Seventeen out of eighteen Councilors attended events, with most attending two events.

In addition to events, approximately 250 Vermonters or Vermont-based organizations submitted written comment by email or through the [Public Comment Portal](#) during the public input process. The Climate Council and subcommittees adopted an improved process for receiving written comments at meetings (see Just Transitions Chapter).

How input was used

In the fall, subcommittees considered public comments while finalizing recommendations and pathways in the plan. Feedback from the events did lead to terminology becoming more well defined, inclusive, and intentional when updating the Climate Action Plan. Portions of subcommittee meetings were spent asking whether perspectives were missing, if programs were accessible, and how research and monitoring of the impact on individuals would occur. Additional, more passive inclusion of engagement considerations occurred as ideas and comments were held in the minds of subcommittee members as they updated recommendations for inclusion in the Plan.

After April's engagement on the draft plan, the Council and Steering Committee met many times in May and June to consider input from public meetings and public comment and revise the

Plan. In response to feedback that there were too many priorities and more focus was needed, the Council created a top ten priority actions list out of the broader fifty priority actions. These include actions that public meetings revealed broad support for, including weatherization, Cap-and-Invest, supporting electrification, workforce development, maintaining and expanding the Flood Resilient Communities Fund, investing in municipal infrastructure, and conservation that supports landscape connectivity.

CALLOUT BOX: “Too many goals! Prioritize!”

“Great ideas but too many. Whittle down to the most impactful, most likely to succeed and result in positive benefit and success.”

The Council also made a new recommendation for a funding mechanism for these programs.

CALL OUT BOX: “Need to ensure funding for actions” and “So many of the priorities are around increasing funding, but there is not necessarily a noted path forward to that funding. Being more specific and clear and make actual recommendations on funding sources.”

In response to feedback that geothermal networks should be part of the priorities, the Council created a new recommendation

CALL OUT BOX: “There is no mention of geothermal networks in this draft. TENS (Thermal Energy Networks) are CO2 free, use the [rights-of-way] of gas and power companies; have the same worker skills and tools and use off-the-shelf parts and technologies...[a] bill passed this year that allows towns, groups, and organizations to form companies to create TENS.”

Many participants expressed that the Plan’s language was difficult to understand and communications could be improved. The Council added introductory framing language to better communicate the overall plan and its goals. In 2026, a plain language summary of the Plan will be released as well.

CALL OUT BOX: “The language use in these recommendations isn't accessible to many VTers it would be so helpful to put these in plain language.”

The preamble also responded to feedback emphasizing the importance of affordability by speaking about the actions with a heavy emphasis on affordability and low- and moderate-income Vermonters seeing benefits from this plan.

CALL OUT BOX: “Please be mindful of the impacts of the proposed actions on low- and moderate-income Vermonters. The cost of living is high in Vermont and adding more financial burden will only make people angry at the government.”

Actions for which there was broad support at the meetings remain in the top 50 priorities—these include public transit, education, and the utility-scale biomass study.

In addition, nuanced edits were made to actions about solar siting, climate-ready workforce, business emergency (BEGAP) funding, public health, and education and workforce actions were made in response to feedback.

CALL-OUT BOX: Councilor quotes

“I really appreciated the feedback we got from people in terms of their interests and goals related to different priorities, as well as their interest in ensuring our recommendations thoughtfully balance goals important to them -- including cutting planet warming pollution while also ensuring any solutions recognize and respond to the financial and other challenges Vermont families and communities are already facing today...we adjusted our [Cap and Invest] recommendation to aim to make clear 1) our goal in aiming to mitigate and avoid negative cost impacts to low income Vermonters from any potential program and 2) outlined some key principles ... that any program is designed to not only deliver (real-time) direct financial relief to [low and moderate income] households as well as direct benefits from clean energy programs, while also cutting climate pollution.”

– Johanna Miller, Council member representing a statewide environmental organization

“We heard consistently during public meetings that members of the public would like to see the plan include a greater degree of prioritization among our recommendations, including the development of something like a "Top 10" list of the highest priority actions. As a Council, we followed through on that idea and, in addition to our list of 50-ish priority recommendations, have also worked to lift up a list of 10 top priority recommendations.”

– Jared Duval, Council member representing a Vermont-based organization with expertise in energy and data analysis

Continued Engagement

Recognizing that engagement is a key component of successful climate action, efforts to reach Vermonters in all corners of the state will continue between now and the next Climate Action Plan. In the coming years, community engagement conducted by the Climate Action Office will seek to reach rural communities, geographic areas not yet engaged, and frontline and impacted communities. This work is aligned with and guided by broader state government efforts to improve community engagement—including the [Environmental Justice Law](#) and ensuing

Agency-specific Community Engagement Plans, as well as the new Community Engagement Community of Practice.

Climate and Climate Change in Vermont

1.0 Preface

This section of the Climate Action Plan presents the land-air-water-plants dimensions of climate change in Vermont and the interconnected ways that we as peoples both affect and are impacted by such changes. From the homelands of the Abenaki and the Mohican, we honor all ways of knowing (Betts, 2021) and present mitigation, adaptation and resilience through the overlapping lenses of natural hazards, inclusion and vulnerability of peoples, the natural environment and human infrastructure, as we seek to do no harm.

For consistency with other state-level Climate Action Plans, this section used data, methodologies and results developed in support of the 2023 Fifth National Climate Assessment (NCA5), as well as from multiple federal and State of Vermont agencies. Following the presentation style used in NCA documents, information here will be organized into Key Messages which highlight updates and developments made since the Initial Climate Action Plan of 2021.

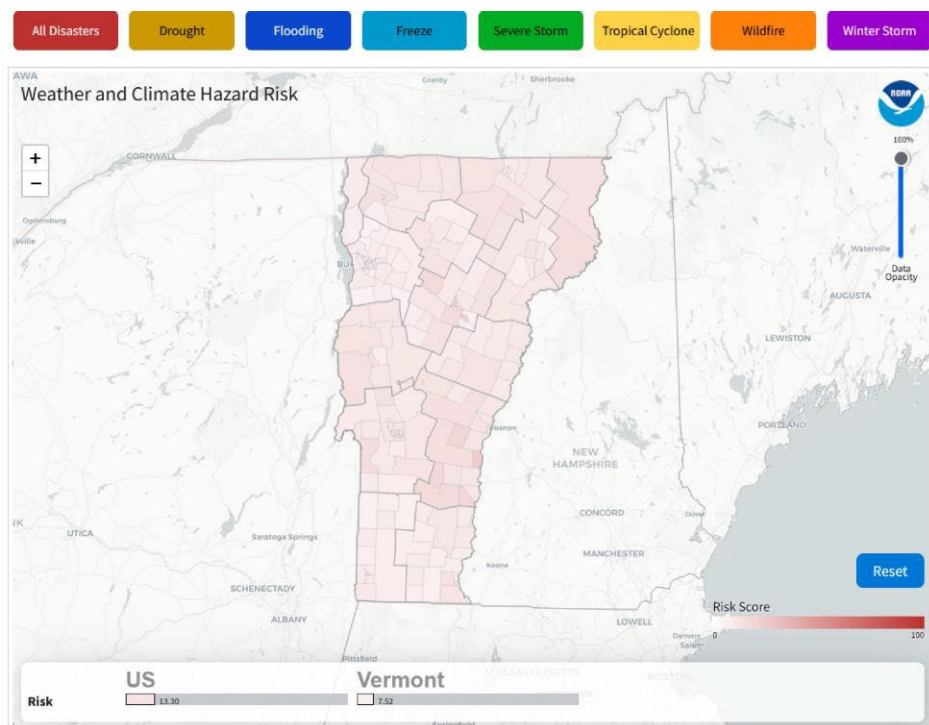
2.0 Setting the stage for the ongoing impacts of our changing climate

There are three main factors which influence our past, present and future susceptibility to weather and climate events and their changes. These include Vermont's geology, topography or physical geography, its culture and history that predate us, and which in turn have influenced the social and economic decisions/choices that have been made. The geology and physical geography of Vermont influence where natural hazards occur, their impacts on human settlements, the location of our major roadways in steep, V-shaped valleys, and our ability to increase resilience as a state. From a geologic perspective, large swaths of the state are inherently susceptible to failure due to the glacial stratigraphy (Figure 1b). For example, loose sand often directly overlies dense glacial till or glacial lake clays and silts, which sets up a significant permeability contrast and leads to saturation of the overlying sands. This saturation reduces soil cohesion, particularly when located along the steep slopes of the Green

Mountains. The north-south spine of the Green Mountains, along with the complex east-west valleys and the north-south ridges of the Taconic Mountains also affect the movement of localized winds and the incidence of freezing rain conditions; produce enhanced orographic precipitation and the associated flooding events; control the incidence of air pollution and stagnation events, as well as variations in freeze and frost dates. Figure 1b highlights the locations of landslides and mass movements across the state, while the 2023 U.S. Department of Agriculture's (USDA) Plant Hardiness Zone map with the shift in zones as our climate has warmed, is shown in Figure 1c.

Apart from landslides, various online tools can be used to map Vermont's exposure to multiple weather and climate-related hazards in each of its 184 Census tracts. One such tool is the NOAA National Centers for Environmental Information (NCEI) Billion-dollar disaster mapping tool <<https://www.ncei.noaa.gov/access/billions/mapping> >. Figure 1a shows the Weather and Climate risk from 7 hazards. Vermont as a whole has a risk score of 7.52 compared to the national average of 13.30. However, it is important to note that some counties have higher risk scores, e.g. Windsor County (12.15), Rutland County (10.97) and Washington County (10.36). Also of note is that risk scores vary by hazard. For example, in the case of flooding, Vermont's risk score of 9.13 is the same as the national average, with Windsor County (16.07), Rutland County (14.16) and Washington County (13.77) again exceeding the statewide and national levels. Of particular note is Census Tract 9660 (Town of Windsor) in Windsor County which has the highest hazard risk both overall (23.95) and in terms of flooding (37.07).

(A)



(B)

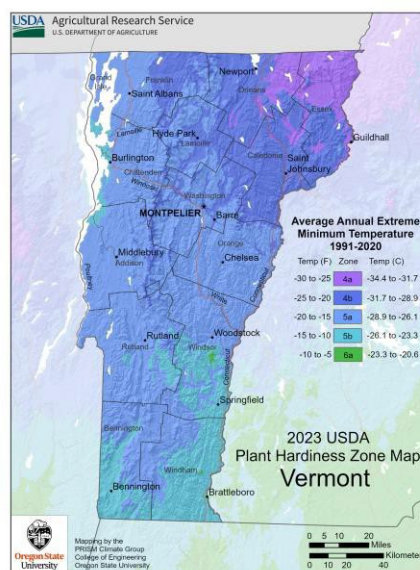
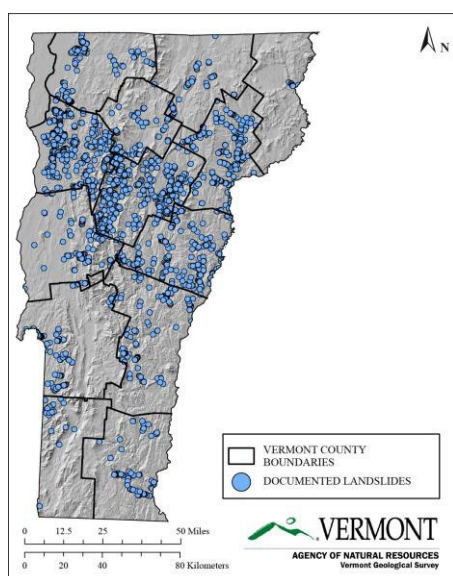


Figure 1

Maps of Vermont's counties (1a) and census tracts showing the degree of risk (0-100) from seven weather and climate hazards (drought, flooding, freeze, severe storm, tropical cyclone, wildfire, winter storm, all) <https://www.ncei.noaa.gov/access/billions/risk>; (1b) showing the locations where landslides have been documented, courtesy of the Vermont Geological

Survey and; (1c) showing the 2023 USDA Plant Hardiness Zone map
https://planthardiness.ars.usda.gov/system/files/VT300_HS.png.

KEY MESSAGE 1: Our seasons are changing, with the largest changes being observed during the winter

Vermont is characterized by a great deal of climate variability, particularly with regards to precipitation. Climate variability includes the variations that occur from one year to the next and can include changes in the storm tracks observed. Recent examples of the year-to-year differences in storm tracks (and resulting slope failures) were observed during the north-south flooding rains of July 2023, versus the northeast-southwest track of July 2024 (Figure 2d). In terms of actual amounts, it is not sufficient to state unequivocally that every storm system produces more precipitation than the last. In fact, as Figure 3b shows, Tropical Storm Irene produced more rainfall over a larger geographic area in August 2011, than the flooding rains of July 2023. Even more importantly, heavy precipitation (both snow and rain) can occur during single-day events as well as multi-day ones, where the latter have been increasing in frequency over time (Crossett et al., 2023; Kunkel et al., 2020). The National Weather Service also calculated that the number of days on which at least 1" of precipitation fell at the Burlington International airport has increased from about 4 days per year earlier in the record (which starts at 1940) to 6.5 days/year recently.

Increasingly, Vermont has also experienced what are called “temporally compounding” events where a hazard or event occurs one after the next (Singh et al., 2023). Examples of these would include the frosts in the spring of 2023, which were followed by the droughts in June, wildland fire smoke from the Canadian provinces in June and July, culminating in the flooding rains of July and August of that year. Such back-to-back events have disproportionate impacts on key socioeconomic sectors such as agriculture. It is also very challenging to convey messaging to Vermonters about human and other responses to these complex, overlapping or sequential events.

Vermont’s seasons are changing (Dupigny-Giroux et al., 2018) with backward/false springs (Dupigny-Giroux, 2009; Runkle et al., 2022) during which snow and cold temperatures as late as

April/May have been observed. It is important to note that our winters are changing the most rapidly. As Figure 4a shows, the 2023-2024 winter was the warmest on record since 1895 across almost all of Vermont, upstate New York and five other High Plains states. The National Weather Service calculates that the winters in the Champlain Valley have warmed by 8.4°F, compared to the annual value of 4.8°F. While 7 of the warmest 10 winters in the 1941-2024 period at the Burlington International Airport (Figure 4b) were observed since the 2001-2002 winter, it is important to note that bone-chilling cold continues to occur across Vermont (e.g. 31 January-6 February 2021, as shown on Figure 4c). Warming winter seasons pose particular challenges for the utilities sector because increases in snowstorms lead to more outages from wet snow falling near the freezing mark. NOAA's Billion Dollar Disasters product (Figure 4d) shows that the greatest number of damaging events actually occurred in January during the 1980-2024 period. Shorter winters with increased precipitation also affect the timing and thickness of the ice that forms on lakes and ponds as highlighted in the ice fishing Call out box 1 below which spotlights the braiding of Traditional Ecological Knowledge and Western science.

CALL OUT BOX 1 **CONDITIONS ON THE ICE ARE CHANGING** (by Judy Dow & the
National Weather Service)

The National Weather Service maintains a 200-year record of climate variability and change dating back to 1816, in the form of the dates on which Lake Champlain closed <https://www.weather.gov/btv/lakeclose>. The early part of the record is based on historical climate content analysis from reports and shipping logs, with observations beginning in 1906. In recent times, with the advent of Low Earth Orbiting (LEO) satellites, data from the visible band images on cloud-free days are used to determine whether the lake is completely frozen over or ‘closed’. Since 2008, Lake Champlain has rarely closed. Driven by the observations of drownings when individuals fall through thin ice or capsize in a small boat when air temperatures are warm, but water temperatures are cold (50F or colder), the NWS undertook a study of the ice-related and cold-water injuries in Vermont and upstate New York for the 1990-2023 timeframe. The study highlighted the fact that the climatology of the ice has changed over time and “it’s not your grandfather’s ice” (Alan Betts, pers. comm.) any more. Of the 59 incidents investigated, most occurred during ice fishing (45.2%) and driving/riding (29.8%). Children (aged 12 and younger) and individuals aged 50 or older were those most involved in ice-related incidents, while adults in the 20-29 age range accounted for the majority of the cold water boating accidents.

END OF CALL OUT BOX 1

KEY MESSAGE 2: **Vermonters are exposed to multiple hazards, all of which are complex, changing and interconnected**

Across Vermont, natural hazards of varying intensity, duration and frequency occur. These include severe storms, winter storms, drought, flooding, wildfires, air pollution, ground-level ozone, temperature extremes, localized winds, and biotic elements (insects and disease). Some of these hazards are ubiquitous, while others tend to occur at specific geographic locations. This poses varying exposure or risk and therefore, societal vulnerability.

It is unequivocal that climate-related hazards are impacting Vermont with increasing frequency and intensity. The changing seasonality outlined in Key Message 1 creates compound and cascading effects that strain emergency response systems and affect everyone, but hit some Vermonters harder than others - like farmers dealing with unpredictable growing seasons, older residents during heat waves, or manufactured housing communities during floods. Vermont's interconnected natural and human systems mean that impacts to one sector - such as agriculture or infrastructure - create ripple effects throughout communities. While individual extreme events cannot be directly attributed to climate change, the increasing frequency and severity of hazards aligns with scientific projections. These intensifying hazards often lead to increased emissions - for example, when extreme weather damages infrastructure or forces greater energy use - creating a cycle that requires both adaptation strategies to protect communities and mitigation efforts to reduce future impacts. This evolving landscape of hazards demands new approaches to planning that account for changing conditions and help communities become more resilient.

The Vermont Geological Survey (VGS) is at the forefront of this call to action. It wasn't until Vermont was significantly impacted by landslide hazards following extreme precipitation events in July 2023 and July 2024 (Figure 3b, c), both of which resulted in federal disaster declarations, that the VGS more fully realized the state's susceptibility to unstable slopes. As a result of these storms, the VGS has responded to over 150 individual requests for landslide hazard assessments in 64 towns primarily located along the corridors of greatest rainfall and supported Vermont Emergency Management (VEM) in technical evaluations for 16 residential buyouts through the Federal Emergency Management Agency (FEMA). From these site visits, it has

become clear that Vermont's slope susceptibility is not limited to the "typical" glacial stratigraphy associated with landslides, but rather that nearly all unconsolidated materials on slopes become prone to failure over some threshold precipitation amount. Significant failures have been observed on glacial till, lacustrine and fluvial sands, and artificial fill at residential and municipal parcels that hadn't shown signs of failure for decades to centuries.

In terms of socioeconomic vulnerability due to 11 factors (including age, income, mobility, veteran status), the NOAA Billion Dollar Disaster Mapping tool (Figure 5a) shows that Vermont has an overall vulnerability score of 9.95 compared to the national average of 13.5. However, as noted for weather and climate risks in Key Message 1, socioeconomic vulnerability varies by factor and by county, ranging from the highest values in Essex (11.67), Orleans (11.48) and Bennington counties (10.63) to the lowest in Grand Isle (8.89) and Chittenden (8.98) counties. In most counties, *it is the Census tracts with the smallest geographic area that have the largest socioeconomic vulnerabilities*. Census tract 3 in Chittenden County has the largest overall socioeconomic vulnerability in Vermont with a score of 16.29. This tract which runs along Riverside Avenue and into the Old North End in Burlington, will be explored more fully in Call out box 2. The components that contribute to a community's resilience are shown in Figure 5b.

CALL OUT BOX 2: The White Monsters & Vulnerability in Burlington's Intervale by Judy Dow

"As a child, I lived in Burlington and my relatives mostly lived near here. I am very familiar with the landslides in the area. The first photo documented landslide of Riverside Ave. in Burlington, VT was in 1929. Small mudslides continued with at least one or two each decade until 1955 when a major landslide occurred after receiving 2.37 inches of rain (TEK; VT Agency of Natural Resources, 2018). That event was followed by three smaller mudslides in the same year. After a

mudslide in 1958, it took 5,000 cubic yards of rock and other fill (that's a ¼ of a football field filled up to the top of the goal post) to make repairs to the area. Each decade after 1955 witnessed at least two landslides per year in this same area until Aug. 2024 (personal observations; news media). When combined with large amounts of water a landslide forms a flowing liquid creating a mudflow, which has more fluid than a landslide. Here, I have used the terms landslide and mud slide as it has been used by the source.

There seems to be many drivers for these mudslides as excessive rain events continue and the land becomes more and more saturated leading to the land slides. The years of adding fill contributed to a lack of successful drainage. The slope of the bank is steep and insufficient stabilization has contributed to landslides in this area. The city of Burlington increased the width of the road and added sidewalks in this area which continued to push the buildings further toward the steep banks (Triantafillou et al., 2020). In addition, 25 to 37 train carloads of wood chips and approximately twenty eighteen-wheeler truck-loads of logs and wood chips travel this road each day on their way to McNeil Generating Plant (personal interviews with residents) The weight alone adds pressure on the filled areas.

The parking lots and backyards of the businesses along this road show signs of future mudslides. Increased major precipitation events, cracks everywhere, illegal dumping and the continuing to build on unstable land adds to a loss of land, healthy riparian zones, more precarious homes for people, and the loss of connectivity for animals and biodiversity. The future of this area looks tenuous with a serious risk of future mudslides. Predicted increases in storm events frequency and intensity will only exacerbate slope hazards by raising ground water tables.”

Figure 7 Spotlight on Census Tract 3 in Burlington, bounded by Riverside Avenue, Route 127 and the Winooski River. This Census tract has the highest socioeconomic vulnerabilities in Vermont (7c), is prone to freezing, winter storm and severe storm risks (7a) and has experienced multiple landslides along Riverside Avenue close to the Intervale, as shown on the photos dating back to 1929 (Photo credit: Judy Dow).

The White Monsters [NARRATION ON MP3 AUDIO IS AVAILABLE]

Pepe lived on the edge of town, high up on the bluff overlooking the Intervale and the Winooski River in a place called Moccasin Village. Moccasin Village was built on the top of an ancient sand dune nestled between the Intervale and Lake Champlain. All twenty or so families living in Moccasin Village were French Indian people who had decided to stop traveling back and forth to Canada and settle down in one place, in 1886 Moccasin Village was called home. "Times were changing," Pepe used to say, but living next to the Intervale was perfect because people could still hunt, fish, and gather off this open land. "Intervale" is an old English word that describes a long narrow valley between two high points with a river running down the middle. To us, it was the common pot, a huge bowl of food. This particular Intervale is called the Winooski Intervale. Burlington, Colchester and Winooski surround the 1700 acres. Outside of New England, people never use this word to describe the land.

In the spring, when we visited Pepe, we would go to the Intervale to harvest fiddle heads and wild leeks. "Winooski" means "the place of the wild onions" in the Abenaki language. As soon as the snow was gone, the leeks would peek their heads out of the ground. You didn't need

many. They had a strong taste but added a lot of flavor to the roasted squirrel and baked beans that Pepe often had cooking on a small ledge in the wood-fired boiler down stairs in his house.

Pepe would tell me stories as we walked through the riparian forest, picking a few fiddle heads here and a few there until we had a pail full. "It was important not to pick all that we wanted in one place, picking all the heads on one bulb would kill the bulb," Pepe explained. So, we walked all day long picking here and there. The heads we left behind would provide a beautiful spray of ostrich ferns that would eventually grow to cover the worn path we walked in early spring. As we slowly walked back to the house, I would tell Pepe how much I loved spending time in the Intervale. "Yes," he would tell me, "it's a great place to visit and get your food".

Before I was born Pepe would hunt for muskrats in the spring; he and my father would tan the hides in their back yard and sell them for 75 cents apiece. Muskrats live in the wetlands of the Intervale, making little push-ups for dens to protect the young from predators. When visiting Pepe during this time, it was not uncommon to see many hides stretched out drying in his back yard. People wanted the hides for their warm coats.

Sometimes in the spring we would fish for Shad. When the shad trees were in bloom in the uplands where I live, the shad were spawning in the low lands, where Pepe lived. Pepe would go to the edge of the river where his two ended boat was tied up, and we would fish for shad. The pesky little shad flies were out too, and they would land on every part of my body until I shoed them away. Pepe would say, "never mind them. They won't hurt you; they are food for the fish." This cycle is confused now because of climate change. The shad flies are not always there in time for the shad run. My favorite berries were shadberries. We would pick baskets full of these little berries and bring them to Pepe because they didn't grow in the Intervale and Pepe loved them. As we floated down river in the boat that Pepe's brother had made, I looked up at the

trees stretched out over the river and I dreamed of living in the Intervale. I never wanted to leave there, it was so beautiful.

In the summer, we made many trips to the Intervale, picking raspberries, blackberries, and many different kinds of plants for food and medicines. We also fished for bass and perch and occasionally caught an eel. Pepe had stories for all of them. I can still hear him singing, "little fishes in the lake come and bite upon my bait." The eels were sweet and prized by the elders living down the road, so Pepe nailed their heads to the tree, cut around their throats, and pulled the skins off. He then had us deliver the eels to the old people living in Moccasin Village. I later found out that eels had a high nutritional value, something I 'm sure Pepe knew all the time. That's why the old ones got the eels.

When fall came, things were different. We went to the Intervale to gather butternuts. We would pick bushels of butternuts. Filling our backpacks with the heavy nuts, we would lug them back to Pepe's house. We would place newspapers on the floor in the basement and spread the nuts out to dry. When it got cold outside, Pepe would slide the nuts into a vice that was anchored to his work bench and crack them open, one by one. He would place the special nut meat into canning jars and for Christmas everyone got a jar to celebrate the holiday. It was the greatest treasure to receive, and we were excited because with the nuts in hand we knew that my father always made penuche fudge.

It was in the Fall that Pepe would hunt for deer, ducks, and geese. His freezer was always full of frozen game and the pantry filled with canned fruit and vegetables. We grew plums, apples, pears, and berries. Along with the harvest of our vegetable garden, we always had some awesome food come winter. Pepe made some of the most wonderful meals I ever had; the food he harvested from the Intervale was different than what we get at the grocery store today. In most grocery stores you can't find venison, duck, goose, and squirrel at the meat counter, or

Butternuts and fiddleheads on the shelves, but you could find them in the freezer and on the shelves at Pepe's. Pepe knew the land. He knew when the fish were spawning, the ducks were migrating, and the deer were yarding up. He knew when to burn the Intervale and where the burning was most beneficial for drawing out the muskrat in the Spring. Pepe understood the cycles.

As soon as the ice froze in the flooded parts of the Intervale, we would be out there skating and sliding down the side of the thirty-foot bluff into the Intervale. When the ice was frozen enough to walk on, Pepe would say, "it was time to burn the Intervale," and my father and other neighborhood kids would gather to each light certain parts of the land on fire. This was often reported in the local papers as mischievous kids playing with matches. The wetland plants that once stood green and tall were frozen, brown and brittle now from the cold, and when touched by the fire they curled up and burned to little piles of ash that blew away in the wind. Pepe said, "the burning would bring new plants in the spring like the cattails, sedges, and arrowhead that the muskrats loved to eat." Then the cycle would continue, and Pepe would have more muskrat to harvest in the spring.

One beautiful winter day when we were snowshoeing through the Intervale, I blurted out "Pepe, I love the Intervale. I want to live here when I grow up." "You can't live in the Intervale," he said. "Why?" I asked. He then told me, "that not always, but sometimes the White Monsters come and destroy everything in the Intervale." "The White Monsters," I gasped. He said, "the Intervale was a place that we had to share with the White Monsters. It was their home, too." "The white monsters are what helps to make the Intervale so special," Pepe said. Slowly, we walked back to his house, and he told me the story of the White Monsters.

Pepe explained that the Intervale was a place that was supposed to receive excess water during times of flooding. "Flooding is important to the cycle of life," he told me. "Flooding brings

nutrients from up river and spreads it all over the Intervale. The nutrients help the plants and animals to grow, and then helps us by providing the plants and animals that we eat." "But, Pepe, what are the White Monsters?" I asked. "The White Monsters are the big chunks of ice that float in the high water onto the Intervale floor. They often tear down buildings, houses, trees and bridges on their way to the Intervale. They are so big, sometimes they destroy everything in their way, and that's why you can't live in the Intervale. You just never know when they are coming. People should live high up on the bluffs and visit the Intervale, but they shouldn't live there unless they are prepared to lose everything they worked hard for."

I was sad thinking about not being able to live in the Intervale, but I understood what Pepe was telling me. Sharing the Intervale with the White Monsters was not so bad because I still got to visit during the times they weren't there. On their occasional visits, I would be sure to greet them from high on the bluffs overlooking the Intervale, just as my ancestors had done before me."

END OF CALL OUT BOX 2

KEY MESSAGE 3: Climate Change Increases Challenges for Vermont's Most Vulnerable Peoples

The impact of climate change on the health of Vermonters is covered in depth in Section X. This Key Message provides a preview of how climate change impacts Vermont's most vulnerable communities. Vermont is at risk of loss and destruction of some of its most sacred places. Increasing heat waves create serious health risks, especially for older adults, children, outdoor

workers, and those without air conditioning. These rising temperatures bring cascading effects: worse air quality, more disease-carrying ticks and mosquitoes, and harmful algae blooms in our lakes and ponds. More frequent and severe flooding threatens not just homes but entire communities, leading to displacement and long-term health issues from mold and moisture damage. This is especially true for manufactured homes, which have suffered disproportionate damage in past floods despite making up a small portion of Vermont's housing (Figure 7). When extreme weather knocks out power, it creates dangerous situations that disrupt communications and particularly affect rural residents and those who rely on electric medical equipment or may need access to emergency services. These impacts hit hardest in lower-income communities, where affordable housing often faces greater exposure to floods and storms. The loss of culturally significant and sacred places adds another profound dimension to these challenges, affecting community identity and well-being.

KEY MESSAGE 4: From Farms to Main Street: Vermont's changing climate impacts all communities

Vermont's working landscape and community systems face mounting pressures from climate change. Mora et al. (2018) found over 400 pathways by which multiple sectors including human health, security, food and water, infrastructure, and economy, have been impacted by hazards such as flooding, heat waves, changes in natural land cover, fires, etc. In Vermont, our iconic dairy farms and maple sugaring industries struggle with warmer winters and heat waves affecting everything from milk production and livestock stress to maple sap flows, damaged sugar maples, and losses in overall farm productivity. Vermont's buildings and transportation systems, originally designed for cold, temperate climates, face increased strain due to higher temperatures. Roads, bridges, and railways risk damage from thermal expansion, and the Urban Heat Island Effect exacerbates heat exposure in cities.

Many of our historic downtowns, built along rivers that once powered mills, now face increased risks from fluvial erosion and damage. When severe weather interrupts power supplies, it creates a domino effect - particularly dangerous for healthcare facilities trying to keep patients comfortable and safe. Local businesses are feeling the squeeze, too. Weather-damaged inventory, structural losses, and disrupted supply chains and deliveries cut into their bottom line. Towns and State agencies spend more on snow removal, while maintaining and repairing deteriorating infrastructure impacted by freeze-thaw cycles exacerbated by climate change. The ski and tourism industries face growing challenges as warming winters reduce the amount of natural snowfall, shortening seasons and producing an increasing reliance on expensive artificial snowmaking.

Increased rainfall and snowmelt, linked to climate change, contribute to slope instability, exacerbating the risk of landslides. Human activities, like infrastructure construction, can worsen this risk by improperly managing surface runoff or overloading slopes. Roads, bridges, culverts, and buildings on or near steep slopes, especially in historically affected areas, are vulnerable to landslide damage. Landslides can severely impact recreational spaces, such as hiking trails, and hinder transportation networks, complicating emergency response efforts. Although wildfires are currently rare in Vermont, increased temperatures, low humidities, high daily temperatures and various types of droughts have the potential to increase the incidence and exposure to wildfire risks. Severe air quality concerns arose in the summer of 2023 as the wildland fires burning in the boreal forests of northern Québec reached Vermont. Wildland fire smoke from the western US and other parts of Canada, typically produce fewer visibility and human health challenges because it is being transported higher in the atmosphere.

KEY MESSAGE 5: The integrity of Vermont's ecosystems is in peril

Expected changes to Vermont’s climate that have been identified in other parts of this Plan will profoundly affect the natural resources and ecosystems that we enjoy and upon which we depend. Rustad et al. (2014) reviewed literature on how climate change is changing the structure and function of the forest ecosystems in the northeast. They point out that, while slow change in forests’ composition is normal, observed changes in temperature, precipitation and snowfall are rapidly changing our forests (Figure 8 a, b). The tree species that grow in our forests strongly influence the way that water and essential nutrients move through ecosystems. They also alter the habitat characteristics and food types that determine the species of insects, birds, and animals that are likely to flourish in these environments. For example, birds are one of the best studied organisms in the northeast. Rustad et al. (2014) concluded that there is strong evidence for a northward expansion of bird species that were once found further south, often at the expense of valued native species (Figure 8c). Climate change also brings the threat of nuisance species that can affect the health of forest tree species (Figure 8d). Hemlock woolly adelgid has already infected hemlock stands in the southern parts of the state and is moving northward. As climate warms, other pathogens like Armillaria root rot may begin to infect tree species that are being stressed by climate change. Potential impacts of climate change are not restricted to terrestrial ecosystems. For example, Sievert et al. (2022) identified “classes” of fish communities in the Northeast and Midwest on the basis of in-stream temperature and flow characteristics combined with landscape, environmental, and climate variables. They concluded that throughout most of Vermont, fish species were at “high” to “very high” risk of changing from one class to another, favoring warm-water tolerant species and disfavoring cold-water tolerant species (Figure 8e). These “class” changes are potentially important considerations for fish biodiversity and recreation management. Finally, there are interactions between land ecosystems and water ecosystems that will be affected by climate change.

Data summarized by the Lake Champlain Basin Program (2024) show how major storm events – like the July 2023 flood – can deliver not only high runoff totals, but tremendous amounts of

sediment and phosphorus as well (Figure 8f). The July 2023 event delivered more than 100 metric tons of total phosphorus on 11 July alone and 300 metric tons of phosphorus from 10-16 July, which represented half of the recommended total annual load of phosphorus to Lake Champlain. Other water bodies in Vermont were affected in similar ways by this and other events. Such events hinder our ability to meet water quality targets and threaten indigenous aquatic species that we value.

KEY MESSAGE 6: There are critical knowledge gaps in the current research about Vermont's Climate and Climate Change. Opportunities also exist.

Several important areas of Vermont's climate and climate change impacts remain understudied, limiting our ability to fully understand and address emerging challenges. One significant gap involves tracking and quantifying climate migration and displacement. Such monitoring and analyses should be centered on the Earth Systems Science approach of the 2024 National Academies report on this topic, in order to facilitate for a more rigorous understanding of a) the temporary and permanent movement of Vermonters and in-migration to Vermont as a result of climate-related hazards and impacts b) the ability of displaced communities to adapt and c) disparities that may exist or exacerbated. We also lack comprehensive data correlating climate change with shifts in agricultural production and its ripple effects through rural communities. In terms of public health, more research is needed to understand how declining groundwater levels may concentrate contaminants, particularly affecting Vermonters who rely on well water. There are also crucial gaps in our understanding of how gradual climate changes affect affordable housing. For instance, while we have anecdotal evidence that reduced snowpack around manufactured homes leads to moisture damage and health risks - historically, this snow provided crucial insulation - we lack systematic studies of these impacts. These knowledge gaps

highlight the need for more focused research to protect vulnerable communities better and inform adaptation strategies.

Despite the climate change challenges we face, action is possible. In addition to the recommendations and pathways to reduce the state's greenhouse gas emission profile detailed in this Plan, opportunities to build upon existing programs and maximize co-benefits among clean water, biodiversity, and climate resilience in the state, exist. For example, Vermont can advance flood mitigation, climate adaptation, and resilience through riparian, wetland, and floodplain conservation and restoration. Priority recommendations in this Plan highlight the need to adapt land management practices to increase ecosystem resilience, enhance biological diversity, improve water quality, and identify sources of funding for climate resilience adaptation practices that increase the financial capacity of land and water caretakers to achieve these goals. The plan also recommends the promotion of healthy, connected river corridors, floodplains, and wetlands, through expansion of wetlands, floodplains, riparian forests and/or river corridor easements that support co-benefits of increased resilience to climate change, enhanced biological diversity, and water quality benefits. These nature-based, cost-effective approaches increase resilience of natural and human communities to future flooding and droughts. The effect of the floodplain wetlands in the Otter Creek watershed on maximum flood heights in Middlebury during Tropical Storm Irene in 2011 is particularly telling [Galford et al. 2014]. Watson et al. (2016) estimated that these wetlands reduced the potential damage to Middlebury by at least 6 times and perhaps as much as 20 times [Watson et al. Table 1]. The long-term benefit of these nature-based solutions is compelling. Other initiatives like strategic dam removals, right-sizing culverts, and innovative agricultural and land use practices can create connectivity that enhances aquatic organism passage and reduces runoff of sediment and phosphorus that negatively impacts our water bodies. We can also support identifying funding that will help agricultural producers continue to provide a vibrant local food system while at the same time addressing our climate and water quality goals on working lands. We

can support identifying funding for improvements to public infrastructure including bridges, roadways, drinking water facilities, waste treatment facilities, individual septic systems, and stormwater infrastructure to meet current codes and standards and withstand future flooding events. We can prioritize land use and sustainable development that reduces water quality impacts through consistent regulatory enforcement and with support, resources, and technical assistance for developers, farmers, and woodland owners to ensure sound management, healthy soils, and clean water.

KEY MESSAGE 7: How is our climate projected to change in the future?

A warming and wetter climate has varying effects on different weather and climate hazards (Figure 9a). Projected changes in temperature through 2050 show a high degree of confidence in temperatures increasing, resulting in a higher frequency of warmer temperatures and heat waves. In northwestern Vermont, by the end of the century, temperatures over 86°F are projected to increase by at least 27 (57) days under the lower (higher) emissions scenario (Figure 9b). On the other hand, the most extreme cold temperatures will likely decline in magnitude slightly as arctic warming tends to diminish the strength of wintertime arctic air masses. Overall annual precipitation will likely increase, although at a slower rate than temperature (moderate confidence). Extreme precipitation events, such as those with 2" or greater precipitation in a 24-hour period, will likely increase in frequency (moderate confidence).

Annual snowfall variability will likely remain high, with some wet winter seasons producing higher than average snowfall, as the climate remains cold enough to continue to support snowfall. However, the general trend is for more winter rain and reduced annual snowfall, especially in lower elevations and southern areas. Risks from power outages related to wet

snowfall are expected to increase, as more winter storms will likely be closer to freezing where snowfall is wet or sticky in nature (moderate confidence).

Wind storms are expected to increase in intensity, but these will likely be related to unique meteorological storm types. Tropical Storms or hurricanes, if they make landfall and move inland, will likely be able to maintain strength at higher latitudes from warming ocean temperatures, therefore increasing the risk for low-frequency but catastrophic storm impacts (e.g. Hurricane of 1938). On the other hand, gradient wind events from midlatitude storm systems across Canada or nor'easters may decline in frequency.

The projected frequency of ice storms and thunderstorms remain low confidence with competing meteorological risk factors for each. Low-end freezing rain icing events (those with ice accretion insufficient to produce power outages) are expected to increase, as warmer winter temperatures produce more winter storms with mixed precipitation types.

Overall risks to the power distribution grid have been shown to be increasing, more due to storm systems becoming more intense. A combination of weighing current trends, literature, and two climate simulations shows that overall power outage risks are projected to increase by approximately 5-10% through 2050, due to more frequent wet snowfall, and potentially stronger wind storms.

Vermont's annual precipitation is projected to increase 1" to 2" through 2050. These rates of increase track closely to current precipitation rate changes over the last 30 to 40 years. Through 2100, the lower emissions scenario predicts approximately 4" greater annual precipitation, whereas the high emissions scenario predicts 9" greater annual precipitation. The spatial distribution precipitation change is relatively equal across Vermont counties. Extreme

precipitation events will increase at a faster rate than annual precipitation increases, likely following current ratios of extreme events to annual precipitation rate changes.

Vermont's annual temperatures are projected to increase over 2°F through 2050 on either the lower emission or high emissions scenarios. These scenarios differ significantly through 2100, with the lower emissions scenario predicts 4°F of warming whereas the high emissions scenario predicts 9°F of warming. The spatial distribution of warming is relatively equal across Vermont counties. With a warming climate comes a greater likelihood of higher temperatures. Extreme temperatures (as defined by a high temperature $\geq 90^{\circ}\text{F}$) are projected to double in frequency by 2050 through either the lower emission or high emissions scenario. Vermont-wide average days above 90°F go from 4 days a year to 9 days a year by 2050. By 2100, however, there is significant variability, with the lower emissions scenario reaching 15 days a year, and the high emissions scenario projecting 45 days a year.

In terms of hydrology, a high-level picture of Vermont's future in the middle of the 21st century has been extracted from the most recent Fifth National Climate Assessment (Payton et al., 2023). Figure 10 shows relative changes in precipitation, evapotranspiration, snow water equivalent, summer soil moisture, and runoff across the use. The larger maps on the left shows the average expectation, with smaller maps on the right showing the expectations for the wettest 20% of model projections (top) and the driest 20% of model projections (bottom). Focusing on Vermont, the following patterns emerge. On average we can expect 1-2" of additional rainfall annually. However, we can expect about 1" less total water input from snowfall. A portion of this water coming into the state will be lost back to the atmosphere by evapotranspiration. The model projections suggest that on average the additional loss from evapotranspiration will be about 1". The balance of rain and snowfall that is not evapotranspired will either soak into the soil or runoff into surface water bodies. The expectation is that soil will likely become slightly drier (up to -0.05"). So, the sum of these

water gains and losses suggests that future runoff to streams – on an annual basis – may not change that much, ranging from a loss of about -0.1” to a gain of about +0.1.” However, as explained in other parts of this report, this very simple water balance formulation obscures crucial changes to the natural ecosystems and human communities that we value and on which we depend. For example, changes in snowfall and soil moisture content, though seemingly small, will have profound effects on the biodiversity of our forest ecosystems and productivity of our working lands. And although the expected increase in rainfall seems small, it is the erratic frequency and increasing intensity of this rainfall that will lead to threats of future flooding if left unmanaged. Floods also impact greenhouse gas emissions, by increasing emissions of carbon dioxide and methane from agricultural streams, especially during periods of frequent and prolonged flooding, during the growing season (Blackburn and Stanley 2021).

FIGURE CAPTIONS

- Figure 1 Maps of Vermont’s counties (1a) and census tracts showing the degree of risk (0-100) from seven weather and climate hazards (drought, flooding, freeze, severe storm, tropical cyclone, wildfire, winter storm, all) <https://www.ncei.noaa.gov/access/billions/risk>; (1b) showing the locations where landslides have been documented, courtesy of the Vermont Geological Survey and; (1c) showing the 2023 USDA Plant Hardiness Zone map https://planthardiness.ars.usda.gov/system/files/VT300_HS.png.
- Figure 2 Spotlight on the catastrophic flooding of 9-11 July, 2023. Images extracted from the USGS report <<https://www.usgs.gov/centers/new-england-water-science-center/science/july-2023-flood-vermont>> show (2a) the locations where events of various probabilities occurred, from the at least 2-year events (smallest black triangles) up to the at least 500-year events (largest black triangles) <https://www.usgs.gov/media/images/annual-exceedance-probabilities-vermont-streamgages-a-july-2023-flood> and (2b) the height of the July 2023 flood compared with five other major floods dating back to 1811 in Pittsford, Vermont <https://www.usgs.gov/media/images/flood-rock-pittsford-vermont-near-otter-creek>. Figure 2c shows the locations of road damage (courtesy J. Shafer, Disaster Tech). Figure 2d shows the north-south track of the rainfall and subsequent

landslides in 2023 compared to the east-west rainfall track and landslides in July 2024 (courtesy Vermont Geological Survey).

- Figure 3 The most significant weather events across Vermont in the 1927-2023 period (3a). Rainfall comparison among Tropical Storm Irene (27-28 August, 2011) and the flooding rains of 10-11 July 2023 (3b), 10-11 July 2024 (3c). Note the heavier and more widespread totals during Tropical Storm Irene, the north-south track in 2023 and northeast-southwest track in 2024. Data courtesy the National Weather Service.
- Figure 4: Map of the continental United States for the winter (December-February) of 2023-2024 showing the rankings by counties since the 1895-1896 winter. Counties with the darkest red experienced the warmest winter since 1895-1896. No counties experienced record cold conditions. Figure 4b is a table of the top 10 warmest winters at the Burlington International Airport since 1941. Figure 4c shows a map of the U.S. for 31 January-6 February 2021, when bone-chilling temperatures as low as -20°F were observed over most of Vermont. Figure 4d shows that between 1980-2024, the most costly hazards in Vermont were winter storms in the month of January.
- Figure 5 Maps of Vermont's counties and census tracts showing the degree of socioeconomic vulnerability (0-40) due to eleven factors <https://www.ncei.noaa.gov/access/billions/risk> (5a); (5b) Original Figure 11.14 in the Fifth National Climate Assessment available at <https://nca2023.globalchange.gov/chapter/11/#fig-11-14>. "The Baseline Resilience Indicators for Communities (BRIC) index is a composite measure of community resilience to natural hazards. It considers 49 indicators of existing attributes of resilience arranged in six broad categories: social, infrastructure, institutional, environmental, economic, and community capital. It can be used to compare community resilience within one county to that of another ... Positive and negative drivers of resilience for rural counties are provided for each category. Figure credit: USDA."
- Figure 6 Spotlight on Census Tract 3 in Burlington, bounded by Riverside Avenue, Route 127 and the Winooski River. This Census tract has the highest socioeconomic vulnerabilities in Vermont (6c), is prone to freezing, winter storm and severe storm risks (6a) and has experienced multiple landslides along Riverside Avenue close to the Intervale, as shown on the photos dating back to 1929 (Photo credit: Judy Dow).

Figure 7 Location of Manufactured Housing Communities across Vermont (a) and the social vulnerabilities experienced at the household, building and community scales in the wake of flooding events (b) (Baker et al., 2014; Hamshaw and Baker, 2024)

Figure 8 (A) The 12 tree species showing the largest projected changes in suitable habitat in 2100 under an average-high emissions scenario. The emission scenarios used in this and other panels in this figure are based on the Intergovernmental Panel on Climate Change (IPPC 2007) greenhouse gas emissions scenarios for New England forests from 2000-2100. The emissions scenarios cited in these figures refer to older terminology but can still be interpreted as “low” and “high.” As adapted and reported by Rustad et al. (2014). (B) Current and projected suitable habitat for major forest types in New England under low and high emissions scenarios. Under the low emissions scenario, the conditions will favor maple-birch-beech forests, while the high emissions scenario suggests that conditions will favor oak-hickory forests. As adapted and reported by Rustad et al. (2014). (C) Number of bird species projected to change their abundance and range between 2000 and 2100. As adapted and reported by Rustad et al. (2014). (D) Modeled responses of six nuisance species to climate warming. Impact refers to the severity of impact within the three species range. As adapted and reported by Rustad et al. (2014). (E) Map showing relative risk of fish community change due to predicted changes in climate. Areas which are not classified are typically reservoirs, lakes, or wetlands for which the local catchment does not include an associated river or stream segment. From Sievert et al. (2022). (F) Cumulative river phosphorus loading to the Main Lake segment of Lake Champlain, each year since 1991. Water years are shown, starting on October 1 and ending on September 30. Data sources include the Lake Champlain Long-Term Monitoring Program (LCBP, VTANR, SUNY Plattsburgh) and USGS. From the Lake Champlain Basin Program (2024). (G) July 2023 flooding impacts by the numbers. From the Lake Champlain Basin Program (2024).

Figure 9 Projections of natural hazards in Vermont with their corresponding confidence levels Shafer and Cronin (2021) (9a)
(9b) Vermont decadal temperature observations and projections under the low emissions scenario (RCP4.5 - moderate global GHG emissions mitigation), and the high emissions scenario (RCP8.5 - GHG emissions continue following business as usual). Inset table shows current and observed seasonal temperature changes across Vermont. Source: Both the inset table and observed temperatures graphic were created using climate division data downloaded from NOAA’s National Centers for Environmental Information Climate at a Glance tool

<https://www.ncdc.noaa.gov/cag/divisional/mapping/>. Climate projections data (red and orange lines) were downloaded (at the county scale and aggregated to a statewide value) from NOAA's Climate Explorer tool <https://crt-climate-explorer.nemac.org>. Further details on this figure can be found in the Initial Climate Action Plan. (7a)

Figure 10 Predicted changes in key components of the U.S. water cycle between a reference period (1991-2020) and the middle of this century (2036-2065). Upper left: Summer soil moisture. Upper right: Precipitation. Lower left: Snow water equivalent. Lower right: Evapotranspiration. In each panel the larger map on the left (a) shows the average of all ensemble model runs. For comparison, the two smaller maps on the right show the predictions for the wettest 20% of projections (b) and the driest 20% of projections (c). From Payton et al (2023).

CITATIONS

Baker, D., Hamshaw, S.D. and Hamshaw, K.A. (2014) “Rapid Flood Exposure Assessment of Vermont Mobile Home Parks Following Tropical Storm Irene,” *Natural Hazards Review*, 15:27-37.

Betts, A.K., Climate change and society[J]. *AIMS Geosciences*, 2021, 7(2): 194-218. doi: 10.3934/geosci.2021012

Betts, A.K. (2011) personal communication.

Crossett*, C.C., Dupigny-Giroux, L.-A.L., Kunkel, K.E., Betts, A.K. and Bombles, A., (2023) “Synoptic Typing of Multiduration, Heavy Precipitation Records in the Northeastern United States: 1895-2017, *Journal of Applied Meteorology and Climatology*, <https://doi.org/10.1175/JAMC-D-22-0091.1>

Dupigny-Giroux, L.-A.L., 2009: Backward seasons, droughts and other bioclimatic indicators of variability. In: *Historical Climate Variability and Impacts in North America*. Dupigny-Giroux, L.-A. and C.J. Mock, Eds. Springer Netherlands, Dordrecht, 231–250. http://dx.doi.org/10.1007/978-90-481-2828-0_14

Dupigny-Giroux, L.A., E.L. Mearns, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell, 2018: Northeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 669–742. doi:10.7930/NCA4.2018.CH18

Galford, G., A. Hoogenboom, S. Ford, J. Nash, E. Palchak, S. Pears, K. Underwood, and D. Baker. 2014. *Vermont Climate Assessment: Considering Vermont's Future in a Changing Climate*. Gund Institute of Ecological Economics, University of Vermont, Burlington, VT.

Hamshaw, K.A. and Baker, D. (2024) “Manufactured housing communities and climate change: Understanding key vulnerabilities and recommendations for emergency managers” Special Issue on Climate Change and Sustainability in Emergency Management, *Journal of Emergency Management*, Vol. 22, No. 7, pp. 87-99.

Lake Champlain Basin Program. 2024. *State of the Lake Report 2024*. Lake Champlain Basin Program, Grand Isle, VT.

Mora, Camilo, Daniele Spirandelli, Erik C. Franklin, John Lynham, Michael B. Kantar, Wendy Miles, Charlotte Z. Smith, et al. 2018. “Broad Threat to Humanity from Cumulative Climate

Hazards Intensified by Greenhouse Gas Emissions.” *Nature Climate Change* 8 (12): 1062–71.
<https://doi.org/10.1038/s41558-018-0315-6>.

National Academies of Sciences, Engineering, and Medicine. 2024. Climate Change and Human Migration: An Earth Systems Science Perspective: Proceedings of a Workshop. Washington, DC: The National Academies Press. <https://doi.org/10.17226/27930>.

NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2025). <https://www.ncei.noaa.gov/access/billions/>, DOI: 10.25921

Payton, E.A., A.O. Pinson, T. Asefa, L.E. Condon, L.-A.L. Dupigny-Giroux, B.L. Harding, J. Kiang, D.H. Lee, S.A. McAfee, J.M. Pflug, I. Rangwala, H.J. Tanana, and D.B. Wright, 2023: Ch. 4. Water. In: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023.CH4>

Runkle, J., K.E. Kunkel, S.M. Champion, L.-A. Dupigny-Giroux, and J. Spaccio, 2022: Vermont State Climate Summary 2022. NOAA Technical Report NESDIS 150-VT. NOAA/NESDIS, Silver Spring, MD, 4 pp.

Rustad, L., J. Campbell, J. S. Dukes, T. Huntington, K. F. Lambert, J. Mohan, and N. Rodenhouse. 2014. Changing Climate, Changing Forests: The Impacts of Climate Change on Forests of the Northeastern United States and Eastern Canada

Shafer, J. C., and K. Cronin, 2021: Extreme weather and climate change in Vermont: Implications for the electric grid. Vermont Electric Power Company. 47 pp.

Sievert, N., C. Paukert, J. Whittier, W. Daniel, D. Infante, and J. Stewart. 2022. Projected stream fish community risk to climate impacts in the Northeastern and Midwestern United States. *Ecological Indicators* 144:109493.

Singh, D., A.R. Crimmins, J.M. Pflug, P.L. Barnard, J.F. Helgeson, A. Hoell, F.H. Jacobs, M.G. Jacox, A. Jerolleman, and M.F. Wehner, 2023: Focus on compound events. In: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA.
<https://doi.org/10.7930/NCA5.2023.F1>

USDA Plant Hardiness Zone Map, 2023. Agricultural Research Service, U.S. Department of Agriculture. Accessed from <https://planthardiness.ars.usda.gov/>

Pages 50. General Technical Report NRS-99. U.S.D.A. Forest Service, Newton Square, PA.

Triantafyllou, S., Morrison, A., Mischler, E. And Debber, J. (2020) Landslides along the Winooski River in Burlington, Vermont: Landscape change and slope stability, Department of Geology, University of Vermont. https://site.uvm.edu/geomorphology/files/2020/11/Group1_draft.pdf
USGCRP, 2023: Fifth National Climate Assessment. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023>

Vermont Agency of Natural Resources (2018)
<https://anrgeodata.vermont.gov/datasets/VTANR::landslides/explore>

Watson, K. B., T. Ricketts, G. Galford, S. Polasky, and J. O'Niel-Dunne. 2016. Quantifying flood mitigation services: The economic value of Otter Creek wetlands and floodplains to Middlebury, VT. *Ecological Economics* 130:16-24.

Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont

The number of **billion-dollar weather and climate disasters** occurring each year in the U.S. is increasing.
Average # of events per year, adjusted for inflation

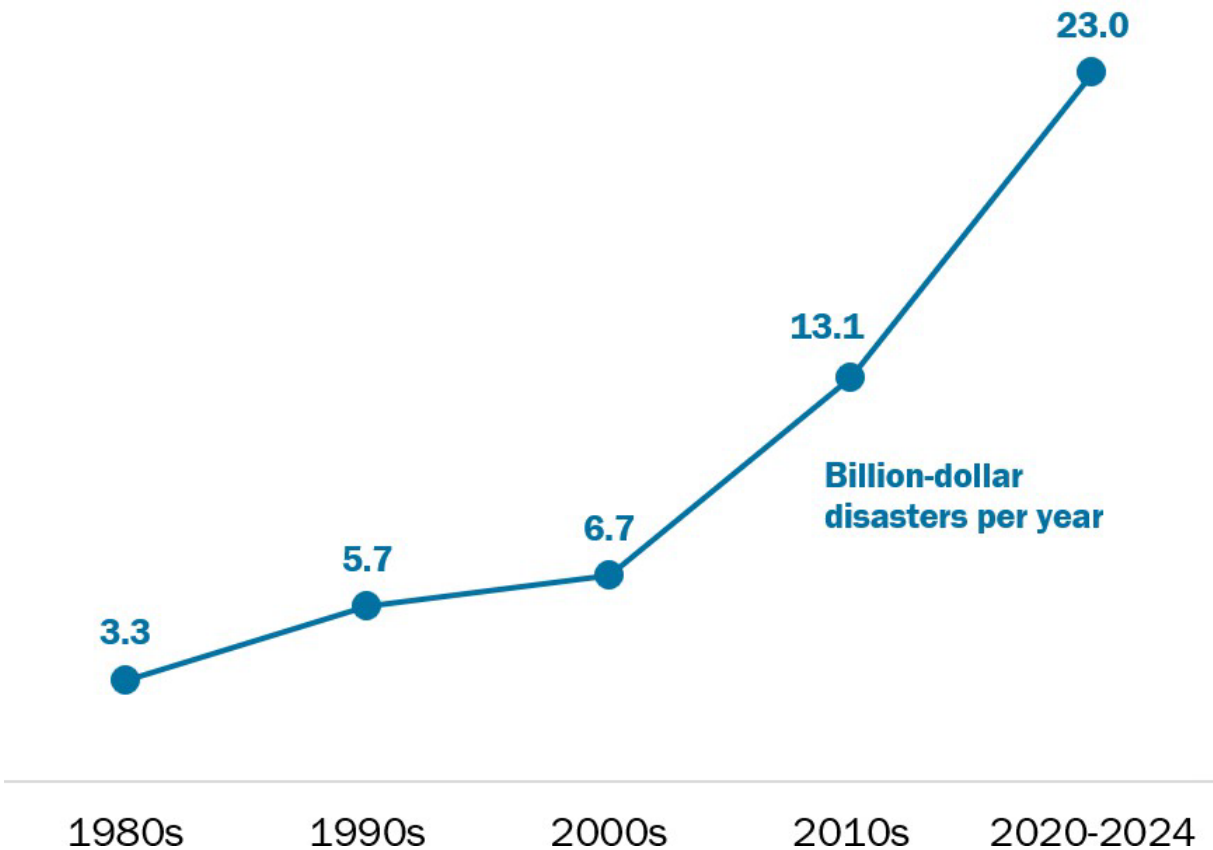


Figure 4. The average number of weather and climate disasters with overall damages/costs exceeding one billion dollars occurring in the United States each year, grouped by decade.¹

Introduction

The desire to protect human health from the impacts of climate change was one of the central motivations for reducing emissions of planet-warming gases cited by the Vermont’s Global

Warming Solutions Act, “[a] climate emergency threatens our communities, State, and region and poses a significant threat to human health and safety, infrastructure, biodiversity, our common environment, and our economy.”² Deepening our understanding of how the climate emergency threatens human health can help direct the prioritization of actions as part of the Climate Action Plan.

In 2021, over 200 medical and health journals, led by The Lancet and the New England Journal of Medicine, released a joint statement declaring climate change the “greatest threat to global public health.”³ This threat includes both direct, acute impacts on health such as illness caused by extreme heat, wildfire smoke, vector-borne diseases, as well as delayed and persistent indirect effects exacerbated by chronic stress, economic hardship, and damage to housing and other critical infrastructure. To date, efforts to reduce health impacts caused by climate change in Vermont have focused primarily on direct health impacts. The long-term impacts on Vermonters’ health and well-being of the catastrophic flooding that occurred in 2011, 2023 and 2024, especially the physical and mental health toll of the clean-up and recovery phase, have not been central to discussion of the climate impacts on health. The aim of this chapter is to improve our understanding of these kinds of indirect health impacts so that we can do a better job preventing, measuring, and managing them in the future.

Direct Impacts

Direct Health Impacts

result from direct exposure to climate hazards

Hot weather or drought
Wildfire smoke or ozone
Intense precipitation & wind
Flooding and landslides

Heat-related illness
Lung or heart disease due to air pollution
Drowning or injuries due to flooding
Allergies or asthma due to pollen
Mosquito and tick-borne diseases

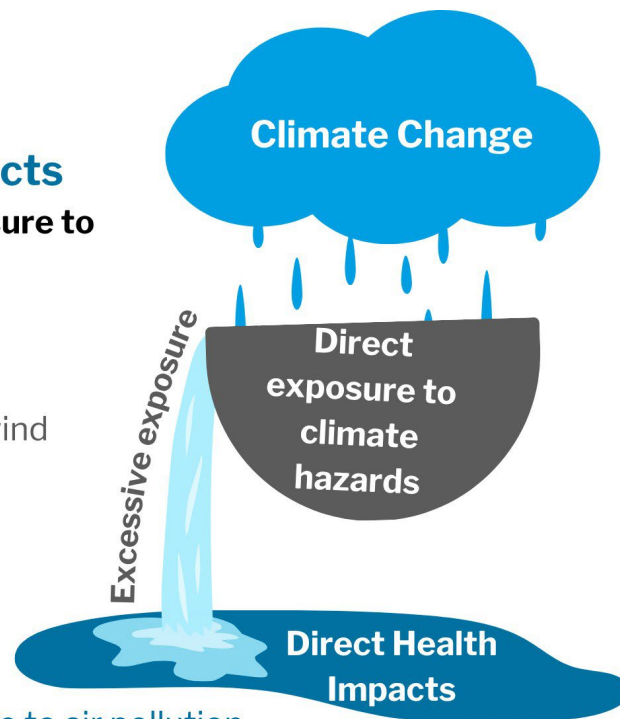


Figure 5. Direct health impacts of climate change.

Prior summaries of the health impacts of climate change in Vermont^{4,5,6} and nationally⁷ primarily focus on the health risks directly associated with climate change. Direct impacts include illnesses, injuries or deaths that can be directly attributed to changing temperatures or weather patterns or weather disasters made more intense by climate change.

Efforts to quantifying and prevent direct health impacts⁸ are essential; however we also need to be able to identify, measure, and address those health impacts associated with economic

hardship, grief, stress, damaged homes and infrastructure, displacement and loss of connection that can result from flooding, landslides, drought, or incremental climate change.

Indirect Impacts

Key Message 1: The impacts of climate on health can be sudden and direct, or more gradual and indirect, as environmental changes undermine the conditions that support our health, including our physical surroundings, economic stability, and social support systems.

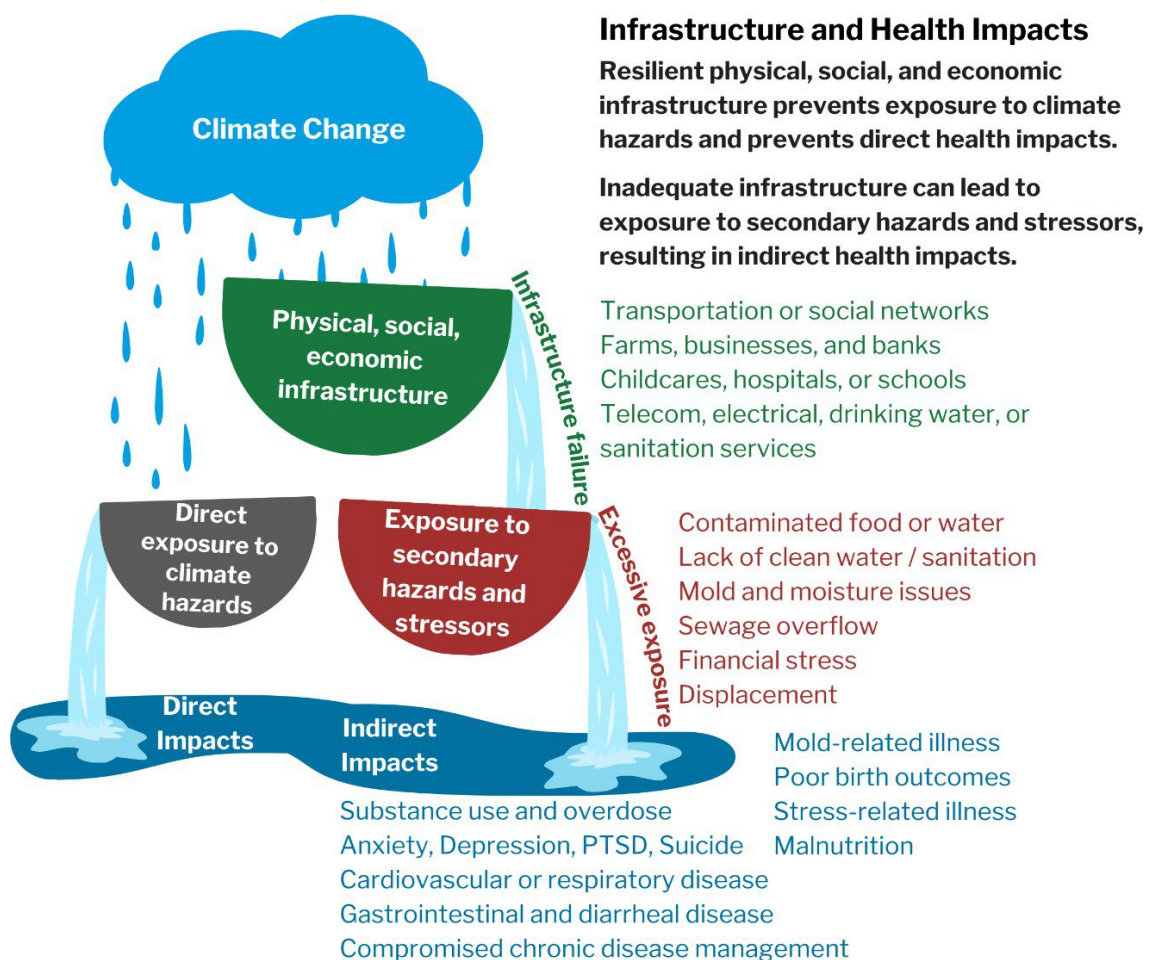


Figure 6. Indirect health impacts result from climate-related damage to physical, social, and economic infrastructure, natural systems or essential services.

Climate change affects human health indirectly through its impacts on the physical, economic, and social conditions that provide the foundation for human health and well-being. By degrading the conditions in which a person lives, climate change ‘loads-the-dice’, reducing the likelihood that an individual will be healthy. This degradation can occur gradually, for example when we restrict outdoor activities due to a lack of snow or ice, or to limit tick or mosquito-borne disease risks. The conditions in which we live can also degrade suddenly, due to destruction caused by floods, landslides, or wildfire. While not specific to Vermont, one study that examined the relative size and importance of indirect impacts found that the number of deaths attributable to the longer-term social and economic effects of hurricanes during the 15 years after a storm was 300 to 480 times greater than the number of deaths that occurred in the immediate aftermath of the storm.⁹

Indirect impacts also include opportunity costs. For example, when a family living in an area impacted by repeated extreme weather events has to pay more for homeowner’s insurance, groceries, air conditioning, or storm repairs,¹⁰ they have less money available to spend on food, housing, recreation, and healthcare. Climate change can have similar effect on the expenses of towns or the state as a whole.

“Because of the floods, there are less investments happening in regular paving projects. Because of the floods, there are less investments happening in public safety. Because of the floods, there is less investment happening in water and wastewater infrastructure.”

-Ted Brady, Executive Director, Vermont League of Cities and Towns¹¹

Funds that are required to repair roads and essential infrastructure cannot be invested in infrastructure for walkers, cyclists or public transportation, police, fire, and EMS services, libraries, parks and recreation, drinking or wastewater infrastructure. Some towns’ debts from road and infrastructure repair from the flooding that occurred in 2023 and 2024 exceeded their annual budgets.¹² These community-wide impacts affect property values, the tax-base¹³, and

the labor market.¹⁴ Agriculture provides another example of infrastructure damage mediating health impacts: In 2023, flooding events and severe weather in Vermont caused more than \$16 million in losses across 27,000 acres of farmland.¹⁵ Apart from the economic losses and resulting stress and anguish for farmers, crop and livestock losses may affect the availability of local food options for consumers who live nearby.

Baseline Wellbeing and Health Status Modify Exposure and Resilience

Key Message 2: Compromised health or well-being increases the risk of exposure to climate hazards and the likelihood that those exposures will result in negative impacts such as illness, death, or the loss of values that contribute to well-being, like sense of identity, self-determination, influence, or dignity.

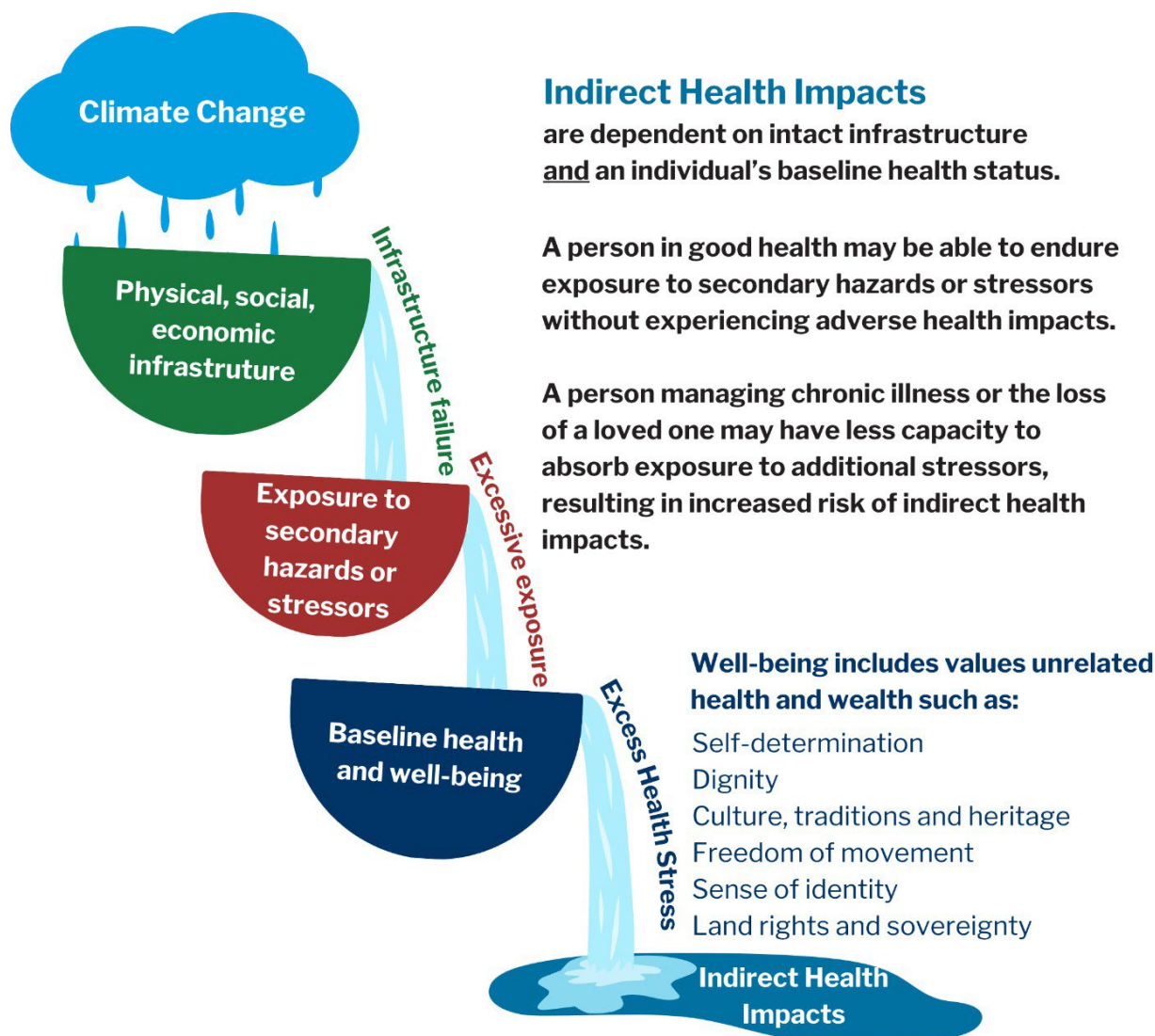


Figure 7. People's baseline health and well-being impacts their resilience to harm when exposed to secondary climate hazards stressors like contaminated food or water, financial stress, or loss of their home.

Poor health can affect a person's exposure to climate hazards. Someone in poor health might not be able to evacuate without assistance during a flooding event and may have more difficulty finding adequate housing if their home is uninhabitable. Someone who relies on medical devices like an oxygen concentrator or dialysis machine will be exposed to greater risk during a power outage. It may also take someone in poor health longer to recover from a climate disaster, and that exposure may, in turn, prolong their illness. Similarly, a person's baseline health can affect whether exposure to a climate hazard will result in health impacts

and the severity of those impacts. For example, someone experiencing anxiety or depression may find that their symptoms worsen during a heatwave. A road closure or disruption in mail service may be life-threatening for someone dependent on medication or daily therapies such as dialysis to manage a chronic illness.

Determinants of well-being beyond money and health can also be impacted by climate change¹⁶ and can reinforce or undermine a person's resilience. Examples of 'non-economic values' that influence well-being are listed in Figure 7. When values such as dignity, influence, and self-determination are preserved, they can help insulate people from the stresses associated with living in an area affected by a natural disaster, like lack of access to clean water, sanitation, or having to live as guest in a shelter or someone else's home. Alternatively, repeated exposure to daily stress increases the risks of substance use, intimate partner violence, post-traumatic stress disorder, anxiety, depression, suicidal ideation, and stress-related illness such as cardiovascular disease. First-person narratives are helpful to convey impacts on non-economic values in ways that maps of disease and injury rates cannot.

"My parents got divorced. I think definitely... the flood had something to do with it because it really stressed the whole family out."

- Vermont resident three years after Tropical Storm Irene¹⁷

"It's hard for my husband to talk about. He still wears it very close. On rainy days he's looking out the window and checking the river levels. A nervous wreck. And he knows that it's not going to happen. And I have to remind him it was a freak storm."

- Vermont resident seven years after Tropical Storm Irene¹⁸

"I find that when you can't get out so much... you tend to do more things. Some people use addictions more, whatever that may be. It may be drinking, or drugging... that's' increasing."

- Health worker, describing the impacts of people
not being able to go out on the ice¹⁹

“I have lost interest in my house... it’s not home anymore... I knew that the thing that really finished me (loss of personal possessions and craft work)... because I cannot get my motivation back to do things... I think ‘why bother...’”

- Flood survivor²⁰

“I was suicidal in January and February. Emotionally the worst period of my life... I feel very isolated... I’m running out of resilience to keep taking the blows and keep moving on... I carry the hurt inside”

- Individual describing the impact of extended drought²¹

Societal and Institutional Inequities

Key Message 3: Individuals or communities with the least economic, social, or political resources tend to experience the greatest risks and impacts associated with climate change hazards.

The impacts of climate change are most severe for segments of the population that have historically had the least social, political, and economic power and capital. These groups often live closest to the edge, whether on a literal edge like a floodplain, or on the figurative edge of losing access to housing, employment, childcare, food, health care, and family support. As a result, groups with the smallest buffer between them and an acute hazard are most likely to experience the greatest cumulative impacts of a climate disaster and its aftermath.²² Groups that are impacted ‘first and worst’ by climate change may also be at the greatest risk during non-climate natural disasters such as infectious disease pandemics, economic recessions, or other societal disruptions. Because they are more likely to have experienced prior loss or trauma, and because of disparities in social, political, and economic capital, these groups are subject to increased exposure to chronic stress²³, which contributes to their baseline mental and physical health burden.

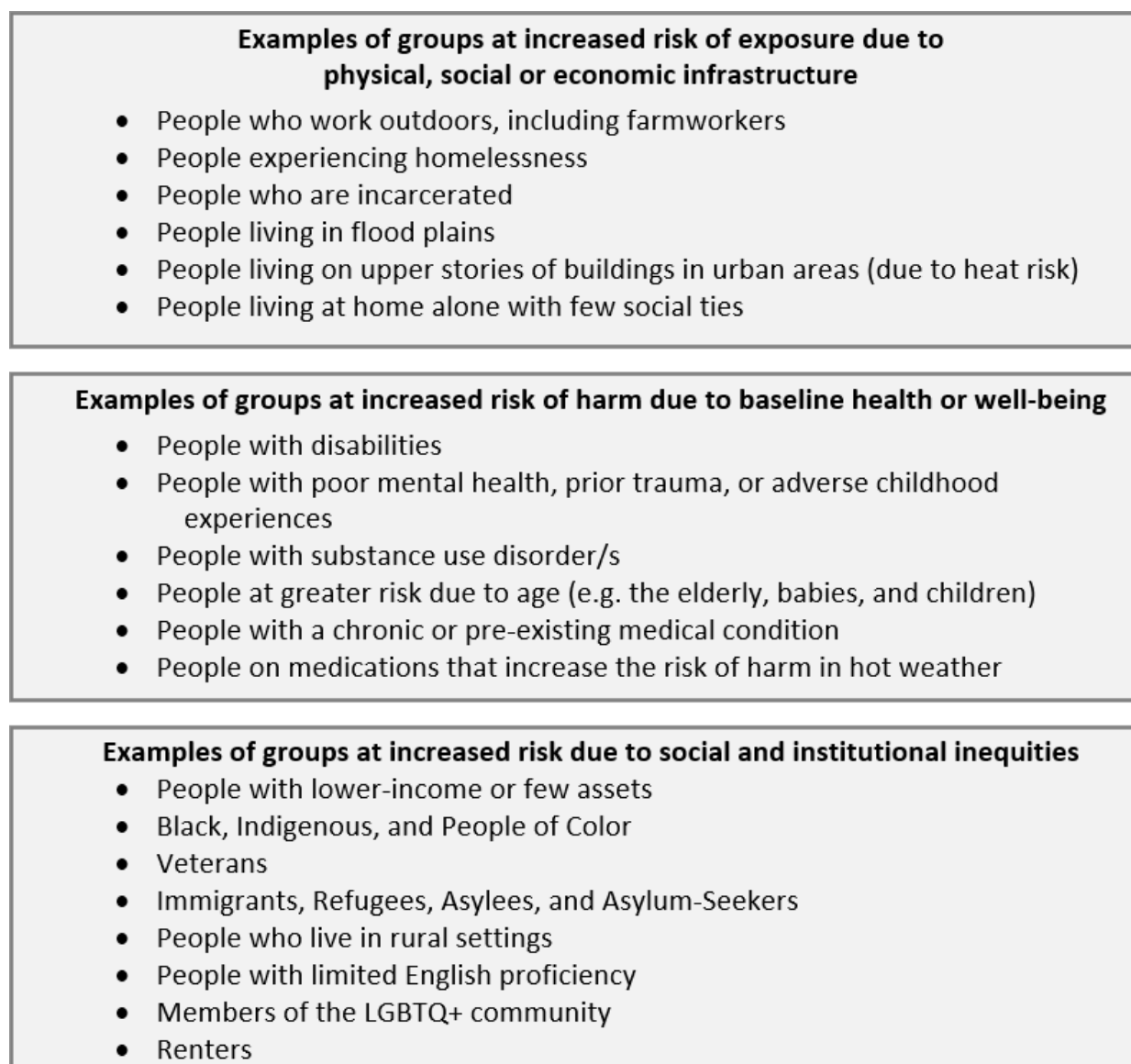


Figure 8. Examples of groups that may be disproportionately affected by climate change impacts on individual health and community resilience.

Sources of Climate-related Stress

Key Message 4: Climate-related impacts on the health of a community, like increased cost of living, unemployment and housing insecurity, act as chronic stressors at the individual-level, undermining physical and mental well-being.

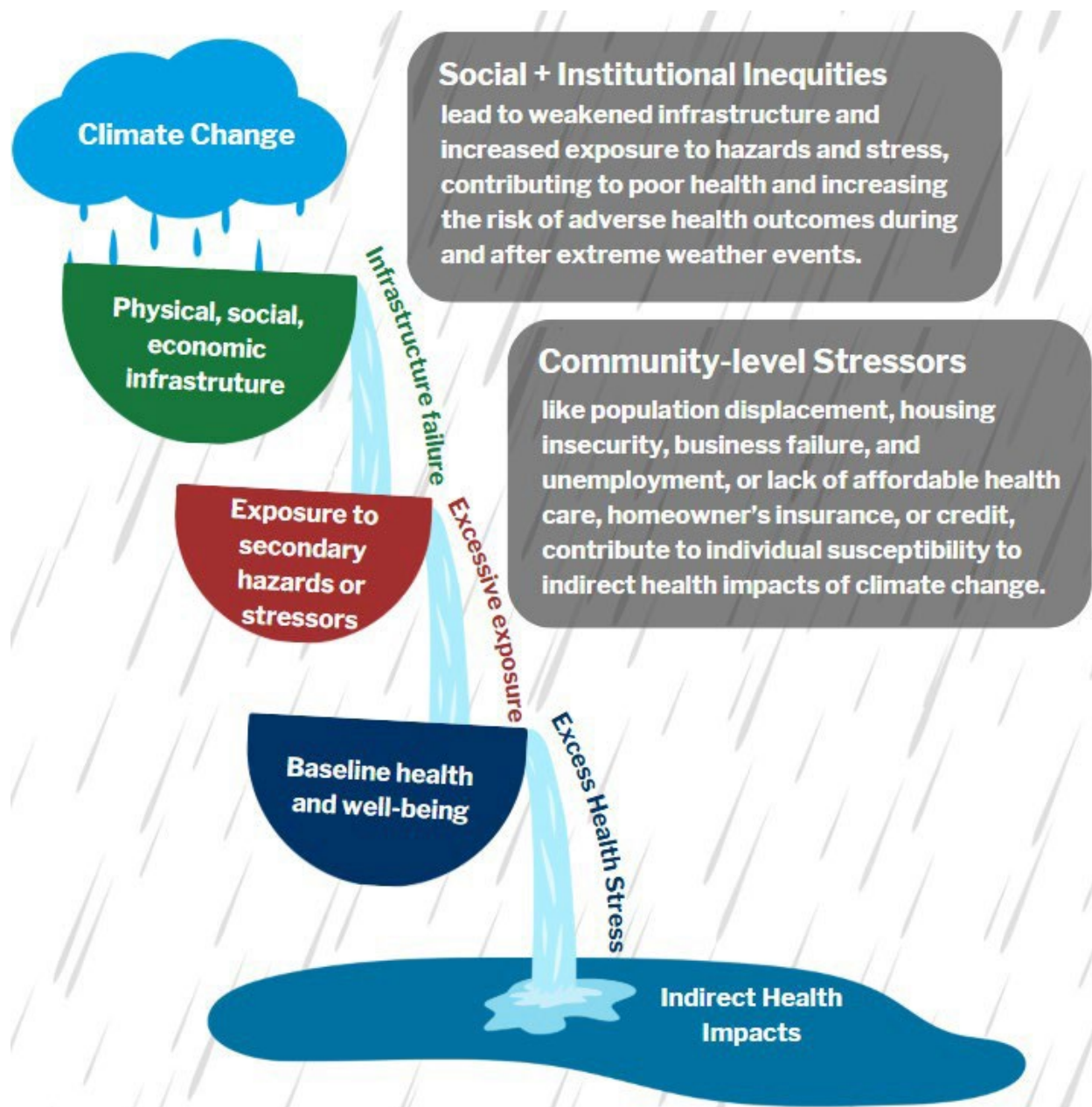


Figure 9. Climate-related hazards and stressors add to a person's cumulative exposure to chronic stress. Repeated climate disasters exacerbate social and institutional inequities and community-level stressors, reducing individual and community resilience during subsequent emergencies.

Under normal conditions, sources of chronic stress could include job loss, losing a loved one, worrying about how to pay rent or buy food, or a divorce. In the aftermath of a disaster, chronic

stress could include things like overcrowded or inadequate housing, lack of access to clean water, heat or sanitation, discrimination, stigma, or lack of access to education and employment. The [Fifth National Climate Assessment](#),²⁴ provides examples of elements of community resilience that are affected by climate disruption, shown in **Figure 6**. Through their impacts on chronic stress, these indicators of community resilience (including rates of crime and domestic violence,²⁵ substance use,²⁶ and student absenteeism²⁷) can impact individual physical and mental well-being.

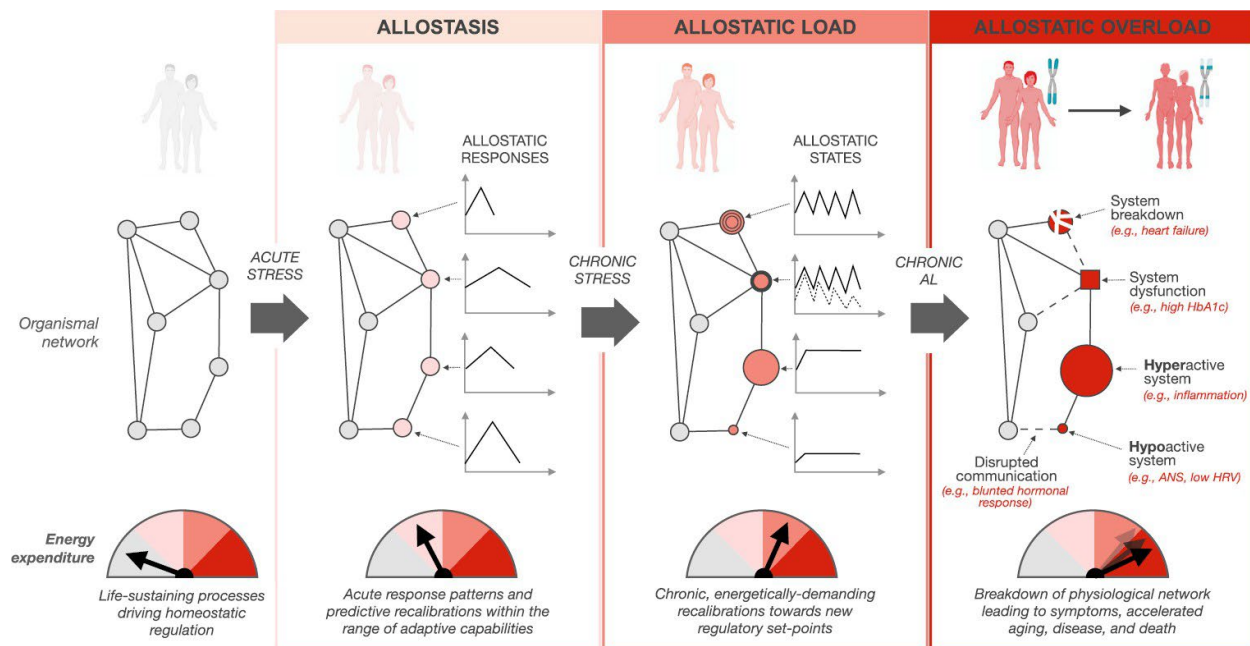


Figure 10. The Allostatic Load model for how stress leads to disease.²⁸

Allostatic load is ‘wear-and-tear’ on the body that results from (energy-consuming and potentially unhealthy) cellular, physiological, or behavioral adaptations to stress²⁹, for example the thickening of arterial walls in response to chronically elevated blood pressure. Allostatic load provides a model for understanding how chronic stress can translate into pathology. Similarly, the physical or financial stress of responding to natural disasters or climate change contributes to ‘wear-and-tear’ (i.e. indirect impacts) for affected individuals and communities, in part because the time, energy, and dollars expended could have been put to more productive use.

What actions are being taken to reduce the health risks of climate change in Vermont?

By incorporating indirect impacts into our understanding of how climate impacts health, it becomes clearer how actions that aim to prevent damage to physical, social, or economic infrastructure contribute to the protection of health and well-being. The [Climate Action Plan](#), the [State Hazard Mitigation Plan](#), the [Resilience Implementation Strategy](#), and the [State Health Improvement Plan](#), all include actions that help insulate people's health from climate impacts by shoring up infrastructure and/or essential services. Federal, state, or non-profit programs designed to provide financial assistance to impacted individuals, farms, or other businesses, can help reduce the indirect health impacts associated with financial stress. Finally, efforts that are specifically targeted to address health risks include the Department of Mental Health's flood recovery outreach program [Starting Over Strong](#), [Farm First Vermont](#)'s flooding and disaster relief services, and the Vermont [Department of Health](#)'s efforts to provide guidance and support to municipalities, schools, child cares, residential care facilities, and homeless shelters to develop hot weather response plans and increase hot weather preparedness.

Conclusion

In order for our understanding of the health impacts of climate change to reflect Vermonters' experience with repeated climate disasters during the last 15 years, it must include both direct impacts and indirect impacts that result from damage to physical, social, and economic infrastructure. Since most indirect health impacts of climate change do not result in a visit to the emergency room or admission to the hospital, they need to be accounted for in other ways, for example by monitoring how flooding events impact housing, food, and economic security. An improved understanding of indirect health impacts, paired with the capacity to measure them, can help to ensure that climate adaptation and response actions do a better job protecting human health and well-being in the future.

¹ NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2025). <https://www.ncei.noaa.gov/access/billions/>, DOI: [10.25921/stkw-7w73](https://doi.org/10.25921/stkw-7w73)

² Global Warming Solutions Act, 2020, Vermont State Legislature, Act 153, Sec 2.1, Page 1. <https://legislature.vermont.gov/Documents/2020/Docs/ACTS/ACT153/ACT153%20As%20Enacted.pdf>

³ Atwoli, Lukoye, Abdullah H. Baqui, Thomas Benfield, Raffaella Bosurgi, Fiona Godlee, Stephen Hancocks, Richard Horton et al. "Call for emergency action to limit global temperature increases, restore biodiversity, and protect health." *The Lancet* 398, no. 10304 (2021): 939-941. [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(21\)01915-2.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(21)01915-2.pdf)

⁴ Vermont State Hazard Mitigation Plan, 2023, Vermont Emergency Management. https://vem.vermont.gov/sites/demhs/files/documents/2023%20SHMP_Adopted%20Draft%20Jan2024.pdf

⁵ Clement, S., Mezzacapo, M., 2021. Human Health. In Galford, G.L., Faulkner, J. et al. (Eds), *The Vermont Climate Assessment 2021*. Burlington, Vermont: Gund Institute for Environment at the University of Vermont. DOI: 10.18125/kowgvg.

⁶ VT Dept. Health. (accessed Feb 26 2025). Health Risks of Climate Change. *Climate and Health Program*. <https://www.healthvermont.gov/environment/climate-health/health-risks-climate-change>

⁷ Hayden, M.H. *et al.*, 2023: Ch. 15. Human health. In: *Fifth National Climate Assessment*. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023.CH15>

⁸ VT Dept. Health. (accessed May 23 2025). [Health Risks of Climate Change](#).

⁹ Young, Rachel, and Solomon Hsiang. "Mortality caused by tropical cyclones in the United States." *Nature* 635, no. 8037 (2024): 121-128. <https://www.nature.com/articles/s41586-024-07945-5>

¹⁰ Hsiang, S. *et al.*, 2023: Ch. 19. Economics. In: *Fifth National Climate Assessment*. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023.CH19>

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- ¹¹ Peter Hirschfeld, “FEMA's plodding bureaucracy exacts financial toll on Vermont towns” *Vermont Public*, September 23, 2024. <https://www.vermontpublic.org/local-news/2024-09-23/fema-plodding-bureaucracy-puts-small-rural-vermont-towns-debt>
- ¹² Kevin O’Conner, “Flooding long past, many Vermont municipalities are still swimming in red ink” *VT Digger*, February 27 2025. <https://vtdigger.org/2025/02/26/flooding-long-past-many-vermont-municipalities-are-still-swimming-in-red-ink/>
- ¹³ Hsiang, S. *et al.*, 2023: [Ch. 19. Economics](#). In: Fifth National Climate Assessment. USGCRP.
- ¹⁴ Coulombe, Raphaele G., and Akhil Rao. "Fires and local labor markets." *Journal of Environmental Economics and Management* 130 (2025): 103109.
- ¹⁵ VT Agency of Agriculture Food and Markets. (accessed March 22 2025). 2023 Extreme Weather Impact & Recovery Report. <https://agriculture.vermont.gov/severe-weather-and-flooding-agricultural-impacts-survey-2024>
- ¹⁶ Tschakert, Petra, Neville R. Ellis, Christopher Anderson, Adam Kelly, and James Obeng. "One thousand ways to experience loss: A systematic analysis of climate-related intangible harm from around the world." *Global Environmental Change* 55 (2019): 58-72.
- ¹⁷ Buschman, V., Fernandes, C., Guth, S., Mullen, A., Rosales-Underbrink, P. “Tropical Storm Irene: A Retrospective on Mental and Emotional Impacts on Vermont Communities, Three Years Later” *Middlebury College Community Engaged Practicum*, Fall 2014B. https://drive.google.com/drive/folders/1KOYE7fyJZ1Fbryol5LbUXG_Kxrfy9Yw0?usp=sharing
- ¹⁸ Carmichael, C., Danks, C., Vatovec, C. “Health Impacts of Climate Change: Perspectives from Waterbury, Vermont” *Presentation at Northeast Vermont Regional Hospital*, Feb 14, 2019.
- ¹⁹ Tschakert, Petra *et al.* *Global Environmental Change* 55 (2019): 58-72.
- ²⁰ Tapsell, S.M., Tunstall, S.M., 2008. “I wish I’d never heard of Banbury”: the relationship between ‘place’ and the health impacts from flooding. *Heal. Place* 14, 133–154. <https://doi.org/10.1016/j.healthplace.2007.05.006>.
- ²¹ Tschakert, Petra *et al.* *Global Environmental Change* 55 (2019): 58-72.
- ²² McKee, M., Reeves, A., Clair, A. *et al.* Living on the edge: precariousness and why it matters for health. *Arch Public Health* 75, 13 (2017). <https://doi.org/10.1186/s13690-017-0183-y>
- ²³ Geronimus A.T., “Weathering: The Extraordinary Stress of Ordinary Life in an Unjust Society”, *Hachette Book Group*, 2023. <https://www.hachettebookgroup.com/titles/dr-arline-t-geronimus/weathering/9780316257978/>

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- ²⁴ Hsiang, S. *et al.*, 2023: [Ch. 19. Economics](#). In: Fifth National Climate Assessment. USGCRP.
- ²⁵ Le Masson, V., 2022. Disasters, climate change, and violence against women and girls. In *Oxford Research Encyclopedia of Natural Hazard Science*.
<https://doi.org/10.1093/acrefore/9780199389407.013.393>
- ²⁶ Vergunst, F., Berry, H. L., Minor, K., & Chadi, N. (2023). Climate Change and Substance-Use Behaviors: A Risk-Pathways Framework. *Perspectives on Psychological Science*, 18(4), 936-954. <https://doi.org/10.1177/17456916221132739>
- ²⁷ United Nations Office for Disaster Risk Reduction. The invisible toll of disasters. *UNDRR* <https://www.undrr.org/explainer/the-invisible-toll-of-disasters-2022> (2022).
- ²⁸ Bobba-Alves, Natalia, Robert-Paul Juster, and Martin Picard. "The energetic cost of allostasis and allostatic load." *Psychoneuroendocrinology* 146 (2022): 105951.
<https://www.sciencedirect.com/science/article/pii/S030645302200292X>
- ²⁹ Juster, Robert-Paul, Bruce S. McEwen, and Sonia J. Lupien. "Allostatic load biomarkers of chronic stress and impact on health and cognition." *Neuroscience & Biobehavioral Reviews* 35, no. 1 (2010): 2-16. https://www.ebtconnect.net/science/biomarkers_juster.pdf

Building Equity into the Climate Action Plan

Introduction

The [Global Warming Solutions Act](#) (GWSA) requires that Vermont's Climate Action Plan (CAP) incorporate equity into each recommendation. The Just Transitions Subcommittee (JTSC) is responsible for ensuring this is carried out. Our strategy has three parts:

1. Creating space for equity-centered discussions in every meeting,
2. Tackling structural challenges by enhancing the representation of Black, Indigenous, and People of Color (BIPOC), low-income, rural, and other frontline communities, and
3. Promoting widespread public engagement.

Despite the underrepresentation and power imbalance of the council and its subcommittees, efforts are underway to diversify membership. The Climate Council is dedicated to collaborating with everyone living in Vermont to ensure that equity is woven into every step of the climate action plan.

How do we define a Just Transition?

A "Just Transition" refers to the shift from a carbon-heavy economy to a low-carbon, sustainable one, while ensuring that vulnerable communities, particularly minorities and frontline populations, receive support throughout this transformation. This approach emphasizes fairness and equity by addressing the unequal effects of climate change on marginalized groups. It highlights the importance of inclusive decision-making, enabling these communities to play an active role in shaping the policies that impact their lives. By focusing on equity, a Just Transition seeks to guarantee that everyone has the necessary resources and opportunities to succeed in the new green economy.

Equality Vs. Equity

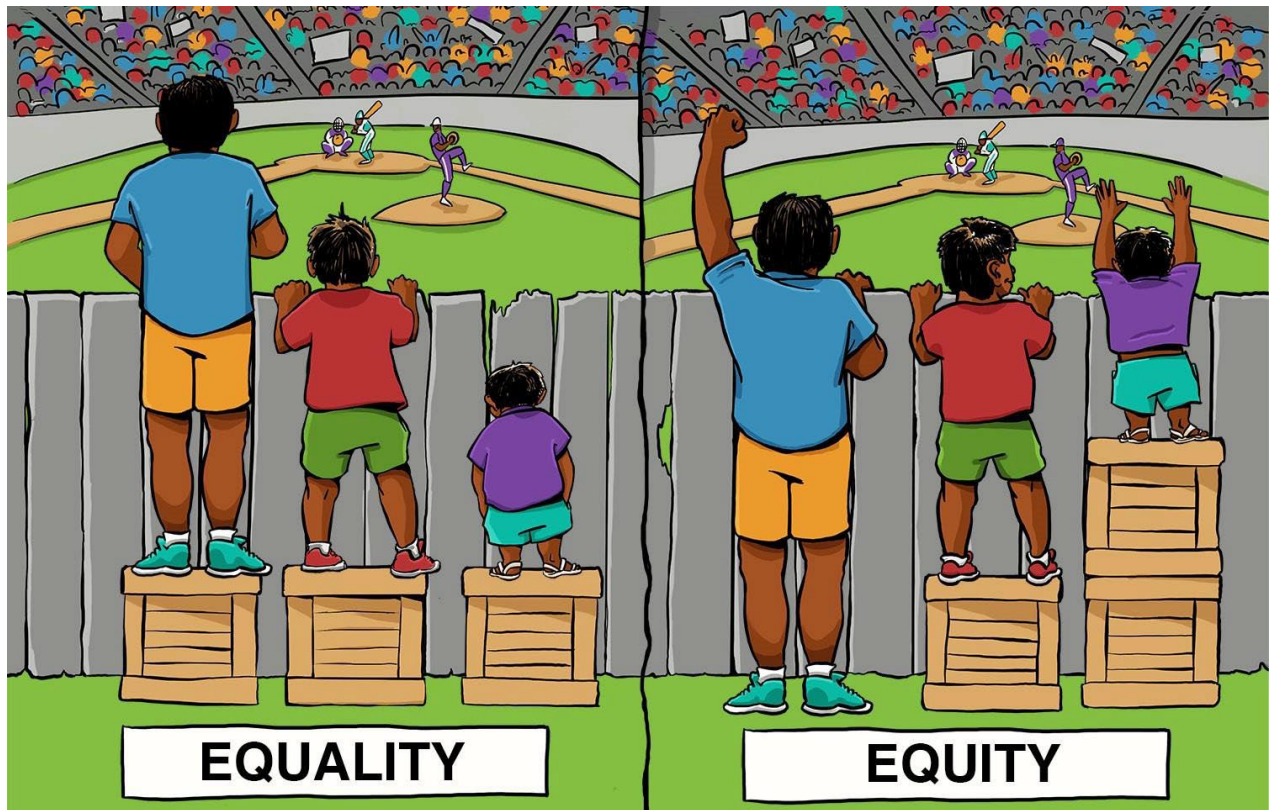


Figure 12

Equality and equity are terms that are often confused, but they have important differences that are crucial to grasp. Equality means providing everyone with the same resources and opportunities, regardless of their circumstances or needs. While it promotes uniformity, it does not account for the unique challenges some individuals or groups may face in achieving the same outcomes. On the other hand, equity takes into account the varying circumstances, needs, and challenges faced by individuals and groups. It goes beyond treating everyone the same, advocating instead for the fair allocation of resources, opportunities, and support tailored to help each person or group. By addressing systemic barriers and inequalities, equity aims to create a level playing field where everyone has the tools and opportunities needed to achieve shared goals.

Which approach is more effective? The JTSC highlights the significance of focusing on equity rather than equality. Equity understands the unique backgrounds and challenges that people face, ensuring that everyone receives the specific support they need to meet shared objectives. By adopting an equity-focused approach, we pave the way for a more inclusive and fair journey toward our collective goals.

Who are Vermont's Frontline and Impacted Communities?

Many residents of Vermont are significantly impacted by the growing threats of climate change. These effects are particularly severe for certain groups, referred to as Frontline and Impacted Communities. These communities are especially susceptible to climate risks, including extreme weather events like heat waves, flooding, droughts, and storms, as well as long-term dangers such as rising sea levels, wildfires, and the decline of ecosystems and biodiversity. They also face additional challenges like disruptions in agriculture, water shortages, health risks, economic instability, and social unrest. Furthermore, Frontline and Impacted Communities often endure higher levels of oppression, greater exposure to pollution, and the risk of job losses as the economy shifts in response to climate change. With limited resources, political influence, and safety nets, these communities are often less prepared to deal with or recover from the impacts of climate change. Acknowledging these vulnerabilities, JTSC's guiding principles emphasize the importance of including Frontline and Impacted Communities in the creation of climate action strategies, ensuring their perspectives are integral to the decision-making process and that resources are distributed to meet their specific needs and challenges. The list below highlights particular communities in Vermont that are most at risk.

Specific Frontline and Impacted Communities

- Rural Communities
- Youth
- Senior Citizens
- Non-native English Speakers

- Women
- Unhoused and Housing-Insecure
- Low-income
- LGBTQIAP+ Individuals
- Recent Graduates of the Foster Care System
- People of Color; Black/African-American, Brown, Latinx, Asian, Pacific Islander, and Indigenous communities and Native nations
- Outdoor Workers
- Incarcerated or Formerly Incarcerated Populations
- Renters and Subsidized Housing Tenants
- Chronically Ill and Hospitalized
- Single Parent Households
- Individuals with Disabilities
- Small Business Owners
- Immigrants, Asylees, and Refugees
- Unemployed and Underemployed
- Those impacted by natural disasters

Then and Now

The Just Transitions Subcommittee’s work during the initial 2021 Climate Action Plan focused on developing the [Guiding Principles](#) for a Just Transition and accompanying assessment tool. The Subcommittee simultaneously worked on engaging the public in the planning process. Contracted organizations supported public engagement during the summer and fall of 2021, resulting in a final report in October 2021. Another consultant, Kiah Morris, met with other Subcommittees and the Council to help them apply the Guiding Principles to evaluate their recommendations for equity considerations. Additionally, liaisons between Just Transitions and other Council Subcommittees were present to uplift equity considerations in real time as those Subcommittees were deliberating suggestions for the CAP.

Table 4

Then: Initial Climate Action Plan (2021)	Now: Revised Climate Action Plan (2025)
The subcommittee drafted the Guiding Principles, formally adopted by the Climate Council in August 2021. There were only four months to incorporate the Guiding Principles into the plan. That was not enough time to use the principles proactively to develop and prioritize recommendations.	The Just Transitions Subcommittee (JTSC) heard from other subcommittees that using the Guiding Principles while developing recommendations felt daunting. In response, the JTSC created a simplified visual explaining which questions to ask at each step of the planning process. It showed when and how to consider public input.
Members of other subcommittees were unclear on how and when to apply the Guiding Principles. Liaisons from Just Transitions to the other subcommittees were available for support.	In addition to the Guiding Principles simplified visual, five JTSC members volunteered as liaisons to the other subcommittees. The liaisons attended those subcommittees' meetings to help them to apply the Guiding Principles <i>throughout</i> the drafting process, rather than at the end.
The quick timeline limited public engagement during the first Climate Action Plan. Agency of Natural Resources staff had to move quickly to contract outreach support, which did not allow time for deliberation and input from the Just Transitions Subcommittee.	Public engagement occurred before and throughout the planning process at key junctures. Public input was better communicated to subcommittees and the Council through quarterly reports and other means. Engagement activities were vastly broadened to lift up voices of frontline and impacted communities. These improvements were possible because of a new staff position in the Climate Action Office (CAO) and additional capacity via the Consensus Building Institute (CBI); these did not exist during the

	first Climate Action Plan process. <i>See Public Engagement chapter (page #s) for full details.</i>
There was not a streamlined process in place to ensure that public input was reviewed and discussed by subcommittees and the Council before decisions were made.	In fall 2024, the JTSC created public comment recommendations , detailing how to better receive and incorporate public comment into subcommittees' work. A revised version was then adopted by the Council for their own work in early 2025.
The CAO did not have a designated staff person to support JTSC, though CBI provided support in most meetings. A staff member from Public Service Department and another from Department of Environmental Conservation supported JTSC.	In addition to the two support staff, CAO Communications & Community Engagement Coordinator supported JTSC. CBI also provided facilitation support to the Subcommittee for two key meetings.

Challenges/stumbling blocks 2024-25

Challenges Faced by Just Transitions Subcommittee

Time:

- There was not adequate time for JTSC members to re-introduce the Guiding Principles and other tools to the drafting subcommittees and help them become fully comfortable with the materials.
- More time is needed for new JTSC members to become oriented to the CAP update process and their role in it, and for the JTSC to build meaningful relationships with the other subcommittees.
- The time commitment for subcommittee members is high, and the current compensation system (per diem) doesn't adequately reflect that. The low per diem may preclude people from marginalized and frontline communities from participating as subcommittee members.

- The time commitment for JTSC liaisons to attend the other subcommittees' meetings was high. Some liaisons did not have the capacity to engage as much as other liaisons.

Capacity:

- There has not been enough capacity and time allocated for equity training for Councilors and Subcommittees. Daytime meetings are inaccessible for subcommittee members who work during the day and cannot leave their jobs to attend virtual meetings. This has limited JTSC liaison participation in other subcommittees' meetings.
- Without adequate compensation in relation to time and energy commitments, who can join these conversations and efforts is severely limited to those who are already able to meet their needs and offer additional time without being paid sufficiently.
- Capacity and ability to engage with those impacted by climate events, especially catastrophic flooding, since the initial plan was adopted.

Broad Scope of Recommendations:

- Many recommendations in the CAP are broad. Thus, they could be implemented either equitably or inequitably, depending on decisions made by implementors (usually the legislature, executive branch, or a combination of the two). This can make conversations about incorporating equity into the CAP complicated and confusing for everyone involved.

Suggested Solutions to Overcome Challenges

- Recruit new subcommittee members earlier in the process.
- Present Guiding Principles, and related tools to the drafting subcommittees early, with support from liaisons throughout the entire process.
- Increase per diem amount.
- Better define the role and time commitment of JTSC liaisons.
- JTSC should play a role in recommending how to center equity in the *implementation* of the Plan (not just the planning itself). The JTSC should also evaluate the equity impacts

of the draft pathways, strategies, and actions and make recommendations to the drafting subcommittees,

- Offer equity training for all Councilors and Subcommittee members early in the planning process.
- Work with Vermont Agency of Human Services and local recovery groups to directly engage with disaster impacted communities about their climate adaptation and resilience priorities.

Youth as an Impacted Community

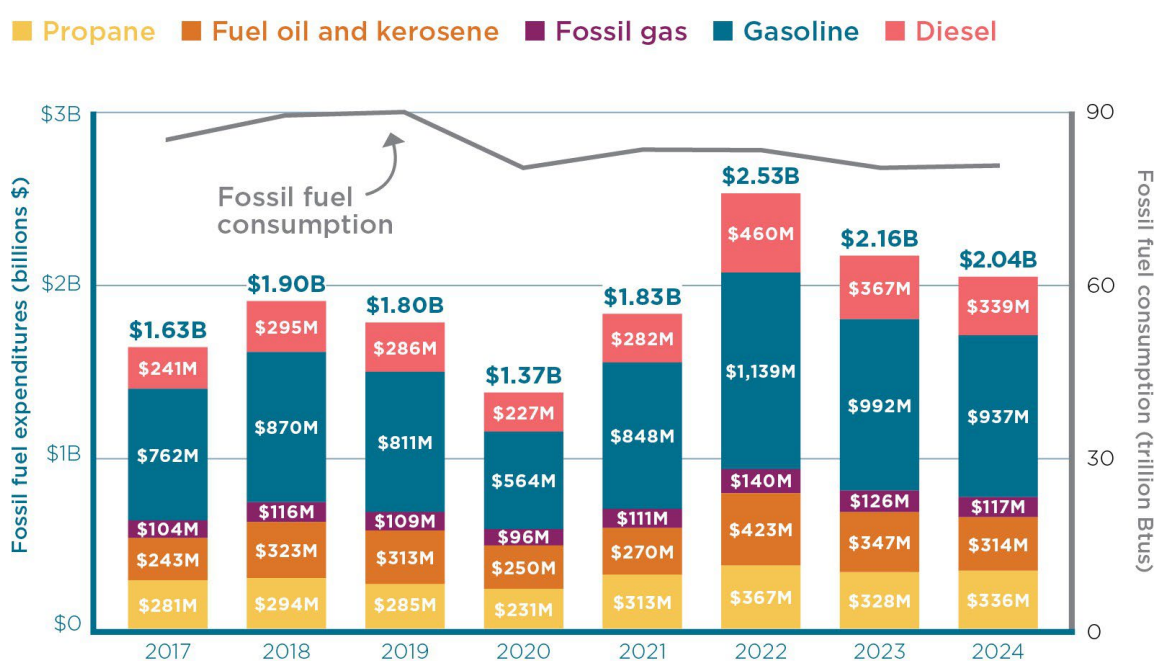
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Young people face systemic barriers that limit their ability to make decisions, yet their involvement in climate action is essential for a just and sustainable future. By including youth in the Just Transition process and Climate Action Plan (CAP), we empower them to contribute innovative solutions, build leadership skills, and drive meaningful change. Investing in young voices ensures that climate policies are inclusive, equitable, and representative, creating a resilient future for all.

The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action

This chapter describes the economic impact of Vermonters' energy choices. Those choices include the purchase of fuels and also energy utilizing appliances and equipment and other related investments. Beyond the direct impacts of the costs, the circulation of the money spent represents a significant portion of the Vermont economy.

Fossil fuel price volatility has led to large cost swings for Vermont, despite relatively flat consumption



Sources: Gasoline and diesel sales volumes from Vermont Department of Taxes via the Joint Fiscal Office; fuel oil, kerosene, and propane sales volumes from Vermont Department of Taxes; fossil gas sales volumes and prices from VGS; other fuel prices from Vermont Department of Public Service and EIA. **Note:** This estimate only includes Vermont sales of gasoline, diesel, propane, fuel oil and kerosene, and fossil gas. It does not include sales of aviation gasoline or jet fuel from the transportation sector or of fossil fuel-based electricity generation (less than 10% of Vermont's electricity portfolio).

Figure 12

In summary, this graph shows that Vermont continues to spend billions of dollars for the purchase of fossil fuels, with over \$2 billion per year spent on fossil fuels for transportation and heating each of the past three years. While there are some changes in overall fossil fuel volumes

used, we are not yet seeing the scale of reductions necessary to meet the greenhouse gas emissions reduction requirements established in the Global Warming Solutions Act (GWSA).

As shown in the following graph, fossil fuel prices since the first Climate Action Plan was adopted in 2021 continue to show large fluctuations. Prices dropped during Covid but spiked in 2022 to the point where fuel oil and diesel prices reached more than \$5 per gallon.

Cost comparison of different transportation fuels over time in VT (adjusted for inflation, December 2024 dollars)

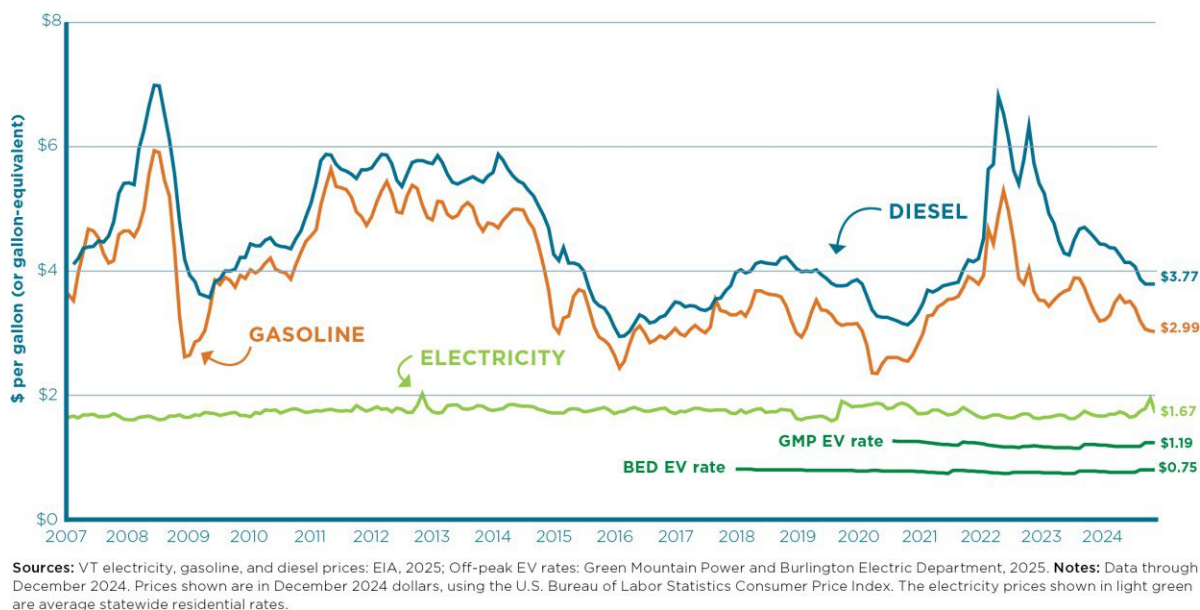


Figure 13

Additional investment

Beyond the purchase of energy and fuels in Vermont, each year, Vermonters, businesses, and property owners also buy cars, appliances, and other equipment that uses energy. Many of the ways to reduce our use of fossil fuels involve the replacement of inefficient, polluting equipment with more efficient and less polluting electric or renewably fueled equipment. In some cases, the purchase of more efficient equipment and appliances lead to lower lifetime

costs but also require additional upfront cost, both of which are important in considering the overall economic impact of a cleaner energy future.

The following table provides a picture of estimated average annual spending in Vermont on the purchase and replacement of heating, cooling and cooking appliances, many of which have traditionally been powered by fossil fuel.

Table 5:

Annual Energy Equipment Choices in Vermont	# of units	Cost per unit	Total cost	Reference for unit numbers	Reference for unit costs
Heating system replacements	11,300	\$5,700	\$64.4 million	Zero Emission Heating Standard Study ¹ EAN	Blend for boiler and furnace ²
Heating systems for new construction	1,680 residential	\$20,000	\$33.6 million	Zero Emission Heating Standard Study EAN	Above plus estimate for distribution system
Heat pumps to supplement existing systems	11,000	\$9,700	\$107 million	Zero Emission Heating Standard Study EAN	Blend of costs from NV5 Potential Study Appendices
Wood stoves to supplement existing systems	2,000	\$3,000	\$6 million	2020 Vermont Single Family Existing Homes Baseline Study ³	Author's review of retail prices

¹ <https://eanvt.org/wp-content/uploads/2025/02/ZEHES-analysis-report-FINAL.pdf>

² Boiler <https://www.thisoldhouse.com/heating-cooling/reviews/boiler-replacement-cost>.
Furnace <https://www.angi.com/articles/how-much-does-it-cost-install-new-furnace.htm>

³ Estimate based on Report's number of homes with wood heating appliances

Window unit air conditioners	15,000	\$400	\$6 million	2020 Vermont Single Family Existing Homes Baseline Study ⁴	Author's review of retail prices
Hot water heating replacements ⁵	23,500	\$1,500	\$35.3 million	Zero Emission Heating Standard Study EAN	PSD Tech Ref Manual for HPWH. Author's review for others.
Hot water heating for new const'n.	1,680 residential	\$2,000	\$3.4 million	Zero Emission Heating Standard Study EAN	PSD Tech Ref Manual for HPWH. Author's review for others.
Cooking appliance replacement	15,000	\$1,000	\$15 million	Estimate based on average replacement time of 20 years	Author's review of Retail prices
Cooking appliance for new const'n.	1,680 residential	\$1,500	\$2.5 million	Zero Emission Heating Standard Study EAN	Retail price plus installation

In total, these annual purchases amount to more than \$250 million. These numbers provide important context for the design of incentive programs meant to encourage the replacement of fossil fueled appliances, both when such equipment reaches the end of its useful life as well as to promote replacement of a working appliance.

⁴ This study reported an increase in room air conditioning penetration which represents about 6,000 homes per year and the replacement of existing air conditioners represents about 9,000 per year.

⁵ A mix of resistance, combustion, and heat pump (HPWH)

Vermont thermal measures: Historical uptake and Climate Action Plan pathways



Figure 14

There is appropriate interest in considering the investments necessary to transition to a lower greenhouse gas emitting future. For thermal energy needs, the electrification of heating systems requires the purchase of heat pump systems that often cost more up front than the oil, propane, or natural gas combustion devices they are replacing; additionally, switching may necessitate changes to the existing ductwork and electrical system to accommodate the heat pump. However, these up-front costs can be balanced by multiple years of reduced expenditures on heating fuels, depending on the fuel one is replacing and the utility territory they are located in. This hurdle of higher up-front costs to realize lower annual and lifetime costs points to the important role of grants and incentives (especially for Vermonters with lower- and middle-incomes) and financing programs (especially for middle- and upper-income Vermonters).

In addition to appliance purchase costs, Vermonters have been gradually carrying out weatherization actions to improve the quality and efficiency of existing homes and buildings. Historically, this has occurred at a level of about 2,000 homes per year, though that number often increases when additional federal funding has been available, as in recent years.⁶ Weatherization costs are a combination of materials purchases and the labor for installation.

A different and more dramatic investment is represented in the purchase of vehicles in Vermont. In Fiscal Year 2024, Vermonters purchased new and used vehicles with an annual net cost of about \$2.4 billion.⁷ In addition to the purchase price and fuel costs described earlier, Vermonters spend money for repairs, registration and insurance. To get an overall number, the total vehicle miles travelled in Vermont (7.15 billion in 2023)⁸ can be applied to a fleet average of 80 cents per mile,⁹ meaning Vermonters spend more than \$5.7 billion on vehicle-based transportation needs.

⁶ Based in part on the Annual Report from the Office of Economic Opportunity and supplemented by estimates on subsidized weatherization from Efficiency Vermont

⁷ This calculation is based on the collection of the vehicle Purchase and Use Tax. For both new and used car purchases, the tax is based on the difference between the purchase price and the trade-in value of the car being replaced (when appropriate). This means that the tax represents the increase in the vehicle stock value in the state.

⁸ https://vtrans.vermont.gov/sites/aot/files/documents/VT_VMT_FC_2023.pdf

⁹ Bureau of Transportation Statistics, <https://www.bts.gov/content/average-cost-owning-and-operating-automobilea-assuming-15000-vehicle-miles-year>

In total, it is estimated that Vermonters annually spend more than \$1 billion on home heat and appliances, of which about 80% is represented by fuel costs, and more than \$5.7 billion on vehicle-based transportation needs, of which about 20% is represented by fuel costs. Fossil fuel purchases result in a large flow of dollars to out-of-state entities (on average 75%)¹⁰ because no fossil fuel production takes place in Vermont.

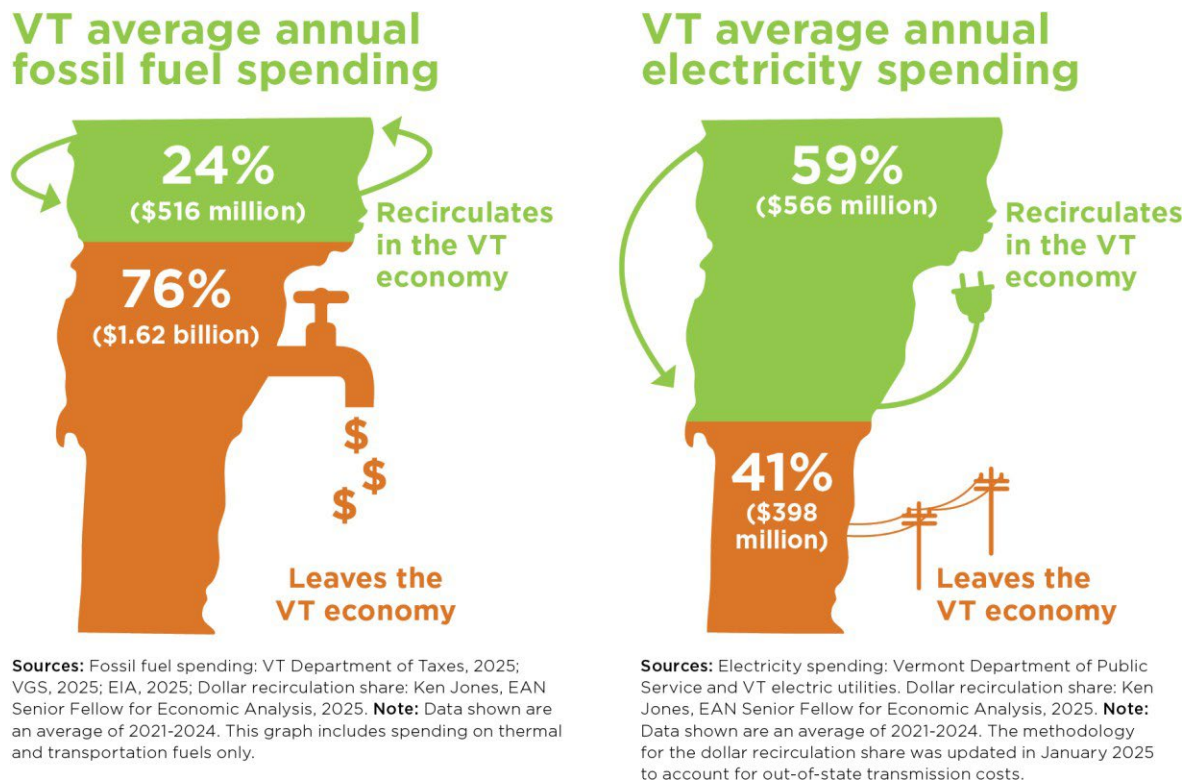


Figure 15

To put these large numbers into context, Vermont's GDP totaled more than \$35 billion in 2023. There is no simple calculation of Vermont's energy GDP. The calculation would include the in-state portion of fuel (electricity, fossil and renewable) amounting to about \$1 billion and the in-state portion of capital expenditures for cars, trucks, HVAC equipment and building construction which may add another \$1 billion. The remaining billions of out-of-state expenditures for fuel and capital purchases must be paid for by the export of Vermont goods and services.

In addition to the cost of the fuel itself, another portion of fuel purchase dollar costs is in Vermont employment. Because fuel purchases have not changed significantly since the first Climate Action Plan, the employment numbers for those involved in fossil fuel delivery have largely remain unchanged. There remain about 3,500 people employed at gas stations and convenience stores and 1,100 involved in fuel oil and propane deliveries. On top of these numbers, there are several hundred people employed in the wholesale movement of fossil fuels. Costs beyond employment include those related to transportation and business operations. Beyond fossil fuel delivery, there is also employment related to the installation and maintenance of fossil fuel-based equipment not reflected in the jobs numbers above.

The Clean Energy Economy

As with other sectors of the economy, the expenditures by Vermonters are reflected in economic activity that results in local employment and, for investors, a return on their capital. The Clean Energy Economy includes the development of renewable energy supplies, design and installation of efficiency technologies, and the several support sectors that result in retail sales and service.

Each year, the Department of Public Service produces a report that focuses on the employment associated with the Clean Energy Economy. The most recent report reflects conditions through the year 2024.¹¹ At that time, more than 18,000 people were employed in the Clean Energy Sector which represents about 6% of the Vermont workforce.

The largest subsectors within the whole include solar installations, weatherization, the installation of heating systems and production of woody biomass. It is also important to recognize that some of that employment includes workers carrying out functions in the non-Clean Energy Economy, the full-time equivalents in the Clean Energy Sector is closer to 13,500 people.

¹¹ https://publicservice.vermont.gov/sites/dps/files/documents/VCEIR_2024_Slide%20Deck.pdf

Beyond the thermal and transportation sectors, Vermont has focused on the efficient use of electricity for more than 25 years. These electric efficiency investments have helped avoid the need for new electricity supplies and distribution and transmission investments.

Efficiency Vermont is overseen by the Public Utility Commission to use funds from ratepayers to support cost-effective investments in electric efficiency. In 2023, Efficiency Vermont invested more than \$40 million in “electric resource acquisition” spending. These are direct investments in businesses and residential properties to reduce electricity use. In 2023, the electricity reductions amounted to more than 72,000 Megawatt hours (MWh). These savings accumulate over time, and in their 2023 annual report, Efficiency Vermont reports that the lifetime savings from the past three years of investments is more than 3 million MWh. At current rates, this amounts to more than \$480 million in customer savings.

One set of strategies worthy of note is an increase in the use of liquid and gaseous biofuels. Liquid biofuel feedstocks include waste fats, oil, and grease which can be sourced locally, but larger volume liquid biofuels rely on seed oil crops that are largely grown in more intensively cropped parts of the US and Canada.

Renewable Natural Gas (RNG) can be derived from animal manure waste which has multiple benefits when compared to management that allows for methane release to the air. RNG is also created in the anaerobic treatment of wastewater and other food wastes. To the extent that these activities take place in Vermont, it displaces the purchase of natural gas from the Canadian pipeline.

Forest resources have also long been used to provide heat. Modern wood heating appliances are more efficient in their use of wood. Cord wood and wood chips primarily come from in-state sources. Wood pellets, while produced in Vermont, currently largely come from out-of-state suppliers.

Current costs of climate related damages

Elsewhere, this Plan includes information on the updated calculation for the Social Costs of Greenhouse Gases that assigns a dollar amount to each ton of greenhouse gas emitted. Those calculations are based on global impacts and report the incremental damage from each ton emitted. A different way to look at economic damages is to consider the actual costs in Vermont that have arisen from climate-related impacts on economic activity. It is possible to look at trends in damages and, utilizing advances in attribution science, estimate how much greater damages have been due to climate destabilization.

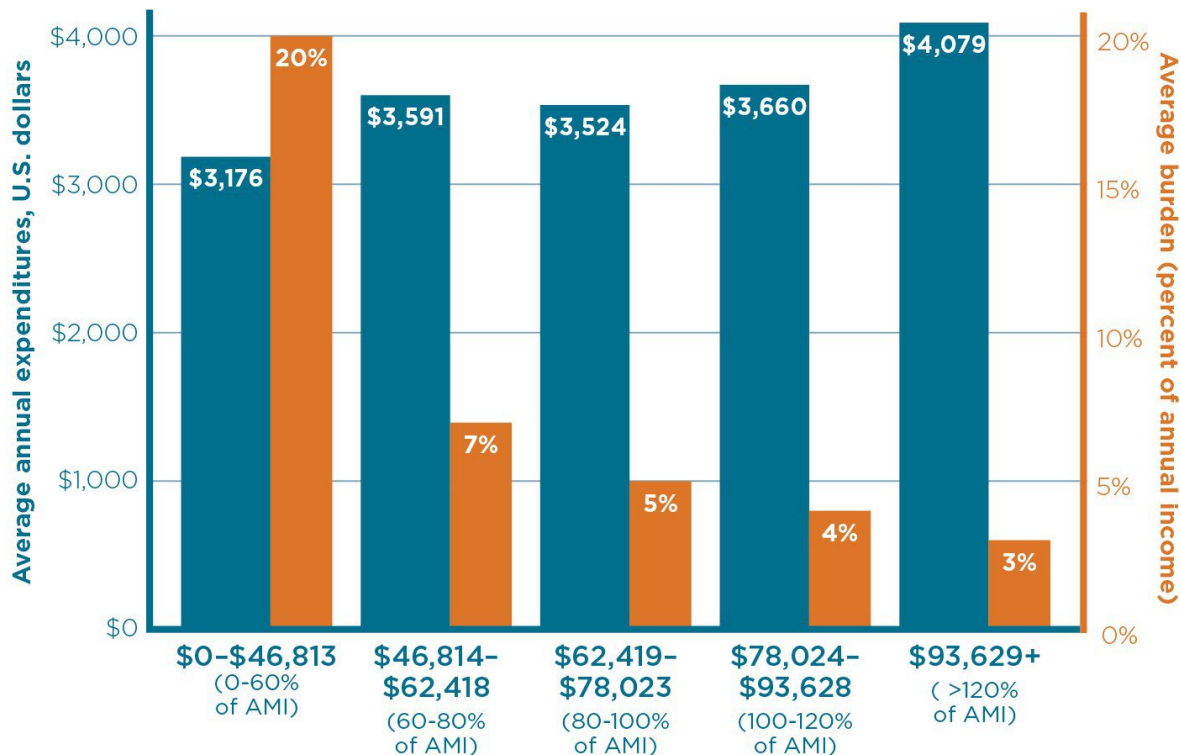
The most obvious examples of climate related damages in Vermont are the increasing frequency and severity of flooding events. From 2011-2024, Vermont tied for the 5th highest number of climate related disaster declarations of any state in the U.S., with the 4th highest per capita climate disaster costs, as measured by FEMA and HUD assistance dollars.¹² Unfortunately, FEMA and other federal government payments represent only a fraction of the total costs that Vermonters face in repairing the damages from climate-related events. As noted in the first report, insurance payments are in addition to FEMA payments and the continuing trend of increasing insurance premiums reflects the increasing payments that are necessary in addressing climate-related damages. Furthermore, insurance companies that work in multiple states must also address climate-related damages that are resulting from increases in hurricane and wildfire events taking place outside of Vermont. In this way, Vermont pays a portion of the costs of the climate related damages resulting from out-of-state occurrences.

Recognizing the Important Aspect of Equity in the Energy Economy

It is typical and yet somewhat misleading to talk about the Vermont economy as the total of dollars in terms of income and expenditures. Unfortunately, such a presentation, including in this section, misses the important fact of the distribution of costs and income to different portions of the Vermont population.

¹² <https://rebuildbydesign.org/wp-content/uploads/2024/07/Atlas-of-Accountability-Fact-Sheet.pdf>

Vermont combined average household heating and electricity fuel costs and burden by income level, 2019–2023



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.

Figure 16

Understanding that the \$2 billion plus dollars spent on fossil fuels means that some households are spending 20% or more of their overall income on those purchases is critical in the design of strategies to move us to a lower carbon future. Energy burdens above 6% are considered to be high and above 10% are considered severe.¹³

A corollary to the direct expenditures for energy purchases is the very different cost of capital when households need to borrow to make purchases for their home or transportation. Any

program that increases household debt has a much greater negative impact on a low-income household than on a moderate- or upper-income household.

Resilience and Adaptation

This version of the Climate Plan includes the consideration of resilience and adaptation as a necessary direction for Vermont to pursue in the context of rapidly changing climate conditions. Vermonters have and will, to an increasing extent, need to make investments to reduce the economic danger from future climate related events such as floods, drought, and high temperature events. As with mitigation, these activities will require investments and those investments will yield local economic activity as well as a reduction in future costs. Concurrent with the development of the Climate Plan, the Agency of Natural Resources led the development of a Resilience Implementation Strategy that sought to catalog existing programs and identify critical gaps within the resilience and adaptation work supported by state government. As a next step, the Treasurer will be examining possible approaches to expand funding for this work.¹⁴ In addition to state-led work, there are also considerable resilience and adaptation efforts underway at the regional and local levels. A visit to the website: <https://floodready.vermont.gov> provides a snapshot of the planning activities underway in each of Vermont's municipalities. As resilience and adaptation efforts are growing rapidly at all levels, developing a more fulsome understanding the economics of resilience and adaptation will require additional research and data collection.

¹⁴ See <https://climatechange.vermont.gov/resilience>

Progress Assessment and Implementation

In addition to preparing this update to Vermont's Climate Action Plan, the Council, as supported by the Climate Action Office, continues to track progress of efforts to implement the Initial Climate Action Plan and the additional requirements of the [GWSA](#). Substantive progress has been made in a number of the focus areas identified in the Initial Plan – efforts that were accelerated by unprecedented federal funding that has been available to Vermont over the last several years to invest in existing and new programs. As a result, spending on climate action has steadily increased since the adoption of the Initial Plan. There are challenges ahead, however, that will change that picture.

Under the current federal administration, Vermont has already experienced and anticipated further reductions in federal investments. Funding through the American Recovery Plan Act (ARPA) has always been slated to wind down in late-2026, but federal funds from laws like the Inflation Reduction Act and the Bipartisan Infrastructure Law (also known as the Inflation Investment and Jobs Act) appear increasingly vulnerable to roll back and rescission. There is also growing risk of the loss of sustained federal funding for critical programs like the [Climate and Health Program](#) at the Vermont Department of Health. In addition, the tariffs implemented by the current administration have created uncertainty and raised the cost of many of the materials and equipment needed in the transition to electric vehicles and home-heating systems.

Over the past four years state funding has been used to advance key initiatives from the Initial Plan—from flood preparedness and recovery to new energy navigator positions that support low-income Vermonters accessing grant funds—new funding sources will be necessary if we want to continue to sustain the current pace and scale of climate action, to say nothing of achieving the pace and scale needed to fulfill the obligations created by the Global Warming Solutions Act.

The Climate Action Office [detailed progress](#)* across all the pathways, strategies, and actions as the Council began its work to update the Plan in the Spring of 2024. These efforts include programmatic initiatives to build landscape-level resilience and reduce climate pollution, as

*See Appendices: Table 6

well as several detailed technical studies necessary to better understand the mechanics and the costs of different possible approaches to achieving required emissions reductions. Specific progress and data related to the emission reduction requirements can be found in the chapter entitled *Scientific Underpinning of the Emission Reductions*.

While it is clear real progress is being made, such an unprecedented rise and equally precipitous fall in federal funding reveals the imperative for Vermont to prioritize and quantify the benefits and costs of the respective initiatives that comprise the Climate Action Plan. Effective, equitable implementation will require the development of an implementation plan that strives to reconcile the initial public and private capital outlays for the materials and new equipment necessary to secure the long-term climate benefits and value that come from beneficial electrification and creating more resilient communities – knowing that there are many competing demands for finite public and private dollars.

Of note, since the Initial Plan was adopted, several administrative and legislative actions have been taken. Of note, the Initial Climate Action Plan and GWSA required ANR to adopt California's Advanced Clean Cars II (ACC II) Regulations (amending Vermont's existing Low and Zero Emission Vehicle Regulations), Advanced Clean Trucks, the Heavy-duty Low NOx Omnibus Rule, and the Phase 2 Greenhouse Gas Rule for Trucks and Trailers by December 2022. These rules set and amend standards for auto manufacturers and reduce greenhouse gas and criteria air pollutant emissions from passenger cars, light-duty trucks, and medium- and heavy-duty vehicles, along with engines that are delivered for sale or placed in service in Vermont. They also require auto manufacturers to deliver lower emitting and more electric vehicles to Vermont. This work was initiated and conducted in pursuant to the GWSA and in accordance with the procedures for administrative rulemaking in the [Vermont Administrative Procedure Act](#) (APA).

Given the scope of these rules and the tight timeframe in which ANR was required to act, this was a significant undertaking that drew from resources and staff not only within ANR and other state agencies, but also regional organizations and partnerships that have supported work in this space for decades. The GWSA requires a series of reports, rule record sharing, and public

engagement in addition to the requirements of the APA, and ANR engaged with the Climate Council, the legislature, stakeholders, and the public to fulfill these requirements.

ANR led a robust public engagement process designed to support the enhanced outreach requirements of the GWSA, with multiple meetings held in areas and communities that have the most significant exposure to the impacts of climate change, including disadvantaged, low-income, and rural communities and areas. Public events and meetings were held in Manchester, Newport, Bellows Falls, Barre, and Burlington, as well as two virtual meetings including one that focused specifically on the medium- and heavy-duty vehicle rules. ANR received 236 written comments in favor of the rules, and 27 written comments opposed, with over 300 individuals and entities signing on to written comments which were responded to via a responsiveness summary that was filed with the Final Proposed Rule. On November 17, 2022, the Legislative Committee on Administrative Rules approved the rules and ANR filed the adopted rule with the Secretary of State on December 1, 2022, meeting the requirements of the GWSA. The rule amendments were effective on December 16, 2022.

In early-June, however, Congress passed Congressional Review Act (CRA) resolutions to nullify three EPA waivers granted to California that underpin these rules; President Trump has since signed the resolutions. While certain to face legal challenges, this action effectively repealed California's authority to enforce these stricter emission standards, which Vermont had also adopted. Given the uncertainty caused by this specific congressional action coupled with many of the other challenges noted above, enforcement of these rules has been paused by [Executive Order of the Governor](#), calling into question whether the emissions reduction benefits that had been anticipated from these rules can be achieved under their original timeline.

These rules were anticipated to have the greatest impact on climate pollution of any of the initiatives that have been advanced from the Initial Plan, so if they are delayed or rolled back, Vermont will be further challenged to meet its emission reduction targets in the transportation sector.

Beyond the Clean Car and Clean Truck regulations, legislative action has helped advance several other important recommendations in the Initial Plan. These initiatives largely now sit with

Executive Branch agencies charged with their implementation. The complete list of legislative actions that have advanced with relationship to the Initial Plan can be seen in Table 7.

Table 7

Bill	Year	Summary
S.213 – Flood Safety Act	2024	The act establishes a minimum state floodplain standard, expands regulation of development in river corridors, improves dam safety, and enhances wetland restoration to improve our collective flood preparedness, climate resilience, and water quality.
S.310 - Flood Response	2024	Creates the Community Resilience and Disaster Mitigation Fund to assist municipalities with infrastructure projects, creates stronger coordination of first responders, includes public works employees in planning and benefits, requires more comprehensive local & regional emergency planning, updates and clarifies stormwater utility statutes, improves emergency communications translation & interpretation services, supports the state swift water rescue operations, and provides additional support to all communities that were flooded last year.
S.259 – Make Big Oil Pay	2024	Authorizes the state to recover financial damages from fossil fuel companies for the impacts of climate change to Vermont. Funds recovered would support climate adaptation projects.
H.289 – Renewable Energy Standard	2024	Require Vermont’s electric distribution utilities to source 100% of their power from renewable sources by 2030 for large utilities and by 2035 for smaller, municipal utilities.
H.687 – Act 250 Reform and Housing	2024	Comprehensive reform of Act 250 jurisdiction, criteria and administration that supports expanded housing opportunities, smart growth and new protections for forest blocks, connecting habitat, and other critical resource areas.
H.868 – Transportation Bill	2024	Contains numerous statutory amendments and funding authorizations related to transportation. It also required Vtrans

		and ANR to study the impacts and benefits of Vermont joining a cap and invest program.
S.305 – PUC Miscellaneous Bill (Includes Tweaks to the Clean Heat Standard)	2024	Makes technical clarifications to certain fees related to energy storage facilities, expand the jurisdiction of the PUC, require a report focused on low- and moderate-income households, and establish new Energy Savings Account requirements

Transition from Contextual Chapters to Recommendations

As the Climate Action Plan transitions from the foundational elements to the specific recommendations that will guide climate action over the next four years, it is important to recognize the groundwork that has been laid. The [Global Warming Solutions Act](#) (GWSA) has set forth targets for greenhouse gas (GHG) emissions reductions, as well as objectives to advance building resilience and adaptation strategies in both our communities and natural environment.

The Vermont Climate Council, established under the GWSA, has been tasked with the challenge of not only identifying and evaluating strategies to meet these targets but also ensuring that Vermont's communities, infrastructure, and economy are prepared to adapt to the ongoing and future impacts of climate change. The Council's work is guided by foundational criteria the initial Climate Action Plan: impact, cost-effectiveness, co-benefits, equity, and technical feasibility. Further information of the prioritization framework can be accessed in the [Initial Climate Action Plan](#). The foundational criteria are essential in evaluating and prioritizing actions that will be most effective in achieving the GWSA's goals.

The GWSA provides the framework for reducing GHG emissions and enhancing resilience, and the following chapters of this update to the Climate Action Plan will outline the pathways, strategies, and actions necessary to meet these objectives. The following context is intended to setup the reader to understand both the structure of the Plan and criteria used to evaluate the recommendations.

Vermont Climate Action Plan Requirements

On September 22, 2020, the Vermont Legislature passed Act 153, the Vermont Global Warming Solutions Act of 2020 (GWSA) that created the Vermont Climate Council (hereinafter the Council) and set forth specific greenhouse gas (GHG) reduction requirements for the State to achieve.

The Plan shall include specific initiatives, programs, and strategies that will:

1. Reduce greenhouse gas emissions from the transportation, building, regulated utility, industrial, commercial, and agricultural sectors
2. Encourage smart growth and related strategies
3. Achieve long-term sequestration and storage of carbon and promote best management practices to achieve climate mitigation, adaption, and resilience on natural working lands
4. Achieve net zero emissions by 2050 across all sectors;
5. Reduce energy burdens for rural and marginalized communities;
6. Limit the use of chemicals, substances, or products that contribute to climate change; and
7. Build and encourage climate adaptation and resilience of Vermont communities and natural systems.

In addition, the specific initiatives, strategies and programs identified in the Plan must further the following objectives:

1. Prioritize the most cost-effective, technologically feasible, and equitable GHG emissions reduction pathways, adaptation and preparedness
2. Ensure that all regions of the State benefit from GHG emissions reductions
3. Provide for GHG emissions reductions that reflect the relative contribution of each source of emissions
4. Minimize negative impacts on marginalized and rural communities and individuals with low and moderate incomes
5. Support economic sectors and regions of the State that face the greatest barriers to emissions reductions (rural and economically distressed regions and industries)
6. Support industries, technology, and training that will allow workers and businesses in the State to benefit from GHG reduction solutions
7. Support the use of natural solutions (inc. working lands) to reduce GHG, sequester carbon and increase resilience; and

8. Maximize the State's involvement in interstate and regional initiatives and programs designed to reduce regional GHG emissions and build upon state, national, and international partnerships and programs

Using this Plan

The Climate Action Plan outlines the path forward for Vermont to take meaningful climate action and is organized around four key areas:

Using this Plan

1. Emissions Reductions ("Cutting climate pollution")
2. Building resilience and adaptation in Vermont's natural and working lands
3. Building resilience and adaptation in Vermont's communities and built environment
4. Cross-cutting Pathways: Workforce, Education, Funding & Finance (those that are particularly impactful in supporting both the emissions reduction and resilience and adaptation efforts called for by the GWSA)

For each area, the Plan identifies a set of pathways, strategies, and actions that strive to meet the intent of the objectives for that area. Recommendations are outlined in three categories: Pathways, Strategies and Actions. Each category serves a distinct function in the overall recommendation.

1. Pathway: A pathway is a high-level means of achieving GHG emissions reductions or adaptation, resilience, and sequestration goals.
2. Strategy: Under each pathway, a suite of strategies has been developed. These strategies are a statement of measurable activity, a benchmark, to be reached in pursuit of the pathway.
3. Action: Actions have been identified as the "operational" tasks that the state, regional organizations, municipalities, non-governmental organizations, and Vermonters will undertake to meet the pathways and strategies.

Foundational Criteria

To meet both the requirements and objectives laid out in the Global Warming Solutions Act (GWSA) the Council utilized foundational criteria from the initial Climate Action Plan: impact, cost-effectiveness, co-benefits, equity, and technical feasibility. These criteria speak directly to the priorities put forward in the GWSA while building upon the specific work to develop the Update to the Climate Action Plan (CAP) to inform high priority actions. More detailed information on the foundational criteria utilized can be accessed in the [Initial Climate Action Plan](#).

Table 8: Foundational Criteria

Impact	Mitigation: Impact is the consideration of actions’ contribution to achieving 2025, 2030, and 2050 emission reduction requirements. The gross GHG emissions reductions required by 2025 are 1.26 MMTCO2e below our most recent (2018) levels. 3.46 MMTCO2e of reductions are required by 2030.	Resilience: The assessment of impact for adaptation, resilience, and sequestration actions takes into consideration both the scale at which a particular action occurs and the effects (both short and long term) of that action.
Cost-Effectiveness	Mitigation: Cost-effectiveness refers to the lifetime net cost per ton of GHG emissions avoided (acknowledging that some mitigation measures do not generate net costs and save money). Cost effectiveness shall also be understood to account for lifetime or dynamic costs, not merely upfront or static costs.	Resilience: Cost-effectiveness for actions seeking to build resilience, further adaptation, and enhance sequestration and carbon storage refers to the relative lifetime net cost of the action compared to the desired outcome or impact. This definition only deals with the true cost to Vermonters and 43 does not

		speak to the cost of avoided damages which we know is very important.
Co-Benefits	Comprehensive climate policy will advance actions that work to mitigate climate pollution, while also building resilience, adaptation and storing and sequestering carbon. Actions must also seek to advance broader societal benefits such as public health, equity (specific focus on impacted communities), economic prosperity, biodiversity conservation, workforce opportunities and other benefits that improve the quality of life in Vermont broadly.	
Technical Feasibility	This speaks to the degree to which the required technologies are developed and reasonably available. As this is called out in the GWSA, it is important to simply answer yes or no to ensure the action is implementable.	

The release of this updated Climate Action Plan is a step forward in the Council’s ongoing work to inform climate action in Vermont. The following chapters outline recommendations that can be utilized by legislators, state agencies, and communities to fulfill the charge of the GWSA.

Introduction to Priority Actions

In preparing this updated plan, the Council sought to focus the state's action by calling special attention to 52 priority actions as well as a short list of the 10 highest priority actions. These prioritized actions are comprehensive, providing important recommendations for how Vermont communities can become more resilient and reduce climate pollution, while recognizing the changing context for this work.

The context for this updated plan

A period of unprecedented federal investment in climate action is abruptly ending, requiring significant changes to underlying assumptions about how climate action is supported and what entities will have the financial and operational capacity to do this work, impacting Vermont's efforts to reduce emissions as well as support disaster recovery and resilience initiatives.

Simultaneous with federal efforts curtailing funding, the federal government is also pulling back on key policies, such as support for electrification of vehicles and deployment of renewable energy that were intended to drive climate action. Even before this challenging context came into focus, Vermont faced a heavy lift to achieve its 2030 emissions reductions requirements under the GWSA and has struggled to fully recover from recent disasters. Reduced federal funding, coupled with the finite financial capacity of Vermonters and their municipalities, will require the state to weigh multiple criteria as it considers how to raise revenue and prioritize investments in reducing emissions and making the state more resilient.

Even in this moment, the reality of the climate hazards facing the state and urgent need for action drives us to take responsibility for Vermont's own contribution to this crisis. This plan identifies a series of meaningful actions Vermont can take to reduce emissions and become more resilient. This plan emphasizes actions that:

- Make investments in resilience, preparedness, and community development that will help Vermonters recover more quickly and save money and lives as Vermont faces future climate hazards
- Make homes more efficient and help Vermonters switch to price-stable and affordable sources of heat and transportation, particularly for Vermonters living on low and moderate incomes.
- Invest in building the workforce needed to implement these actions
- Identify sustainable, long-term funding to support the actions.

As we undertake this work, we recognize that Vermont has a history of innovation to draw and build upon. The can-do ethos of Vermonters sees not only challenges but opportunities -- including the opportunity to act together and nimbly as a small state. In the context of current federal opposition to energy efficiency, clean energy, hazard mitigation, and other climate action, we recognize an increased responsibility for state-level action and an imperative for collaboration across states. Important progress can be achieved through partnerships with other states, such as Vermont's continued involvement with the U.S. Climate Alliance and evaluating opportunities to join multi-state programs such as the Western Climate Initiative. As we lean into new state and multi-state action, we believe we can and should advance solutions that reduce costs and deliver benefits, especially for households with lower and middle incomes. In sum, the actions in this plan represent opportunities to effect positive changes in a challenging context.

Criteria for action

The Council offers the following criteria as especially important when designing policy and implementing climate action:

- First, reduce financial hardship for low- and middle-income Vermonters in the intentional design, prioritization, and pacing of the programs recommended in the plan,

including how revenue needed to support these programs is raised and invested/distributed.

- In addition, be intentional in making investments both in the efforts needed to reduce emissions and the urgent adaptation measures to strengthen resilience against current climate impacts.
- Importantly, when evaluating the costs of programs and policies, also take into account the costs of not acting, considering Vermonters' continued dependency on price-volatile fossil fuels to heat their homes and get around, and the cost of failing to invest in resiliency measures that will help communities and municipalities reduce losses and recover more quickly from future climate disasters.
- Ensure adequate funding to underwrite state agency capacity, create the administrative framework, and undertake the work needed to advance the actions in this updated Climate Action Plan. Also, identify revenue sources that don't work against Vermonters' adoption and implementation of key climate actions, such as adoption of electric heating and transportation options.
- Take steps to support and develop enough trained workers in the state to implement the actions. In addition, ensuring necessary supporting investments are being funded and implemented (e.g. residential electric panel upgrades, expanded availability of electric vehicle charging infrastructure, etc.).

Sequence of actions

For emissions reductions: this updated plan includes actions that will reduce emissions now as well as critical steps on more complex efforts such as cap and invest, which will serve Vermont in the medium and long term. Similarly, the plan urges the legislature and administration to find funding sources that can be deployed immediately towards climate action, while concurrently taking action to secure sustainable, long-term funding for climate action, such as developing and implementing a cap and invest program.

Priority Recommendations

The Vermont Climate Council selected more than fifty priority recommendations with a top ten list. These are not listed in priority order. The full suite of Pathways, Strategies, Actions are located the appendices of this Plan.

Top 10 Priority Recommendations

Make Vermont more resilient

1. Expand and maintain a permanent Flood Resilience Communities Fund
 - See Rural Resilience & Adaptation #3
2. Invest in municipal infrastructure to support compact development
 - See Rural Resilience & Adaptation #10

Support climate-informed land use

3. Increase funding and adapt existing Vermont programs that achieve climate goals on farms and in forests
 - See Agriculture & Ecosystems #1
4. Promote equitable landscape connectivity and conservation for 30x30 and 50x50 goals
 - See Agriculture & Ecosystems #13

Reduce climate pollution

5. Weatherize homes, focusing on low- and moderate-income households
 - See Emissions Reductions # 7
6. Take preparatory steps now and join a cap-and-invest program as soon as a viable option is available
 - See Emissions Reductions #1

7. Support utility programs that ensure the electric grid supports customer electrification and resilience
 - See Emissions Reductions #4 and Emissions Reductions #6.
8. Reduce greenhouse gas emissions from vehicles and buildings through electrification
 - See Emissions Reductions #2 and Emissions Reductions #9.

Identify funding and also support the needed workforce

9. Identify revenue sources to immediately support these priority actions
 - See Cross-Cutting Issues #7
10. Implement the Climate-Ready Workforce Initiative and related actions
 - See Cross-Cutting Issues #4

A longer description of these actions is included in the list of top 52 actions below.

1) Take the following steps to join a cap-and-invest program:

- Develop a framework for the reporting of greenhouse gas emissions data from fuel suppliers and other significant emitters of climate pollution. ANR will work expeditiously to put a reporting framework in place and recommend to the Legislature by December 15, 2025, statutory changes and funding needed to support streamlined reporting requirements and a stepped implementation plan.
- Determine the most appropriate and feasible mechanism(s) for addressing affordability concerns related to the implementation of a cap-and-invest program.
 - Ensure that a significant portion of cap-and-invest revenues are used to provide direct payments or rebates in as close to real time as possible to Vermonters with low- and middle-incomes, to prevent cost of living increases for those households from the program. Another significant portion of revenues should be used to provide direct incentives to support low- and middle-income households in reducing pollution and saving money via increased energy efficiency and adoption of no or low-carbon technologies.
 - ANR, in collaboration with the Public Service Department, the Vermont Agency of Transportation, and the Vermont Climate Council, will advance a study that will make specific technical recommendations around achieving affordability, including potential limits on allowance prices (i.e. a price ceiling).
- Monitor cap-and-invest programs and continue to track updated economic analysis to understand the costs and benefits on implementing the program in Vermont, and join the best available program, such as the Western Climate Initiative or the New York Cap and Invest, based on the above analysis.

The Council views a cap-and-invest program as an overarching policy to provide predictable and substantial emissions reductions in Vermont over time. However, alongside such a program, additional policies will be needed to achieve targeted reductions, deliver benefits to lower-

income Vermonters, and to achieve the scale of emissions reductions required by the GWSA. In the thermal sector, this plan recommends important investments in weatherization and lower emission heating systems, which can provide near-term emissions reductions. The Council also acknowledges the need to explore and implement other complementary policies to accelerate the transition to non-fossil heating fuels. Options include a thermal energy benefit charge and thermal sector performance standards, such as a modified clean heat standard, equipment standards, and fuel standards.

2) Reduce greenhouse gas emissions from vehicles by:

- i. Continuing to monitor and maintain Vermont’s adoption of the California Advanced Clean Cars II (ACC II) and Advanced Clean Trucks, including adopting rule amendments adopted by CARB that provide increased compliance flexibility.
- ii. Urge the Vermont Attorney General to join and participate in any litigation defending California and the Section 177 states’ authority under the Clean Air Act.
- iii. Supporting vehicle electrification ensuring long-term, consistent funding for EV incentives to low- and moderate-income car purchasers which aligns with estimates provided for the VT Agency of Transportation’s February 2024 Clean Transportation Incentive Programs Report; as well as guidance from the February 2025 Legislative Report on Vermont Clean Transportation Incentive Programs.
- iv. Supporting vehicle electrification investment for the equitable deployment of fast charging and Level 2 charging options to levels needed to meet the modeling done in the Pathways 2.0 Report and as estimated in the Agency of Transportation’s January 2025 Statewide Level 3 Report, Map, and Funding.

3) Invest in public, active, shared, and multimodal transportation, such as transit, micro transit, biking and walking.

- Use VTrans’ July 2024 Vermont Smart Growth, Vehicle Miles Traveled (VMT), and GHG Research Project Report and the November 2023 VT Agency of Transportation Carbon Reduction Strategy and associated GHG Sketch Tool to guide investments, to reduce the

need for single occupancy vehicles, also known as reducing vehicle miles traveled, which has important co-benefits such as cost savings to individuals and families, access to jobs, and health and environmental benefits.

- Leverage the Downtown Transportation Fund in a manner that most effectively accelerates this policy.

4) Support cost-effective load management, grid hardening, and optimization, e.g., through advanced metering, storage, targeted siting of generation, rate design, and distributed energy resource management systems statewide to enable customer programs and avoid or delay more expensive physical upgrades.

- Continued Public Utility Commission (PUC) oversight of utility load management programs, investments, and rate designs, and consideration of regulatory approval improvements for efficient generation and infrastructure siting.

5) Review and implement as appropriate recommendations from Act 179 study regarding evolution of community-level renewable energy programs, especially for low-income customers.

- With community and customer input, utilities continue, or consider, creating procurement and customer enrollment programs to support community-based renewable energy projects. Primary considerations for any such program should be cost-containment actions, funding avenues that are not electric customer supported, and how approval for community-based project siting occurs.

6) Support existing programs and expand as needed to ensure the electric grid supports customer electrification necessary to meet Global Warming Solutions Act goals, including service drops, transformers, smart panels, EV chargers, storage, etc. Highlight importance of cost-effectiveness and equity in design, implementation, and affordable funding.

- Continued Public Utility Commission oversight of utility programs (e.g. Tier III); consider expanding credit in Tier II for these purposes; seek state or federal sourced funding

where possible; strive for deployment across utility territories with ability to participate for all customers, including rural/low-income.

7) Sustain and expand funding for comprehensive weatherization focused on low- and moderate-income households.

Through legislation or administrative action, ensure that the current scope of weatherization being conducted is sustained, while aggressively working to ensure that 79,000 additional homes are comprehensively weatherized as soon as practicable, with a priority on low- and moderate-income households.

- The weatherization work should recognize energy efficiency broadly. It should include traditional energy efficiency measures, electrical, health, and safety measures needed to comply with codes, and needed infrastructure upgrades such as wiring and service panels to enable electric vehicle charging, the adoption of heat pumps for space and water heating, and other strategic electrification opportunities.
- Current programs (funding and workforce) are able to weatherize approximately 4,000 homes per year at an average cost of \$11,000 per unit. Much of the recent funding has come from federal sources, which are unlikely to be renewed.
- It is essential, however, that Vermont take steps to maintain and accelerate its current pace of weatherization in order to complete the additional 79,000 units as soon as practicable.

8) Through legislation or administrative action, ensure additional commercial, industrial, municipal, and non-residential buildings, as modeled to be necessary, are comprehensively weatherized by 2030, and secure the funding needed to achieve the target.

- Including “weatherization ready” project needs
- With priority for supporting/expanding existing programs (i.e. the Municipal Energy Resilience Program, Municipal Technical Assistance Program, Building Communities, etc.).

9) Secure funding for electrification of space & water heating for low-and moderate-income households.

- Develop programs for implementation regarding 200-amp service and related building upgrades, coordinated with weatherization, efficiency, and equipment incentive programs (EV chargers, heat pumps, storage, etc.), and ensure that any potentially related statewide program (such as Clean Heat Standard, if adopted, or enhanced weatherization efforts) includes building electrical upgrades in their design and funding models in order to enable decarbonization.

10) Conduct a study that considers the technological options and market feasibility for emissions-based equipment standards for various types of heating. The purpose is to better understand the feasibility and considerations of Vermont adopting thermal equipment emissions standard(s), either for oxides of nitrogen or, more broadly for Greenhouse Gases.

- The legislature needs to fund the study
- The Agency of Natural Resources needs to file a report with the Vermont Climate Council by June 30, 2027
- The study shall consider:
 - adoption by other states,
 - the means by which equipment standards can influence market activity,
 - the most equitable approaches, and
 - how to secure the greatest emissions reductions

Study is contingent on securing funding.

11) Analyze options for a performance-based Clean Fuels Standard that implements a declining carbon intensity (CI) score eligibility requirement for residential, commercial, and industrial (RCI) fuels and can be implemented gradually alongside other complementary policies that would be necessary. As a potential alternative, analyze instituting a minimum percentage clean fuel blending requirement for all residential, commercial, and industrial liquid and gaseous fuels, utilizing an approved list of eligible clean fuels.

- 12) **Utilities and their regulators should adopt standards and programs to support geothermal networks, such as community-scale geothermal.**

- 1) **Amend the Vermont State Board of Education's Education Quality Standards to incorporate environmental and climate change education at all grade levels.**
- 2) **Compile an open source, accessible, and interdisciplinary climate change curriculum for Vermont educators that builds off existing resources and programs to enable teaching across subject areas.**
- 3) **Maintain funding for programs to educate Vermonters about their energy choices and funding options to increase energy efficiency in residential homes, including the energy Coaches and Navigator Program.**
- 4) **Implement the Climate-Ready Workforce Initiative to grow career pathways in climate change and clean energy fields, support new and existing workers, retain recent graduates, ensure job quality and safety, strengthen workforce diversity, and train workers in service of the collective U.S. Climate Alliance goal of 1 million new registered apprentices across 24 states by 2035.**
 - Increase the number of registered apprenticeships that can be supported in the state by Vermont State University, the Department of Labor, and other registered apprenticeship programs, especially in plumbing/HVAC, electrical, and weatherization.
 - Support training from middle school through adult education and Service-Learning programs for a wide variety of audiences, including through the weatherization training center and the many existing training programs
 - Target outreach, training, support, and Service-Learning systems for existing Vermont residents to enter and stay in careers that support on climate action, including farm and forestry, conservation, clean energy, weatherization, outdoor recreation, and resilience and adaptation careers.
 - Invest in instructors and physical infrastructure to increase the number of students who can be supported in the Career and Tech Ed system in the state including electrician,

plumbing, building trades programs, as well as agriculture, forestry and other sectors mentioned above.

- 5) **Support programs for people to start and build their own businesses in the trades, including those offered by business development and climate change career programs.**
- 6) **Monitor the impacts of decarbonization on the workforce and create programs to support impacted workers by tracking leading indicators.**

Funding and Financing

- 7) **Interim Funding for Priority Climate Actions:** Until new and significant sources of revenue are in place to fully implement the recommended priority actions in this Climate Action Plan, the State should identify, authorize, and appropriate revenue from existing or new sources that will immediately support the creation or expansion of certain priority actions. This funding should be used to (a) establish or grow programs proven in Vermont, or demonstrated in other jurisdictions, to be cost-effective strategies for achieving climate benefits, while optimizing other public policy co-benefits, and (b) increase investment in building state agency capacity to design and implement the priority action recommendations. The source of revenue should (a) be a bridge to having adequate revenue from other programs such as a cap-and-invest system, (b) be structured to mitigate impacts on Vermonters facing financial hardships, and (c) not burden those economic sectors and programs that are essential to a transition to a low-carbon and climate-adapted landscape and economy.
- 8) **Support the implementation of the Climate Superfund (Act 122),** including by funding the work at the Agency of Natural Resources, Vermont Treasurer's Office and any other work deemed necessary to support its implementation, helping to provide essential revenue to invest in resilience and adaptation measures.

- 9) **Building off recent Climate Infrastructure Financing efforts, the Vermont State Treasurer, in consultation with the Climate Action Office and Climate Council, should explore opportunities to further leverage public and private capital to make needed clean energy, resilience and adaptation investments.** This effort should focus on reducing hurdles facing Vermonters in accessing and affording cleaner and more energy efficient technologies, weatherization, and necessary infrastructure and resilience investments. It should seek to build off existing structures and institutions to leverage programs, partners and capital (e.g. credit unions and banks), as well as explore other potentially useful strategies (such as on-bill utility financing, bonding and insurance markets)

- 1) **Increase State capacity to manage funding programs and provide technical assistance for the development and implementation of climate resilience plans, with a focus on maximizing the efficacy of Local Hazard Mitigation Plans, and augmenting existing programs with the Municipal Planning and Resilience Grant Program, the Municipal Climate Planning Framework and Guide, and the Municipal Climate Toolkit.**
- 2) **Establish permanent, dedicated funding for Regional Planning Commissions to hire and retain staff for climate resilience and natural resources planning work, hazard mitigation application development, and management of hazard mitigation grants on behalf of municipalities or other eligible grant recipients as well as cover overhead costs related to completing Local Hazard Mitigation Plans.**
- 3) **Secure sustainable, long-term funding to expand and maintain a permanent Flood Resilient Communities Fund (Community Resilience and Disaster Mitigation Fund) for the design and implementation of local and regional climate change adaptation projects and community resilience.** Funding may be used as local match for federally funded hazard mitigation programs as well as non-FEMA eligible hazard mitigation activities.
- 4) **Expand the Business Emergency Gap Assistance Program (BEGAP) to provide financial support and one-on-one coaching to businesses and nonprofits before a disaster in addition to providing funding to businesses who are impacted by climate disasters and disruptions. Link and coordinate efforts with organizations and networks providing similar support to businesses.**
- 5) **Integrating regional housing targets and ongoing mapping, including Flood Insurance Rate Map updates, River Corridors, and landslide hazards, identify areas that are suitable for new, climate safe housing, and increase funding mechanisms where communities are investing in development-ready infrastructure.**

- 6) **The State, through the Public Utility Commission and Public Service Department, should complete the PUC resilience planning investigation underway, which is analyzing whether and how to define, value, measure, and set targets for grid resilience. Utilities should continue to integrate resilience planning into their operations.**
- 7) **Expand upon the Municipal Vulnerability Indicators tool to create a Municipal Vulnerability Index that can be used by state agencies and others as a resource to assist in prioritizing infrastructure resilience investments across the state based on specific vulnerabilities or combinations of vulnerabilities.** Ensure it includes currently missing data such as historic utility outage data, to the extent available, and the Agency of Natural Resource's Environmental Justice mapping tool, when complete.
- 8) **Develop a framework that creates a plan to identify prioritized state investments in resilience projects. The framework should be attentive to fiscal constraints, similar to the State Transportation Improvement Program, and build upon the Resilience Implementation Strategy, the State Hazard Mitigation Planning, and Hazard Mitigation Project Review processes.** The purpose of this action is to have a standing list of projects, vetted through an interagency prioritization and public engagement process, that could be implemented as funding is available.
- 9) **Create a transportation flood resilience funding program to design and construct transportation projects identified as high priority locations via use of the most relevant risk and vulnerability assessment tools.**
- 10) **Replace or harden electric and communication infrastructure with the most appropriate resilient alternative when cost effective.** For example, for aging or unreliable lines, utilities should continue to evaluate improving resilience by relocating lines underground or through other options, where demonstrated to be feasible and cost effective to electric customers.

- Planning frameworks, valuation tools, and metrics resulting from the Resilience Investigation (Case No. 25-0339-PET) being conducted by the Public Utility Commission should be used to inform this evaluation.

11) Increase investment in municipalities to harden, improve, expand and build new drinking water, wastewater, stormwater, and other infrastructure to support compact development, especially growing away from climate hazards such as flooding, and ensure the assets' long-term operation and maintenance.

12) Continue to implement Act 181¹, an act relating to community resilience and biodiversity protection through land use, by increasing investment in walkable and livable communities while also reducing sprawl, protecting critical natural resources, addressing flood adaptation and resilience of historic villages and downtowns, and planning new development away from flood, fluvial erosion, and landslide hazards.

13) Provide increased capacity to strengthen messaging and awareness of local and state emergency preparedness, response, and recovery structures.

14) Provide funding and technical assistance to municipalities and local partner organizations to support adaptation and preparedness planning in communities, with specific focus on disproportionately affected and vulnerable populations; including the identification, adaptation, and equipping of facilities to serve as community resilience hubs that serve as places for learning, collaboration, resource access, and refuge in response to climate-related hazards and other community needs.

15) Provide funding for equipment, supplies, and services that improve resilience and reduce the health impact of climate-related hazards for income-qualifying households needing extra assistance. The intent is to provide financial support for resilience needs in a similar way to existing

¹ <https://legislature.vermont.gov/bill/status/2024/H.687>

financial support for energy efficiency (e.g., through heat pump and EV rebates). Resilience equipment and strategies should address health risks related to flooding, power outages, extreme temperatures, hazardous air quality, humidity, vector-borne diseases, and other climate-related hazards, and could include:

- **Supplies and equipment to improve heat resilience**, such as trees and other vegetative shade, window treatments (shade and thermal barriers), efficient air conditioning (heat pumps) fans, and dehumidifiers;
- **Equipment to improve indoor air quality**, such as air purifiers, mechanical ventilation (e.g. ERVs);
- **Backup power equipment**;
- **Window screens**;
- **Services** such as water intrusion and moisture mitigation & management, private drinking water testing and treatment, etc.

16) **Provide state-contracted community mental health services partners more capacity to address anxiety, depression, distress, and trauma caused by climate change and climate-related disasters.**

- 1) **Increase funding, enhance, and adapt existing State of Vermont programs that support greenhouse gas emissions reductions, soil carbon sequestration, and/or climate adaptation and resiliency on working lands, including through manure management.** Coordinate with applicable agencies to defend and accelerate the implementation of federally funded climate mitigation and resilience practices in Vermont.
 - Enhance and adapt programs to better incorporate nature-based solutions as well as Traditional, Ecological and Indigenous Knowledge.
 - Example State programs include, but are not limited to: Agency of Agriculture Farms and Markets (AAFM): Agriculture-Clean Water Initiative Performance (Ag-CWIP), Best Management Practice (BMP), Forestry Acceptable Management Practices (AMP), Capital Equipment Assistance Program (CEAP), Conservation Reserve Enhancement Program (CREP), Farm Agronomic Practice (FAP), Grassed Waterway and Filter Strip (GWFS), Pasture and Surface Water Fencing (PSWF), Vermont Pay for Phosphorus (VPFP), The Vermont Farmer Ecosystem Stewardship Program (VFESP); land acquisition, river corridor easements, wetland conservation, County Forester Program, and the recommendations in the ANR report, “Maintaining and Creating Resilient Forests (2015).”
- 2) **Utilize best practices to quantify carbon sequestration and emission reductions from agriculture and forestry.**
- 3) **Fund and implement Payment for Ecosystem Services (PES) programs for lands to encourage landowners and land and water caretakers² to implement practices that improve soil health, crop and forest resilience, increase carbon storage, increase stormwater storage capacity, and reduce runoff.** Fund existing agricultural PES programs and expand to include or develop new programs for forestry. Note: Payment for Ecosystem Services (PES) programs recognize and reward land and

² The Agriculture and Ecosystems Subcommittee used the word “caretakers” to refer to any individual who makes decisions around the land and water. This could include land and water managers and stewards, as well as land owners.

water caretakers for practices that enhance ecological function and community well-being, rooted in both traditional stewardship values and modern land management. These programs do not include carbon markets or trading.

- 4) **Leverage the power of peer learning to advance climate resilience by funding a Request RFP that provides funds to support Vermont Natural Resources Conservation Districts, farmer organizations, and non-profit organizations with the specific objective of allowing them to reach other farmers and foresters and do peer-to-peer education about improved soil and manure management strategies that enhance climate resilience.**
- 5) **Create a dedicated climate impact emergency recovery fund for farms and forestry operations or related infrastructure (or ensure the agriculture and forestry sectors are given specific considerations in existing recovery funds), support leverage of federal funds and expansion of programs to support the adaptive capacity and restoration of farms and forests, and promote insurance for farm and forest landowners and businesses, to ensure that they can equitably and viably recover from climate induced disasters.**
 - The fund should be simple to access, deploy sufficient funds quickly following a disaster, be flexible, equitable, and proportional to meet the diverse needs of the farming and forestry community, and be sustained over time with predictable and consistent funding.
- 6) **Dedicate robust funding for farm and forest supply chain resilience and state food security, including significant investment in storage, processing, and distribution infrastructure.** Prioritize investments in farm, food, and forestry businesses, cooperatives, non-profits, tribes, and community projects that have climate resilience, adaptation, and mitigation goals.
 - Funding should include a substantial increase in base funding for the Working Lands Enterprise Initiative (WLEI), the Agriculture Development Grant program, as well as the Crop Cash Plus and Farm Share, dedicated appropriations for distribution and food hub operations and infrastructure, and appropriations for research, development, and

support for siting and permitting process improvements that recognize the vital conservation benefits of market expansion opportunities for local wood products processing and manufacturing in Vermont.

- 7) **Improve funding opportunities and create equitable access for Black, Indigenous, and People of Color (BIPOC) farm, food, and forest organizations and businesses by developing multi-year unrestricted BIPOC-centered grants and loan programs.** This includes uplifting and resourcing the work of the Vermont Abenaki and other Indigenous Peoples in the State, Land Access and Opportunity Board (LAOB), and other BIPOC peoples and organizations in Vermont.
- 8) **Promote and incentivize the use of agricultural and sustainably harvested wood-based construction materials (subject to existing certification criteria or procurement standards to be developed) over less climate-friendly options, such as imported wood from locations lacking required sustainable harvest requirements and/or non-wood materials with high carbon footprints (such as steel, concrete, etc.).**
 - This could include using state procurement standards to require that publicly funded building projects, or those subsidized through low-interest loans or tax benefits, use chain-of-custody certified wood products (mass timber, cellulose insulation, advanced wood heating, etc.) and prioritize building materials—such as sustainably harvested wood—that align with climate goals and ecological values, while reducing reliance on high-carbon, non-renewable materials like steel and concrete.
 - Continue to research and develop the life-cycle accounting of these products for the greatest impact.
- 9) **State agencies should utilize financial incentives, siting policies, and regulations to incentivize, support, and preferentially site renewable energy capacity on buildings, parking lots (by installing solar roofs), in compact settlement areas, including renewable energy and charging facilities at rental housing, as well as in previously disturbed / developed areas, where feasible.** Avoid conversion of ecologically sensitive areas, forests, and prime agricultural soils.

- 10) **State agencies should promote nature-based climate solutions (NbS), Traditional Ecological Knowledge (TEK), and Indigenous Knowledge (IK) by considering how to gauge their effectiveness³ and incorporate them into assessments, planning efforts, prioritization frameworks, and funding programs to address climate change impacts.**
- 11) **State land management agencies should continue to adapt their management of lands using nature-based climate solutions (NbS) to address climate impacts, increase ecosystem resilience, enhance biological diversity, and improve water quality.** State land management agencies should also enhance technical assistance and resilience funds to support the financial capacity of other land and water caretakers to achieve these goals.
- 12) **State agencies and the legislature should identify gaps and opportunities to expand and improve current programs that promote healthy, connected river corridors, floodplains, and wetlands, prioritize restoration and conservation, and incentivize water storage in headwaters and natural areas to promote flood resilience and biodiversity through expansion of wetland, floodplain, riparian forest and river corridor easements that better compensate land and water caretakers for restoring, managing and conserving these natural water storage areas** (including opportunities presented by Act 121⁴, an act relating to the regulation of wetlands, river corridor development, and dam safety.)
- 13) **State agencies should work with partners, and the legislature should fund the state agencies as necessary, to promote strategic and equitable statewide landscape connectivity and the conservation of priority forest blocks, farmland, and other actively and passively managed lands through planning and implementation toward 30x30 goals, and 50x50 goals in alignment with Act 59 of 2023.** This work should use the best available data and mapping, including Vermont

³ The Council received a specific recommendation on how to gauge the effectiveness of nature-based solutions in the following [comment](#) from the Transnational Environmental Law Clinic.

⁴ <https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT121/ACT121%20As%20Enacted.pdf>

Conservation Design, while braiding in Traditional Ecological Knowledge (TEK) and Indigenous Knowledge (IK).

- Conservation planning and implementation should meet the targets set forth in Vermont Conservation Design. These goals include managing forests to achieve a target of 3-5% young forest and allow at least 9% of Vermont's forest to become (or be maintained as) old forest, specifically targeting 15% of the matrix forest within the highest priority forest blocks—including National Forests—to achieve the old growth condition and ensure the protection of sacred sites or other historically or culturally important areas as determined by the Vermont Division of Historic Preservation.
- At the same time, protecting farmland and managed forestlands from development through land conservation and protection programs is essential to ensure these land uses continue to provide climate mitigation, adaptation, and resilience benefits. Existing State land use protection programs—such as the Vermont Farmland Conservation Program and forest conservation easements—should be enhanced to improve farmland access and the protection of agricultural soils and working forests.

14) Enhance education, outreach, research, and technical assistance programming to encourage farmers, foresters, and other land and water caretakers to adopt strategies that increase climate mitigation, adaptation, and resilience. State agencies should work with and support efforts to fund partners and higher education, such as University of Vermont (UVM) Extension and Natural Resource Conservation Districts (NRCDs).

- These efforts should be incorporated into current programs, braiding Traditional Ecological Knowledge (TEK) and Indigenous Knowledge (IK), recognizing the value these bring to better understanding and taking care of the land. Initiatives should be designed to represent diverse perspectives while addressing a diversity of audiences and age groups. Simplify and assist with application processes for funding and support programs.

15) **Fund and undertake as soon as possible the study previously requested by the Vermont Climate Council on the use of woody biomass for utility-scale electric energy facilities⁵.** In addition, use the guidance previously provided by the Council to the Vermont Public Utility Commission (PUC) regarding biomass.

- The Council's biomass addendum is here:

<https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Biomass%20recommendations%20-%20Final%20Approved%20Version%20-%20December%202023.pdf>

⁵ This study is not aimed at smaller-scale biomass such as advanced wood heat and agricultural waste methane generation.

Education, Workforce, Funding & Finance

Cross-Cutting Pathways provide a comprehensive approach to take climate action by supporting both emission reduction and resilience and adaptation efforts. Through the development of the initial Climate Action Plan, several cross-cutting pathways were identified as integral to climate action in Vermont. These pathways included Environmental Justice, State Government, Community and Partner Capacity, Building Codes, Transportation, Workforce Development, Education, and Compact Settlement. Since the adoption of the initial Climate Action Plan, there has been a completion of Cross-Cutting recommendations and acknowledgment from the Climate Council that some of the pathways would be best served by Subcommittees with expertise of the Pathway. For instance, the Environmental Justice pathway, which recommended the creation of an environmental justice policy, was addressed by the passage of [Vermont's Environmental Justice Law \(Act 154\)](#) in 2022. Additionally, the establishment of the Climate Action Office made progress toward what was envisioned by the State Government, Community, and Partner Capacity pathway. Furthermore, Building Code and Transportation Pathways were moved to Cross Sector Mitigation, as expertise on building codes and transportation reside in the Cross Sector Mitigation subcommittee.

As a result, the update of Cross-Cutting Pathways in the Climate Action Plan is now focused on the following three key cross-cutting pathways: Workforce Development, Education, and Compact Settlement. These pathways have been identified as necessary for climate action across various sectors. To support this work, representatives from Cross-Sector Mitigation, Rural Resilience and Adaptation, and Agriculture and Ecosystems subcommittees worked to refine these pathways and build upon actionable recommendations in the update of the Plan. This collaborative effort involved public meetings to gather feedback and finalize recommendations, ensuring that the Cross-Cutting Pathways are comprehensive and forward-looking.

Following the development of the updated Compact Settlement actions and public input, the Council determined that it would be most effective for Compact Settlement to be integrated within the Rural Resilience and Adaptation section of the updated Climate Action Plan.

Additionally, the Council added a Finance & Funding pathway to the Cross-Cutting pathways. The Finance & Funding pathway speaks to the need to leverage public and private capital to facilitate clean energy, resilience, and adaptation investments, focusing on reducing barriers for Vermonters in accessing and affording cleaner technologies and necessary infrastructure.

Education

The Education Cross-Cutting Pathway encompasses strategies aimed at equipping Vermonters with the knowledge and skills necessary to take climate action. The update to the Education pathway emphasizes the importance of creating accessible, equitable research, partnerships, and education. Among these, a key priority is to offer technical assistance to Vermonters about energy choices and available funding to increase energy efficiency in their homes. For example, the Energy Navigators Program – administered by Vermont’s Community Action Agencies – plays a key role in ensuring that residents have the information and resources needed to make informed energy decisions about efficiency improvements they can make, ultimately contributing to reduced energy consumption and emissions. Additionally, there is a focus on creating an accessible curriculum Vermont climate curriculum for educators, which would be interdisciplinary, open-source, and accessible, building on existing resources. Furthermore, incorporating environmental and climate change education at all grade levels is recommended to ensure that climate education becomes a fundamental part of the educational experience. Lastly, supporting educational programs that strengthen the workforce pipeline, with a focus on postsecondary educational models like apprenticeships and stackable credentials in fields such as construction, energy, agriculture, and renewable energy is essential.

Additional Education Cross-Cutting Pathways that were not identified as priority but are critical components to advancing Education in the Climate Action Plan includes developing accessible educational materials that communicate climate science and local impacts and promoting equitable language use across state agencies. The collective priorities outlined in the Education Cross-Cutting Pathway supports Vermonters with the foundational knowledge to build a just energy transition and implement the [Global Warming Solutions Act](#).

Workforce Development

The current capacity of Vermont's workforce will constrain efforts to achieve climate goals. The Workforce Development Pathway is critical to equip Vermont's workforce to meet the demands of a climate-resilient economy and enhance workforce capacity. One key priority is increasing access to equipment and supporting contractors in making investments that boost their operational capacity. Another priority focuses on targeting outreach and training for existing Vermont residents to enter and remain in climate careers, such as those in farm and forestry, clean energy, and resilience sectors. By supporting Vermont workers to join these trades and providing resources for readiness and retention, this action seeks to expand and maintain a climate ready workforce. Additionally, creating clear career pathways for young adults to enter into climate-related fields is essential. Actionable steps include increasing the number of students supported in Career and Tech Ed programs and expanding registered apprenticeships, particularly in plumbing, HVAC, electrical, agriculture and forestry, and weatherization. Supporting programs for individuals to start and build their own businesses in the climate field is also a priority, with initiatives advancing through partnerships with organizations with workforce development and adult learning community-based organizations. These efforts collectively aim to build a robust workforce capable of driving climate action and supporting Vermont's transition to a sustainable and equitable future.

Finance & Funding

The Finance & Funding pathway, a new addition to the Climate Action Plan's cross-cutting pathways, is designed to strengthen the financial mechanisms supporting clean energy, resilience, and adaptation investments in Vermont. In order to immediately start to fund key Climate Action Plan recommendations, such as weatherization and resilience strategies, it is important to identify revenue sources – new or existing – that can be used to immediately support this work. State funding for clean water can serve as a model. In 2017, then-Treasurer Beth Pearce issued a report establishing an annual target funding necessary investments in clean water; she also recognized that it would likely take several years to put a long-term funding solution in place and so identified two years of “bridge funding” that was used to

accelerate efforts in the near-term. The Council is recommending a similar approach to accelerate climate action, recognizing that joining a cap-and-invest program will take several years. Putting in place bridge funding also provides time for essential efforts to design and structure a cap-and-invest program in a manner that intentionally mitigate impacts on Vermonters facing financial hardships. It is important that any source of bridge funding has a nexus with climate action and supports the transition towards less carbon-intensive fuels (i.e. the revenue source should not involve taxing renewable energy or electric vehicles).

Another critical component in the Finance & Funding Pathway builds on recent Climate Infrastructure Financing efforts. The Vermont State Treasurer, in collaboration with the Climate Action Office and Climate Council, are exploring opportunities to further leverage both public and private capital. A key priority is to address and reduce the financial barriers Vermonters face in accessing and affording cleaner, more energy-efficient technologies, weatherization, and essential infrastructure improvements. While many climate investments may have meaningful upfront costs, they can often save Vermonters money in the medium- and long-term. This pathway recommends using existing structures and institutions, such as credit unions and banks, to maximize the impact of programs, partners, and capital. Additionally, it will explore innovative strategies such as on-bill utility financing, bonding, and insurance markets to broaden financial accessibility. Key stakeholders in this effort may include the Vermont Housing Finance Agency, the Vermont Municipal Bond Bank, economic development associations, distribution and efficiency utilities, credit unions, and pivotal state entities like the Public Utility Commission, among others. Through these collaborative efforts, the Finance & Funding pathway provides direction to ensure that financial resources are effectively mobilized and coordinated to support climate action moving forward.

Conclusion

The update to the Climate Action Plan's Cross-Cutting Pathways—Education, Workforce Development, and Finance & Funding—are pivotal in advancing Vermont's climate goals. Each pathway addresses critical aspects of climate action, from access to low-cost capital and educational initiatives to strengthening the workforce needed for a climate-resilient economy.

The Finance & Funding pathway focuses on coordinating financial investments in clean energy, resilience and adaption, while Education emphasizes equipping Vermonters with the knowledge and skills necessary to engage in climate action. Workforce Development ensures that Vermont's labor force is both prepared and of sufficient size to meet the demands of a sustainable future, with targeted training and career pathways in clean energy and climate-change related fields. Together, these pathways provide an important foundation for the specific actions identified in the Cross-Sector Mitigation, Rural Resilience & Adaptation and Agriculture and Ecosystems chapters of the updated Climate Action Plan.

Reducing the Emissions that Drive Climate Change

Two drivers of our work: climate urgency and economic affordability

During the past two years, as the Climate Council developed this Climate Action Plan, we witnessed -- and in many cases personally lived through -- a series of climate disasters in Vermont, across the US, and globally – reminding us again and again that the human and natural consequences of climate pollution are relentless and will continue to worsen. As UN Secretary-General Antonio Guterres stated at the end of 2024,

“This is climate breakdown — in real time. We must exit this road to ruin — and we have no time to lose.”¹

And Vermonters are still reeling from the high costs of climate disruption following disastrous flooding events across the state in the summers of 2023 and 2024.

In enacting the [GWSA](#) the General Assembly recognized, alongside many other states, cities, and nations, that every government needs to accept a measure of responsibility to reduce harmful climate emissions. This has been an enacted goal in Vermont since 2005 , and a legal obligation since 2020, and has guided the Council in the preparation of this Plan.

A second main driver of the mitigation actions in this Plan is a concern for affordability. We must reduce emissions. We must also consider the economic impacts and benefits of our solutions; with policies and approaches that maximize cost savings to Vermonters and the Vermont economy.

As we considered the costs of *climate action*, we have also considered the high costs to Vermonters of *inaction*. Vermont’s fossil fuel bill has averaged over \$2.2 billion per year

¹ UN / Guterres [New Year Message](#), December 30, 2024.

over the last four years, in the same range as the State’s budget for K-12 education.² Since 2021, the first full year after the GWSA was passed, Vermonters have paid nearly \$9 Billion to import fossil fuels, mostly for transportation and heat. About 75% of that money has left the State’s economy.³

The policies in this Plan are aimed at reducing Vermont’s high annual fossil fuel bills by financing greater efficiency in homes, vehicles and businesses. We emphasize that the transition process should proceed at a pace that is achievable, that grows over time, and that delivers long-term cost savings to rural and lower income Vermonters, while moderating even short-term cost effects.

Getting the structure right: why one or more high-level policy drivers are needed in the transportation and thermal sectors

There is a well-known principle in public policy known as the “tyranny of the status quo,” describing how the beneficiaries of existing public policies and embedded market patterns make it difficult to enact structural reforms.⁴ Vermont’s continuing dependence on fossil fuels is an example of this problem.

Vermonters can rightly take pride in our historic initiatives to reduce energy burdens and fossil fuel emissions. But progress has been piecemeal and too slow. To meet the commitments made in [the Paris Agreement](#) and Vermont law, and to substantially reduce fossil fuel bills, high-level policy drivers are needed.

² Vermont Department of Taxes and Joint Fiscal Office

³ In “2022 alone, nearly \$2 billion of the approximately \$2.6 billion in total fossil fuel spending in Vermont left the state economy.” Annual [Progress Report for Vermont, 2023](#) pg.7. In 2023, \$1.7 billion spent on fossil fuel left the state. Energy Action Network, “[Annual Progress Report for Vermont, 2024](#)”, p.23.

⁴ See, Milton Friedman and Rose D. Friedman, *Tyranny of the Status Quo* (New York: Harcourt Brace Jovanovich, 1984). Although Milton Friedman was a leading conservative economist, the book argues that the power of the status quo tends to block reforms whether viewed as moving in a “liberal” or “conservative” direction.

Across the globe, the most successful large-scale energy transitions have been driven by two types of policies: (a) performance standards and (b) quantitative pollution caps. In this Chapter we recommend that the legislature and administration continue to examine these options to reduce emissions while creating a reliable revenue source to help Vermonters transition away from fossil fuels.

Vermont has plenty of positive examples that such drivers can succeed over time. Think of the decades of experience we have with wastewater cleanup, energy efficiency obligations, and renewable electricity.

We do not recommend adopting performance standards or carbon caps at any cost or regardless of impacts on consumers. Instead, we recommend approaches that can double as consumer-protection initiatives, helping Vermonters with lower and middle incomes to save money and come out ahead. This aligns well with the just transition principles of the GWSA. For example, a cap-and-invest program can provide direct financial relief or rebates to low- and moderate-income households, while also supporting investments in low-emitting vehicles and heating systems .

Lowering climate pollution: a suite of recommended actions

While needed to drive change over time, an overarching policy is unlikely to succeed as a stand-alone initiative. It needs to build upon and help coordinate a suite of supporting policies.

To reduce climate pollution in a complex society, there is no single “silver bullet” solution. But even within the category called “silver buckshot” there is a huge range in scale among different sectors, markets, and opportunities.

In Vermont the two largest emitting sectors by far are transportation (39% of Vermont’s emissions) and buildings (31%) and this Chapter focuses on reducing emissions and costs there.

Industrial processes (8%) and waste management (3%) are smaller-emitting sectors but are covered as well. Agricultural emissions (16%) are addressed elsewhere.

Electric generation (3% of in-state emissions) contributes a small fraction of Vermont's climate pollution. This Chapter recommends continued progress on renewable electricity. It also recommends prioritizing strategies that build on our clean power portfolio, recognizing that electrification is crucial to lowering fossil emissions from vehicles and heating. We recommend actions in the power sector that will accelerate electric solutions generally.

The suite of recommendations in the 2025 CAP necessarily focuses on actions that should be taken by State agencies, including the Agencies of Natural Resources and Transportation, the Department of Public Service and the Public Utility Commission. Some, but not all, of these recommendations would require legislative action.

The task of the Climate Council, according to the GWSA, is to recommend actions by which Vermont *could do its share* to avoid the worst consequences of climate disruption and, instead, create more adaptive, resilient communities. We recommend doing so through strategies that are realistic, affordable, and equitable. We conclude that the mitigation goals of the GWSA can be met with a program of investments in buildings, vehicles, heating and other strategies that would also save Vermonters billions of dollars in fossil fuel costs in coming decades.

Scientific Underpinning of Emissions Reductions

In drafting this update to the Climate Action Plan, the Agency of Natural Resources produced or commissioned the following reports and technical studies, prioritized by the Council, that sought to clarify and improve our understanding of key components of climate action.

Greenhouse Gas Inventory Review and Forecast

The Vermont Greenhouse Gas Inventory and Forecast¹, is published annually by the Agency of Natural Resources (ANR), as required by Vermont statute 10 V.S.A. § 582 and following guidelines for GHG accounting from the Intergovernmental Panel on Climate Change (IPCC) and Environmental Protection Agency (EPA). Vermont's GHG Inventory establishes historic 1990 and 2005 baseline greenhouse gas (GHG) levels for Vermont and tracks changes in GHG emissions through time. The Inventory is the primary means of determining progress toward Global Warming Solutions Act (GWSA) statewide emissions reduction obligations. It is important to note that, historically, there has been a three-year lag in emissions inventory reporting, primarily due to delays in calculating agriculture sector emissions (i.e., the Inventory covering 1990-2022 GHG emissions was published in 2025).

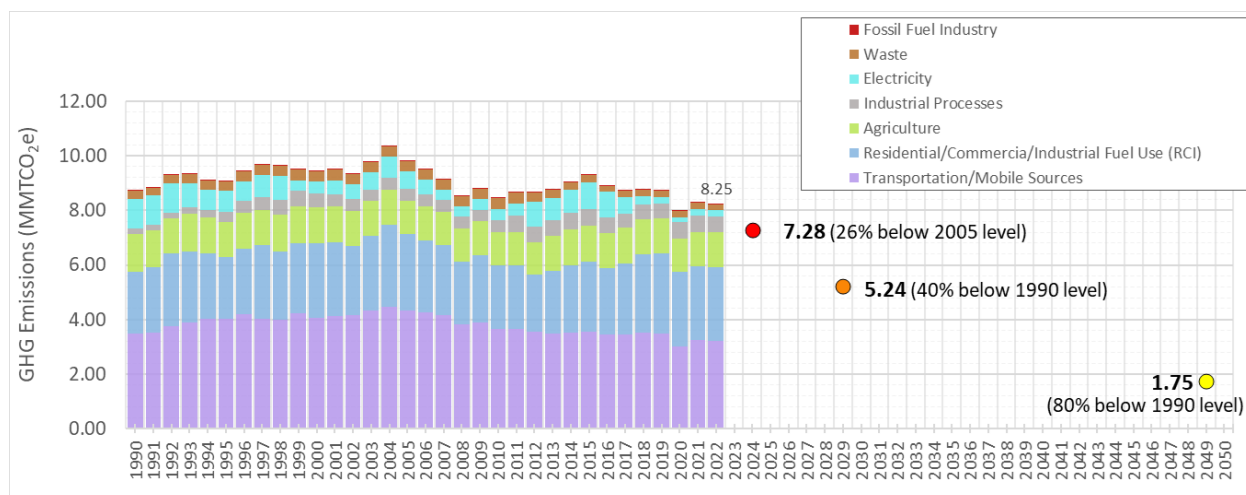


Figure 18: Vermont Greenhouse Gas Inventory historical emissions and future requirements

Vermont's annual statewide GHG emissions from 1990 through 2022 are shown by sector on Figure 18 as reported in the *Vermont Greenhouse Gas Inventory and Forecast*. The red dots indicate the maximum statewide emissions consistent with the Vermont Global Warming Solutions Act requirements to be achieved by January 1st of 2025, 2030, and 2050.

Beginning in 2024, a supporting companion document was published with the annual Inventory, detailing the methodologies and data used to inform the Inventory. This methodology document also discusses data and methods for supplemental analysis related to Land Use and Land Use Change (LULUCF) sources and sinks, providing links to relevant reports.² The Science and Data Subcommittee of the Council is responsible for reviewing and providing feedback on any updates to the inventory methodology. To ensure that Vermont fulfills its legal obligations, it is important that our tracking methods continue to be as transparent and accurate as possible.

Vermont Pathways / LEAP

In support of the 2020 Comprehensive Energy Plan and the 2021 Climate Action Plan the state commissioned development of the Vermont Pathways model in the Stockholm Environment Institute's Low Emission Analysis Platform (LEAP). In contrast to the *Vermont Greenhouse Gas Inventory and Forecast* which presents historic emissions, the Vermont Pathways model utilizes existing data and projections of activity across a wide range of economic sectors to forecast emissions of greenhouse gases and other pollutants. It includes representations of numerous greenhouse gas reduction measures, including data related to their installation and operational costs and their energy use. The model includes a baseline case (often referred to as "business-as-usual") that projects future emissions based on the on-going effects of current policies, as well scenarios developed from that baseline designed to explore the changes in emissions and costs of implementation of different approaches to reduce emissions. The model also provides estimates of key indicators such as the number of weatherization projects completed, the number of electric vehicles in service, and the number of heat pumps installed by year and in total necessary to achieve the emissions target for a given scenario.

Since its initial development, the Vermont Pathways model has been significantly updated twice: once in support of the Analysis of Buildings/Thermal Energy Sector Emissions Reduction Policies for Vermont (discussed below); and a second time in support of this update of the Climate Action Plan ("2025 update").

The 2025 update includes a comprehensive update of the baseline scenario assumptions for all the sectors represented in the model, which mirror the sectors accounted for in the *Vermont Greenhouse Gas Inventory and Forecast*. The model results presented below were provided to the Agency of Natural Resources just as this Climate Action Plan was being published and have not been reviewed by the Climate Council.

The updated baseline incorporates two changes from the previous version worth noting. First, the calibration factors for each sector were updated so that modeled emissions aligned with reported emissions from the 2024 *Vermont Greenhouse Gas Inventory and Forecast* report. Second, implementation of the Advanced Clean Cars II and Advanced Clean Trucks regulations

was removed from the baseline scenario due to uncertainty regarding the waiver granted to California, and by extension to other states, to allow those regulations to become effective. As a result emissions are 0.887 million metric tons carbon dioxide equivalent (MMT CO₂e) / 13.4% higher in 2029 and 0.420 MMT CO₂e / 8.8% higher in 2049 as compared to the previous version of the baseline scenario.

The update also includes four mitigation scenarios. These scenarios implemented the twenty-six mitigation measures³ represented in the model on different schedules in order to explore the potential effects on emission reduction trajectories and net costs or savings. Those scenarios and their emission reductions relative to 1990 emissions, along with the GWSA target reductions and the revised baseline reductions are presented below.

Table 9: Percent Greenhouse Gas Emission Reductions as compared to 1990

	2029	2034	2049
GWSA Requirement	40%	N/A	80%
Baseline	14%	26%	41%
Scenario 1: all mitigation measures implemented over the entire modeling period (2024-2050)	29%	53%	78%
Scenario 2: societally cost-effective measures ⁴ implemented over the modeling period, with non-cost-effective measures implemented 2039-2050	25%	44%	72%

³ Mitigation measures are increased behind-the-meter solar PV, B100 in heavy-duty vehicles, manure management, wastewater methane abatement, ozone-depleting substances substitution, semiconductor manufacturing measures, enhanced agricultural soil sequestration, reduced enteric fermentation, commercial building advanced wood heat, fossil water heating phase-out by 2040, fossil cooking phase-out by 2040, district heating projects, commercial building heat pumps, managed EV charging, residential building heat pumps, E15 ethanol blending in gasoline, vehicle-to-grid technology, B20 biodiesel, B100 heating fuel, sustainable aviation fuel, B100 for industrial processes, renewable natural gas for industry, biogas, light duty internal combustion motor vehicle sales phase-out by 2035, vehicle miles traveled reductions, weatherization at scale

⁴ Social cost includes measure implementation costs, operational costs or savings as compared to baseline, and the social cost of avoided greenhouse gas emissions. Societally cost-effective mitigation measures are increased behind-the-meter solar PV, B100 in heavy-duty vehicles (implemented 2034-2050), B100 heating fuel, B100 for industrial processes, B20 biodiesel, sustainable aviation fuel, E15 Ethanol, manure

Scenario 3: implementation of societally cost-effective measures only through 2050	28%	49%	69%
Scenario 4: societally cost-effective measures plus weatherization implemented over the entire modeling period, with the remainder of the non-cost-effective measures implemented 2039-2050	25%	44%	72%

The results of the scenario analysis illustrate the challenge with achieving the 2030 requirement currently established in state statute. Scenarios 2, 3, and 4 also present the progress anticipated by 2035 to provide context for the impact of implementation over time.

Although Scenario 1 fully implements all twenty-six of the mitigation measures represented in the model in all sectors, as noted above the emission reductions achieved are less than the GWSA emissions reduction requirements for both 2030 and 2050. To achieve a 40% reduction by 2030 would have required increasing the assumed measure adoption/implementation rates for one or more mitigation measures. Tables showing the level of implementation of selected measures are presented later in this section. This scenario results in cumulative savings of \$6.06 billion in 2050 as compared to the baseline scenario with the primary benefit being savings from avoided fuel costs. This scenario becomes net cost beneficial in 2031. In 2030 it is \$9 million more costly than the baseline.

Scenario 2 delays implementation of measures that are not cost-effective until 2039. This results in a 44% reduction by 2035 with cumulative savings of \$2.65 billion as compared to the

management, wastewater methane abatement, ozone-depleting substances substitution, semiconductor manufacturing measures, enhanced agricultural soil sequestration, reduced enteric fermentation, commercial building advanced wood heat, fossil water heating phase-out by 2040, fossil cooking phase-out by 2040, district heating projects, commercial building heat pumps, managed EV charging, residential building heat pumps

baseline. Cost savings as compared to baseline in 2050 are \$7.52 billion, approximately 25% more than Scenario 1.

Scenario 3 implements only societally cost-effective measures over the entire modeling period. As expected, this results in the greatest net savings of all scenarios - \$1.01 billion by 2030, \$2.92 billion by 2035, and \$10.17 billion by 2050. This scenario does not achieve a 40% reduction until 2032 and does not achieve the 80% reduction by 2050 target.

Scenario 4 adds weatherization retrofits to the list of cost-effective measures being implemented over the entire modeling period. This scenario results in nearly identical emission reductions as compared to Scenario 2 in all years. Including weatherization projects throughout the modeling period results in cumulative net savings by 2035 of \$2.18 billion, approximately \$474 million less than Scenario 2. However, the effect of early weatherization projects results in cumulative net savings by 2050 of \$7.6 billion, \$85 million greater than Scenario 2.

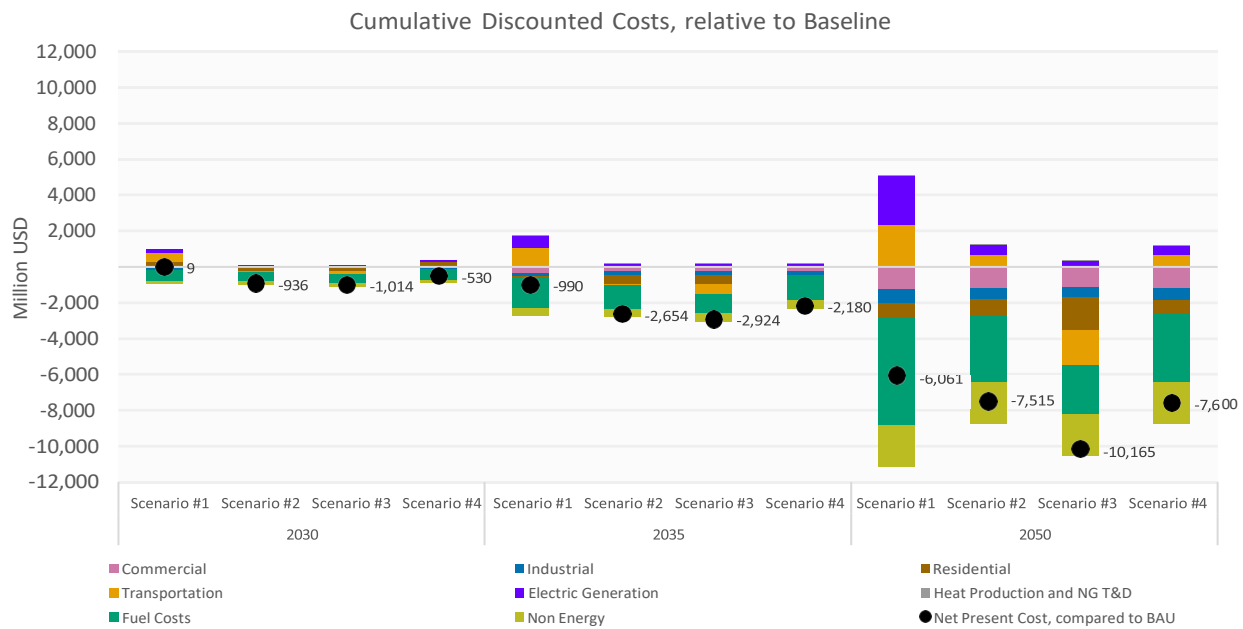


Figure 19: Costs/Savings of Scenarios versus Baseline, including social costs of GHGs

Note that the costs/savings results from the model are inclusive of the social cost of greenhouse gases, which is described in more detail below. Among the costs that the social cost

of greenhouse gases estimates are the increased costs due to negative health outcomes related to pollutant emissions, but those costs are not specific to Vermont. In addition, several measures (e.g. weatherization, EVs) produce health benefits to Vermonters that are not related to greenhouse gas emissions. Those benefits were not included in the benefit-cost analysis. However, a health benefits study performed in support of a prospective regional transportation sector cap-and-invest program in the northeast United States concluded that positive health outcomes would likely result from decreased combustion emissions from motor vehicles and an increase in non-motorized transport modes.⁵

Given that the social cost of greenhouse gases estimates the avoided costs of emissions that accrue to society worldwide over decades, the cumulative net cost analysis was performed minus that adjustment in an effort to present a rough estimate of the costs/benefits at the state scale of the various mitigation scenarios. The analysis likely overestimates costs to some extent as there are benefits embedded in the social cost of greenhouse gases that do accrue to Vermonters, but development of state-level cost of greenhouse gas emissions values was beyond the scope of this modeling effort. As expected, net costs increase in all scenarios as compared to the analysis with the social cost of greenhouse gases included. Scenario 3 (cost-effective measures) results in net benefits from 2030 onward with \$1.66 billion in net benefits by 2050. Scenario 2 (delayed implementation) is net beneficial by 2030 and 2035 but has cumulative net cost of \$1.26 billion by 2050. Scenario 4 has a net cost of \$307 million by 2030, is net beneficial (\$9 million in net savings) by 2035, and has a cumulative net cost of \$1.2 billion by 2050. Scenario 1 shows net costs over the entire modeling period, with a cumulative net cost of \$5.73 billion by 2050; over 4 times the average net cost of scenarios 2 and 4 (\$1.23 billion).

⁵ Fallon Lambert, K. et al, "Air Quality, Health and Equity Impact Assessment of the Transportation Climate Initiative", American Geophysical Union, Fall Meeting December 2020, abstract accessed at <https://ui.adsabs.harvard.edu/abs/2020AGUFMA111.0003F/abstract>

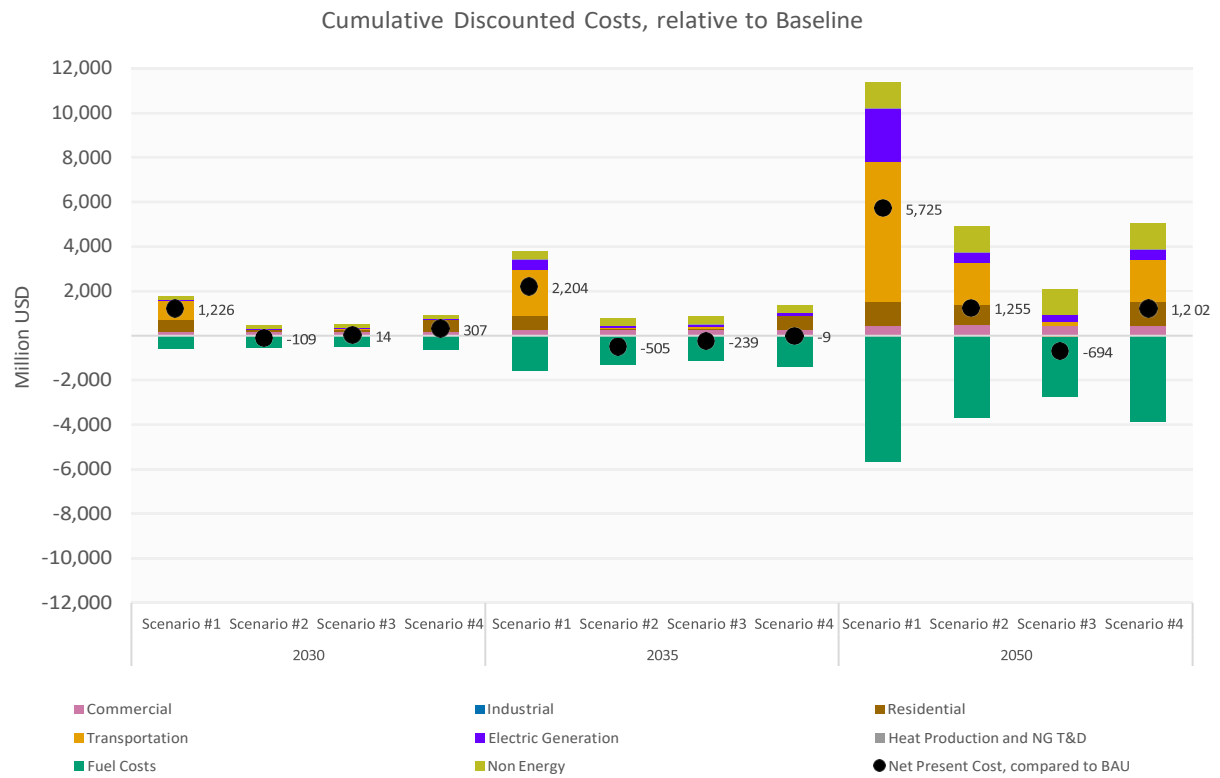


Figure 20: Costs/Savings of Scenarios versus Baseline, excluding social costs of GHGs

Indicators from the two sectors that make up the majority of the state’s emissions, transportation and residential/commercial/industrial heating, illustrate the level of mitigation measure adoption necessary to achieve the emission reductions noted above:

Table 10: EV/PHEVs

	Number of Vehicles					Percent of Fleet			
	2025	2029	2034	2050		2025	2029	2034	2050
Baseline	21,870	66,543	153,342	281,920		4.0%	12.2%	29.3%	64.0%
Scenario 1	22,633	79,075	187,724	418,759		4.1%	14.5%	35.9%	95.0%
Scenario 2	21,870	66,543	153,342	339,341		4.0%	12.2%	29.3%	77%

Table 11: Heavy-Duty EV/PHEV- Number of Vehicles / Percent of Fleet

	Number of Vehicles					Percent of Fleet			
	2025	2029	2034	2050		2025	2029	2034	2050
Baseline	510	784	1,957	4,246		1.0%	1.4%	3.3%	6.7%
Scenario 1	793	4,727	15,044	51,343		1.5%	8.3%	25.1%	80.1%
Scenario 2	525	834	2,050	20,878		1.0%	1.5%	3.4%	32.9%

Table 12: Residential Weatherization Retrofits

	Average Annual Retrofits					Cumulative Retrofits			
	2025	2026-2029	2030-2034	2045-2049		2025	2029	2034	2049
Baseline & Scenario 3	5,845	3,969	2,254	2,199		5,845	21,722	32,992	65,719
Scenarios 1 & 4	11,613	11,613	7,262	6,174		11,613	58,064	94,373	186,987
Scenario 2	2,345	2,345	2,345	20,591		2,345	11,726	23,452	166,243

Table 13: Heat Pump Installations

	Average Annual Housing Units Switching to Heat Pumps					Cumulative Housing Units			
	2025	2026-2029	2030-2034	2045-2049		2025	2029	2034	2049
Baseline	5,003	1,118	4,927	2,362		5,003	9,474	34,108	96,430
Scenario 1	6,018	1,859	5,973	3,147		6,018	13,452	43,317	117,502
Scenario 2	5,251	1,086	5,558	3,759		5,251	9,594	37,384	117,049
Scenario 3	5,538	1,218	5,552	3,242		5,538	10,409	38,168	113,721

Marginal Abatement Cost Analysis⁶

This report, released in 2022, provided additional analysis and information on the emissions abatement potential and costs for each of the mitigation measures represented in the original version of Vermont Pathways. The analysis examined two timeframes. The first scenario implemented the measures only through 2030 but accounted for savings realized through 2050. The second implemented the measures through 2050 and accounted for savings and costs through 2050. The results showed a wide range of both emission reduction potential for each measure and their cost. Three measures, all in the residential sector (fossil cooking phase-out, fossil water heating phase-out, and heat pump space heating) had savings in the range of \$140-\$400 per metric ton reduction in both scenarios. Two transportation measures (internal combustion sales phase-out by 2035 and E15 motor fuel) had costs ranging from \$0.32 to \$50.04 per metric ton reduction in both scenarios. Four measures across three sectors (transportation, residential, industrial) had costs ranging from \$132 to \$972 per metric ton reduction. Two residential sector measures (weatherization at scale and advanced wood heating) had significant savings in the 2030 scenario but significant costs in the 2050 scenario, due in part to decreasing opportunities for savings for measures implemented after 2030 due to ongoing decarbonization of energy.

Analysis of Buildings / Thermal Energy Sector Emissions Reduction Policies for Vermont⁷

In 2023 ANR released a study of a suite of policies for reduction of greenhouse gas emissions in the buildings/thermal energy sector. The study utilized the Vermont Pathways model and several external spreadsheet workbooks to explore the efficacy and comparative cost of three

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<https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/MAC%20Curve%20Deliverable%20Memo%20Clean%20Version.pdf>

⁷

https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/VT%20Thermal%20Analysis%20Final%20Report%2011_28%20revisions.pdf

overarching policy options (expansion of existing programs in the buildings/thermal energy sector, a clean heat standard, and a cap-and-invest program) under two different emission trajectory scenarios (40% reduction in emissions from 1990 level by 2030, and the same reduction by 2035). It also examined a bundle of regulatory measures that would achieve the 40% reduction in emissions by 2030. The study made several findings, including:

- Achievement of reductions were made easier due to availability of federal and state funding, however additional policies and programs were required to meet emission reduction targets;
- Many of the emission reduction measures considered would reduce energy costs for consumers that are able to implement them; and
- The cost of fossil fuels would need to increase to recover program costs.

Transportation Carbon Reduction Study⁸

In 2023 the Vermont Department of Transportation (VTTrans) released their Carbon Reduction Study, analyzing a collection of mitigation measures in the transportation sector to understand how current programs affect greenhouse gas emissions and to assess future policy options and investment strategies towards the reduction of transportation emissions. The baseline forecast from this analysis indicated transportation sector emissions in carbon dioxide equivalents would be 0.4 million metric tons over the transportation sector's target emissions to achieve a 40% reduction from 1990 levels by 2030 and 0.1 million metric tons over the 80% reduction by 2050 target. The majority of transportation emissions are from and are forecast to continue to be from motor vehicles (cars and trucks) operating on Vermont's roadways. The study concluded that achieving transportation sector emission reductions consistent with the Global Warming Solutions Act targets requires measures beyond the simple expansion of current programs and projects. Development and implementation of additional innovative policies and programs is necessary to move towards more rapid decarbonization

⁸<https://vtrans.vermont.gov/sites/aot/files/climate/VTrans%20Carbon%20Reduction%20Strategy%20Final.pdf>

Life Cycle Emissions Study⁹

Act 18 of 2023 amended 10 V.S.A. §582 Greenhouse Gas Inventories; Registry to require an annual supplemental accounting of upstream and lifecycle greenhouse gas emissions from liquid, gaseous, solid geologic and biogenic fuels combusted in Vermont. Subsequently the ANR commissioned an analysis of the life cycle emissions from sources of energy, both electricity and thermal, used in Vermont. The study was delivered in April 2024. The analysis combined emissions from the existing Vermont Greenhouse Gas Emissions Inventory for the energy sector with the upstream emissions occurring due to use of energy in the state to determine total Vermont energy sector life cycle emissions for the time series 1990-2020. It concluded that the percentage of total energy sector emissions from upstream sources ranges from 17% to 21%. Upstream emissions from petroleum products were consistently the highest contributor to the transport and RCI sectors.

Clean Heat Standard Assessment of Thermal Sector Carbon Reduction Potential in Vermont (CHS Potential Study)

The Affordable Heat Act (Act 18 of 2023) required the Department of Public Service to undertake a study to assess and quantify the technical, economic, and maximum achievable potential for greenhouse gas emission reductions in the building thermal energy sector. In September 2024 PSD's contractor, NV5, delivered their report¹⁰ which analyzed those three scenarios and a fourth scenario that prioritized implementation of cost-efficient life cycle emission reductions to meet the sector reductions specified in Act 18. The study developed a mix of mitigation measures that achieved the by 2030 and by 2050 building thermal sector proportional share of the reductions required in Vermont's Global Warming Solutions Act. This scenario relied heavily on a rapid transition to biofuels in the short-term to achieve the by 2030 reductions coupled with a steadily increasing number of buildings switching to heat pumps to

⁹ https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/VT_GHG_EnergySector_LCA_May2024.pdf

¹⁰ <https://publicservice.vermont.gov/clean-heat-standard/public-service-department-thermal-sector-carbon-reduction-potential-study>

achieve the by 2050 target. The estimated cumulative societal net benefits of this scenario were \$124 million through 2029 and \$2.14 billion through 2049. The majority of the benefits are generated by avoided social economic and environmental damages and avoided fossil fuel (fuel oil and propane) consumption, while the majority of the costs are due to incremental mitigation measure costs (e.g. cost associated with heat pump installation) and increased consumption of biofuels and renewable fuels.

The report also included an analysis of the state's workforce's ability to deliver clean heat measures. While the results vary by measure, in general the state's clean energy workforce will require expansion through 2049, with the most significant need for single-family home weatherization workers.

Cap-and-Invest Study¹¹

In early 2025 VTrans released a study, developed cooperatively with ANR, analyzing the effect of Vermont's participation in a multi-jurisdictional cap-and-invest program covering the state's transportation sector and potentially the thermal energy sector. The two candidate programs considered were the linked California and Quebec programs (the Western Climate Initiative or WCI) and the prospective New York Climate Initiative (NYCI). The study concluded that Vermont's participation in either of these programs would support additional progress toward meeting the state's emission reduction targets. However, due to the time required to develop and promulgate regulations, develop other program support measures, and ultimately link with another program that cap-and-invest would not enable Vermont to reduce emissions to the level required by the GWSA by 2030. As directed by statute, the Treasurer's Office reviewed this study. The Treasurer recommended Vermont not consider joining WCI as this time given concerns about work needed to insulate low- and moderate-income Vermonters from the resulting increased fuels costs but rather wait for and analyze the details of the NYCI when they become available.

¹¹https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Vermont_Climate_Council/VT%20Cap-and-Invest%20Report_Final.pdf

Social Cost of Greenhouse Gases

Background: As part of the Initial Vermont Climate Action Plan (CAP) adopted by the Vermont Climate Council (VCC) in December of 2021, estimates of the Social Cost of Carbon (SCC) and of other greenhouse gases were recommended for use in Vermont.¹² At the time the Initial Vermont Climate Action Plan was adopted, the federal government was in the midst of a comprehensive update to Social Cost of Greenhouse Gases (SC-GHG) estimates to reflect the latest science.

The SC-GHG puts a dollar value on the harm caused by releasing one ton of greenhouse gases into the air. The SC-GHG estimates the value of all future climate impacts (both negative and positive) – like farm productivity, health effects, flood damage and other forms of extreme weather, energy disruptions, conflicts, migration, and ecosystem harm – on society worldwide.

However, current estimates miss some impacts because of data gaps and modeling limits. When certain damages can't currently be quantified, they're essentially counted as zero. This means the real cost of climate pollution is likely higher than is currently reflected in the SC-GHG. The SC-GHG gives policymakers a way to compare the economic benefits of cutting emissions against the costs of climate action, though the true benefits are probably underestimated.

Adopted recommendation

Based on a) the EPA's updated Social Cost of Greenhouse Gases (SC-GHG) estimates developed in response to the National Academies of Sciences, Engineering, and Medicine (NASEM) recommendation to incorporate the latest science in estimates of SC-GHG values and b) consistent with the 2021 Initial CAP recommendation to "update[e] the Social Cost of Carbon and discount rate on a regular basis, taking into account new research", the Science & Data

¹² See pages 52-55. [Initial Vermont Climate Action Plan](#), Vermont Climate Council, December 2021

Subcommittee unanimously advanced and the Vermont Climate Council unanimously adopted the following recommendations:

- 1) Vermont should utilize the EPA’s updated SC-GHG estimates as provided in the [Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances](#) from November, 2023¹³ for benefit cost analysis of activities that impact greenhouse gas (GHG) emissions and for GHG emissions-related rules adopted or amended pursuant to 10 V.S.A. chapter 24 and the Climate Action Plan.
- 2) The EPA’s Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances from November, 2023 shares SC-GHG estimates calculated with 1.5%, 2%, and 2.5% discount rates, with 2% selected as the central discount rate. For clarity, we recommend a central discount rate of 2%, as used by the EPA and recommended by a leading panel of economists in the United States.¹⁴ While the estimated social cost per ton of emissions varies by greenhouse gas and the year it is emitted, for reference, the 2023 EPA report establishes an estimated social cost of \$190 per ton of CO₂ emitted in 2020 when utilizing a 2% near-term discount rate.¹⁵
- 3) The Science & Data Subcommittee of the VCC will continue to track the latest and most relevant scientific literature regarding social cost of greenhouse gas estimates, including any updates released by the federal Interagency Working Group on the Social Cost of Greenhouse Gases or its successors that are in line with NASEM recommendations. What Vermont uses for SC-GHG should continue to be based on NASEM recommendations and the best available science.

¹³ https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf

¹⁴ Rennert, K., Errickson, F., Prest, B.C. *et al.* Comprehensive evidence implies a higher social cost of CO₂. *Nature* 610, 687–692 (2022). <https://doi.org/10.1038/s41586-022-05224-9>

¹⁵ See page 4, https://www.epa.gov/system/files/documents/2023-12/epa_scghg_2023_report_final.pdf Note: for comparison, among the SCC values adopted as part of the 2021 Climate Action Plan, the estimated social cost of CO₂ emitted in 2020 when utilizing a 2% near-term discount rate was \$121 per ton.

Transportation Pathways for Mitigation

Challenges and opportunities in the transportation sector

The implications of fossil dependence in a rural state

Transportation – the movement of people and goods – is essential to the state’s economy and Vermonters’ quality of life. Due to the state’s rural character and low population density, Vermonters depend primarily on personal vehicles – as opposed to public transit – to get them where they need to go. Over 97% of those vehicles rely on fossil gasoline and diesel fuels. This combination of factors makes transportation Vermont’s largest source of climate pollution, now 39% of our greenhouse gas emissions.¹ It is also a significant reason why Vermont emits more greenhouse gasses per capita than any other state in New England.² Transforming the state’s transportation system with cleaner vehicles and multiple transportation options to support getting where people need to go is essential to meeting the emissions reduction requirements of the [Global Warming Solutions Act](#). In addition, cleaner, more multi-modal transportation options can have significant public health benefits (and cost savings) by reducing exposure to the air pollutants caused by gasoline and diesel burning and by expanding active modes of transportation.³

Vermont families and businesses spend more than \$1 billion per year on fossil fuels for transportation, representing about 45% of Vermont’s total annual fuel bill.⁴ Electric vehicles (EVs) are inherently more energy-efficient than conventional combustion vehicles, so as more Vermonters transition to EVs, we expect to see reduced transportation emissions and transportation fuel and maintenance costs for EV drivers.⁵ Policies to accelerate that transition are key elements in this CAP.

¹ https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/1990-2021_GHG_Inventory_Uploads/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2021_Final.pdf

² EAN, Assessing Vermont’s Climate Responsibility, Updated March 2025.

³ https://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_CH_Transportation-Health.pdf

⁴ [EAN, Fossil Fuel Sales in Vermont report](#), 2025.

⁵ At current average electricity rates in Vermont, electric vehicles can be fueled at approximately half the cost of gasoline vehicles, [EAN 2024 Annual Progress Report](#). The size of the EV cost advantage will vary depending on

Lower-income Vermonters spend a greater proportion of their incomes on energy than upper income families. Transportation costs – primarily through owning, operating and maintaining a vehicle – make up about 45% of total energy expenditures for the average Vermont household. And because energy expenditures constitute a greater percentage of the household budget of lower income Vermonters, this reality places a disproportionate economic burden on these households.⁶ Transportation recommendations in this CAP also aim to improve energy equity through thoughtful program design, incentives or new and expanded programs.⁷

Research also highlights that vehicle ownership is a significant requirement for job access and retention for lower income Vermonters.⁸ Research found that “possession of a driver’s license and a car was a stronger predictor of leaving public assistance than even a high school diploma,” which speaks to the importance of vehicle access and ownership as an important justice issue.⁹

While the operating costs of electric vehicles are lower on an annual basis, the often-higher upfront cost of electric vehicles presents a barrier to getting EVs into the hands of households that can benefit most from the long-term cost savings. The relatively high cost of EVs and the limited number of pre-owned EVs available for purchase in Vermont means that EV uptake among lower income households has been lower than among more affluent households. Finding a continued source of funding for upfront incentives is essential to expanding the uptake of EVs among energy burdened households in the state.

changes in the price of electricity relative to the prices of gasoline and diesel fuel. Policies that limit avoidable increases in the price of electricity are an important factor in promoting electric vehicles and beneficial electrification generally.

⁶ <https://www.efficiencyvermont.com/Media/Default/docs/landing-pages/energy-burden-report/2023-EfficiencyVermont-EnergyBurdenReport.pdf>

⁷

https://publicservice.vermont.gov/sites/dps/files/documents/Pubs_Plans_Reports/Legislative_Reports/2021%20Annual%20Energy%20Report%20Final.pdf

⁸ https://ljfo.vermont.gov/assets/Uploads/9bc271c390/Reach-Up-Annual-Report_FINAL_2020.01.15.pdf

⁹ <https://www.sierraclub.org/sites/www.sierraclub.org/files/sce-authors/u2196/Arrive%20Together%20Transportation%20Access%20and%20Equity%20in%20Wisconsin.pdf>

Transportation strategies to lower costs and reduce climate pollution

The GWSA requires us to take a comprehensive look at the pathways needed to reduce climate pollution, fuel costs and energy burdens. In the transportation sector as in the other sectors covered in the CAP, there is no single “silver bullet” policy to meet these goals. Achieving these goals will require short-term actions to sustain funding as well as serious consideration of tradeoffs inherent in each policy decision. This CAP covers the sector broadly by recommending four key pathways:

- Adopt a **cap and invest program**, including the transportation sector, to achieve GWSA obligations and create a sustainable revenue source for carbon- and cost- reducing transportation programs. We emphasize here, as we do in more detail elsewhere in the Chapter, that provisions to ensure equity in the design of the cap and in the distribution of benefits are essential elements of the cap-and-invest program that the CAP recommends.
- Reduce greenhouse gas emissions through **performance standards for vehicles**.
- Lower the **carbon intensity of fuels**.
- Reduce **dependence on private vehicles** through smart land use strategies and multi-modal transportation programs.

Together, these strategies will not only improve health outcomes and save Vermonters money but also set the state on a course to reduce transportation-related carbon pollution and more equitably shift to a cleaner, more accessible transportation system.

Pathway 1: Join a multi-jurisdictional cap and invest program covering transportation fuels and emissions

Vermont has made progress in transportation sector regulatory policy since the initial Climate Action Plan was adopted, particularly with the adoption of California’s Advanced Clean Cars II and Advanced Clean Trucks standards (see Pathway 2). However, these new vehicle performance standards (which would apply, by definition, only to new vehicles purchased in Vermont or another participating state) are not yet in effect. There is also a possibility that

these rules will be delayed or their implementation barred by policy changes at the federal level. In sum, the clean cars programs are important but insufficient on their own to meet the GWSA's emission reduction requirements.

To make needed progress, Vermont must advance a primary regulatory or policy tool to reduce emissions – equitably and with certainty – in line with the obligations of the GWSA. The Climate Council has identified preparing for and joining a carbon cap and invest program, such as the Western Climate Initiative (WCI), or the New York Cap and Invest Initiative (NYCI), as the preferred approach to meeting the GHG emissions obligations in the GWSA.¹⁰ Vermont has successfully participated in a similar cap-and-invest program for the power sector, the Regional Greenhouse Gas Initiative (RGGI) since 2009.

At the same time, there is recognition that additional policies will be needed to accelerate the pace of low-emission vehicle sales, to enhance public transportation options, to deploy electric vehicle charging points and to provide transportation assistance to lower-income Vermonters. As this CAP is being written, we do not know the details of the NYCI program. However, we do know that participating in a cap-and-invest program could be a powerful means of reducing climate pollution, lowering overall transportation costs, and supporting more equitable transportation options.

[As re-affirmed by the Vermont Climate Council in November 2022](#), it remains clear that “(t)he only currently known policy options for which there is strong evidence from other states, provinces and countries of the ability to confidently deliver the scale and pace of emissions reductions that are required of the transportation sector by the GWSA are one or a combination of: a) a cap and invest/cap and reduce policy covering transportation fuels and/or b) a performance standard/performance-based regulatory approach covering transportation fuels.”

¹⁰ To be sure, the Western Climate Initiative stated in spring 2025 that it was not currently accepting new members, and New York has yet to implement its initiative. As of the writing of this Plan, there is not an immediate opportunity for Vermont to join a multi-state cap-and-invest program. However, this plan calls for taking the steps needed to join such a multi-state initiative in the future. The Council also recommends taking complementary actions to reduce emissions.

In this CAP, the Council continues to support this conclusion. The Council, however, also points to two reports since this 2022 statement that help provide more guidance on the ability of a cap-and-invest initiative to deliver the scale and pace of emissions reductions envisioned under the GWSA. One report is a [technical study presented in early 2025](#). In addition, [the Office of the State Treasurer issued a report](#) responding to the technical work.

That is why, in this pathway, we recommend taking both administrative and legislative steps to monitor cap-and-invest options and undertake the necessary steps for Vermont to join a program, including: establishing the necessary reporting system within the ANR so that sales data and emissions rate baselines can be set, designing tools to address affordability concerns, and readying the state to receive and deploy potential program proceeds. These steps and others will support Vermont in joining a multi-state cap-and-invest program and should begin as soon as possible.

Pathway 2: Continue to participate in and to defend emissions performance standards for vehicles.

As recommended in the 2021 Climate Action Plan, Vermont moved forward with the adoption of the next phase of our state's long-standing participation in California's clean vehicle programs. In 2022, Vermont adopted both the Advanced Clean Cars (ACC) II program and the Advanced Clean Trucks (ACT) regulation. ACC II promotes the electrification of light-duty cars, requiring automakers to deliver a gradually increasing percentage of zero-emission vehicles into the Vermont market, eventually putting the state's car and light truck sales on a pathway toward 100 percent new electric vehicle sales by 2035. The ACT rule requires manufacturers to produce and sell an increasing percentage of zero-emission trucks and buses annually through 2035. Both programs – ACC II in particular – are foundational to achieving the targets of the GWSA and ensuring cleaner, more affordable vehicles are delivered to Vermont.

In recent actions, the federal government and other actors have sought to repeal California's (and thus Vermont's) authority to implement ACC II. Because implementing these rules is

essential to achieving needed emission reductions in Vermont, this CAP recommends a set of administrative actions to defend the ANR's authority to adopt ACC II, including working with other states on this and related regulations. We also recommend that the Attorney General join and participate in any litigation defending California's authority under the Clean Air Act.

Pathway 3: Continue transportation electrification by supporting the availability, accessibility, and affordability of EVs and reliable EV charging options

The beneficial electrification of transportation is an essential component of Vermont's clean energy future. We recommend a suite of policies and programs to advance the use of EVs in Vermont broadly and to make EVs affordable for lower-income Vermonters in particular.

Recommendations include ensuring long-term consistent funding for EV incentives to low- and moderate-income vehicle purchasers; and the equitable deployment of fast-charging and Level 2 charging stations, in line with the [Vermont Agency of Transportation's Electric Vehicle Infrastructure Deployment Plan](#).

Since the last CAP, Vermont has leveraged an unparalleled influx of federal funds to support investments in cleaner transportation. That included significant investments in electric vehicle incentive programs and EV charging infrastructure, helping support thousands of Vermonters in reducing pollution and saving money by switching to electric vehicles, with nearly 18,000 EVs registered in Vermont as of January 2025.¹¹ Federal and state funds also enabled significant investments in climate and equity-focused programs, like Mileage Smart and Replace Your Ride. Restarting and expanding electric vehicle point of sale purchase or lease financial incentives is important in that it can be an important consideration as car owners are deciding which vehicle to purchase, knowing that vehicle – whether fossil-fueled or an EV – may be on the road for a decade or more.

Many new and used electric vehicles are now available for purchase. They are more energy efficient than gas powered vehicles and cost far less per mile than a gas-powered vehicle to

¹¹ https://www.driveelectricvt.com/uploads/media/Documents/Maps/vt_ev_registration_trends.pdf

own and operate over time.¹² This means that rural Vermont drivers can see significant savings. A recent study estimated that a typical rural driver can save approximately \$1,500 per year by switching from a conventional gasoline car to a comparable electric vehicle, made even more significant over the life of the vehicle ¹³

This section and the related recommendations of the CAP focus on electrification of vehicles. However, aviation sector fuel switching is also actively advancing. Electric aviation has the potential to measurably reduce transportation sector emissions. Electric aircraft are currently being manufactured and tested in South Burlington by BETA Technologies, which has collaborated with VTTrans to install two aircraft chargers at two state airport facilities. Reduced reliance on road vehicles for the movement of cargo and passengers in the years to come, has the potential to save both emissions and time.

Pathway 4: Invest in public, active, and shared transportation and support smart growth development patterns

This CAP, like its predecessor, recommends a range of programs and policies that can reduce emissions, improve public health, and provide improved mobility options to Vermonters. Avoiding car trips, reducing car trip lengths, and/or replacing car trips with clean and energy efficient transit, biking and walking options, carpool and rideshare programs and other non-single occupancy vehicle strategies have economic, equity and public health benefits – while also delivering climate emissions reductions. These policies are important for a host of reasons, even though they are unlikely to deliver the scale of GHG reductions that the GWSA requires and that the other three pathways in this section would accomplish – especially in the near term. Some of these options (e.g., carpooling and remote work options) can be implemented in the near term while some (e.g., building a bike path) may take a few years. On the other hand, building out a planned “smart growth” community center will take decades to meaningfully affect climate emissions.

¹²<https://eanvt.org/wp-content/uploads/2025/01/EAN-APR-2024-updatedJan2025.pdf> (Pages 5, 22)

¹³ <https://www.ucsusa.org/about/news/rural-communities-could-benefit-most-electric-vehicles>

Buildings & 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.¹ This Chapter tackles thermal costs 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 heating fuels, the vast majority of which left the state's economy.² 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 income.

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 1939.³ 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.⁴ Vermonters rely on a variety of resources to heat

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

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's meeting its climate commitments. It will also support Vermont's economy because more of the money Vermonters spend on heating will stay in state.⁵ 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 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.

The first challenge is 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-

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.

term cost impacts⁶. For this reason, we recommend including clear cost caps or price caps in the design of the thermal policies included in the Plan.

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 RPS, and the cap-and-invest policy of RGGI. 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.

This Chapter contains recommendations that 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. Those 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.

The second challenge is the 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

⁶ See, e.g. [The Analysis of Buildings/Thermal Energy Sector Emissions Reduction Policies for Vermont](#), (2023, commissioned by the ANR); and <https://puc.vermont.gov/sites/psbnew/files/documents/second-checkback-report-on-clean-heat-standard-act-18-011525.pdf> (2024, PUC analysis delivered to the legislature).

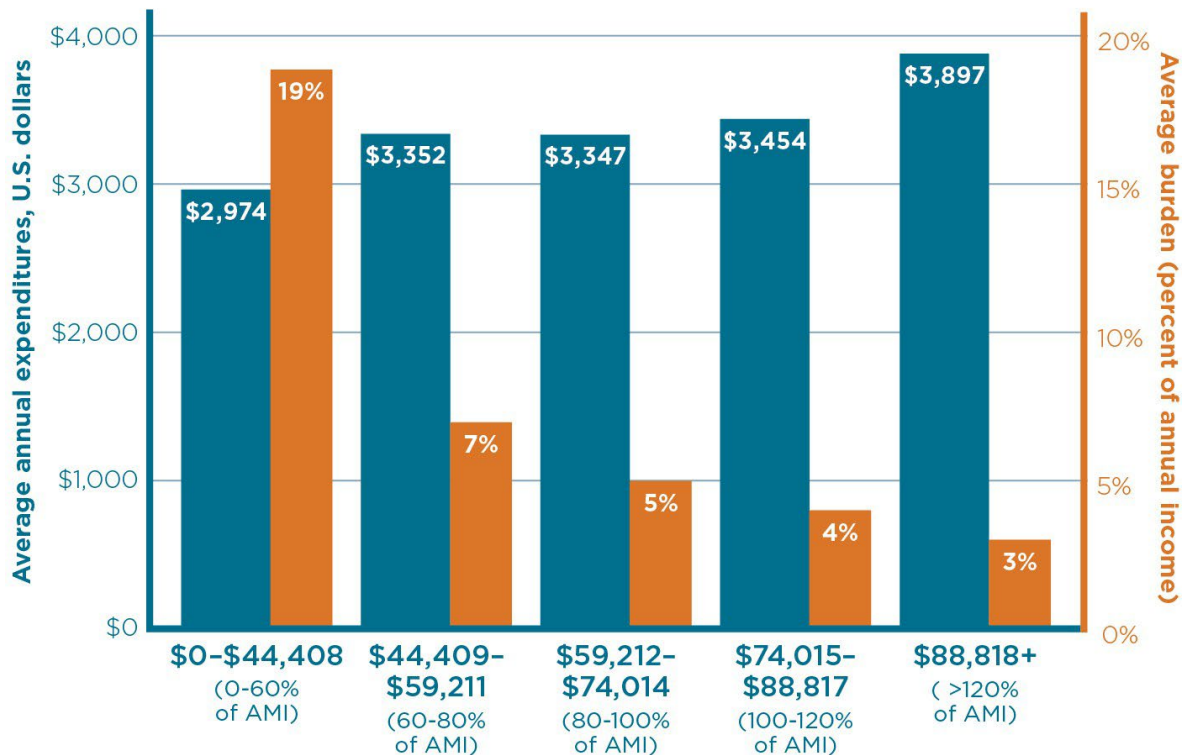
with the cost burdens associated with housing and energy use. In 2019 Efficiency Vermont studied energy burdens in the state and determined that, on average, Vermonters spent about 10 percent of their income, or roughly \$5,800 annually, on energy expenses. However, the actual energy burden that Vermonters face ranges statewide from 6% to as much as 20%.⁷

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 [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.⁸ This is true even though average energy consumption is higher in higher-income households.

⁷ “What is the impact of energy burden in Vermont?” (“Energy Burden in Vermont”) Rebecca Foster, Director Efficiency Vermont, October 13, 2019.

⁸ 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.



Figure 16

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.⁹ 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, a large portion of the Vermonters who rent, roughly 80%, are categorized as low-income, according to Efficiency Vermont and VHFA.¹⁰ 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

⁹ VHFA Housing Needs Assessment, p. 1

¹⁰ "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>

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

In Pathway 1 we recommend adoption of 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. 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 PUC's recent report. 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 focuses on buildings directly. We recommend ramping up implementation of the Weatherization at Scale Initiative 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.

In Pathway 3 this Plan focuses 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.

Pathway 4 focuses 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 across 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 LIHEAP’s financial support. 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.

In Pathway 5 we focus on heating fuels, recommending adoption of a performance-based clean fuels standard to reduce the greenhouse gas 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 to the legislature and could advance one of implementation options proposed by the legislature in the Affordable Heat Act.

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.

Electricity Sector Recommendations

Beneficial electrification is key to reducing climate pollution

In the preceding sections on Transportation and Buildings we set out high-level recommendations to lower emissions from the two most climate-polluting sectors of the Vermont economy. The most significant of those recommendations would accelerate the use of electric vehicles and electric heat pumps in place of existing fossil-fueled vehicles and furnaces. These new electric technologies are more efficient, less polluting, and over time, less expensive than their fossil counterparts. Providing clean electricity to power those devices is foundational for a low-emissions economy. Using electricity in this way is called “beneficial electrification.”¹

Vermont is in an especially strong position to advance beneficial electrification because our existing electric power mix is substantially lower-emitting than the power mix in other states. In 2024, Vermont’s electricity supply was 75% renewable, about 16% nuclear, and only 9% fossil-based, and electricity accounted for just 3% of the state’s total emissions.² Replacing fossil fuel-powered vehicles and heating appliances with electric technologies can significantly lower the emissions from those uses. Adding these new loads to the grid can be “beneficial” in climate terms but the right policies also need to be in place to minimize power system costs, meet reliability standards and promote climate resilience.

Expanding renewable electricity supplies

Since the release of the initial Climate Action Plan (CAP), steps have been taken to further decarbonize Vermont’s already very clean electricity supply and to enhance grid resilience. Notably, the passage of [H.289 in 2024](#), which amended Vermont’s Renewable Energy Standard (RES), addressed a recommendation in the initial CAP to move toward 100% carbon-free or renewable electricity supply by mandating a 100% renewable electricity supply for all regulated

¹ See “*Beneficial Electrification: Ensuring Electrification in the Public Interest*” (Regulatory Assistance Project, 2018).

² EAN progress report 2024 at p 11.

utilities by 2035, with some larger utilities mandated to reach that by 2030. The updated RES also includes provisions to increase the supply of in-state renewable generation along with new regional renewable energy, enhance load growth planning, and incorporate equity considerations³

Recognizing this recent legislative action, the updated Electricity Sector Priority Recommendations in this CAP focus on three interrelated and complementary areas:

- **Ensuring a strong, affordable, and resilient electric grid to support deep emissions reductions in the transportation and thermal sectors.**
- **Enabling all Vermonters to electrify their homes, businesses, and transportation affordably and equitably.**
- **Expanding access to and participation in local renewable energy programs, especially for disadvantaged communities.**

These priority recommendations are briefly summarized below.

Pathway 1: Keep the electric system strong and affordable to support beneficial electrification of buildings and transportation

In coming decades, Vermont utilities will likely need to reliably serve hundreds of thousands of new heat pumps and electric vehicles, while also interconnecting new utility-scale and distributed renewable generators and storage batteries. Ensuring that essential electric services remain both reliable and affordable is an important priority and a substantial challenge. Vermont utilities and regulators will need to employ leading-edge regulatory policies, investments and technologies in this rapidly emerging field. At least three types of actions are needed:

³ Importantly, the updated RES also includes a legislatively-mandated check-in regarding progress, or barriers that may develop, in 2029. This review, in addition to provision for waivers from the Public Utility Commission when needed, will help ensure affordability and practicality as these requirements come into effect while regional renewable energy projects evolve.

- First, to support **grid modernization and the optimal use of transmission and distribution assets**, utilities work to better leverage their system and customer data to: determine where grid-enhancing technologies may be deployed to secure the greatest value; utilize tools such as advanced metering, storage, and distributed energy resource management systems to improve the efficiency and design of necessary grid infrastructure investments; and avoid or defer grid infrastructure expansions where feasible and cost effective.
- Second, the Public Utility Commission (PUC) should continue to ensure that utilities employ **efficiency, demand response and flexible load management programs and rate structures** to manage peak loads and overall demand, and promote affordability and equity. Utilities and stakeholders should **utilize energy storage**, including both short and proven long-duration technologies, where appropriate to enhance grid flexibility, affordability, and support reliability during peak periods.
- Third, utilities should target **grid-hardening investments that improve resilience** against extreme weather events. They should coordinate these resilience investments with state and local efforts, invest in cost-effective solutions, and leverage funding where available. Expanded investments in storm resilience and preparation will be required as the effects of climate change intensify, and all sectors must glean lessons from the severe weather events Vermont has already experienced. [This topic is also covered elsewhere in the CAP].

Pathway 2: Enable All Vermonters to Choose Electrification.

In this pathway we recommend actions to support the transition to electrified transportation, heating, and industrial energy use by Vermonters. The focus in this pathway is on customer-facing policies that **facilitate customer decisions to switch from fossil to electric end-uses**.

In support of this objective, utilities should:

- Deploy cost-effective infrastructure upgrades (e.g., service panel upgrades, service drops, transformers, grid hardening) to support statewide resilience and electrification goals, through both customer-requested projects and utility projects;
- Provide electrification incentives through Tier III of RES and other programs to encourage customer decarbonization, including for low-income customers and those in multi-family housing – all the while keeping an eye on moderating electric rate impacts so as to facilitate customers’ choosing beneficial electrification options; and
- Continue to deploy innovative programs to help cost-effectively manage electric vehicles, storage, and other distributed energy resources and offer rates (e.g., time-of-use pricing) where cost-effective to encourage efficient energy consumption.

Pathway 3: Increase Access and Participation in Renewable Energy Programs.

In this pathway we seek to ensure that all Vermonters, especially low-income, rural, and frontline communities, benefit equitably from renewable electricity programs. As a foundation, policies should continue to support appropriate development of in-state renewables, in line with the updated RES Tier 2 requirements, which mandate a 20% share of new in-state renewable generation for most of the state’s consumption, consistent with the overarching goal of energy affordability.

In addition, the PUC and utilities should implement appropriate recommendations from the [Act 179](#) study regarding evolution of community-level renewable energy programs, especially for low-income customers. Utilities with PUC support and stakeholder input should enable customer enrollment programs that expand participation in local renewable energy projects, including for disadvantaged communities and low-income customers. Wherever possible utilities and developers should seek state and federal funding for community renewable projects. Such funding will lower costs for participating customers and help to keep electricity rates lower generally, in support of electrification objectives generally.

Finally, regulators and utilities should adopt and implement policies to support deployment of geothermal heating systems, including thermal energy networks, such as community scale geothermal, as an additional option to provide efficient, renewable heating and cooling services.

Vermont's electric sector has long been low emitting, and the State has made significant strides toward fully decarbonizing its electricity sector over the past decade, as noted elsewhere in the CAP. By continuing to advance these electricity sector priorities while working to maintain affordability for customers, Vermont can continue to be a leader in a clean, affordable, resilient, and community-driven energy transformation.

Non-Energy

The Climate Action Plan (CAP) continues to focus on pathways that advance the reduction of non-energy emissions. Non-energy encompasses emissions from industrial processes, solid waste, wastewater, and other sectors that contribute significantly to the state's greenhouse gas (GHG) footprint. Key sources include the use of ozone-depleting substance substitutes, semiconductor manufacturing, and fugitive methane emissions, among others. Unlike carbon dioxide (CO₂), the majority of these emissions consist of gases such as methane (CH₄), nitrous oxide (N₂O), and various fluorinated gases, which have a much higher global warming potential (GWP). For instance, sulfur hexafluoride (SF₆) is approximately 22,800 times more potent than CO₂ over a 100-year period. Given the potency and, in some cases, the short atmospheric lifetimes of these gases, reducing emissions of high GWP short-lived climate pollutants (SLCPs) is a priority for achieving impactful GHG reductions in the near term.

Taken together, these “non-energy” sources comprise about 10.5% of Vermont’s GHG emissions. This chapter outlines strategic pathways to mitigate emissions from the wastewater sector, high GWP refrigerants, semiconductor production, and solid waste.

Reducing Emissions from Refrigerants

High global warming potential (GWP) hydrofluorocarbons (HFCs) are widely used in commercial and industrial refrigeration systems, such as refrigerators and freezers. When these systems experience leaks or accidental releases, they can significantly contribute to greenhouse gas emissions. To address this issue, the 2025 Climate Action Plan outlines a strategic approach to reducing emissions from high GWP refrigerants. This involves transitioning refrigeration systems to low GWP alternatives, which is a critical step in reducing emissions from the industrial processes sector.

Vermont is actively implementing incentives to encourage the improvement or replacement of refrigeration systems. With state funding, the Vermont Energy Investment Corporation (VEIC) is providing enhanced support through increased project incentives for grocers, convenience stores, and other facilities that require refrigeration for perishable products. This support aims

to facilitate the transition to lower GWP and natural refrigerants, as well as the installation of leak-detection systems to minimize emissions from existing systems.

Additionally, the CAP recommends providing incentives for businesses to voluntarily transition from high GWP refrigerants to lower GWP alternatives. This initiative would use data collected for the Refrigerant Management Program (RMP) to target appropriate facilities, supplementing reductions achieved through the Act 65 rulemaking. Furthermore, the Plan recommends considering the inclusion of heat pumps in Act 65 to provide a comprehensive approach to managing refrigerant emissions. Moving forward on these strategies will support the reduction of emissions from refrigeration systems in buildings, and in the commercial and industrial sectors.

Continue to Explore Efficiencies and Alternatives to High GWP Fluorinated Gases in the Semiconductor Manufacturing Process

In Vermont, semiconductor manufacturing is a significant contributor to greenhouse gas emissions, accounting for approximately 34% of the total emissions in the Industrial Processes sector. Global Foundries, the state's sole semiconductor manufacturer, relies on several high global warming potential (GWP) fluorinated gases, such as sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and nitrogen trifluoride (NF₃). These gases are integral to the etching and chemical vapor deposition (CVD) processes, as well as their use as heat transfer fluids in various tools. While reducing emissions from these high GWP gases presents technological challenges, it is imperative to reaching Vermont's climate goals.

Semi-Conductor Manufacturing strategies focus on exploring efficiencies and alternatives to high GWP fluorinated gases in semiconductor manufacturing. To achieve this, Global Foundries is advancing the adoption of emission reduction technologies, such as combustion abatement units. These technologies aim to destroy high GWP gases or replace them with less harmful chemicals during the manufacturing process. Additionally, Global Foundries is actively seeking funding through the CHIPS Act to support research, development, and implementation of these technologies. It is through these strategic investments in sustainable technologies and the

application of federal funding that Global Foundries plans to make progress in reducing emissions within the semiconductor manufacturing sector.

Reduce fugitive emissions from Wastewater Treatment Facilities by improved methane flaring and waste heat recovery

Greenhouse gas emissions from wastewater treatment facilities (WWTFs) in Vermont primarily consist of methane (CH₄), a potent greenhouse gas that is 25 times more impactful than carbon dioxide (CO₂) on a per mass basis. These emissions occur during the anaerobic decomposition of organic materials in digesters. While methane can be combusted for beneficial uses like generating heat or electricity, it is often flared to convert CH₄ to CO₂, reducing its environmental impact. Ensuring that flares at these facilities are operational is a priority in mitigating methane emissions.

The most effective way to reduce fugitive emissions from Wastewater Treatment Facilities (WWTFs) is by ensuring the functionality of flares at existing anaerobic digesters. The Vermont Department of Environmental Conservation's Watershed Management Division has completed a survey of WWTFs with anaerobic digestors, providing valuable data on their operational status. The 2025 Climate Action Plan prioritizes installing or repairing functional flares at the next facility upgrades for Barre City and Newport City. Specifically, Barre City WWTF has a non-functional flare that needs fixing, while Newport City lacks a flare altogether, prompting a recommendation to design and install one during the next upgrade.

Additionally, the requirement of waste heat recovery capabilities in new wastewater system projects and significant expansions, are cost-effective. These projects can be funded through state wastewater programs. Implementing these actions and strategies will enable Vermont to significantly reduce methane emissions from wastewater treatment facilities.

Waste Prevention and Reduction

In broadening the scope of non-energy emission reductions, this Plan has introduced new pathways which focus on waste prevention and reduction. The Vermont Department of

Environmental Conservation (DEC) has begun taking action to reduce the environmental impact of waste and thus, to reduce non-energy emissions. One set of actions focuses on general waste reduction, such as hosting a statewide conference and establishing a Reduce, Reuse, and Repair Network. The goal of the Reduce, Reuse, Repair Network is to form a group of individuals and organizations who promote waste reduction in order to keep materials out of landfills and reduce the resources needed to make new things. They will support the reuse of materials more than once before being recycled or discarded and help Vermonters share, repair, refurbish, and repurpose as many materials as possible. When it comes to reducing food waste, Vermont DEC is implementing actions that enhance communication on best practices, including maintaining the [ScrapFoodWaste.org](https://www.scrapfoodwaste.org) website, which serves as a central hub for food waste reduction and composting information and resources. Furthermore, Vermont DEC's contractor is about to complete a [Recycling Systems Analysis Report](#), in early 2025. This report will provide critical data on emissions associated with various recycling systems, guiding future discussions on the Vermont Bottle Bill and other recycling policies. Vermont DEC has been actively implementing these strategies, with many initiatives already underway. The Plan seeks to build upon the momentum of waste prevention and reduction strategies to continue contributing to overall non-energy emissions reductions.

Next steps in Other Non-Energy Emissions Reductions

The expansion of scope and strategies to reduce non-energy emissions represents a critical component of the state's comprehensive plan to meet requirements of the [Global Warming Solutions Act](#) (GWSA). By addressing emissions from refrigerants, semiconductor manufacturing, wastewater, and waste management, Vermont is taking steps to reduce its greenhouse gas footprint. The collaborative efforts of state agencies, businesses, and communities are essential to achieving these goals. Through leveraging data-driven insights and promoting sustainable practices, the state can ensure that the strategic pathways outlined to reduce non-energy emissions are both cost effective and long-lasting.

Agriculture and Ecosystems

Overview

Protecting, sustainably managing, and enhancing Vermont’s working and natural lands¹ provides a critical climate mitigation, adaptation and resilience opportunity. The “green hills and silver waters” referenced in Vermont’s state song represent a widely shared image of the Vermont landscape, with walkable and livable communities surrounded by farm fields and forested hills, all bounded by Lake Champlain and the Connecticut River. This image represents not just a shared sense of the past, but of the future, and represents a way of living on the land that is deeply embedded in Vermont’s cultural heritage and way of life. Today’s Vermonters are just the most recent group of people to have taken on the responsibility for stewarding a landscape that has supported humans since time immemorial. Protecting, stewarding and restoring these landscape features, including farms and working forests as well as our wild and undeveloped spaces and the rich diversity of life within this landscape, is necessary to life here for generations to come and is critical to achieving the climate mitigation, adaptation, and resilience benefits described in legislative findings of the [Global Warming Solutions Act](#).

¹ For the purposes of this document, we use the language “working and natural lands” as used (though not defined) in the GWSA Statute, a usage that implies a distinction between lands used to produce food, fiber and forest products for human use and consumption, on the one hand, and lands that are left in a natural and unmanaged state on the other. We note, however, that natural lands do work through providing ecosystem goods and services such as wildlife habitat, water quality, forage, shelter, spiritual sustenance, aesthetic value and many others. Conversely, working lands have natural features that provide these same benefits.

Rationale

Vermont's open landscape is not just beautiful but is also our greatest opportunity to both sequester greenhouse gas emissions and adapt to climate change. This landscape is already a significant source of carbon storage and sequestration, and improved protection, restoration and management of our forests and farms can further enhance this capacity. Further, Vermont would be at much greater risk from the increased intensity and frequency of extreme weather events but for the abundance of open lands, forests and fields, and healthy functioning watersheds.

The benefits of investing in Vermont's natural and working lands are not limited to the physical landscape, but also to our human communities. Our forests and farms are the source of food and forest products and are the foundation of Vermont's rural community economies. Through careful stewardship of our lands, we have opportunities to prioritize food security, ensure equitable land access and home ownership for Vermonters from historically marginalized or disadvantaged communities, and support landowners seeking to steward their land for its ecological and climate benefits. The Intergovernmental Panel on Climate Change (IPCC) emphasizes that sustainable land management can help meet climate goals, slow ecological crises, and provide access to nutritious food.² Education and financial support are essential in helping land stewards adopt practices that benefit the economy and the environment. Relying on science, braided with and informed by Traditional Ecological Knowledge, and drawing on a long and evolving history of land stewardship by Vermont landowners, our state can take advantage of and learn from the new ideas, concepts and information that demonstrate the many co-benefits associated with the implementation of policies aligned with our natural and cultural heritage.

Climate Mitigation Benefits of Natural and Working Lands

Vermont's landscapes play a crucial role in carbon sequestration and storage, helping to offset emissions while enhancing resilience. Natural climate solutions, such as conservation,

² [IPCC 2019: Special Report on Climate Change and Land](#)

restoration, and improved land management, increase carbon storage while preventing greenhouse gas emissions. When combined with aggressive emissions reduction efforts, they provide some of Vermont's most effective tools for addressing climate change.

Currently, Vermont's natural and working lands sequester and store significant levels of carbon. Preserving and enhancing this sequestration capacity requires supporting the people who live and work within these ecosystems. Landowners, farmers, and foresters must have the knowledge and resources to make informed decisions that reduce emissions while increasing carbon sequestration and storage. Thoughtful land management in forests, wetlands, and agricultural landscapes can ensure Vermont continues to capture more carbon than it emits. Public engagement, education, and careful planning are essential to align land-use policies with Vermont's climate goals while supporting local communities.

Forests especially play a critical role in Vermont's carbon storage in tree biomass and the organic soil layers beneath them. Forest protection, restoration and management should focus on maintaining these vital ecosystems, recognizing their importance for both biodiversity and climate resilience. While forests store carbon above ground, below-ground ecosystems—including soil microbial communities and root networks—are equally vital for long-term sequestration.

Vermont's landscape has undergone a dramatic transformation over the past century. A century ago, the state's forests had been reduced by logging and clearing for agriculture and development to only twenty percent of the landcover. Today, as a result of a shift away from a landscape dominated by small hillside farms, combined with land protection policies, nearly eighty percent of Vermont's landscape is forested. This recovery highlights the potential for ecosystem regeneration but also reveals a critical gap—many recovering forests lack the structural complexity and biodiversity of old-growth ecosystems. The current state of our forests, both in terms of the permanent conversion of forests to development, and in terms of the ecological health of our forests, underscores the need for proactive policies that ensure forests regain their ecological function rather than simply regrowing tree cover.

Vermont's landscape is continuing to transform as forest cover has been declining in recent years and farmland is under increasing pressure from development coupled with economic challenges faced by farmers. Carbon sequestration in agricultural landscapes is an emissions related strategy for agriculture that yields great co-benefits. Soil health is another essential but often overlooked aspect of carbon sequestration. Healthy soils store more carbon through the development of soil aggregates, root exudates that feed microbial life, and the formation of stable organic matter. Vermont can prioritize soil health initiatives by supporting farmers in adopting practices such as reduced tillage, nutrient management, manure management, cover cropping, perennial systems, riparian tree plantings, and managed grazing. These methods enhance soil resilience and contribute to long-term carbon sequestration, while also reducing carbon emissions and increasing local food production.

Another lens for understanding the importance of Vermont natural and working lands to achieving Vermont's goals for reducing and mitigating greenhouse gas emissions is watershed health. Protection and restoration of Vermont's headwater streams, wetlands, and floodplain ecosystems are all critical to achieving Vermont's climate mitigation goals. As some of the most efficient natural carbon sinks on a per acre basis, these landscape elements store substantial amounts of carbon. Low oxygen levels in wetlands slow decomposition and prevent carbon from being released as carbon dioxide. Additionally, wetlands continuously accumulate organic material, enhancing their carbon storage capacity over time. In contrast, when filled, altered, drained or degraded, these ecosystems release stored carbon back into the atmosphere. Protecting and restoring headwater streams, wetlands and floodplains is essential for maintaining their function as long-term carbon sinks.

Climate Adaptation Benefits of Natural and Working Lands

The northeastern region of the United States is already experiencing an increase in extreme weather as a result of climate change, including severe precipitation events, winter ice storms, drought, flooding, wildfires, temperature extremes, and localized wind events.³ Our

³ Climate and Climate Change Chapter, Vermont Updated Climate Action Plan 2025, <https://climatechange.vermont.gov/climate-action-plan-2025-update>; National Climate Assessment: <https://nca2023.globalchange.gov/>

region is also experiencing a general warming trend, with impacts including loss of outdoor winter recreation opportunities, ground conditions conducive to sustainable logging, the spread of invasive and pest species, loss of biodiversity, declining northern forest ecosystem health, and associated changes in forest structure. The breadth of climate change impacts on Vermont's communities includes not only disruptions to housing and business development, public health, energy, transportation, and recreation and tourism, but also disruptions to our working and natural lands – the agriculture lands, forests, and watersheds -- which are the foundation of our economic health, and the backbone of our mitigation and adaptation and resilience strategies.⁴

Vermont's forests and farms, wetlands, connected floodplains and river corridors all absorb excess water and reduce high, erosive energy during flooding events. These landscape features can also, when properly stewarded, serve as a buffer against droughts and other disruptions, increasing protections for the built environment in our communities and providing public health benefits. In addition, protecting and enhancing our natural and working lands will also provide critical habitat and landscape connectivity for the plants and animals which need refugia from the changes to their habitat resulting from climate change. Though the interrelationships within and among these systems are sufficiently complex to defy simple assertions in the near-term, over the long-term, the benefits to plants and wildlife resulting from protecting, stewarding and enhancing natural and working lands will, in turn, return benefits to Vermont's agricultural and forestry sectors and the people who depend upon them. Finally, supporting our natural and working lands will also increase protection for the built environment in our communities and provide public health benefits.

Climate change adaptation efforts focused on protecting and enhancing natural and working lands, requires significant investments, but climate experts agree that the long-term savings justify these investments, given the rapidly increasing cost of climate change impacts.⁵ Beyond economic returns, adaptation efforts yield myriad co-benefits – from building community resilience to sequestering and storing carbon, improving soil health to maintaining

⁴ Id.

⁵ IPCC Sixth Assessment Report, “AR6 Synthesis Report: Climate Change 2023”, <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>; Economics of Adaptation, Chapter 17, https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap17_FINAL.pdf

habitat connectivity, and more.⁶ The recommendations in this section aim to increase the adaptive capacity of Vermont's natural and working lands and support watershed health, as well as enhance the resilience of our natural and human systems to a changing climate, through science-based, technical and traditional knowledge. The increased incidence of drought, extreme precipitation events, and changes in temperature patterns associated with climate change in Vermont have already begun to impact our natural and human communities and systems. At the same time, features of Vermont's natural and working landscapes have absorbed, buffered and reduced climate risks, such as the impacts of extreme precipitation and associated floods. Broadly, the strategies that the State of Vermont must take to secure the health, resilience, and benefits of climate adaptation and mitigation from natural and working lands include,

- funding, enhancing, and adapting programs that support greenhouse gas emissions reductions, carbon sequestration and storage, and climate adaptation and resiliency on our forests, fields and farms,
- utilizing best practices to account for carbon sequestration, storage, and emission reductions from agriculture and forestry,
- funding and implementing Payment for Ecosystem Services programs for lands to encourage implementation of practices that improve soil health, crop and forest resilience, increase carbon storage, increase stormwater storage capacity, and reduce runoff,
- creating dedicated climate impact emergency recovery funding for farms and forestry operations, and related infrastructure, supporting and expanding programs to support the adaptive capacity and restoration of farms and forests, and promoting insurance for farm and forest landowners and businesses, to ensure that they can equitably and viably recover from climate induced disasters,
- funding farm and forest supply chain resilience and state food security, and investing in storage, processing, and distribution infrastructure,

⁶ Id.

- promoting Vermont-sourced agricultural and sustainably harvested wood-based construction materials,
- protecting the supply and access to local food, fiber, and forest products,
- statewide planning and programs to promote landscape connectivity and durable land conservation strategies,
- incentivizing the use of nature-based solutions, traditional ecological knowledge and Indigenous knowledge to provide alternatives to engineered and technological solutions to adaptation and resilience,
- promoting healthy and connected river corridors, floodplains, and wetlands,
- engaging and supporting indigenous communities, communities of color, and underserved communities in the work of protecting and enhancing natural and working lands, and
- enhancing education, outreach, research, peer-to-peer learning, and technical assistance programming to encourage climate smart strategies by land and water managers.

Inter Connections

Vermont has historically invested heavily in policies and practices that protect its forests, farms and open spaces as well as the rich mix of wetlands, floodplains, streams, rivers, lakes and ponds that are vital to managing the increased threats of extreme weather, including flooding and drought, associated with climate disruption. The recommendations in this chapter should be seen as complementary to the array of existing statutes, policies, and programs that are playing a central role in protecting and enhancing the ecological, economic, and aesthetic qualities of our landscape through a mix of environmental and land use regulations, financial incentives, and education and outreach.⁷ The recommendations in this Chapter also assume continued and increased investment in the foundational programs established to support

⁷ Examples include Act 250, 30 V.S.A. § 248 (Energy Project Siting), state water quality and wetlands protections, local land use plans and regulations, Use Value Appraisal Program (“Current Use”) and the Vermont Housing and Conservation Act.

individual Vermont landowners, businesses and organizations who seek to steward their privately owned land through sustainable management and permanent conservation.⁸

In addition, ongoing initiatives such as the [Vermont Conservation Strategy Initiative](#)⁹, [Vermont Forest Futures Strategic Roadmap](#)¹⁰ and the work of the [Governor’s Commission on the Future of Agriculture](#)¹¹ include ideas that will support and complement the strategies described in this Chapter. It is critical that a diversity of communities across the state continue to engage actively in defining and supporting the proposals that result from these efforts.

In conclusion, while the benefits of Vermont’s forests and farms provide obvious adaptation and resilience benefits, these recommendations should not be viewed through only through that lens. Protecting and enhancing our natural environment and working lands also provides direct carbon storage sequestration opportunities so is tied to mitigation.¹² Further, management of Vermont’s forests and farms has a direct connection to recommendations related to Vermont’s energy future – both as connected to the role of biomass for combined heat and power, advanced wood heat, and agricultural waste methane generation, and as connected to renewable energy siting policy prioritizing the siting of new projects in already developed areas to reduce pressures on forests, farms and watersheds.¹³ These same strategies are also inextricably linked to the design and investment in building resilient, walkable, and livable communities, and a strong, sustainable economy.¹⁴

⁸ Examples include the Vermont Housing and Conservation Fund and the Working Lands Enterprise Initiative.

⁹ <https://vhcb.org/our-programs/VCSI>

¹⁰ <https://fpr.vermont.gov/forest-future-strategic-roadmap>

¹¹ <https://agriculture.vermont.gov/administration/governors-commission-future-vermont-agriculture>

¹² Cross-reference section of report describing relevant mitigation strategies

¹³ Cross-reference mitigation chapter recommendations relating to biomass and renewable energy siting

¹⁴ Cross-reference section of report describing relevant rural resilience and cross-cutting strategies

Adaptation and Building Resilience in Communities and the Built Environment

Resilience thinking in the built environment recognizes that our communities are deeply linked with their natural environments. Our response to a changing climate therefore must consider how climate change will disrupt communities and the businesses and individuals within them. We must identify strategies to adapt or transform, develop holistic land use patterns, and ensure all Vermonters are supported through these transitions. By seeing our communities as connected to both people and nature instead of treating them as separate, standalone places, resilience thinking can work to address climate-related challenges while fostering sustainable local development through collaborative, participatory processes.

Vermont has experienced 25 federally declared major disasters due to extreme weather between 2011-2024. Every county has had 5 or more recent major disasters, and 8 counties have had at least 11.^x Ten disaster declarations have occurred since the initial Climate Action Plan (CAP) was adopted in December, 2021.¹ In the last 3 years (2022-2024) Vermont has had four billion-dollar disasters.² While catastrophic flooding was the primary disaster, Vermonters are also subject to drought and extreme heat events, a less obvious but deadly health risk, and are experiencing more frequent and severe impacts from landslides, wind, winter storms, and smoke from wildfires burning in other parts of the North American continent. These hazards have caused, in many cases irreparable, harm to individuals and families, entire neighborhoods, businesses, municipalities, and critical public infrastructure.

To successfully address the climate factors underlying these disasters, concerted efforts must take place at a global scale. This is currently not occurring at the pace necessary to limit these types of events in the near- or medium-term. And while mitigation measures have been taken

^x [Building Resilience in Rural Communities Speaker Series - Rebuild by Design](#)

¹ <https://www.fema.gov/locations/vermont#declared-disasters>

² <https://www.ncei.noaa.gov/access/billions/state-summary/VT>

to improve climate adaptation and resilience in Vermont, the underlying, historic settlement patterns that put large numbers of people and civic, economic, cultural, and public infrastructure at risk have not changed to a meaningful degree. Understanding this takes time, it is important to seek both immediate opportunities to reduce risk and long-term strategies to build infrastructure and landscape-level resilience.

Since the adoption of the initial Climate Action Plan in 2021, the following important steps have been taken towards building resilience in Vermont communities and the built environment:

- Formation of the Climate Action Office and its development of the [Municipal Climate Change Vulnerability Indicators Tool](#), the beginning of the development of the [Municipal Climate Toolkit](#) to be completed by Fall, 2025, and its support of the [Resilience Implementation Strategy](#) in collaboration with the Office of the State Treasurer.
- The enactment of the [Flood Safety Act](#) (Act 121 of 2024), which will move regulation of development in high-hazard river corridors to the state, establish a net-gain wetlands policy, improve dam safety through consolidated oversight, dam owner maintenance requirements, and investment in strategic removal of dams, and study how flood hazard policy might be more effectively administered.
- The enactment of [Act 181](#) of 2024 , which overhauls Vermont’s planning framework for coordinating state, regional, and municipal land use. It will better enable the mapping of future growth areas that consider the evolution of historic compact settlements up and away from flood hazard risks, plan for new neighborhoods and growth centers, and protect large forest blocks to better protect headwaters and buffer runoff.
- The enactment of Act 59 of 2023, the [Community Resilience and Biodiversity Protection Act](#), the goal of which is to protect the ecological functions of our landscapes with the ambitious goals of conserving 30% of Vermont's landscape by 2030 and 50% by 2050. A [draft conservation inventory](#) is complete, and the development of a Comprehensive Conservation Plan will soon be underway to be presented to the legislature in the Summer of 2026.

- The enactment of the [Vermont HOME Act](#), which amends the Planning and Development statute, Act 250, and other laws to enable new opportunities for housing development within state, regional, and local planning and development regulations.
- The creation of the [Flood Resilient Communities Fund](#), which prioritizes projects in communities and/or for homeowners with greatest economic need and projects that mitigate repetitive loss among low-income and marginalized portions of the population.
- The program was designed to fund voluntary buyouts of flood-vulnerable properties that typically would not qualify for federal funding. All available funding has been obligated.
- The opening of a grid resilience proceeding at the Public Utility Commission (Case No. 25-0339-PET), to develop a common and robust framework for planning, valuing, and measuring grid resilience investments (e.g., line hardening, undergrounding energy storage, enhanced vegetation management, storm response, etc.).
- \$8m funding opportunity for grid resilience through federal Infrastructure Investment and Jobs Act funds awarded to Vermont issued
- The development of a Transportation Resilience Improvement Plan that prioritizes high risk locations along both state and local highway systems.

While progress is being made, we know there is much more to be done. 61% of Vermonters live in rural areas. Rural resilience needs to be informed by the people experiencing the impacts.

“Until we start talking to communities about what they care about we’re having the wrong conversation.” Kelly Pflicke, AICP Resiliency Specialist, FEMA Region II ^Y

Vermonters have voiced the need to recognize the overlap between resilience in our built environment and our natural and working lands. Many stress the importance and need for more compact development that provides resilience through thoughtful planning and siting of infrastructure in community centers that are surrounded by and where climate impacts are buffered by surrounding natural and working lands. Others point out the importance of resilient

businesses that contribute to the economic vitality of communities and the workforce and housing needed to support both. Communities, businesses, and people need incentives, grants, and low-cost loan programs that offer financial and technical assistance to support planning and informed decision making, as well as implementation of existing Plans (i.e Local Hazard Mitigation Plans) to promote proactive solutions. There is a call to focus on strengthening what exists rather than creating new and for funding to go to trusted entities that have existing and strong relationships with communities, businesses, and individuals.

Resilience in the built environment comes through a focus on communities and infrastructure. It means supporting communities through increased capacity for proactive planning and implementation of solutions that consider adaptive land use as well as ensuring all people have access to safe, accessible, energy efficient and affordable housing. It means proactively and strategically evaluating risks and vulnerabilities to infrastructure serving communities, evaluating the costs and benefits of different types of interventions and investments available to mitigate those risks, and prioritizing solutions based on factors including the needs of communities and vulnerable Vermonters. Additional context around the rationale to prioritize health impacts is included in the Health Chapter of this document. The recommended priority actions of this section speak broadly to building upon existing structures, relationships, and programs to provide technical support, proactive planning and implementation of projects, and dedicated and sustained funding.

^Y https://www.fema.gov/sites/default/files/documents/fema_rural-guide_jan-2021.pdf

Supporting Successful Community and Infrastructure Planning and Project Implementation

Integrating actions required by recently passed statutes, rather than taking a piecemeal approach, creates the opportunity to achieve more holistic and comprehensive plans and

actions to achieve climate adapted and resilient communities and infrastructure². Taken together the statutes modernize Vermont's approach to regional and municipal planning to more uniformly and specifically designate areas suitable for development, encourage the construction of more housing where supported by infrastructure, establish the creation of a statewide land conservation plan, and support state regulation of river corridors, conservation of wetlands, planning for dam safety, and consideration of the efficacy of the current approach to flood hazard regulation. If brought together at the regional scale, in collaboration with planning at the municipal scale, the opportunity exists to:

- More intentionally plan for future land use that integrates conservation, flood safety, compact settlement and housing, while also identifying gaps and needs for infrastructure investment to make adaptive and resilient community development possible.
- Establish more intentional land uses patterns that consider conservation, development, and infrastructure needs that transcend municipal boundaries.
- Create a statewide land use map by stitching together the new regional future land use maps, which can both guide development and tell the story of opportunities and barriers to making a more adaptive and resilient Vermont possible.

Resilient community development requires detailed physical master planning, capital improvement and investment planning, and public financing strategies and tools to create conditions for resilient development. Physical master planning considers the appropriateness of particular locations on the Vermont landscape to support resilient development, and guides where infrastructure ranging from water and wastewater, streets, power, and public spaces, should be located. Capital planning must include asset assessments and prioritize projects that provide long-term resilience. This will likely necessitate the development of public investment and system operations structures that are intermunicipal, or regional, in nature, and that

² Act 47 – HOME Act (<https://legislature.vermont.gov/bill/status/2024/S.100>); Act 181 Regional Planning Act (<https://legislature.vermont.gov/bill/status/2024/H.687>); Act 121 Flood Safety Act (<https://legislature.vermont.gov/bill/status/2024/S.213>); Act 59 Community Resilience and Biodiversity Protection Act (<https://legislature.vermont.gov/bill/status/2024/H.126>)

involve close coordination between municipal, regional, and state planners as well as utilities and other public and private entities planning for infrastructure serving Vermont communities.

Vermont is currently experiencing a housing crisis driven by high demand and low supply. At the same time, large areas of the state have lost significant numbers of housing units to flooding. Vermont needs not only more housing, but housing where it is best suited to withstand climate risks, and the right types of housing for different life stages. The housing status quo threatens the resilience of our economy, social well-being, health and health care system, education system, senior care, public safety, and tax base, among others. The latest [\(June 2024\) Vermont Housing Needs Assessment](#) concludes that 36,000 primary homes are needed in the state in 2025-2029.³ Developing such quantities of housing requires greater density and while this strategy should make the most of our existing historic compact settlements, all new settlement and its related infrastructure must occur in a manner that minimizes flood hazard and landslide risk. Creation of new and use of existing tools and resources is critical to thoughtful planning and ensuring successful, long term sustainable and equitable development.

Compact settlement planning should not occur in a vacuum. What happens on the landscape around the compact settlement influences its success as a desirable place to live, as well as its ability to both be a means of climate resilience and adaptation, and to be climate resilient and adaptive itself. The infrastructure that supports the compact settlement must promote resilience and be resilient. This includes accommodation of drinking water wellhead protection areas, and wastewater disposal sites that minimize energy consumption and minimize the risk of groundwater and surface contamination. Streets leading to, through, and from the settlement should promote, not impair, quality of life. Any development outside designated centers should be well-planned. Forest and habitat blocks, and habitat connectors, should be maintained and improved not only for the habitat and working lands benefits, but also to sequester carbon and maintain land cover and soils that mitigate greenhouse gases and flood

³ <https://accd.vermont.gov/housing/plans-data-rules/needs-assessmentment>

and drought risks. Floodplain conservation and improved floodwater access to the floodplain will help mitigate against both flood and drought. Planning compact settlement with river and brook channel migration – fluvial erosion – in mind is essential to avoid the state’s primary and most violent hazard. And incorporating wildland fire-adapted community strategies into all aspects of development planning will help mitigate a lesser known but increasing risk in New England and the northeast.

Providing resources in the form of tools and guidance as well as technical assistance for planning, in the use of available tools, for applying for grants, for implementation of projects, and for financial assistance is foundational to a broad array of state, regional, and local policy directives related to land use, energy development and conservation, greenhouse gas reduction, land conservation, transportation, education, and economic development.

Strategic and Sustained Funding

We are “Vermont Strong,” but the disaster, recovery, and mitigation aid landscape is changing with both the sheer frequency, intensity and scale of events, and the quantity, terms and conditions of funding. For example, the mitigation funding the state and municipalities receive in the wake of disaster, after damage is done, is orders of magnitude greater than what is normally available in the absence of a disaster. Indications are that long-relied upon federal funding formulas could change, requiring state and local government – as well as Vermont’s 16 municipal and cooperative utilities – to provide more of their own taxpayer or ratepayer funding for recovery and mitigation. It is also possible, or likely, that federal disaster declaration thresholds will be elevated, and the support services in the immediate aftermath of a disaster, which have traditionally been provided by FEMA, diminished – decreasing the likelihood that robust federal aid will be made available. At the household and business level, the catastrophic floods of 2023 and 2024 were severe enough that federal Individual Assistance (IA) Disaster declaration thresholds were exceeded. An IA declaration brings in federal resources to assist individuals and families, and businesses, with recovery that otherwise would not be available, as Vermonters in towns not included in the IA declarations discovered. This threshold, too,

could and likely will increase. As we have learned, IA assistance is insufficient to support full recovery. By design it is intended to be supplemented by local philanthropic and volunteer aid.

Increasingly, federal and state funding that is intended for resilience and adaptation is being directed to support property buyouts to prevent future damage caused by flooding, fluvial erosion, or landslides. In fact, the majority of mitigation funding Vermont received following the 2023 and 2024 federally declared disasters has gone to buyouts. While these buyouts can result in community-scale flood hazard mitigation outcomes, most are at the individual property level rather than a floodplain or river corridor level. This is of great benefit to individual Vermonters whose property has been or could be damaged or destroyed. However, it is imperative that Vermont also invest in community-scale flood adaptation and resilience, including growing up and away from flood hazards and brook and river channel migration. This is essential to develop and protect our civic, economic, cultural, and housing infrastructure in anticipation of more frequent and intense events that threaten our historic settlements that will continue to lie in harm's way.

It is imperative that Vermont establish policies and protocols and recovery and funding structures so Vermonters, communities and businesses can properly plan and implement solutions prior to disaster striking and so they can know before disaster strikes what support for recovery might be available. This will also serve as a framework that allows everyone involved in response and recovery work – state agencies, municipal governments, non-profits, businesses – to anticipate their roles and responsibilities. Preparedness is a form of adaptation and essential to resilience.

Similarly, it is essential that entities planning for critical infrastructure serving communities – such as utilities – are modeling future climate risks and evaluating their systems to understand where vulnerabilities exist and plan for the appropriate scale, pace, and types of investments to cost-effectively reduce the risks and resulting costs to Vermonters of impacts from severe

storms and other threats to that infrastructure (e.g., widespread and long-duration power outages).

Coordination of the Climate Action Plan with Other State Plans and Initiatives

The [GWSA](#) requires that the Climate Action Plan (CAP) be coordinated with the [Comprehensive Energy Plan](#). This was intentionally orchestrated during the Initial Climate Action Plan in 2021 as the CEP was due to be completed only one month after the CAP was adopted. However, the CEP is required to be updated every six years and as a result is not currently being revised. That said, it is still important to understand the distinctions between the two planning processes and the rationale for why the plans should be aligned.

The CAP is an Action Plan for greenhouse gas mitigation, sequestration, and adaptation strategies in the face of climate change. The CEP is a mechanism to implement statutory energy policy¹ based on a comprehensive analysis of challenges and opportunities in Vermont. While the CAP and the CEP have considerable areas of overlap, they remain distinct planning requirements, with different objectives. While the CEP must be consistent with and a key component of meeting the State's GHG requirements, it is not a climate change plan nor a comprehensive look at Vermont's non-energy GHG emissions or climate adaptation needs. That said, and as described in this plan, energy consumption drives a large majority of Vermont's greenhouse gas emissions; it is important that the process for the CAP and CEP aligned.

While the CEP is not currently being updated, the CEP is required to be consistent with the requirements of the GWSA and the CAP. At the same time, the CAP is required to be informed by the CEP. These requirements to closely coordinate the efforts – even if the resulting actions are not necessarily identical, are important. As a result, the Public Service Department and the Agency of Natural Resources continue to engage around the modeling efforts that underpin the plans, as well as in engagement to support the public's involvement and understanding of both efforts.

In addition to the CEP, there are other state planning efforts and initiatives that align with and further support the recommendations in the CAP. As a starting place for the development of this plan, the Council received a presentation to learn more about the [Vermont State Hazard](#)

[Mitigation Plan](#) (SHMP). The [2023 SHMP](#) presents the natural hazard impacts most likely to affect Vermont, an assessment of our vulnerabilities, and a mitigation strategy to reduce or eliminate our most significant risks. The 2023 Plan accounts for both observed and projected hazard impacts and accounts for changes in population and development. This Plan places a special focus on how hazards affect people beyond loss of life and property damage to account for quality of life and impacts to our frontline communities. The SHMP is foundational to the resilience and adaptation recommendations found in the CAP, with recommendations in the CAP building off recommendations from the 2023 SHMP that have not been completed or needed additional focus. The Rural Resilience and Adaptation Subcommittee of the Climate Council is charged with developing actions that focus on the pressures that adaptation will impose on rural transportation, electricity, housing emergency services, and communications infrastructure, and the difficulty of rural communities in meeting the needs of its citizens.

In addition to recommendations in both the CAP and the SHMP, additional work is needed to strategically prioritize actions in state government to build resilience and adapt to a changing climate. The devastating flooding of 2023 and 2024, along with heat waves, droughts, and wildfire smoke make it clear that climate change is threatening Vermonters' health, safety, quality of life and economic security. The [Resilience Implementation Strategy](#) (RIS) is a joint initiative of Governor Scott and State Treasurer Pieciak, announced on January 3, 2024. The RIS will develop a comprehensive strategy to guide and prioritize climate resilience efforts, as well as help policy makers understand and address gaps. This strategic set of recommendations will detail where adjustments to State programs can increase resilience to climate change and will augment considerable work done by State Government to date to build resilience to climate change. It is intended to complement the CAP by prioritizing capacity and funding for resilience projects. It will also identify available new and innovative funding solutions for climate adaptation activities.

Climate Council Next Steps

The Update to the Climate Action Plan builds off of the [initial Climate Action Plan](#) and is the result of over a year of work that included input from five subcommittees, as well as ongoing and public input from Vermonters. The work of the Climate Council is ongoing, and additional efforts are needed to drive climate action forward and meet the emission reduction targets outlined in the Global Warming Solutions Act (GWSA).

The recommendations in this plan will require a combination of legislative and administrative action. Specifically, the implementation of the CAP will require the Legislature to pass significant legislation, as well as allocate the necessary resources to advance the recommendations. The GWSA also requires that the Secretary of the Agency of Natural Resources adopt rules consistent with the Climate Action Plan, as adopted, on or before July 1, 2026. There are currently no rules being put forward under that timeline.

While the Legislature, the Agency of Natural Resources, and other agencies of state government will work to advance numerous actions put forward in this plan through legislative action and rulemaking, the Council will work to further advance work efforts in several key areas, including but not limited to:

- Monitoring and tracking the progress of implementation of the Update to the Climate Action Plan
- Considering additional resources to make the Plan actionable
- Working in partnership with the State government, the Legislature, and the Climate Action Office
- Convening Climate Council meetings on a quarterly basis to engage with the public
- Bringing Subcommittees together as needed to support the work of the Climate Council

Connect with Climate Action Office

The Vermont Climate Action Office (CAO) plays a pivotal role in coordinating state-led climate initiatives and providing expertise on climate adaptation, mitigation, and resilience activities.

The Climate Action Office will continue to evaluate progress in meeting the requirements of the Global Warming Solutions Act (GWSA) and support implementation of the update of the Climate Action Plan. As a division within the Agency of Natural Resources (ANR) Secretary's Office, the CAO focuses on three core areas:

1. **Climate Program Coordination:** The CAO supports the ongoing implementation of the climate action and solutions, ensuring that climate strategies are effectively integrated across state government.
2. **Community and Public Engagement:** Recognizing the importance of public involvement, particularly from frontline and impacted communities, the CAO is committed to fostering broad citizen participation and partnerships to deliver climate solutions for all Vermonters.
3. **Inter-Agency Collaboration:** The CAO works closely with various state agencies, the State Climatologist, and key stakeholders such as the Vermont Climate Council. An Inter-Agency Advisory Board meets regularly to coordinate climate action across state government, focusing on proactive coordination, maximizing resources, monitoring progress, and developing state positions on climate-related issues.

The Inter-Agency Advisory Board includes representatives from:

- Agency of Agriculture, Food, & Markets
- Agency of Commerce and Community Development
- Agency of Human Services (Department of Children & Families, and Department of Health)
- Agency of Natural Resources
- Agency of Transportation
- Department of Buildings & General Services
- Department of Labor
- Department of Public Service
- Vermont State Climatologist
- Vermont Division of Emergency Management

Public meetings and events hosted by the Climate Action Office are continuously updated and can be found on the CAO's website: climatechange.vermont.gov/learn-and-act. The website also provides information on how to get involved and learn additional information about CAO programs.

The Climate Action Office looks forward to continuing its work with Vermonters to achieve transformative climate action for current and future generations.

Definitions and Acronyms

	Definition	Source	Section of CAP	
AAFM	Agency of Agriculture Farms and Markets		Agriculture & Ecosystems: Reduce-Sequester	
	Act 121	The flood safety act grants the VT DEC and ANR the power to regulate wetlands, river corridor development, and dam safety.	https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT121/ACT121%20Act%20Summary.pdf	Agriculture & Ecosystems: Climate Resilient Lands
	Act 171	Act 171 amended Vermont Planning Statutes to encourage and allow municipalities to address protection of forest blocks and habitat connectors while supporting the local forest products industry.	https://av.vermont.gov/Planning/Forest_Blocks_And_Habitat_Connectors	Agriculture & Ecosystems: Climate Resilient Lands, Rural Resilience & Adaptation: Community Capacity Planning, Compact Settlement
Act 179	Enacted in 2024, Act 179 reformed Vermont's renewable energy standard to require electric utilities to purchase 100% renewable energy on or before January 1st, 2035, and phased out the group net metering program.	https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT179/ACT179%20Act%20Summary.pdf	Emissions Reductions: Electricity	
Act 181	Enacted in 2024, Act 181 reformed land use and housing policies to build community resilience and improve biodiversity protection.	https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT181/ACT181%20Act%20enacted.pdf	Rural Resilience & Adaptation: Compact Settlement, Emissions Reductions: Transportation	
Act 250	Vermont's land use and development law, enacted in 1970. The law provides a public, quasi-judicial process for reviewing and managing the environmental, social and fiscal consequences of major subdivisions and developments in Vermont.	https://rbk.vermont.gov/act250-program	Education, Workforce, Funding & Finance: Compact Settlement, Agriculture & Ecosystems: Climate Resilient Lands	
Act 41	Act 41 of 2021 created an Agricultural Residuals Management Program to be administered by Vermont Agency of Agriculture and Food Markets (VAAFM). The purpose of this new chapter of the law is to establish a program for the management of residual wastes generated, imported to or managed on a farm for farming in Vermont.	https://agriculture.vermont.gov/agriculture/agricultural-residuals-management-program#:~:text=on%2020%21%20the%20Vermont%20legislature.principally%20used%20on%20the%20farm	Agriculture & Ecosystems: Reduce Sequester	
Act 47	The Vermont HOME Act amends the Planning & Development statute, Act 250, and other laws to enable new opportunities for housing development within state, regional, and local planning and development regulations.	https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT047/ACT047%20Act%20enacted.pdf	Emissions Reductions: Buildings and Thermal	
Act 49	An act relating to establishing the Agricultural Innovation Board.	https://legislature.vermont.gov/Documents/2022/Docs/ACTS/ACT049/ACT049%20Act%20enacted.pdf		
Act 59	An act relating to community resilience and biodiversity protection. This act establishes State goals of conserving 30 percent of the land of the State by 2030 and 50 percent by 2050.	https://legislature.vermont.gov/Documents/2024/Docs/ACTS/ACT059/ACT059%20Act%20Summary.pdf		
Act 66	Rulemaking regarding phase-down of the use of Hydrofluorocarbons in Vermont	https://dec.vermont.gov/files/dec/files/ag/laws-reg/documents/Vermont_HFC_Rule_Adopted_CLEAN.pdf	Emissions Reductions: Non-Energy	
Active restoration	The use of active measures, such as hand-planting trees and shrubs and removing exotic plants and animals, in habitat restoration.	Oxford Reference	Agriculture & Ecosystems: Climate Resilient Lands	
Adaptation		10 V.S.A. § 509	Agriculture & Ecosystems: Climate Resilient Lands, Education, Workforce, Funding & Finance: Financing, Rural Resilience & Adaptation: Public Health, Rural Resilience & Adaptation: Community Capacity Planning, Agriculture & Ecosystems: Reduce Sequester	
Advanced Clean Cars II (ACC II)	Reducing vulnerability and advancing resilience through planned and implemented enhancements to, or avoiding degradation of, natural and built systems and structures		Agriculture & Ecosystems: Support Adaptation	
Advanced Clean Trucks (ACT)	The motor vehicle emissions regulatory program that implements LEV and ZEV rules in California, and other states including Vermont.	arba.ca.gov	Emissions Reductions: Transportation	
	A rule adopted by the California Air Resources Board and part of a holistic approach to accelerate a large-scale transition of zero-emission medium-and heavy-duty Class 2b to Class 8 vehicles.	arba.ca.gov	Emissions Reductions: Transportation	
AFOLU	Agriculture, Forestry and Other Land Use		Agriculture & Ecosystems: Reduce Sequester	
Agricultural Innovation Board (AIB)	A 13 member board created by the Vermont Legislature tasked with evaluating the impacts of pesticides in the context of health and the environment to create a more holistic approach to state-wide pesticide management and policymaking.	https://agriculture.vermont.gov/public-health/agricultural-resource-management/division/pesticide-programs/agricultural-innovation	Agriculture & Ecosystems: Reduce Sequester	
Agriculture-Clean Water Initiative Program (Ag-CWIP)	The Agricultural Clean Water Initiative Program (Ag-CWIP) from the Vermont Agency of Agriculture, Food and Markets (VAAFM) Water Quality Division provides grants to local and regional partners to work with farms to support the improvement of water quality across the state of Vermont through education and outreach, technical assistance, organizational capacity development, and conservation practice surveys.	https://agriculture.vermont.gov/agricultural-clean-water-initiative-program	Agriculture & Ecosystems: Reduce Sequester	
ARI	Authority having jurisdiction		Emissions Reductions: Buildings and Thermal	
Anaerobic digester (AD)		https://www.epa.gov/apstar/how-does-anaerobic-digestion-work	Agriculture & Ecosystems: Reduce Sequester	
	System in which bacteria break down organic material in the absence of oxygen and produce biogas (as well as solid and liquid end-products).		Emissions Reductions: Non-Energy , Rural Resilience & Adaptation: Built Infrastructure	
ANR	Vermont Agency of Natural Resources		Rural Resilience & Adaptation: Community Capacity Planning, Emissions Reductions: Transportation	
ARA, ARS, and ARS	IPCC Working Group climate change reports			
Atmospheric lifetime	The amount of time a gas remains in the atmosphere before being broken down by chemical processes.	https://www.sciencedirect.com/topics/engineering/atmospheric-lifetime#:~:text=Atmospheric,lifetime%20refers%20to,the%20half%20life%20boundary%20layer%20%202020	115	
Automated wood pellet boilers	Boilers used for space or water heating and fueled by wood pellets	https://rfr.vermont.gov/automated-pellet-boilers	4	
Battery Electric Vehicle	A motor vehicle that can only be powered by an electric motor drawing current from a rechargeable energy storage system	21 V.S.A. §4	11	
BEV	billion cubic feet		4	
BED	Burlington Electric Department		4	
Beneficial electrification	The growing recognition that using clean electricity to keep our homes and businesses running is cheaper, greener, and a smarter way to meet our energy needs.	https://www.nrel.gov/experts/vijaykesh-gowrishankar/beneficial-electrification-plus-greener-grid#:~:text=the%20beneficial%20electrification%20is,the%20new,tech%20enables%20what%20was%20not	Emissions Reductions: Buildings and Thermal	
Biodiesel	Biodiesel is a liquid fuel produced from renewable sources, such as new and used vegetable oils and animal fats and is a cleaner-burning replacement for petroleum-based diesel fuel. Biodiesel is nontoxic and biodegradable and is produced by combining alcohol with vegetable oil, animal fat, or recycled cooking grease.	https://www.energy.gov/eers/bioenergy/biofuel-basics	4	
	Like petroleum-derived diesel, biodiesel is used to fuel compression-ignition (diesel) engines. Biodiesel can be blended with petroleum diesel in any percentage, including B100 (pure biodiesel) and, the most common blend, B20 (a blend containing 20% biodiesel and 80% petroleum diesel).			
Biodiversity		OED	Agriculture & Ecosystems: Support Adaptation, Agriculture & Ecosystems: Climate Resilient Lands	
	The variety of life in the world or in a particular habitat or ecosystem	OED	Emissions Reductions: Transportation , Agriculture & Ecosystems: Support Adaptation	
Biofuels	A fuel derived from living matter	https://www.eia.gov/energy/fuels/2016/07/2016-11/dec/energy.php?topic=report&url=act1110.pdf	115	
Biogenic greenhouse gases	Greenhouse gas emissions produced through biological processes involving living organisms	Biomass Energy Developing Working Group, Final Report, Vermont Legislative Council, January 2012	Agriculture & Ecosystems: Climate Resilient Lands	
Biomass	material from trees, woody plants, or grasses, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, farm, rangeland, or wildland-urban environment that is the product of forest management, land clearing, ecosystem restoration, or hazardous fuel reduction treatment	https://www.researchgate.net/publication/260692078_Biomass_Energy_Development_Working_Group_Final_Report_to_the_Vermont_State_Legislature	Agriculture & Ecosystems: Support Adaptation	
Bioplastic composites	Plastic materials produced from renewable biomass sources, such as vegetable fats and oils, corn starch, straw, woodchips, sawdust, recycled food waste		115	
BIPOC	Black, Indigenous, People of Color		Agriculture & Ecosystems: Reduce Sequester	
BMP	Best Management Practice		Agriculture & Ecosystems: Support Adaptation	
Business Emergency Gap Assistance Program (BEGAP)	A grant program for businesses and nonprofits that suffered physical damages from flooding events.	https://accd.vermont.gov/BEGAP		
CAP	The Vermont Climate Action Plan		Emissions Reductions: Transportation, Agriculture & Ecosystems: Support Adaptation, Emissions Reductions: Buildings and Thermal	
Capital Equipment Assistance Program (CEAP)	Through VAAFM, financial assistance is available for new or used innovative equipment that will aid in the reduction of surface runoff of agricultural wastes to state waters, improve water quality of state waters, reduce odors from manure application, separate phosphorus from manure, mitigate greenhouse gases, and reduce costs to farmers when they apply manure.	https://agriculture.vermont.gov/ceap...	Agriculture & Ecosystems: Reduce Sequester	
CARB	California Air Resources Board		111	
Carbon Budget	The cumulative amount of carbon dioxide (CO2) emissions permitted over a period of time to keep within a certain temperature threshold	https://carbontracker.org/carbon-budgets-explained/	Agriculture & Ecosystems: Reduce Sequester	
Carbon Flux	The rate at which CO2 is taken in from or released to the atmosphere. Positive fluxes represent CO2 emissions to the atmosphere (also called a carbon source) and negative fluxes represent sequestration of CO2 from the atmosphere (also called a carbon sink). The net carbon flux is the sum or balance of emissions (sources) and sequestration (sinks).	30 V.S.A. § 8123	Emissions Reductions: Buildings and Thermal, Emissions Reductions: Transportation , Agriculture & Ecosystems: Reduce Sequester	
Carbon Intensity (CI) value	The amount of lifecycle greenhouse gas emissions per unit of energy of fuel expressed in grams of carbon dioxide equivalent per megajoule (gCO2e/MJ)	https://www.usgs.gov/facts/what-carbon-sequestration?qt-news_science-products-0&qt-news_science-products-0	Agriculture & Ecosystems: Climate Resilient Lands	
Carbon sequestration			9	
	The process of capturing and storing atmospheric carbon dioxide.		Emissions Reductions: Buildings and Thermal	
Carbon sink	A forest, ocean, or other natural environment viewed in terms of its ability to absorb carbon dioxide from the atmosphere	OED	Emissions Reductions: Buildings and Thermal	
Carbon Stock	The amount of CO ₂ stored in an entity, like a tree or an acre of land.		9	
CBS	Commercial Building Energy Standards	https://publicservice.vermont.gov/efficiency/building-energy-standards/commercial-building-energy-standards	Emissions Reductions: Buildings and Thermal, Rural Resilience & Adaptation: Community Capacity Planning	

Cellulose insulation	Cellulose insulation is made from recycled paper products, primarily newspaper, and has a very high recycled material content, generally 82% to 85%. Cellulose insulation is used in both new and existing homes, as loose-fill in open attic installations and dense packed in building cavities such as walls and cathedral ceilings.	https://www.energy.gov/energywatch/insulation-materials/cellulose	Agriculture & Ecosystems: Support Adaptation
CH4	Methane		11.5
Chemical vapor deposition (CVD)	Method used to create thin films necessary in the semiconductor manufacturing process.	https://www.horiba.com/ra/semiconductor/markets/semiconductor-processing/tools/equipment/deposition/	11.5
CHIPS Act of 2022	This act provides funds to support the domestic production of semiconductors and authorizes various programs and activities of the federal science agencies. (H.R.4346 – 117th Congress (2021-2022))	https://www.congress.gov/bills/117th/congress/house/bills/4346	Emissions Reductions: Non-Energy
CI-5	Clean Heat Standard		Emissions Reductions: Buildings and Thermal
Clean Energy Industry Report	A report commissioned by the Clean Energy Development Fund at the Vermont Department of Public Service (PSD) tracking the progression of Vermont's clean energy labor market.	https://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy_CEDF_Report%201_VCEIR_FINAL.pdf	4
Clean Water Initiative Performance (CWIP) Report	The Vermont Clean Water Initiative Annual Performance Report summarizes the State of Vermont's clean water efforts and demonstrates how investments are making a difference in water quality of Vermont's rivers, lakes, and wetlands.	Clean Water Initiative 2024 Performance Report Department of Environmental Conservation	
Climate refugia	Areas that remain relatively buffered from contemporary climate change over time and enable persistence of valued physical, ecological, and socio-cultural resources	https://www.fs.usda.gov/ccr/topics/climate-change-refugia?int=Climate%20change%20refugia%20and%20cultural%20resources%20and%20USFS%20USFS	13
Climate resilience		https://www.c2es.org/document/what-is-climate-resilience-and-why-does-it-matter/	Rural Resilience & Adaptation: Public Health Rural Resilience & Adaptation: Community Capacity Planning Agriculture & Ecosystems: Support Adaptation Agriculture & Ecosystems: Climate Resilient Lands
Climate resilience zones	The ability to prepare for, recover from, and adapt to climate change		Agriculture & Ecosystems: Support Adaptation
Climate Smart CO2 allowance	Areas defined by their respective resilience to climate change for both the natural and built environments A community that has successfully evaluated climate information to prioritize potential impacts, developed a plan, identified funding and taken action to build resilience to those hazards. A limited authorization by a jurisdiction under a cap and trade program to emit up to one metric ton of CO2, subject to any applicable limitations.	https://www.noaa.gov/news-release/biden-harris-administration-invests-14-point-2-million-to-develop-climate-smart-communities transportationclimate.org	11.1
CO2 equivalent (CO2e)	The amount of carbon dioxide (CO2) emission that would cause the same integrated radiative forcing, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs.	IPCC AR5 - Annexes	11.5
co-benefits	Actions which also seek to advance broader societal benefits such as public health, equity (specific focus on impacted communities), economic prosperity, biodiversity conservation, workforce opportunities and other benefits that improve the quality of life in Vermont broadly.	https://outside.vermont.gov/agency/arc/climatecouncil/Shared%20Documents/15129242F0406d50ac%20C%20Items%20Definitions.pdf	Agriculture
Cold climate heat pump	An air source heat pump that is capable of delivering heating even in cold climates.	https://www.energy.gov/eere/buildings/articles/cold-climate-air-source-heat-pumps-innovative-technology-stay-warm-winter	4
Community-based social marketing (CBSM)	Marketing strategy that uses direct neighbor-to-neighbor communication and influence to promote behavior change. In-person communications are often complemented by electronic social media tools.	https://www.epa.gov/stateandenergy/ctsc-rip-shorts-community-based-social-marketing	Emissions Reductions: Non-Energy
Comprehensive Assessment of Soil Health (CASH)	Commonly known as the Cornell Soil Health Test, CASH is designed for farmers, gardeners, agricultural service providers, landscape managers and researchers who want to go beyond simply testing the nutrient levels of their soils. The Cornell Soil Health Lab was the first to offer a commercial soil health test that provides standardized information on important soil biological and physical constraints in addition to standard nutrient analyses.	https://soilhealthlab.cals.cornell.edu/	Agriculture & Ecosystems: Climate Resilient Lands
Conservation Reserve Enhancement System (CREP)	Vermont's Conservation Reserve Enhancement Program (CREP) is a voluntary program designed to reduce sediment runoff and improve water quality by removing land from agricultural production and establishing vegetative buffers.	https://agriculture.vermont.gov/crep	Agriculture & Ecosystems: Reduce Sequester
Criteria Air Pollutants	One of six common air pollutants determined to be hazardous to human health and regulated under EPA's National Ambient Air Quality Standards (NAAQS). The six criteria air pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, and particulate matter. The term "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised.	EPA.gov	11.1
Cross-docking		https://www.adaptall.com.au/blog/2011-12-22-what-is-cross-docking-understanding-the-concept-definition	Agriculture & Ecosystems: Support Adaptation
DEC	A logistics procedure where products from a supplier or manufacturing plant are distributed directly to a customer or retail chain with marginal to no handling or storage time.		Emissions Reductions: Non-Energy
Demand deposit accounts (DDA) payment	Allow the withdrawal of money with little or no advance notice.	https://www.consumerfinance.gov/ask-cfpb/what-is-the-difference-between-a-checking-account-a-demand-deposit-account-and-a-now-account-en-35/	Emissions Reductions: Buildings and Thermal
Demand response	Programs being used by electric system planners and operators as resource options for balancing supply and demand	https://www.energy.gov/eo/activities/technology-development/grid-modernization-and-smart-grid/demand-response	Emissions Reductions: Buildings and Thermal
DPS	Division of Fire Safety		Emissions Reductions: Buildings and Thermal
Direct Current Fast Charging (DCFC)	Electric vehicle charging equipment which offers rapid charging along heavy-traffic corridors at installed stations.	https://www.transportation.gov/eo/162920/162920%20EV%20charging%20speeds	Emissions Reductions: Transportation
Discount rate	A discount rate is a method to place a present value on costs or benefits that will occur at a future date		9
Distributed Energy Resources (DERs)	Small, modular, energy generation and storage technologies that provide electric capacity or energy where you need it. Typically producing less than 10 megawatts (MW) of power, DER systems can usually be sited to meet your particular needs and installed on site.	nrel.gov	Emissions Reductions: Electricity, Rural Resilience & Adaptation: Built Infrastructure
EAN	Energy Action Network		17
Ecologically Significant Treatment Area (ESTA)	lands within a parcel of managed forestland that will be managed using protective or conservation management strategies and are not required to be managed for timber, including old forests; State-significant natural communities; rare, threatened, and endangered species; riparian areas; forested wetlands; and vernal pools.	32 V.S.A. § 3724	Agriculture & Ecosystems: Climate Resilient Lands
EPG	Energy Futures Group		Agriculture & Ecosystems: Climate Resilient Lands
Electric vehicle (EV)		23 V.S.A. § 4	Emissions Reductions: Transportation
	A motor vehicle that can be powered by an electric motor drawing current from a rechargeable energy storage system, such as from storage batteries or other portable electrical energy storage devices, provided that the vehicle can draw recharge energy from a source off the vehicle such as electric vehicle supply equipment.		Emissions Reductions: Buildings and Thermal
	A device or system designed and used specifically to transfer electrical energy to a plug-in electric vehicle as defined in 23 V.S.A. § 4(8)(5), either as charge transferred via a physical or wireless connection, by loading a fully charged battery, or by other means.	30 V.S.A. § 201	Emissions Reductions: Transportation
Electric vehicle supply equipment (EVSE)			Emissions Reductions: Transportation
Emergency Relief and Assistance Fund (ERAF)	Provides State funding to match Federal Public Assistance after federally-declared disasters.	https://houshady.vermont.gov/fund_funding/emergency_relief_assistance	Rural Resilience & Adaptation: Community Capacity & Planning
Energy Efficiency Utilities (EEUs)	The EEU Program works to provide energy efficiency services to residential and business electricity, natural gas, and thermal-energy-and-process-fuel consumers throughout Vermont.	https://www.vermont.gov/energy/energy-efficiency-utility-program	Emissions Reductions: Buildings and Thermal
EPA	Environmental Protection Agency		Agriculture & Ecosystems: Reduce Sequester
Equilibrium condition	A state of dynamic equilibrium within a community of organisms in which genetic, species and ecosystem diversity remain relatively stable, subject to gradual changes through natural succession with a stable balance in the numbers of each species in an ecosystem.	World Wide Fund For Nature (WWF)	13
Erosive flooding	The collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclic levels or suddenly caused by an unusually high water level in a natural body of water		13
F2P	Vermont Farm To Plate strategic plan		Agriculture & Ecosystems: Support Adaptation
The Farm Agronomic Practices (FAP) Program	The Farm Agronomic Practices (FAP) Program utilizes state funding to help Vermont farms implement soil-based agronomic practices that improve soil quality, increase crop production, and reduce erosion and agricultural waste discharges. The FAP program also provides education and instructional activity grants to support outreach regarding the impacts of agricultural practices on water quality and current state agricultural water quality regulations.	https://agriculture.vermont.gov/fap	Agriculture & Ecosystems: Reduce Sequester
Fauna	The animals of a particular region, habitat, or geological period	OD	13
FEMA	Federal Emergency Management Agency		Rural Resilience & Adaptation: Community Capacity Planning
Flood Hazard Area & River Corridor (FHARC) rule	The Flood Hazard Area and River Corridor Rule regulates development exempt from municipal regulation within designated Flood Hazard Areas and River Corridors. Development exempt from municipal regulation includes state-owned and operated institutions and facilities; accepted agricultural and silvicultural practices; and, power generation, transmission, and telecommunication facilities requiring a Certificate of Public Good from the Public Service Board.	https://dec.vermont.gov/content/vermont-flood-hazard-area-and-river-corridor-rule	Agriculture & Ecosystems: Climate Resilient Lands
Floodplain storage	Part of the mapped floodplain that identifies the natural flood storage capacity of that area in a watershed	https://www.fema.gov/glossary/compensatory-storage	13
Flora	The plants of a particular region, habitat, or geological period	OD	13
Fluvial	Of or found in a river	OD	13
Food hubs	Business or organization that actively manages the aggregation, distribution, and marketing of course-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand	https://sustainableamerica.org/blog/what-is-a-food-hub/	13
Food miles	A mile over which a food item is transported during the journey from producer to consumer, as a unit of measurement of the fuel used to transport it.	https://sustainableamerica.org/blog/what-is-a-food-hub/	13
Forest fragmentation		https://northernwoodlands.org/article/article/forest-fragmentation	Agriculture & Ecosystems: Climate Resilient Lands
Forest parcelization	The breaking of large, contiguous, forested areas into smaller pieces of forest; typically these pieces are separated by roads, agriculture, utility corridors, subdivisions, or other human development		Education, Workforce, Funding & Finance: Compact Settlement
Forest productivity	The subdivision of forest tracts of land into smaller and smaller ownerships.	https://www.nrs.fs.fed.us/futures/issues_influences/fragmentation_parcelization/	13
	The annual average change in cubic feet, board feet, cords, or biomass of wood.	https://www.nrs.fs.fed.us/pubs/jrnl/nr2446.pdf	13
		https://www.nrs.fs.fed.us/pubs/jrnl/nr2446.pdf	Agriculture & Ecosystems: Reduce Sequester
Forest Stewardship Council (FSC)	A global non-profit organization with the mission of promoting environmentally appropriate, socially beneficial, and economically viable management of the world's forests.	https://fsc.org/eng/about-us	Agriculture & Ecosystems: Support Adaptation
Fossil fuel	Non-renewable energy resources (including oil, coal, and natural gas) formed from the remains of prehistoric plants and animals that produces carbon dioxide when combusted as a fuel source.	https://www.energy.gov/science-innovation/energy-sources/fossil	Emissions Reductions: Buildings and Thermal Agriculture & Ecosystems: Support Adaptation
FPR / VFPR	Vermont Department of Forests Parks and Recreation		Agriculture & Ecosystems: Reduce Sequester
Front Line and Impacted Communities	Frontline communities include people who are both highly exposed to climate risks (because of the places they live and the projected changes expected to occur in those places) and have fewer resources, capacity, safety nets, or political power to respond to those risks (e.g. these people may lack insurance or savings, inflexible jobs, low levels of influence over elected officials, etc.). Frontline communities are those that experience the "first and worst" consequences of climate change. These are often communities of color whose communities of color whose communities of color whose communities were placed in the least desirable areas of cities, often with high exposure to climate impacts like flooding. These can be low-income communities, whose neighborhoods often lack basic infrastructure to support them and who will be increasingly vulnerable as the climate changes. But these are also communities of people who immigrated to the United States, including legal immigrants, refugees, and undocumented immigrants who may or may not be native English speakers.	https://asa.vermont.gov/sites/asa/files/Boards/VCCF/Frontline%20and%20Impacted%20Communities%205.4.21.pdf	Public Engagement
Gleaners	Extracting something from various sources.		13

VHCB	Vermont Housing and Conservation Board		Rural Resilient & Adaptation: Community Capacity & Planning, Agriculture & Ecosystems: Climate Resilient Lands
VMT	Vehicle Miles Traveled		Emissions Reductions: Transportation
VTrans	Vermont Agency of Transportation		Emissions Reductions: Transportation
Vulnerability	The inability to withstand the effects of a hostile environment.		Rural Resilience & Adaptation: Built Infrastructure, Community Capacity & Planning
WCI	Western Climate Initiative		Emissions Reductions: Buildings & Thermal
Weatherization (WZ)	The installation of energy-efficient measures to improve the building envelope, its heating and cooling systems, its electrical system, and reduce electricity and/or fuel consumption		Emissions Reductions: Buildings & Thermal, Education, Workforce, Funding & Finance: Workforce, Financing, Rural Resilience & Adaptation: Community, Capacity & Planning
Wetlands	Vermont's wetlands are defined as those areas of the state that are inundated by surface or ground water with a frequency sufficient to support plants and animals that depend on saturated or seasonally saturated soil conditions for growth and reproduction.	https://dcr.vermont.gov/watershed/wetlands/what	Agriculture
WISPI	Water Infrastructure Sponsorship Program		13
Working Lands Enterprise Initiative (WLEI)	A State initiative which makes strategic investments and develop policy that support a resilient and sustainable farm, food, and forest economy in Vermont.	6 V.S.A. § 4604	Agriculture & Ecosystems: Support
WWTF	Wastewater treatment facility		Adaptation
ZEV	Zero Emission Vehicle		Emissions Reductions: Non-Energy
			11.1

Full Suite of Pathways, Strategies, and Actions

Emissions Reductions: Buildings and Thermal Recommendations
Pathway: Reduce greenhouse gas (GHG) emissions from the residential, commercial, and industrial (RCI) fuels sector via a broad sector-wide policy framework.
Strategy: Adopt at least one sector-wide mechanism to reduce thermal sector greenhouse gas emissions (GHG), recognizing that, regardless of the specific broad sector-wide approach, complementary policies will also be necessary to meet Global Warming Solutions Act (GWSA) emissions reduction requirements
Priority Action: Analyze options for a performance-based Clean Fuels Standard that implements a declining carbon intensity (CI) score eligibility requirement for residential, commercial, and industrial (RCI) fuels and can be implemented gradually alongside other complementary policies that would be necessary. As a potential alternative, analyze instituting a minimum percentage clean fuel blending requirement for all RCI liquid and gaseous fuels, utilizing an approved list of eligible clean fuels.
Pathway: Reduce greenhouse gas (GHG) emissions associated with buildings and facilities through cost-effective and affordable weatherization and energy efficiency improvements, as well as through use and enforcement of energy and electrical standards and codes.
Strategy: Ramp up implementation of the multi-year Weatherization (WX) at Scale Initiative to meet the scale and pace of residential and commercial weatherization that is <i>[used in the Vermont Pathways model]</i> necessary to meet 2030 Global Warming Solutions Act (GWSA) requirements
Priority Action: Sustain and expand funding for comprehensive weatherization focused on low- and moderate- income households. Through legislation or administrative action, ensure that the current scope of weatherization being conducted is sustained, while aggressively working to ensure that 79,000 additional homes are comprehensively weatherized as soon as practicable, with a priority on low- and moderate-income households. • The weatherization work should recognize energy efficiency broadly. It should include traditional energy efficiency measures, electrical, health, and safety measures needed to comply with codes, and needed infrastructure upgrades such as wiring and service panels to enable electric vehicle (EV) charging, the adoption of heat pumps (HP) for space and water heating, and other strategic electrification opportunities. • Current programs (funding and workforce) are able to weatherize approximately 4,000 homes per year at an average cost of \$11,000 per unit. Much of the recent funding has come from federal sources, which are unlikely to be renewed. • It is essential, however, that Vermont take steps to maintain and accelerate its current pace of weatherization in order to complete the additional 79,000 units as soon as practicable.

Priority Action: Through legislation or administrative action, ensure additional commercial, industrial, municipal, and non-residential buildings, as modeled to be necessary, are comprehensively weatherized by 2030, and secure the funding needed to achieve the target.

- Including “weatherization ready” project needs
- With priority for supporting/expanding existing programs (i.e. the Municipal Energy Resilience Program, Municipal Technical Assistance Program, Building Communities, etc.).

Priority Action: Secure funding for electrification of space & water heating for low-and moderate-income households.

- Develop programs for implementation regarding 200-amp service and related building upgrades, coordinated with weatherization, efficiency, and equipment incentive programs (electric vehicle (EV) chargers, heat pumps (HP), storage, etc.), and ensure that any potentially related statewide program (such as Clean Heat Standard (CHS), if adopted, or enhanced weatherization efforts) includes building electrical upgrades in their design and funding models in order to enable decarbonization.

Strategy: Strengthen state-wide building energy standards and fund related education and code compliance necessary to meet the 2030 and 2050 Global Warming Solutions Act (GWSA) requirements, consistent with pending Building Energy Code Working Group recommendations.

Action: Regularly update the existing statewide residential building energy standard (RBES), putting Vermont on the path to adopting Zero Energy Ready building energy standards for new construction by 2030.

Action: Regularly update the existing statewide commercial building energy standard (CBES), putting Vermont on the path to adopting Zero Energy Ready building energy standards for new construction by 2030.

Action: Develop and fund a state-level energy code initiative that provides standards, education and compliance assistance, and training to municipalities to ensure awareness of and compliance with existing and future building energy standards and/or codes.

Action: In alignment with the Act 47 Building Energy Code Study Committee's recommendations, through legislation action, consider designating the Division of Fire Safety (DFS) as the statewide “authority having jurisdiction” (AHJ) over all building construction (public, private, commercial, and residential):

- a. Empower the DFS to enforce Vermont’s Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES).
- b. Give them the ability to raise funds to cover the cost of energy code adoption and administration through permit fees.
- c. Expand DFS’s current database redesign to incorporate a statewide, central, publicly accessible repository for all Vermont buildings (including all residential buildings) that includes energy code data.
- d. Eliminate filing the certificate in town records and the notarization requirement.
- e. Establish a certificate application tool for both CBES & RBES that generates an energy standard “permit” before construction and a final certification upon completion that is part of the DFS database.

Action: In alignment with the Act 47 Building Energy Code Study Committee's recommendations, require the Office of Professional Regulation (OPR) to: a. Update the contractor registry so contractors explicitly acknowledge residential building energy standards (RBES) and commercial building energy standards (CBES) legal requirements. b. Develop a certification designation for contractors trained on RBES and include the certification on the OPR Contractor Registry and Division of Fire Safety (DFS) websites. c. Update the OPR website to make it user-friendly, alert consumers to contractors who are trained on RBES, and provide filtering functionality, e.g., by specialties, location, and certifications. d. Authorize OPR to update their contract requirements and template for contractor-owner agreements to include a clause acknowledging that energy codes are mandatory.
Action: Establish a role for energy efficiency utilities (EEU) to play in supporting energy codes compliance and incentives.
Action: In alignment with the Act 47 Building Energy Code Study Committee's recommendations, incentivize energy efficiency utilities (EEU) to support projects meeting “net zero” level of performance in their residential new construction programs.
Action: In alignment with the Act 47 Mobile Home Task Force recommendations continue and increase funding for existing programs that replace aged mobile homes or fill vacant mobile home park lots with new energy efficient models.
Action: Direct the Commissioner of Public Service through legislation to explore the use of efficiency standards for multi-family rental properties more consistent with at least the 2015 International Energy Conservation Code (IECC) with amendments. Require a report by March 2026 on the impacts on housing costs, energy burden, and GHG emissions of adopting such a standard. Require recommendations from the Commissioner on whether to require such a standard in Vermont and, if recommended, which rental properties should be covered under such a standard.
Pathway: Reduce greenhouse gas (GHG) emissions through appropriate use of emission-based equipment standards
Strategy: Explore and potentially implement a regulatory requirement for new space and water heating equipment sold and installed in Vermont to meet a zero greenhouse gas (GHG) emissions standard

Priority Action: Conduct a study that considers the technological options and market feasibility for emissions-based equipment standards (EBES) for various types of heating. The purpose is to better understand the feasibility and considerations of Vermont adopting thermal equipment emissions standard(s), either for oxides of nitrogen or, more broadly for greenhouse gases (GHG). • The legislature needs to fund the study • The Agency of Natural Resources (ANR) needs to file a report with the Vermont Climate Council by June 30, 2027. The study is contingent on securing funding and shall consider: ○ adoption by other states, ○ the means by which equipment standards can influence market activity, ○ the most equitable approaches, and ○ how to secure the greatest emissions reductions
Strategy: Adopt a regulatory and/or performance-based approach that results in the use of lower global warming potential (GWP) refrigerants sold in Vermont.
Action: Work with key stakeholders to better understand the number and type of entities that would potentially be subject to a refrigerant management program (RMP) and the associated costs and benefits of an RMP (From Non-Energy Pathways recommendations).
Action: Work with key stakeholders to better understand and formulate recommendations regarding a regulatory or performance-based approach that results in the use of lower global warming potential (GWP) refrigerants in heat pumps (HP) sold in Vermont.
Action: Consider whether to require permanent leak detection systems for entities using over a certain threshold of high global warming potential (GWP) refrigerants and if a cost share should be provided, with additional outreach through work with key stakeholders to better understand the number of applicable entities and the costs and benefits of such a requirement.
Pathway: Reduce greenhouse gases (GHG) by ensuring beneficial electrification of building space and water heating, with a focus on ensuring equitable access to cost-effective and affordable electrification by low- and moderate-income households.
Strategy: Encourage equitable adoption of electric heat pumps (HP) as replacements for fossil fuel heating and ensure access to beneficial electrification regardless of household income.
Action: Through legislation or administrative action, develop a long-term sustainable source (or sources) of funding to enable expanded outreach, consumer funding, and financing for the beneficial electrification of low- and moderate-income households, including home repairs and electrical wiring and panel upgrades needed in order to be "heat pump ready". Implementation Lead: Legislature, Public Utility Commissions (PUC) (through Clean Heat Standard design and rules)

Action: Through administrative action, provide due consideration to measures to ensure consumer protections are in place to ensure low- and moderate-income households do not experience increased service disconnections as a result of increased electrification of space and water heating.
Action: Through administrative action, ensure consumer protections are in place to ensure low- and moderate-income households do not experience increased overall energy costs and/or reduced access to federal or state fuel assistance support as a result of increased electrification of space and water heating.
Action: Support the Department of Children and Families (DCF) to allow the disbursement of Low-Income Energy Assistance Programs (LIHEAP) funds across multiple fuel types (at the individual household level).
Strategy: Institute regulatory or performance-based approaches to transition the water heater market in Vermont and ensure that water heaters models are able to be managed by electric utilities
Action: The Public Utility Commission (PUC), in consultation with the Public Service Department (PSD) and State electric distribution utilities, shall file a written report with the House Committees on Energy & Digital Infrastructure Committee and the Senate Committees on Finance and Natural Resources and Energy, no later than March, 2026, that addresses the feasibility of Vermont adopting an appliance performance standard requiring new electric water heaters for sale in Vermont to be manufactured with a modular demand response communications port or the capability of responding to an open communications standard, ensuring that all new electric water heaters are capable of load management. <i>Report is contingent on securing funding.</i>
Strategy: Encourage integration of electric water heaters into Vermont's electric system and the timely adoption of utility programs to ensure that electric water heating loads are directly managed or controlled through time-differentiated price signals.
Action: Adopt legislation consistent with the provisions of Section 33 (Plug In Vehicle Electric Distribution Utility Rate Design) in Act 55 (2021, an act relating to the Transportation Program) directing all Vermont distribution utilities to adopt propose demand response programs for electric water heaters, and to file electric water heating demand response tariffs with rates consistent with the criteria set out in Act 55 of 2021, Section 33, (c)(1)(A)-(D), (F), and (e) by July 1, 2027 for review by the Public Utility Commission (PUC) pursuant to 30 V.S.A. § 225. <i>Legislation needs to provide funding necessary to support state oversight.</i>
The PUC may grant a petitioning electric distribution utility an extension of the filing deadline. An extension may only be granted in response to a petition if the PUC finds that the electric distribution utility's inability to meet the July 1, 2027, implementation deadline is due to a technical inability to implement demand response program, adverse economic impacts to ratepayers that would result from such implementation, or other good cause demonstrated. The length of the extension shall be directly related to the demonstrated need for the extension.
Pathway: Reduce greenhouse gas emissions by reducing the greenhouse gas (GHG) intensity of fuels used for thermal residential, commercial, and industrial (RCI) purposes.
Strategy: Create a market-based approach to reduce thermal sector greenhouse gas (GHG) emissions

Action: Through legislative and administrative action, adopt a performance- based Clean Fuels Standard that implements a declining carbon intensity (CI) score eligibility requirement for residential, commercial, and industrial (RCI) fuels and can be implemented gradually alongside other complementary policies that would be necessary.

- Alternate approach if recommended action is not deemed feasible (not performance based): Through legislative and administrative action, institute a minimum percentage clean fuel blending requirement for all RCI liquid and gaseous fuels, utilizing an approved list of eligible clean fuels.

Action: Alternate approach if recommended action is not deemed feasible (not performance based) : Through legislative and administrative action, institute a minimum percentage clean fuel blending requirement for all residential, commercial, and industrial liquid and gaseous fuels, utilizing an approved list of eligible clean fuels.

Pathway: Optimize greenhouse gas (GHG) emissions reduction requirements and energy equity in electric, gas, and energy efficiency utility regulation.

Strategy: Consider changes to regulated utility performance metrics to include greenhouse gas (GHG) emissions reductions and energy burden reductions so as to more cost-effectively achieve Vermont’s legal GHG reduction requirements and energy-equity goals.

Action: Through legislation direct the Public Utility Commission (PUC) to open a case that examines existing regulated utility performance metrics and considers whether changes to those metrics to optimize greenhouse gas (GHG) reductions and energy burden reductions for Vermonters with low- and moderate-incomes would promote state policy goals.

Pathway: Recruit, train, and retain the workers and support the businesses necessary to implement Vermont’s thermal sector energy transformation.

Strategy: Increase coordination among multiple state agencies, workforce development entities, public education institutions, and employers to ensure the scaling up of the workforce needed to achieve the Global Warming Solutions Act (GWSA) requirements. This will require a substantial ramp up in workforce recruitment, training, placement, and retention involving multiple public and private entities.

Action: Complete the development of the Weatherization Workforce Training Center currently underway under the leadership of the Weatherization Workforce Training Center Steering Committee.

Geothermal

Priority Action: Utilities and their regulators should adopt standards and programs to support geothermal networks, such as community-scale geothermal.

Emissions Reductions: Non-Energy Recommendations
Pathway: Further reduce non combustion emissions through development of strategies that look at refrigerants, semi conductors, waste, and wastewater.
Strategy: Reducing Emissions of Refrigerants
Action: Provide incentives to improve or replace commercial and industrial refrigeration systems with the goal of reducing the use of high global warming potential (GWP) refrigerants. With state funding, Vermont Energy Investment Corporation (VEIC) will provide enhanced support through increased project incentives for grocers, convenience stores, and other facilities that require refrigeration for perishable products within Vermont to transition to lower GWP and/or Natural refrigerants and install leak-detection systems to reduce refrigerant emissions from existing systems.
Action: Provide incentives for businesses to transition from high global warming potential (GWP) refrigerants to lower GWP alternatives using data from outreach for refrigerant management program (RMP) development to target appropriate facilities. This would be a voluntary program that would speed the transition to lower GWP refrigerants and supplement/compliment reductions achieved through the Act 65 rulemaking (rules regarding phase-down of the use of Hydrofluorocarbons).
Action: Consider appropriateness of adding heat pumps to Act 65 (rules regarding phase-down of the use of Hydrofluorocarbons)
Strategy: Continue to Explore Efficiencies and Alternatives to High global warming potential (GWP) Fluorinated Gases in the Semiconductor Manufacturing Process
Action: Further develop incentives for the adoption of emission reduction technologies such as combustion abatement units to reduce greenhouse gas (GHG) emissions during semiconductor production processes.
Action: Seek funding available through the CHIPS Act (an act which provides funds to support the domestic production of semiconductors and authorizes various programs and activities of the federal science agencies) to support research, development, and implementation of emission reduction technologies in the semiconductor industry and advance sustainable manufacturing practices
Strategy: Further reduce fugitive emissions from Wastewater Treatment Facilities (WWTFs) by ensuring flares are operational at existing anaerobic digesters (ADs) at WWTFs
Action: Complete a survey of Wastewater Treatment Facilities (WWTFs) with Anaerobic Digestors (ADs) and their operational status.
Action: Prioritize installing or repairing functional flares at the next facility upgrade for the two identified facilities, Barre City and Newport City, that are not implementing beneficial use
Action: Explore requiring wasteheat recovery capabilities in new wastewater system projects and significant system expansions where cost effective, which are funded via state wastewater programs including those associated with State designation programs.
Strategy: General Waste Reduction
Action: Create Reduce, Reuse, Repair network

Action: Host statewide Reuse conference
Action: Promote waste reduction messaging on social media: VTRecycles Facebook page and TheVermontDEC Instagram and Facebook pages
Action: Conduct media and community-based social marketing (CBSM) campaign on waste reduction
Strategy: Reduce Wasted Food
Action: Maintain related website scrapfoodwaste.org
Action: Promote annual food waste reduction challenge.
Action: Conduct outreach to businesses and schools on food waste reduction and management
Action: Promote wasted food reduction and management messaging on social media through VTRecycles Facebook page and TheVermontDEC Instagram and Facebook pages
Strategy: Promote General and Special Recycling
Action: Promote recycling messaging on social media through VTRecycles Facebook page and TheVermontDEC Instagram and Facebook pages
Action: Support special recycling media and outreach
Action: The Agency of Natural Resources (ANR) upcoming Recycling Systems Analysis Report, due in early 2025, should provide more information on the estimated emissions related to various recycling systems and their costs and benefits. This information should help inform any future conversations about the Vermont Bottle Bill and general recycling systems in Vermont to further support emissions reductions.

Emissions Reductions: Electricity Recommendations	
Pathway: Load Management and Grid Optimization	
Strategy: Support cost-effective load management, grid hardening, and optimization, e.g., through advanced metering, storage, targeted siting of generation, rate design, and distributed energy resource management systems statewide to enable customer programs and avoid or delay more expensive physical upgrades.	
Priority Action: Support cost-effective load management, grid hardening, and optimization, e.g., through advanced metering, storage, targeted siting of generation, rate design, and distributed energy resource management systems statewide to enable customer programs and avoid or delay more expensive physical upgrades. Continued Public Utility Commission (PUC) oversight of utility load management programs, investments, and rate designs, and consideration of regulatory approval improvements for efficient generation and infrastructure siting.	
Pathway: Further decrease greenhouse gas Emissions (GHG) emissions from electric sector purchases	
Strategy: 100% Carbon-free or Renewable Electricity	
Action: Review design parameters of 100% carbon-free electric portfolio standard that equitably promotes electrification - Here are the questions reviewed by the Climate Council previously that we would expect to include: Mechanisms to support equitable access to renewable energy Supporting existing versus new resources In-state versus out-of-state generation Supporting generation of all sizes (ex. small scale distributed energy resources (DERs) versus utility-scale/larger DERs) - Scale of deployment - Energy storage (both short and long duration) Time scale on which renewability is measured (ex, annual, quarterly, monthly, hourly) - Incentivizing resources to deliver when needed (e.g. during peak hours, noting that these are likely to shift over time; seasonal needs such as winter loads; how storage may fit in) Siting, including environmental, community, and transmission system considerations Carbon impact of resources; what source/criteria are utilized - Informed by greenhouse gas (GHG) inventory recommendations Timeline for reaching 100%	
Pathway: Increase Access and Participation in Renewable Energy Programs	
Strategy: Review and implement as appropriate recommendations from Act 179 (an act relating to the Renewable Energy Standard) study regarding evolution of community-level renewable energy programs, especially for low-income customers.	

Priority Action: Review and implement as appropriate recommendations from Act 179 (An act relating to the Renewable Energy Standard) study regarding evolution of community-level renewable energy programs, especially for low-income customers.

- With community and customer input, utilities continue, or consider, creating procurement and customer enrollment programs to support community-based renewable energy projects. Primary considerations for any such program should be cost-containment actions, funding avenues that are not electric customer supported, and how approval for community-based project siting occurs.

Pathway: Enable All Vermonters to Choose Electrification

Strategy: Deploy programs that ensure the electric grid supports customer electrification necessary to meet Global Warming Solutions Act (GWSA) Goals, incl. service drops, transformers, smart panels, electric vehicle (EV) chargers, storage, etc. Highlight importance of cost-effectiveness and equity in design, implementation, and affordable funding.

Priority Action: Support existing programs and expand as needed to ensure the electric grid supports customer electrification necessary to meet Global Warming Solutions Act (GWSA) goals, including service drops, transformers, smart panels, electric vehicle (EV) chargers, storage, etc. Highlight importance of cost-effectiveness and equity in design, implementation, and affordable funding.

- Continued Public Utility Commission (PUC) oversight of utility programs (e.g. Tier III); consider expanding credit in Tier II for these purposes; seek state or federal sourced funding where possible; strive for deployment across utility territories with ability to participate for all customers, including rural/low-income.

Rural Resilience & Adaptation: Compact Settlement Recommendations
Pathway: Support compact settlement patterns that contribute to the reduction of greenhouse gas (GHG) emissions, enhance community and built environment resilience, and help conserve natural and working lands.
Strategy: Increase investment in the infrastructure (sewer, water, stormwater, transportation, mixed-use development, housing, sidewalks, bike lanes, electric vehicle (EV) charging, broadband, energy supply) needed to support resilient, compact, walkable development.
Action: Expand the eligibility of the existing downtown and village center tax credit programs to revitalize neighborhood housing in and around state designated centers.
Action: Support public private partnerships to fund the design and construction of new infill housing in existing neighborhoods.
Action: Increase Municipal Planning Grant (MPG) funds to support physical planning and design, zoning modernization and bylaw adoption that creates housing growth opportunities and more housing choices.
Action: Expand the existing downtown and village tax credit program eligibility to offset the cost to elevate or flood proof existing buildings located in areas with increased flood risks. Strengthen coordination with existing programs such as Vermont Emergency Management (VEM)
Priority Action: Increase investment in municipalities to harden, improve, expand and build new drinking water, wastewater, stormwater, and other infrastructure to support compact development, especially growing away from climate hazards such as flooding, and ensure the assets' long-term operation and maintenance.
Action: Establish a rolling planning grant for communities in need of consulting assistance to prepare Neighborhood Development Area (NDAs) applications. This designation works to align state and local regulations to increase housing options within compact centers.
Strategy: Update state and local land-use policies, regulations, and practices to remove barriers to compact settlement and improve coordination on land use and development planning and implementation across agencies, departments, municipalities, boards, commissions, and authorities.
Action: Prioritize public funding for mixed-use developments near transit hubs in regional and rural centers
Action: Align development regulations and remove financial barriers to compact development in and around downtowns and village centers (i.e., Act 250 (Vermont's land use and development law), local zoning, aging infrastructure, etc.). Provide statewide guidance and incentivize housing in built up areas to encourage development away from open fields and forests, and river corridors.
Action: If a statewide land use planning policy and implementation plan is authorized, assess the feasibility and potential benefits of creating a State Planning Office and/or other potential structures within the executive branch to implement the Plan at the state level.

Action: Create an office of Strategic Investment and Coordination that supports achievement of land use planning goals by aligning and resolving conflicts in state and local regulations and funding and provides a permitting platform from both the customer and policy objective perspective.

Priority Action: Continue to implement Act 181 (an act relating to community resilience and biodiversity protection through land use), an act relating to community resilience and biodiversity protection through land use, by increasing investment in walkable and livable communities while also reducing sprawl, protecting critical natural resources, addressing flood adaptation and resilience of historic villages and downtowns, and planning new development away from flood, fluvial erosion, and landslide hazards.

Action: Hire a consultant to review and assess the state designation programs that recognize and support Vermont's compact settlement areas.

Action: Encourage the Legislature to authorize the creation a multi-stakeholder committee process with funding to support the development of a statewide land use planning policy and implementation plan that guides development to growth areas, town centers, and appropriate rural locations, and limits the development within ecologically sensitive/risk-prone areas. The Legislature should clarify how and if this plan informs or directs land use planning, policy and regulation at the local, regional, and state level.

Action: Connect existing programs with new and safe development across rural communities. Create a State-wide redevelopment authority to bank land , underwrite acceptable risk, address vacancy, and brownfields, improve building flood resilience in settled areas, and plan for new neighborhood development and infrastructure.

Action: Provide enhanced technical assistance and support to municipalities and regions, including outreach and education for landowners and community members, to develop and implement town plans intended to maintain forest blocks and connecting habitat as authorized by Act 171 (an act which amended Vermont Planning Statutes), and effective zoning and subdivision bylaws to maintain forest blocks and connecting habitat. Because forest and habitat blocks do not end at state and national boundaries, support engagement in interstate and bi-national forest block and habitat connectivity efforts such as the Staying Connected Initiative at both the state and regional levels.

Action: Update Act 250 (Vermont's land use and development law) to promote compact settlement by:

- i. waiving the mitigation fees for prime agricultural soils for alternative or community wastewater systems that will serve a state designated center.
- ii. removing the population-based caps on the Act 250 exemption for priority housing projects
- iii. including criteria that better address climate change, forest fragmentation and forest loss, to incentivize growth in the state's designated centers and better address the specific challenges to working lands enterprises;
- iv. updating its governance, staffing, public engagement, and the role of State Agency permits in the Act 250 process to create the enterprise capacity necessary to implement new climate related criteria and respond to future land use pressure from climate change and in-migration of climate refugees.
- v. removing Act 250 jurisdictional thresholds for housing development within and immediately adjacent to certain state designated centers to incentivize compact, dense settlement in areas with adequate local land use laws and existing infrastructure, reducing development pressures on open spaces such as greenfields and forested locations. These centers should grow in a manner by which walking and biking are preferred means of mobility, and mobility infrastructure should be designed for universal accessibility.

Action: Amend Neighborhood Development Area (NDA) enabling statute to allow the inclusion of river corridors upon local adoption of River Corridor bylaws.

Strategy: Fund research, data collection and digital maps to provide insights on land use decisions in Vermont and the impact it can have on climate and resilience goals and outcomes.

Action: Fund a study that quantifies the vehicle miles traveled and greenhouse gases (GHGs) for both compact and dispersed areas of development as well as the co-benefits of compact centers.

Education, Workforce, Finance & Funding: Education Recommendations
Pathway: Create accessible, equitable research, partnerships, and education
Strategy: Provide climate-related education at all levels, outreach, research, and technical assistance programs.
Priority Action: Compile an open source, accessible, and interdisciplinary climate change curriculum for Vermont educators that builds off existing resources and programs to enable teaching across subject areas.
Action: Develop a Climate Change Curriculum website on the Agency of Education Website
Priority Action: Amend the Vermont State Board of Education's Education Quality Standards to incorporate environmental and climate change education at all grade levels.
Action: Survey Vermont students in areas of interests related to greenhouse gas (GHG) emission reduction strategies and technologies
Action: Strengthen existing extracurricular programs that provide climate change education and activities.
Strategy : The language in Vermont agencies must be reviewed and updated to be more equitable.
Action: Educate state staff on the history of Vermont, the harm that has been done in the name of conservation, the history of state involvement in the eugenics movement, and the role that language plays in the continuation of oppression and misunderstandings.
Action: Identify and develop alternative terms and words to those that are rooted in historical injustices, and invest in community outreach to create broad understanding of de-colonized words.
Action: Recommend that the legislature create a board to systematically review state government institutions to ensure that language intrinsically tied to historical injustices is removed from all active documents and policies.
Action: Leadership in all levels of state government must make this a top priority.
Pathway: Educate Vermonters about their energy choices and available funding options to increase energy efficiency in residential homes
Strategy: Sustain funding for programs to educate Vermonters about their energy choices and funding options
Priority Action: Maintain funding for programs to educate Vermonters about their energy choices and funding options to increase energy efficiency in residential homes, including the energy Coaches and Navigator Program.

Education, Workforce, Finance & Funding: Workforce Recommendations
Pathway: Advance workforce development and strengthen current Vermont workforce by addressing the comprehensive needs of employees and employers, while focusing on both immediate and long-term solutions
Strategy: Advance the US Climate Alliance's Governor's Climate-Ready Workforce Initiative in service of building a workforce needed to drive climate action in Vermont.
Priority Action: Implement the Climate-Ready Workforce Initiative to grow career pathways in climate change and clean energy fields, support new and existing workers, retain recent graduates, ensure job quality and safety, strengthen workforce diversity, and train workers in service of the collective U.S. Climate Alliance goal of 1 million new registered apprentices across 24 states by 2035. • Increase the number of registered apprenticeships that can be supported in the state by Vermont State University, the Vermont Department of Labor (VDOL), and other registered apprenticeship programs, especially in plumbing/HVAC (heating, ventilation, and air conditioning), electrical, and weatherization. • Support training from middle school through adult education and Service-Learning programs for a wide variety of audiences, including through the weatherization training center and the many existing training programs • Target outreach, training, support, and Service-Learning systems for existing Vermont residents to enter and stay in careers that support on climate action, including farm and forestry, conservation, clean energy, weatherization, outdoor recreation, and resilience and adaptation careers. • Invest in instructors and physical infrastructure to increase the number of students who can be supported in the Career and Tech Education system in the state including electrician, plumbing, building trades programs, as well as agriculture, forestry and other sectors mentioned above.
Action: Climate Action Office, in collaboration with the Vermont Department of Labor (VDOL) and other relevant state Agencies, will lead the Resilient Communities and Lands, focused on careers in the development and maintenance of safe, livable, and resilient communities; preparedness for and response to climate impacts such as extreme heat, wildfires, severe storms, flooding, and drought; and the deployment of natural climate solutions and climate-smart stewardship of our lands and waters.
Action: Focus registered apprenticeship outreach and program development on specific occupations: weatherization specialist, electrician, plumber, solar installer and invest and seek additional state and federal funds in off-setting wages so employers have an incentive to (safely) take on additional apprentice training spots.
Action: Vermont Department of Labor (VDOL) will work to clarify and streamline requirements in electrical and plumbing and work with the electrician's and plumber's licensing boards to include stackable licences in the design of 4 year training programs.
Strategy: Increase capacity and productivity within the current contractor network to speed adoption of cost and energy saving technologies that will lower the cost of housing and accelerate worker productivity.

Priority Action: Monitor the impacts of decarbonization on the workforce and create programs to support impacted workers by tracking leading indicators.

Action: Strengthen partnerships to support business expansion of Human Resources training and support (including for employee benefits) training employers to increase success in recruitment and retention.

Action: Create new avenues for businesses to access equipment and make other investments that will increase their capacity.

Strategy: Target outreach, training, support systems for existing Vermont residents to enter and stay in climate change careers, including farm and forestry, clean energy and resilience careers.

Strategy: Create a full, clear career pathway to support potential workers in climate change careers, including farm and forestry, clean energy and resilience careers.

Priority Action: Target outreach, training, support systems for existing Vermont residents to enter and stay in climate change careers, including farm and forestry, clean energy and resilience careers.

Action: Support professionals and experienced/credentialed retirees to become trainers and instructors for the next generation of workers.

Priority Action: Support training from middle school through adult education programs for a wide variety of audiences, including through the weatherization training center and the many existing training programs.

Priority Action: Increase the number of students who can be supported in the Career and Tech Ed system in the state including electrician, plumbing, building trades programs, agriculture and working land sectors

Priority Action: Increase the number of registered apprenticeships that can be supported in the state by Vermont State University and the Vermont Department of Labor (VDOL), especially in plumbing/HVAC (heating, ventilation, and air conditioning), electrical, and weatherization.

Priority Action: Support programs for people to start and build their own businesses in the trades, including those offered by business development and climate change career programs.

Action: Communicate with potential future employees, including youth and out-of-state workers about benefits of these careers in Vermont.

Education, Workforce, Finance & Funding: Financing Recommendations

Pathway: Explore opportunities to further leverage public and private capital to make needed clean energy, resilience and adaptation investments

Strategy: Reduce hurdles facing Vermonters in accessing and affording cleaner and more energy efficient technologies, weatherization, and necessary infrastructure and resilience investments

Priority Action: Interim Funding for Priority Climate Actions: Until new and significant sources of revenue are in place to fully implement the recommended priority actions in this Climate Action Plan (CAP), the State should identify, authorize, and appropriate revenue from existing or new sources that will immediately support the creation or expansion of certain priority actions. This funding should be used to (a) establish or grow programs proven in Vermont, or demonstrated in other jurisdictions, to be cost-effective strategies for achieving climate benefits, while optimizing other public policy co-benefits, and (b) increase investment in building state agency capacity to design and implement the priority action recommendations. The source of revenue should (a) be a bridge to having adequate revenue from other programs such as a cap-and-invest system, (b) be structured to mitigate impacts on Vermonters facing financial hardships, and (c) not burden those economic sectors and programs that are essential to a transition to a low-carbon and climate-adapted landscape and economy.

Priority Action: Support the implementation of the Climate Superfund (Act 122), including by funding the work at the Agency of Natural Resources (ANR), Vermont Treasurer's Office and any other work deemed necessary to support its implementation, helping to provide essential revenue to invest in resilience and adaptation measures.

Priority Action: Interim Funding for Priority Climate Actions: Until new and significant sources of revenue are in place to fully implement the recommended priority actions in this Climate Action Plan (CAP), the State should identify, authorize, and appropriate revenue from existing or new sources that will immediately support the creation or expansion of certain priority actions. This funding should be used to (a) establish or grow programs proven in Vermont, or demonstrated in other jurisdictions, to be cost-effective strategies for achieving climate benefits, while optimizing other public policy co-benefits, and (b) increase investment in building state agency capacity to design and implement the priority action recommendations. The source of revenue should (a) be a bridge to having adequate revenue from other programs such as a cap-and-invest system, (b) be structured to mitigate impacts on Vermonters facing financial hardships, and (c) not burden those economic sectors and programs that are essential to a transition to a low-carbon and climate-adapted landscape and economy.

Rural Resilience & Adaptation: Community Capacity Planning Recommendations
Pathway: Increase capacity for climate resilience planning and implementation, and address inequities of under-resourced communities.
Strategy: Provide tools, technical support, and permanent funding for local and regional climate resilience planning and project implementation to enhance resilience to the impacts of climate change.
Action: Develop a climate planning toolkit that serves as a hub for existing tools, resources, and information, relevant for designing and implementation of climate action measures or strategies at a municipal level.
Action: Expand capacity for the State to train on and support the use of the Municipal Climate Toolkit through development of education materials, expanded technical assistance, and streamlined tools to help municipalities access planning and implementation support related to climate action.
Action: Provide planning guides and tools, such as the Municipal Climate Planning Framework and Guide and the Municipal Climate Toolkit, that help municipalities develop and integrate climate actions into their planning processes that are locally relevant and aligned with State Climate goals.
Action: Provide funding and technical assistance for the development and implementation of climate resilience municipal plans through existing program and technical assistance providers, such as the Municipal Planning and Resilience Grant Program, and fully funding Regional Planning Commissions to develop Local Hazard Mitigation Plans.
Priority Action: Increase State capacity to manage funding programs and provide technical assistance for the development and implementation of climate resilience plans, with a focus on maximizing the efficacy of Local Hazard Mitigation Plans, and augmenting existing programs with the Municipal Planning and Resilience Grant Program, the Municipal Climate Planning Framework and Guide, and the Municipal Climate Toolkit.
Priority Action: Establish permanent, dedicated funding for Regional Planning Commissions to hire and retain staff for climate resilience and natural resources planning work, hazard mitigation application development, and management of hazard mitigation grants on behalf of municipalities or other eligible grant recipients as well as cover overhead costs related to completing Local Hazard Mitigation Plans.
Priority Action: Secure sustainable, long-term funding to expand and maintain a permanent Flood Resilient Communities Fund (Community Resilience and Disaster Mitigation Fund) for the design and implementation of local and regional climate change adaptation projects and community resilience. Funding may be used as local match for federally funded hazard mitigation programs as well as non-Federal Emergency Management Agency (FEMA) eligible hazard mitigation activities.
Action: Assess the efficacy of and consider revisions to Emergency Relief and Assistance Fund (ERAF) to contribute towards the 25% non-federal match for Federal Emergency Management Agency (FEMA) hazard mitigation funding applications and match for other flood disaster risk reduction opportunities.
Action: Establish a dedicated, comprehensive state level program with funding to strategically purchase or match funding for hazard-prone properties, easements to conserve river corridors, floodplains, forests, and wetlands to reduce overall flood risk and enhance flood storage statewide.

Action: Create and fund one natural resource staff position at every Regional Planning Commission to assist with implementation of climate policies and natural resources requirements such as Act 171 (forestry and habitat blocks) (an act which amended Vermont Planning Statutes). Use the Transportation Planning Initiative as a model to fund RPC natural resource staff and support trainings with the Agency of Natural Resources (ANR) and other partners.

Strategy: Fund initiatives that foster collaboration/coordination between local economic development/small business support organizations and local and regional climate planning efforts.

Action: Provide tools, technical support, and permanent funding for resilience planning and disaster recovery that covers diverse range of small businesses in Vermont, including those dependent on sustainable use of natural resources.

Action: Complete a Statewide climate change impact assessment for Vermont's commercial sector and natural resource based industries including but not limited to the ski, sugaring, and logging industries.

Action: Assist businesses in applying for and receiving recovery loans and grants.

Priority Action: Expand the Business Emergency Gap Assistance Program (BEGAP) to provide financial support and one-on-one coaching to businesses and nonprofits before a disaster in addition to providing funding to businesses who are impacted by climate disasters and disruptions. Link and coordinate efforts with organizations and networks providing similar support to businesses.

Strategy: Increase community participation in local governance and support civic engagement and citizen involvement

Action: Require remote meeting options, including a call-in option for all meetings of public bodies; allow fully virtual meetings of public bodies with guidelines similar to the State of Emergencies; evaluate options for online collaboration in preparation for a meeting that can be done with transparency.

Action: Develop, extend, and implement relevant and appropriate strategies and approaches to increasing local stakeholder engagement and participation in resilience and adaptation programs, such as weatherization and hazard mitigation, at respective municipal levels.

Action: Improve community resilience networks through Resilience Hubs and support for the coordination and capacity of community resilience initiatives at the local level, focusing on what already exists and is working by region (e.g., Community Resilience Organizations, Community Organizations Active in Disaster) to reduce community and individual vulnerability to natural hazards.

Pathway: Change Vermont's land-use policies so current and future land development will be adaptive and resilient to climate change impacts

Strategy: Develop permanent private and public funding sources to floodproof, elevate and purchase commercial and residential properties, as well as conserve and restore ecosystem services upstream to protect our people, property, environment, and economy from flooding.

Action: Expand the eligibility criteria and increase funding for Vermont Housing and Conservation Board's (VHCB) conservation and buyout program, to address any flood-vulnerable structures.

Pathway: Ensure that all people have access to safe, accessible, energy efficient, and affordable housing.

Strategy: Update state and local land-use governance, regulations, practices, and investments to eliminate barriers to housing development, and support the creation additional year round housing units in line with the State's Housing Needs Assessment
Action:Expand pilot program to train a network of local builders in the design and building of small and mid-sized and accessory dwelling units (mother-in-law apartments).
Action:Expand the Rapid Response Mobile Home Infill Program.
Action:Convene a statewide conversation on the Vermont Municipal and Regional Planning and Development Act's (24 VSA, Chapter 117) provisions on land use and housing to outline amendments and strategies that will expand housing choice, opportunity, and improve community resilience.
Action:Explore opportunities for resilient residential building codes and resilient zoning, including evaluation of impacts, and options for programatic and/or regulatory structure to support implementation. Coordinate this effort with existing efforts to adopt the inspection, repair, and cleaning (IRC), enforce and update the Residential Building Energy Standards (RBES) and Commercial Building Energy Standards (CBES) codes, and update the International Building Codes (IBC)
Action:Create educational/informational materials for municipal leaders on the intersection of housing and climate crises.
Action:Improve recovery communications.
Strategy: Increase investments in the preservation and development of both private-market and nonprofit-owned affordable housing.
Action: Increase funding and financing products for homes starts within communities that are planning and investing in development-ready infrastructure, building development partnerships, and updating zoning bylaws to welcome new homes.
Strategy: Increase access to fair and affordable housing for Vermonters who are housing instable
Strategy: Develop data sets and analyses on the intersection of climate and housing policy
Action: Create a geolocated, searchable housing inventory that includes characteristics relevant to climate action planning, such as risk of flooding
Priority Action: Integrating regional housing targets and ongoing mapping, including Flood Insurance Rate Map updates, River Corridors, and landslide hazards, identify areas that are suitable for new, climate safe housing, and increase funding mechanisms where communities are investing in development-ready infrastructure.
Action: Commission a study to identify how many Vermonters have been displaced by floods (Irene, 2023 and 2024 floods).

Rural Resilience & Adaptation: Built Infrastructure Recommendations	
Pathway: Proactively and strategically invest to enhance resilience in transportation, communications, water/wastewater, and energy infrastructure and prioritize our most vulnerable communities and environmental- justice populations.	
Strategy: Create a policy, planning and organizational foundation to support effective investments in infrastructure resilience by understanding exposure, identifying vulnerabilities and risks, investigating options for prioritized actions.	
Priority Action: The State, through the Public Utility Commission (PUC) and Public Service Department (PSD), should complete the PUC resilience planning investigation underway, which is analyzing whether and how to define, value, measure, and set targets for grid resilience. Utilities should continue to integrate resilience planning into their operations.	
Action: Utilities should conduct benefit-cost analysis on resilience upgrades and seek non-ratepayer (e.g., federal, state, municipal, nonprofit, and private) funding for measures where costs exceed benefits.	
Priority Action: Expand upon the Municipal Vulnerability Indicators tool to create a Municipal Vulnerability Index that can be used by state agencies and others as a resource to assist in prioritizing infrastructure resilience investments across the state based on specific vulnerabilities or combinations of vulnerabilities. Ensure it includes currently missing data such as historic utility outage data, to the extent available, and the Agency of Natural Resource's (ANR) Environmental Justice mapping tool, when complete.	
Action: Support the development and implementation of asset management programs for all public water systems and publicly owned wastewater treatment works.	
Action: Understand and develop opportunities for creating water and wastewater systems performance efficiencies (i.e. sewer performance assessments (SPA), inflow, infiltration, pollution reduction) including nature-based solutions (NbS).	
Action: Complete a flood vulnerability assessment of state-owned rail infrastructure to identify and prioritize needed improvements.	
Action: Increase investment to municipalities for new and expanded facilities to support water and wastewater systems performance efficiencies (reductions in inflow, infiltration, pollution).	
Action: Examine pros and cons of regionalizing or sharing resources for all water and wastewater treatment utilities and practices.	
Action: Strategically integrate planning and preparedness across disciplines and geographies addressing the interdependencies of transportation, energy, communications, and other systems	
Action: Increase infrastructure investment needed to for walking, biking and transit; support planning for regional bike corridors to improve safety and transportation options between community centers. Identify and eliminate barriers to development, including inequities resulting from match, maintenance, and other requirements.	
Action: Utilities should deploy technology for management, control, and optimization of distributed energy resources, including energy storage, to improve reliability and resilience while reducing costs for all customers.	
Action: Expand broadband to support remote work, tele-services, and reduce the impact of disruptions to travel, health, and safety.	

Action: Evaluate the risks and opportunities created by potential climate change in-migration to Vermont's critical infrastructure.
Priority Action: Create a transportation flood resilience funding program to design and construct transportation projects identified as high priority locations via use of the most relevant risk and vulnerability assessment tools.
Action: Evaluate the cost benefit of road maintenance stormwater runoff and erosion practices, especially on municipal roads.
Replace or harden electric and communication infrastructure with the most appropriate resilient alternative when cost effective. For example, for aging or unreliable lines, utilities should continue to evaluate improving resilience by relocating lines underground or through other options, where demonstrated to be feasible and cost effective to electric customers. ● Planning frameworks, valuation tools, and metrics resulting from the Resilience Investigation (Case No. 25-0339-PET) being conducted by the Public Utility Commission (PUC) should be used to inform this evaluation.
Action: Local and regional planners, utilities, transportation providers, and state agencies should collaborate to identify mission critical facilities and develop preparedness, survivability, and recovery plans, procedures, and investments that mitigate the impact of extreme weather events to services provided by these facilities.
Action: Assess the vulnerability of drinking water, stormwater, and wastewater infrastructure assets; and prioritize opportunities to address those vulnerabilities; including relocation of systems.
Action: Develop and fund programs to ensure continuous power for continuity of operations at water and wastewater facilities, including evaluation of solar /storage microgrids, anaerobic digesters (ADs), and other potential solutions.
Action: Provide a sustainable funding source for addressing drinking water, stormwater, and wastewater infrastructure vulnerabilities identified and prioritized through asset management plan and vulnerability assessments development.
Pathway: Change Vermont's land-use policies so current and future land development will be adaptive and resilient to climate change impacts
Strategy: Increase investment in the infrastructure (sewer, water, transportation, broadband, energy supply) needed to support communities that are more resilient to climate disruptions, equitable, resource efficient, and protects the adaptive capacity of natural resources.
Priority Action: Develop a framework that creates a plan to identify prioritized state investments in resilience projects. The framework should be attentive to fiscal constraints, similar to the State Transportation Improvement Program, and build upon the Resilience Implementation Strategy (RIS), the State Hazard Mitigation Planning, and Hazard Mitigation Project Review processes. The purpose of this action is to have a standing list of projects, vetted through an interagency prioritization and public engagement process, that could be implemented as funding is available
Action: Understand and invest in opportunities for creating water and wastewater systems performance efficiencies (i.e. sewer performance assessments (SPA), inflow, infiltration, pollution reduction) including investment in nature-based solutions (NbS)
Action: Assess the vulnerability of drinking water, stormwater, and wastewater infrastructure assets; and prioritize opportunities to address those vulnerabilities; including relocation of systems.

Action:Examine pros and cons of regionalizing or sharing resources for all water and wastewater treatment utilities and practices.

Action:Increase investment to municipalities for new and expanded facilities to support water and wastewater systems performance efficiencies (reductions in inflow, infiltration, pollution).

Action: Building upon the State Hazard Mitigation Planning and Hazard Mitigation Project Review processes, develop a framework similar to the State Transportation Improvement Program that creates a fiscally constrained plan to identify prioritized state investments in resilience projects.

Rural Resilience & Adaptation: Public Health Recommendations
Pathway: Support equitable adaptation to the public health impacts of climate change
Strategy: Increase support for regional, municipal, and community partners to mitigate, prepare, and respond to climate impacts on health.
Priority Action: Provide increased capacity to strengthen messaging and awareness of local and state emergency preparedness, response, and recovery structures.
Priority Action: Provide funding and technical assistance to municipalities and local partner organizations to support adaptation and preparedness planning in communities, with specific focus on disproportionately affected and vulnerable populations; including the identification, adaptation, and equipping of facilities to serve as community resilience hubs that serve as places for learning, collaboration, resource access, and refuge in response to climate-related hazards and other community needs.
Strategy: Increase support for individuals and households to prepare and adapt to climate impacts on health
Action: Review/improve existing tools and/or develop new tools to better identify and support Vermonters needing extra assistance during an emergency, including state systems such as the Citizens Assistance Registry for Emergencies and its integration with the Vermont 2-1-1 system, support for local systems managed by municipal and community partners, or other alternatives.
Priority Action: Provide funding for equipment, supplies, and services that improve resilience and reduce the health impact of climate-related hazards for income-qualifying households needing extra assistance. The intent is to provide financial support for resilience needs in a similar way to existing financial support for energy efficiency (e.g., through heat pump (HP) and electric vehicle (EV) rebates). Resilience equipment and strategies should address health risks related to flooding, power outages, extreme temperatures, hazardous air quality, humidity, vector-borne diseases, and other climate-related hazards, and could include: • Supplies and equipment to improve heat resilience, such as trees and other vegetative shade, window treatments (shade and thermal barriers), efficient air conditioning (heat pumps) fans, and dehumidifiers; • Equipment to improve indoor air quality, such as air purifiers, mechanical ventilation (e.g. energy recovery ventilator (ERVs)); • Backup power equipment; • Window screens; • Services such as water intrusion and moisture mitigation & management, private drinking water testing and treatment, etc.
Priority Action: Provide state-contracted community mental health services partners more capacity to address anxiety, depression, distress, and trauma caused by climate change and climate-related disasters.
Action: Adopt a policy to prioritize state climate mitigation spending on actions that maximize public health, climate resilience, and health equity co-benefits, while minimizing the potential for co-harms.
Strategy: Expand state capacity to plan, prepare, and respond to climate-related health hazards.

Action: Direct state agencies to collaborate across relevant agencies to develop, maintain, and exercise state response plans and mechanisms for addressing climate-related health hazards including flooding, extreme temperatures, power loss, hazardous air quality, and infectious diseases.

Action: Fund increased state staff capacity and resources to better plan, prepare, and respond to climate-related health hazards, including increased support for regional, municipal, and community partners.

Strategy: Improve tools and mechanisms for increasing awareness about climate impacts on health and potential adaptation strategies.

Action: Routinely review and update publicly-available information about the highest priority climate-related health risks for Vermont.

Action: Communicate to the public, communities, and state partners about climate-related health risks and offer guidance about what individuals and communities can do to reduce their risks, with specific focus on disproportionately affected populations (including overburdened and underserved communities, unhoused individuals, older adults, children, people with health sensitivities, and outdoor workers).

Action: Direct state agencies to develop improved tools and approaches for communicating with community partners, with people in languages other than English, and with other underserved populations (including rural, unhoused, and isolated individuals).

Agriculture & Ecosystems: Reduce & Sequester Recommendations
Pathway: Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse gases (GHG).
Strategy: Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse gases (GHG).
Priority Action: Increase funding, enhance, and adapt existing State of Vermont programs that support greenhouse gas (GHG) emissions reductions, soil carbon sequestration, and/or climate adaptation and resiliency on working lands, including through manure management. Coordinate with applicable agencies to defend and accelerate the implementation of federally funded climate mitigation and resilience practices in Vermont. • Enhance and adapt programs to better incorporate nature-based solutions as well as traditional, ecological and indigenous knowledge (TEK/IK). • Example State programs include, but are not limited to: Agency of Agriculture Farms and Markets (AAFM): Agriculture-Clean Water Initiative Performance (Ag-CWIP), Best Management Practice (BMP), Forestry Acceptable Management Practices (FAMP), Capital Equipment Assistance Program (CEAP), Conservation Reserve Enhancement Program (CREP), Farm Agronomic Practice (FAP), Grassed Waterway and Filter Strip (GWFS), Pasture and Surface Water Fencing (PSWF), Vermont Pay for Phosphorus (VPFP), The Vermont Farmer Ecosystem Stewardship Program (VFESP); land acquisition, river corridor easements, wetland conservation, County Forester Program, and the recommendations in the ANR report, "Maintaining and Creating Resilient Forests (2015)."
Action: Expand the Capital Equipment Assistance Program (CEAP) program to extend beyond water quality and incorporate climate change criteria.
Action: Implement agroforestry and silvopasture practices that integrate woody vegetation in agricultural production.
Action: Implement agronomic practices that reduce tillage and increase vegetative cover, e.g., no-till, cover crop.
Action: Implement edge-of-field practices that increase herbaceous and woody vegetation, e.g., riparian forest buffers through the Conservation Reserve Enhancement Program (CREP).
Action: Implement grazing practices that increase vegetative cover and forage quality, e.g., rotational grazing.
Action: Implement methane capture and energy generation on farms, e.g., anaerobic digesters (ADs) and covers.
Action: Implement Nutrient Management and Amendments (e.g., biochar, compost) on cropland and grazing land.
Action: Research and develop a climate feed management program, including feed amendments (e.g., seaweed, biochar) and feed quality (e.g., forage quality) to reduce enteric methane emissions; consider downstream impacts, sustainability, and equity.
Action: Research and pilot improved manure management and storage programs.
Action: Implement natural resource restoration practices that support climate mitigation and resilience, including river corridor easements, wetland restoration, and afforestation practices with consideration to agricultural land loss.

Action: Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance (CWIP) Report. The CWIP Report “summarizes the State of Vermont’s clean water efforts and demonstrates how investments are making a difference through accountability measures.” As mentioned, most water quality conservation practices and programs also have climate mitigation, resilience, and adaptation benefits. Recommend using existing tracking systems and quantifying the climate benefits from this existing implementation and data tracking. The data spans state and federal funding and regulatory programs that drive clean water efforts and coordinates across agencies to track these efforts and monitor progress.
Action: The Vermont Climate Council has recommended developing and issuing a Request for Proposals (RFP) that will review and analyze methodological gaps of emission inventory tools currently used by the State of Vermont to quantify greenhouse gas (GHG) emissions for evaluating changes in the Agriculture, Forestry, and Other Land Use (AFOLU) sector and the tools’ alignment with the Intergovernmental Panel on Climate Change (IPCC), Environmental Protection Agency (EPA), and peer state methodologies and approaches. The specific recommendations for this RFP can be found in the Carbon Budget Report memo found in Appendix 10.
Priority Action: Utilize best practices to quantify carbon sequestration and emission reductions from agriculture and forestry.
Action: Enhance education, outreach, research, and technical assistance programming to encourage adopting strategies that increase climate mitigation, adaptation, and resilience on natural and working lands. Education should target farmers, loggers, and those providing technical assistance. Incorporate nature-based solutions and traditional ecological and indigenous knowledge (TEK/IK).
Strategy: Implement a Payment for Ecosystem Services (PES) program for natural and working lands.
Priority Action: Fund and implement Payment for Ecosystem Services (PES) programs for lands to encourage landowners and land and water caretakers to implement practices that improve soil health, crop and forest resilience, increase carbon storage, increase stormwater storage capacity, and reduce runoff. Fund existing agricultural PES programs and expand to include or develop new programs for forestry. Note: PES programs recognize and reward land and water caretakers for practices that enhance ecological function and community well-being, rooted in both traditional stewardship values and modern land management. These programs do not include carbon markets or trading.
Action: Incentivize management for ecosystem services through a tax credit system that compensates landowners/managers for maintaining or restoring ecosystem services.
Strategy: Address upstream waste and downstream emissions from food waste and synthetic fossil-fuel based inputs.

Action: Develop a program for tracking and limiting the use of chemicals, substances, or products that contribute to climate change in Vermont and leverage existing legislative activity on this topic.

- i. Vermont Agency of Agriculture and Food Markets (VAAFM) currently tracks statewide commercial pesticide use as well as statewide fertilizer use. This data is currently used to establish trends in the use of these inputs as our agricultural systems evolve.
- ii. Programs to track these agricultural inputs already exist at VAAFM but have not been assessed through the lens of contributions to climate change. VAAFM, or the newly established Agricultural Innovation Board (AIB) established by Act 49 of 2021, **should** prioritize an assessment of the impacts and benefits our agronomic management systems have on offsetting climate change.
- iii. An assessment of Vermont's different agronomic practices and management, such as conventional, organic, no-till, and cover cropping, should be weighted for impacts on climate change based on agricultural inputs, fuel consumption, carbon sequestration, and other measurable factors.

Action: The state should identify simple, low- and no-cost mechanisms to increase organics diversion and provide incentives and business and workforce development to private organics haulers and composters (including farms).

- i. Act 41 of 2021 (an act relating to the regulation of agricultural inputs for farming) created an Agricultural Residuals Management Program to be administered by Vermont Agency of Agriculture and Food Markets (VAAFM.) The purpose of this new chapter of the law is to establish a program for the management of residual wastes generated, imported to or managed on a farm for farming in Vermont

Strategy: Develop and implement programs which incentivize management practices which maintain or increase forest carbon storage.

Action: Apply these certification standards to procuring forest products utilized in energy or thermal generation facilities subject to Public Utility Commission (PUC) oversight (parallel to the existing review for state-mapped deer winter yard, etc.) through potential revisions to the renewable energy standard.

Action: Create or adopt existing certification standards where management activities account for principles of Improved Forest Management towards increased carbon storage, as well as maintaining and creating resiliency (as described in existing state guidance such as Maintaining and Creating Resilient Forests in Vermont: Adapting Forests to Climate Change, Vermont Department of Forests, Parks, and Recreation (VTFPR) 2015, or as modeled in existing programs such as the American Forest Foundation's Family Forest Carbon Program).

Action: Explore additional market opportunities for certified products, expanding the potential revenue base to support Improvement Forest Management (parallel Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), etc.)

Strategy: Increase tree coverage.
Action: Expand tree and other planting efforts on private land to promote restoration efforts to reforest riparian areas, wetland buffers, and degraded lands.
Action: Increase funding to tree planting via the Renewable Energy Standard (RES).
Action: Expand funding and support to the Vermont Community Canopy Program.
Action: Increase support, funding, and education for increased urban tree planting efforts expansion to increase access to natural spaces and improve carbon sequestration/storage in the urban environment.
Action: Provide incentives for the restoration and expansion of floodplain forests.

Agriculture & Ecosystems: Support Adaptation Recommendations
Pathway: Adaptation—Sustain, restore, and enhance the health and function of Vermont's lands and water to help natural and human communities adapt to climate change.
Strategy: Increase funding and enhance programming and capacity for climate adaptation technical assistance, planning, training, and education for farm and forestland owners, landowners, other land and water caretakers, and municipalities.
Priority Action: Enhance education, outreach, research, and technical assistance programming to encourage farmers, foresters, and other land and water caretakers to adopt strategies that increase climate mitigation, adaptation, and resilience. State agencies should work with and support efforts to fund partners and higher education, such as University of Vermont (UVM) Extension and Natural Resource Conservation Districts (NRCs). • These efforts should be incorporated into current programs, braiding traditional ecological knowledge and indigenous knowledge (TEK/IK), recognizing the value these bring to better understanding and taking care of the land. Initiatives should be designed to represent diverse perspectives while addressing a diversity of audiences and age groups. Simplify and assist with application processes for funding and support programs.
Strategy: Plan and regulate for climate resilience and adaptation.
Action: Establish "climate resilience zones" informed by existing data, bolstered with new research and science, to identify locations that have high resilience potential for both the natural and built environments and use to inform land use development and regulations.
Action: Per the formula in statute, fully fund Regional Planning Commissions (RPCs) to ensure sufficient capacity necessary to address climate change in regional and municipal plans.
Strategy: Promote healthy, connected river corridors, floodplains, and wetlands.
Create a mechanism, position, or body within the Executive Branch to ensure coordinated climate action across state government with just transitions and environmental justice expertise. This interagency body or mechanism is intended to connect actions both within and beyond the scope of the Global Warming Solutions Act (GWSA)-required Climate Action Plan (CAP) to ensure effective communication across agencies that work together to promote climate change mitigation, adaptation, and resilience and add a consistent climate lens to the myriad of regulatory and funding programs.
Pathway: Viability—Support and empower Vermont's natural and working land owners and other land and water caretakers to enhance farm and forest viability and to make informed decisions to increase resilience and adaptation to climate change.
Strategy: Support and enhance local food markets for greater viability, mitigation, and resilience benefits.
Action: Fund training for farm technical and business advisers in the Farm Viability Network on how to integrate climate risk management planning in farm and forest business planning.
Strategy: Foster partnerships at all levels (state, federal, nonprofit, Indigenous/tribal, and private sector) essential to recognizing, capacitating, and building strategies for landowners and other land and water caretakers to address climate change, increase adaptation across natural and working lands, and enhance community resilience.

Priority Action: Leverage the power of peer learning to advance climate resilience by funding a request for proposal (RFP) that provides funds to support Vermont Natural Resources Conservation Districts (NRDCs), farmer organizations, and non-profit organizations with the specific objective of allowing them to reach other farmers and foresters and do peer-to-peer education about improved soil and manure management strategies that enhance climate resilience.

Action: Partner with agriculture, food system, and forest product organizations and networks (e.g., Farm to Plate Network) and host annual/bi-annual input sessions to evaluate policy proposals and Climate Action Plan (CAP) progress and build and reinforce state, federal, non-profit, Indigenous/tribal, and private sector collaborations.

Action: Fund a research project to fully understand household food insecurity in Vermont and how to invest in its elimination. The design and implementation of the research project should engage academics, advocacy groups, and impacted individuals and include research on geographic spread, root causes, and costs to the health care, educational, and emergency response systems (as written in the 2021-2030 F2P Strategic Plan pg. 158). Collaborate with Hunger Free Vermont, Vermont Foodbank, and Liberation Ecosystem.

Strategy: Expand funding for existing programs dedicated to farmland access, forestland ownership, and conservation, and leverage this funding to increase land access through flexible and new ownership financing mechanisms, policies, and models.

Action: Assist food and farm businesses with navigating municipal and state permit requirements and regulations. This will create a more supportive environment for business growth and diversification, especially as it relates to on-farm accessory businesses, farm employee housing, and the development of off-farm processing, distribution, and storage infrastructure (as written in the 2021-2030 F2P Strategic Plan pg. 33).

Strategy: Investigate innovative funding mechanisms for assisting with the implementation of climate-smart agriculture practices, crop insurance for diversified Vermont-scale farms, and emergency recovery following extreme weather events to better respond when climate change-related events occur.

Priority Action: Create a dedicated climate impact emergency recovery fund for farms and forestry operations or related infrastructure (or ensure the agriculture and forestry sectors are given specific considerations in existing recovery funds), support leverage of federal funds and expansion of programs to support the adaptive capacity and restoration of farms and forests, and promote insurance for farm and forest landowners and businesses, to ensure that they can equitably and viably recover from climate induced disasters.

- The fund should be simple to access, deploy sufficient funds quickly following a disaster, be flexible, equitable, and proportional to meet the diverse needs of the farming and forestry community, and be sustained over time with predictable and consistent funding.

Pathway: Economies—Grow and connect local and sustainable natural and working lands' economies, markets, and food systems while ensuring and providing equitable access to said economies, markets, and food systems for Vermont's people.

Strategy: Develop, expand, and sustain local markets specifically for food, agricultural, and forest products in ways that ensure farm and forest viability, climate resilience, and food sovereignty and security for all of Vermont's people.

Action: Support research and development efforts, as well as expansion of new markets and opportunities for local wood products processing and manufacturing in Vermont.

Action: Develop supply chain substitutions that better support local products.

Action: Research the efficacy of food hubs as public infrastructure (e.g., libraries and public infrastructure).

Action: Map Vermont's agricultural land base and production capacity, including geographic data about predicted climate change impacts, aggregation and distribution infrastructure, and regional dietary needs (as written in the 2021-2030 F2P Strategic Plan, pg. 32).

Action: Provide additional support for critical programs that help Vermont's agricultural sustainability and ability to address climate issues, including:

(1) Support the growth of Vermont Agency of Agriculture Food and Markets (VAAFM) Meat Inspection and Agricultural Development programs, which will help expand Vermont products into the regional marketplace and develop consumer education and public awareness campaigns around the steps involved in getting meat products from farm to table;

(2) Fund a pilot aggregation and sales system that effectively serves the charitable food system and institutional and other market channels through a structured partnership among established processors, aggregators, and gleaners. The pilot would include data collection on specific marketable surplus food products;

(3) Support the Vermont Farm to School Network;

(4) Support organizations in the charitable food system to source food directly from Vermont farmers;

(5) Create a Local Food Access Funding Program;

(6) Develop a distribution and logistics infrastructure investment plan to guide strategic transportation investments to improve the efficiency and cost-effectiveness of in-state and regional food distribution. Include a business plan analysis for a public/private Vermont wholesale terminal market that would provide cross-docking, cold storage, and logistical service between Vermont producers and regional wholesale buyers;

(7) Using the infrastructure study as a guide, increase public-private investment in intermediated market distributors to improve operational efficiencies and overall sales through enhanced marketing, infrastructure, route optimization, shared transportation-management software, and access to logistics professional development and consulting.

Action: Develop a strategic plan for the forest economy, modeled on the Farm-to-Plate strategic plan but improved to better incorporate impacted stakeholders and principles of equity, and examine our current language and approach to forest management.

Action: Develop alternative markets for residue, by-products, and otherwise not-used wood, focusing on cellulose insulation, bioplastic composites, or biofuels.

Priority Action: Dedicate robust funding for farm and forest supply chain resilience and state food security, including significant investment in storage, processing, and distribution infrastructure. Prioritize investments in farm, food, and forestry businesses, cooperatives, non-profits, tribes, and community projects that have climate resilience, adaptation, and mitigation goals.

- Funding should include a substantial increase in base funding for the Working Lands Enterprise Initiative (WLEI), the Agriculture Development Grant program, as well as the Crop Cash Plus and Farm Share, dedicated appropriations for distribution and food hub operations and infrastructure, and appropriations for research, development, and support for siting and permitting process improvements that recognize the vital conservation benefits of market expansion opportunities for local wood products processing and manufacturing in Vermont.

Strategy: Promote workforce development in all working lands sectors along all points of the supply chain.

Action: Develop, endorse, and implement fair trade, equitable labor practices, and just livelihoods for the natural and working lands sector.

Action: Better resource state programs to support personal and professional development, and where needed, develop additional affordable and accessible training programs such as apprenticeships, certificates, stackable credentials, and concurrent degrees. Train natural land managers and other land and water caretakers in securing, retaining, and supporting employees.

Strategy: Strengthen all aspects of farm, food, and forest product sector supply chains, including the associated infrastructure necessary to support them (e.g., processing, storage, and distribution).

Action: Make significant investments in storage, processing, and distribution infrastructure to enhance product innovation and quality across all Vermont food and forest products.

Action: Support product-specific value chain development by facilitating producer, distributor, and buyer matchups and supporting producer-driven aggregation, distribution, and marketing enterprises.

Strategy: Ensure equitable access to local foods, culturally relevant foods, land, funds, grants, and technical assistance for people who have been historically marginalized and come from impacted communities.

Priority Action: Improve funding opportunities and create equitable access for Black, Indigenous, and People of Color (BIPOC) farm, food, and forest organizations and businesses by developing multi-year unrestricted BIPOC-centered grants and loan programs. This includes uplifting and resourcing the work of the Vermont Abenaki and other Indigenous Peoples in the State, Land Access and Opportunity Board (LAOB), and other BIPOC peoples and organizations in Vermont.

Action: Build out and utilize traditional ecological knowledge (TEK) to build out connections to our Tribal and Indigenous communities in the development and utilization of traditional products (e.g., birch syrup, sumac spices, etc.).

Strategy: Develop a Vermont food security and sovereignty plan centered around a thriving food system and inspired by community-based responses to food insecurity and disruptive events.

Action: Involve food insecure individuals and farmers in the planning and investigate questions including, but not limited to, affordable housing, health care, transportation, siting of retail grocery stores, food distribution, and ensuring the continued production of food in Vermont.
Action: Work to adopt state and regional level policies, procedures, and plans to ensure that the Vermont food supply is sufficient to withstand global or national food supply chain disruptions caused by climate change and other disasters (as written in the 2021-2030 F2P Strategic Plan pg. 32).
Pathway: Support and empower Vermont's farmers, foresters, and other land and water caretakers to capacitate renewable energy and building product transitions.
Strategy: Promote and incentivize the use of local wood and agricultural products to reduce embodied carbon footprint.
Action: Develop alternative markets for non-timber wood, focusing on cellulose insulation, bioplastic composites, or biofuels.
Priority Action: Promote and incentivize the use of agricultural and sustainably harvested wood-based construction materials (subject to existing certification criteria or procurement standards to be developed) over less climate-friendly options, such as imported wood from locations lacking required sustainable harvest requirements and/or non-wood materials with high carbon footprints (such as steel, concrete, etc.). • This could include using state procurement standards to require that publicly funded building projects, or those subsidized through low-interest loans or tax benefits, use chain-of-custody certified wood products (mass timber, cellulose insulation, advanced wood heating, etc.) and prioritize building materials—such as sustainably harvested wood—that align with climate goals and ecological values, while reducing reliance on high-carbon, non-renewable materials like steel and concrete. • Continue to research and develop the life-cycle accounting of these products for the greatest impact.
Action: Develop a regional certification standard for forestry to validate carbon storage values for forest building products (methodologies supporting supply chain validation for carbon storage frequently use Forest Stewardship Council (FSC) as a proxy; regional-scale certification standards focused around net carbon benefit are needed for product transparency).
Strategy: Transition fuel sources for the forestry and maple sector.
Action: Provide funding to incentivize sugar makers to switch evaporators from fossil fuels to wood pellets and incentivize the elimination of diesel generators for sap vacuum pumps.
Action: Incentivize alternative fuels such as biofuels or offsets for logging equipment.
Strategy: Sustainably source renewable energy products and materials.
Action: Fund competitive research to track and innovate on the sustainability and ethical implications of renewable energy materials and products consumed to meet the Climate Action Plan (CAP).
Pathway: Education: Create accessible, equitable research, partnerships, and education; promote shared understanding; and invest in sustainable workforce development for the natural and working lands sector.
Strategy: Provide funding for climate-related education at all levels, outreach, research, and technical assistance programs.

Action: Develop and make available accessible outreach and educational materials that communicate climate change science and local impacts to the general public, which include and highlight the role that Vermont's natural and working lands play in providing solutions to climate change.
Action: Enhance education, outreach, and technical assistance programming to support farmer learning and to encourage adopting climate-smart agricultural practices. Ensure equitable access by creating two full-time University of Vermont (UVM) Extension and part-time staff for each National Resource Conservation District (NRCD).
Grow the capacity of additional VT academic institutions and indigenous-led & Black, Indigenous, People of Color (BIPOC) organizations to offer technical support to farmers and foresters, such as Middlebury College's perennial program with traditional ecological knowledge (TEK).
Action: Establish and fund an educational program explaining the role of Vermont farmers and foragers and their high-quality, local food products in maintaining a low climate impact.
Action: Establish stronger relationships between state agencies, regional planning commissions (RPCs), and faculty at Vermont and adjacent state institutes of higher learning to create opportunities for state and regional research needs to become an aspect of faculty research agendas.
Action: Support increased investment in healthy soil education through educational mini-grants for teachers to all audiences (including agriculture, homeowner, forestry, publications, K-12 schools, and institutions of higher learning) and implementation of practices through funding of best management practices (BMP) challenges, technical assistance programs, and cost shares.
Strategy: Develop and promote climate-related educational materials for private landowners and other land and water caretakers to empower them to make climate-informed decisions about their land and waters.
Action: Expand infrastructure and educational programs around community and backyard composting and recycling.
Action: Educate Vermont landowners and other land and water caretakers about the benefits of reducing lawn mowing frequency and amount of mowed lawns to increase biodiversity and ecosystem health and ultimately reduce emissions.
Action: Promote planting future climate-adapted tree species and crops to expand tree planting efforts on private land. This promotes restoration efforts in 304 reforest riparian areas, wetland buffers, and unhealthy soil.
Action: Create and deploy an extension-type program for the river corridor and floodplain buffers that provides educational material and technical assistance for private landowners and other land and water caretakers.

Agriculture & Ecosystems: Climate Resilient Lands
Pathway: Adaptation—Sustain, restore, and enhance the health and function of Vermont's lands and water to help both natural and human communities adapt to climate change
Strategy: Increase technical assistance, capacity, education, and resources to support private and municipal farm and forestland owners, planners, and other land and water caretakers for climate change adaptation.
Priority Action: State agencies should utilize financial incentives, siting policies, and regulations to incentivize, support, and preferentially site renewable energy capacity on buildings, parking lots (by installing solar roofs), in compact settlement areas, including renewable energy and charging facilities at rental housing, as well as in previously disturbed / developed areas, where feasible. Avoid conversion of ecologically sensitive areas, forests, and prime agricultural soils.
Strategy: Promote and incentivize climate-adaptive forest management practices.
Action: Braid existing and ongoing research and traditional ecological knowledge and indigenous knowledge (TEK/IK) to promote planting future climate-adapted tree species and agricultural crops where appropriate. Monitor, assess, and adaptively manage these practices. Share results and develop training.
Strategy: Clearly define and articulate the state's approach, definitions, and specific applications of nature-based solutions (NbS) and how these approaches are implemented with the full engagement and consent of Indigenous Peoples and local communities in a way that respects their cultural and ecological rights and knowledge.
Priority Action: State agencies should promote nature-based climate solutions (NbS), traditional ecological and indigenous knowledge (TEK/IK) by considering how to gauge their effectiveness and incorporate them into assessments, planning efforts, prioritization frameworks, and funding programs to address climate change impacts.
Strategy: Manage natural and working lands and waters for biodiversity, forest health, water quality, and climate resilience.
Action: Fund support for local academic institutions, researchers, and applied research, braiding Western science with TEK and IK to evaluate best climate practices for our lands and waters.
Priority Action: State land management agencies should continue to adapt their management of lands using nature-based climate solutions (NbS) to address climate impacts, increase ecosystem resilience, enhance biological diversity, and improve water quality. State land management agencies should also enhance technical assistance and resilience funds to support the financial capacity of other land and water caretakers to achieve these goals.
Action: Support research efforts to better understand forest ecosystems, local climate change impacts on forests, waters, and ecosystems, and restoration and conservation actions needed in the face of these changes.
Action: Incentivize and provide appropriate support for introduced species control efforts, specifically where populations threaten the perpetuation of forest cover and resilience of forests to climate change impacts.
Action: Fund increased investment in healthy soil education for landowners and other lands and water takers and implementation of practices to increase soil health. For example, coordinating a Comprehensive Assessment of Soil Health (CASH) for farmers with the University of Vermont (UVM).

Strategy: Increase flood resilience of the natural and built environments, reduce future development in floodplains and floodways, and educate state and municipal planners.
Action: Invest in transporting funding to restore aquatic and terrestrial connectivity to improve flood resilience and increase habitat for fish, wildlife, and plants.
Priority Action: State agencies and the legislature should identify gaps and opportunities to expand and improve current programs that promote healthy, connected river corridors, floodplains, and wetlands, prioritize restoration and conservation, and incentivize water storage in headwaters and natural areas to promote flood resilience and biodiversity through expansion of wetland, floodplain, riparian forest and river corridor easements that better compensate land and water caretakers for restoring, managing and conserving these natural water storage areas (including opportunities presented by Act 121 (an act relating to the regulation of wetlands, river corridor development, and dam safety))
Strategy: Promote healthy, connected headwaters, river corridors, floodplains, and wetlands.
Develop an equitable and inclusive pay-for-practice incentive program and explore state tax policy incentives for everyone including forest landowners, farmers, and other land and water caretakers to adopt climate-adaptive practices.
Pathway: Land Use—Promote land uses that support carbon sequestration and storage, climate resilience and adaptation, and natural and human communities for a sustainable and equitable future.
Strategy: Educate Vermonters on the benefits of compact settlement, highlighting the need to prioritize the reduction of forest fragmentation. Promote and incentivize compact settlement patterns in suitable areas.
Action: Develop required climate-based framework and/or criteria for state grant and regulatory programs.
Action: Provide enhanced technical assistance and support to municipalities and regional planning commissions (RPCs), including outreach and education for landowners, land and water caretakers, and community members, to develop, revise, and implement town plans to maintain forest blocks and landscape connectivity as authorized by Act 171 (an act which amended Vermont Planning Statutes). Support the adoption of effective zoning and subdivision bylaws to preserve intact forest blocks and connecting habitats while also preventing development in floodplains and floodways.
Strategy: Include biodiversity and resilience goals in the planning and management of public and private lands.
Action: Assess current efforts and support additional efforts to research, educate, and implement practices informed by traditional ecological and indigenous knowledge (TEK/IK), such as using prescribed fire to promote regeneration and coppicing, where appropriate for Vermont's forests and ecosystems.
Action: Identify lands for conservation in or adjacent to the built environment to provide benefits to human health, wellbeing, and equity in those areas.

Action: Improve statewide forest planning efforts braiding in traditional ecological and indigenous knowledge (TEK/IK) on town, state, and federal lands, including developing an action plan by the Agency of Natural Resources (ANR) for how town and state Lands will help accomplish Act 59 (an act relating to community resilience and biodiversity protection) targets by 2030 and 2050. Collaborate with the U.S. Forest Service (Green Mountain National Forest) planners for more unified forest planning across the state.

Action: Examine the implications and consider establishing a state policy of no net loss of natural and working lands (including active and passively managed forests, agricultural lands, and wetlands) accounting for the transitions of lands within and between these conditions, with aspiration for a net gain. Braid traditional ecological and indigenous knowledge (TEK/IK) into policy.

(1) As part of this effort, track land use trends to quantify the degree of no net loss (define), including aggregating data on subdivision, land transfers, and the loss and/or fragmentation of forests, agricultural lands, and wetlands to inform progress and state policy.

(2) Develop a strategy to increase the area of land in functioning wetlands, with an initial focus on protecting and recovering the highest quality wetlands ("Class I Wetlands" in the Agency of Natural Resource's (ANR) wetlands rules), consistent with the goal of ensuring no net loss of other categories of natural and working lands.

Action: Recommend amending the Use Value Appraisal (UVA) program to allow for:

(1) greater development of old forest structure as articulated in the targets of Vermont Conservation Design;

(2) the enrollment of wildland reserves under the existing forestland category where conditions and eligibility criteria are met as defined by Forest Parks and Recreation (FPR), facilitating the development of old forest conditions through active restoration and/or passive management as a means of enrollment in the Old Forest ecologically significant treatment area (ESTA) category;

(3) privately held parcels with 'Forever Wild' easements on them, held by a qualified 501c(3), to be enrolled in the UVA Program in the Conservation Category; and

(4) the potential for, and implications of, developing a new category of enrollment for land in UVA which allows for passive management modeled on the 'open-space' designation included in similar programs elsewhere in New England.

Action: Implement legislation to authorize the Agency of Natural Resources (ANR) to revise the Flood Hazard Area & River Corridor (FHARC) rule to incorporate statewide jurisdiction and permitting authority for river corridors for all kinds of development while also working proactively to restore and conserve river corridors.

Strategy: Invest in strategic and equitable (conservation with impacted people) conservation to increase the pace of permanent conservation towards 30x30 and 50x50 targets (described in Act 59), with Vermont Conservation Design acting as the guiding plan for prioritization of efforts.

Action: Educate communities and expand the use of the Water Infrastructure Sponsorship Program (WISPr) to improve accessibility and use for restoration projects.

Action: Maintain a suite of farmland conservation and protection tools ranging from voluntary, regulatory, and planning (e.g., easements, Act 250 (Vermont's land use and development law), planning, and zoning) and ensure these tools incorporate climate change and monitor progress.

Action: Per the formula in statute, fully fund the Vermont Housing & Conservation Board (VHCB), including \$3 million for the Farm & Forest Viability Program, and increase annual VHCB funding around the statutory amount by 15%, targeting those funds for implementation of conservation actions recommended in the Climate Action Plan (CAP), and informed by traditional ecological and indigenous knowledge (TEK/IK), especially those related to forests.

Priority Action: State agencies should work with partners, and the legislature should fund the state agencies as necessary, to promote strategic and equitable statewide landscape connectivity and the conservation of priority forest blocks, farmland, and other actively and passively managed lands through planning and implementation toward 30x30 goals, and 50x50 goals in alignment with Act 59 of 2023 (an act relating to community resilience and biodiversity protection). This work should use the best available data and mapping, including Vermont Conservation Design, while braiding in traditional ecological and indigenous knowledge (TEK/IK).

- Conservation planning and implementation should meet the targets set forth in Vermont Conservation Design. These goals include managing forests to achieve a target of 3-5% young forest and allow at least 9% of Vermont's forest to become (or be maintained as) old forest, specifically targeting 15% of the matrix forest within the highest priority forest blocks—including National Forests—to achieve the old growth condition and ensure the protection of sacred sites or other historically or culturally important areas as determined by the Vermont Division of Historic Preservation.
- At the same time, protecting farmland and managed forestlands from development through land conservation and protection programs is essential to ensure these land uses continue to provide climate mitigation, adaptation, and resilience benefits. Existing State land use protection programs—such as the Vermont Farmland Conservation Program and forest conservation easements—should be enhanced to improve farmland access and the protection of agricultural soils and working forests.

Strategy: Increase technical assistance, capacity, education, and resources to support private farm and forest landowners in addressing the trends relating to intergenerational transfer.

Action: Support forestland succession and estate planning efforts to reduce forest loss, parcelization, and fragmentation by implementing Act 171, 'Intergenerational Transfer of Forestland Working Group Recommendations' of 2017, and incorporating traditional ecological and indigenous knowledge (TEK/IK).

Action: Research programs in other states and countries and work with land owners to facilitate the transfer of intact farmland and forests.

Strategy: Avoid, minimize, and mitigate the negative impacts of renewable energy generation, like other land development, on natural and working lands.
Priority Action: State agencies should utilize financial incentives, siting policies, and regulations to incentivize, support, and preferentially site solar and wind energy capacity on new buildings, parking lots (by installing solar roofs), in compact settlement areas, including renewable energy and charging facilities at rental housing, as well as in previously disturbed / developed areas. • Use disincentives to avoid forest clearing, particularly clearing of ecologically sensitive forest blocks, and conversion of active agricultural land, particularly prime agricultural soils.
Pathway: Support and empower Vermont’s farmers, foresters, and land caretakers to capacitate renewable energy and build product transitions.
Strategy: Educate, track, and appropriately reward on-farm renewable energy.
Action: Increase outreach, reward, and support renewables on farms on rooftops, barns, and storage facilities, and minimize or avoid loss of working and natural lands to renewables development by siting solar in areas that retain some agricultural use, such as grazing or in locations that do not meaningfully diminish the agricultural viability of a farm.
Pathway: Support compact settlement patterns in suitable locations that contribute to the reduction of greenhouse gas (GHG) emissions, enhance community and built environment resilience, and help conserve natural and working lands.
Strategy: Increase investment in the infrastructure (sewer, water, stormwater, mixed-use development, housing, sidewalks, bike lanes, electric vehicle (EV) charging, broadband, energy supply) needed to support compact, walkable development in suitable locations.
Action: Expand the eligibility of the existing downtown and village center tax credit programs to revitalize neighborhood housing in and around state designated centers.
Action: Support public-private partnerships to fund the design and construction of new infill housing in existing neighborhoods, including affordable housing.
Action: Establish a rolling planning grant for communities in need of consulting assistance to prepare Neighborhood Development Area (NDAs) applications. This designation works to align state and local regulations to increase housing options within compact centers.
Action: Make village centers permanently eligible for the downtown transportation fund that builds infrastructure needed to increase walking, biking and transit.
Strategy: Update state and local land-use governance, regulations, and practices to remove barriers to compact settlement and improve coordination and communication on land-use issues across agencies, departments, municipalities, boards, commissions, authorities, and the public.
Action: Prioritize public funding for mixed-use developments near transit hubs in regional and rural centers.

Action: Align development regulations and remove financial barriers to compact development to support low-income housing in and around downtowns and village centers not in a flood zone (i.e., Act 250 (Vermont's land use and development law), local zoning, aging infrastructure, etc.). Provide statewide guidance and incentivize housing in built-up areas to encourage development away from open fields, forests, and river corridors.

Action: If a statewide land use planning policy and implementation plan is authorized, explore creation of a State Planning Office and/or other potential structures within the executive branch to implement the Plan at the state level.

Action: Create an office of Strategic Investment and Coordination that supports achievement of land use planning goals by aligning and resolving conflicts in state and local regulations and funding and provides a permitting platform from both the customer and policy objective perspective.

Action: Encourage the Legislature to authorize the creation a multi-stakeholder committee process with funding to support the development of a statewide land use planning policy and implementation plan that guides development to growth areas, town centers, and appropriate rural locations, and limits the development within ecologically sensitive/risk-prone areas. The Legislature should clarify how and if this plan informs or directs land use planning, policy and regulation at the local, regional, and state level.

Action: Update Act 250 (Vermont's land use and development law) to promote compact settlement by:

- i. waiving the mitigation fees for prime agricultural soils for alternative or community wastewater systems that will serve a state designated center.
- ii. removing the population-based caps on the Act 250 exemption for priority housing projects
- iii. including criteria that better address climate change, forest fragmentation and forest loss, to incentivize growth in the state's designated centers and better address the specific challenges to working lands enterprises;
- iv. updating its governance, staffing, public engagement, and the role of State Agency permits in the Act 250 process to create the enterprise capacity necessary to implement new climate related criteria and respond to future land use pressure from climate change and in-migration of climate refugees.
- v. removing Act 250 jurisdictional thresholds for housing development within and immediately adjacent to certain state designated centers to incentivize compact, dense settlement in areas with adequate local land use laws and existing infrastructure, reducing development pressures on open spaces such as greenfields and forested locations. These centers should grow in a manner by which walking and biking are preferred means of mobility, and mobility infrastructure should be designed for universal accessibility.

Priority Action: Fund and undertake as soon as possible the study previously requested by the Vermont Climate Council on the use of woody biomass for utility-scale electric energy facilities . In addition, use the guidance previously provided by the Council to the Vermont Public Utility Commission (PUC) regarding biomass.

- The Council's biomass addendum is here:

<https://outside.vermont.gov/agency/anr/climatecouncil/Shared%20Documents/Biomass%20recommendations%20-%20Final%20Approved%20Version%20-%20December%202023.pdf>

Action: Assess the status and impacts of outside burning furnaces. Monitor and regulate the impact of human health and the environment.

Action: Monitor and regulate quality of wood pellets from out of state to ensure public health and ensure the source is not from logging forests emitting carbon dioxide (CO2).

Action: Regulate emissions of biochar burning units in the state.

Tables

Table 1: Events Attended, Page 19, Public Engagement Chapter

January 2024	
Community Dinner at Islamic Society of Vermont	Burlington
February 2024	
Northeast Organic Farmers (NOFA) Conference	Burlington
June 2024	
Vermont Afghan Alliance Lunch	Burlington
Capstone Community Action's annual gathering "Community Impact"	Hyde Park
Memory Lane Car Show	Essex Junction
Juneteenth Celebration	Winooski
Juneteenth Celebration	Burlington
3 rd Annual "Summer Jam" free family day	Bennington
Lamoille Pride Event	Morrisville
July 2024	
Wellness Day	Barton
Vermont Council on Rural Development Community Forum	Johnson
Memphremagog Festival	Newport
Old North End Ramble	Burlington
August 2024	
Farmacy Distribution Day with Addison County Relocalization Network (ACORN)	Middlebury
Abenaki Land Link Harvest Festival	South Burlington
Vermont State Fair (2 days)	Rutland
First African Landing Day	Burlington

All Brains Belong Community Health Education Fair	Montpelier
October 2024	
Missisquoi Festival	Swanton
Intervale Fair Share Distribution Day	Burlington
November 2024	
Deer Check	West Enosburg
Vermont Maple Conference	Randolph
December 2024	
Youth Climate Leadership Academy	Fairlee
January 2025	
Free Ice Fishing Day	Barnard

Table 2: Focus Groups hosted for the Climate Action Plan 2025 Update, Page 21, Public Engagement Chapter

January through March 2024	
Six introductory focus groups were held with linguistically diverse communities (Arabic speakers, French and Lingala speakers, Spanish speakers, Somali Bantu community, and Nepali Bhutanese community). These laid the foundation for the October 2024 focus group below.	Winooski, Burlington, Montpelier, and virtually
October 2024	
Community leaders within linguistically diverse Vermont communities	Winooski
November 2024	
Capstone Community Action focus group with weatherization clients and other program participants	Barre
January 2025	

Caregiver support group with Sunrise Family Resource Center	Bennington
April 2025	
Elder Caucus with Northeast Kingdom Organizing	Barton
University of Vermont Eco-Reps	Burlington
Youth Input Session in partnership with Vermont Energy Education Program	Virtual

Table 3: Public meetings hosted for the Climate Action Plan 2025 Update, Page 22, Public Engagement Chapter

April 10	Virtual
April 14	Hardwick
April 15	Hinesburg
April 16	St. Albans
April 17	Bennington
April 23	Rockingham
April 28	Barre
April 30	Rutland
May 1	Virtual

Table 4: Then & Now Climate Action Plan, Page 79, Building Equity into the Climate Action Plan Chapter

Then: Initial Climate Action Plan (2021)	Now: Revised Climate Action Plan (2025)
The subcommittee drafted the Guiding Principles, formally adopted by the Climate Council in August 2021. There were only four months to incorporate the	The Just Transitions Subcommittee (JTSC) heard from other subcommittees that using the Guiding Principles while developing recommendations felt

Guiding Principles into the plan. That was not enough time to use the principles proactively to develop and prioritize recommendations.	daunting. In response, the JTSC created a simplified visual explaining which questions to ask at each step of the planning process. It showed when and how to consider public input.
Members of other subcommittees were unclear on how and when to apply the Guiding Principles. Liaisons from Just Transitions to the other subcommittees were available for support.	In addition to the Guiding Principles simplified visual, five JTSC members volunteered as liaisons to the other subcommittees. The liaisons attended those subcommittees' meetings to help them to apply the Guiding Principles <i>throughout</i> the drafting process, rather than at the end.
The quick timeline limited public engagement during the first Climate Action Plan. Agency of Natural Resources staff had to move quickly to contract outreach support, which did not allow time for deliberation and input from the Just Transitions Subcommittee.	Public engagement occurred before and throughout the planning process at key junctures. Public input was better communicated to subcommittees and the Council through quarterly reports and other means. Engagement activities were vastly broadened to lift up voices of frontline and impacted communities. These improvements were possible because of a new staff position in the Climate Action Office (CAO) and additional capacity via the Consensus Building Institute (CBI); these did not exist during the first Climate Action Plan process. <i>See</i>

	<i>Public Engagement chapter (page #s) for full details.</i>
There was not a streamlined process in place to ensure that public input was reviewed and discussed by subcommittees and the Council before decisions were made.	In fall 2024, the JTSC created public comment recommendations , detailing how to better receive and incorporate public comment into subcommittees' work. A revised version was then adopted by the Council for their own work in early 2025.
The CAO did not have a designated staff person to support JTSC, though CBI provided support in most meetings. A staff member from Public Service Department and another from Department of Environmental Conservation supported JTSC.	In addition to the two support staff, CAO Communications & Community Engagement Coordinator supported JTSC. CBI also provided facilitation support to the Subcommittee for two key meetings.

Table 5: Estimated average annual spending in Vermont on the purchase and replacement of heating, cooling and cooking appliances, many of which have traditionally been powered by fossil fuel, Page 86, The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action Chapter

Annual Energy Equipment Choices in Vermont	# of units	Cost per unit	Total cost	Reference for unit numbers	Reference for unit costs
Heating system replacements	11,300	\$5,700	\$64.4 million	Zero Emission Heating Standard Study ¹ EAN	Blend for boiler and furnace ²
Heating systems for new construction	1,680 residential	\$20,000	\$33.6 million	Zero Emission Heating Standard Study EAN	Above plus estimate for distribution system

Heat pumps to supplement existing systems	11,000	\$9,700	\$107 million	Zero Emission Heating Standard Study EAN	Blend of costs from NV5 Potential Study Appendices
Wood stoves to supplement existing systems	2,000	\$3,000	\$6 million	2020 Vermont Single Family Existing Homes Baseline Study ³	Author's review of retail prices
Window unit air conditioners	15,000	\$400	\$6 million	2020 Vermont Single Family Existing Homes Baseline Study ⁴	Author's review of retail prices
Hot water heating replacements ⁵	23,500	\$1,500	\$35.3 million	Zero Emission Heating Standard Study EAN	PSD Tech Ref Manual for HPWH. Author's review for others.
Hot water heating for new construction	1,680 residential	\$2,000	\$3.4 million	Zero Emission Heating Standard Study EAN	PSD Tech Ref Manual for HPWH. Author's review for others.
Cooking appliance replacement	15,000	\$1,000	\$15 million	Estimate based on average replacement time of 20 years	Author's review of Retail prices
Cooking appliance for new construction	1,680 residential	\$1,500	\$2.5 million	Zero Emission Heating Standard Study EAN	Retail price plus installation

Table 6: 2021 Climate Action Plan Progress, Progress & Assessment
Implementation Chapter

2021 Climate Action Plan Progress | Updated September 2024

Action	Status
Pathway 1 (Transportation): Light Duty Electrification	
Strategy 1a: Market-Driving Technology Forcing Regulatory Programs	

Adopt California Air Resources Board Advanced Clean Cars II Regulations beginning no later than Model Year 2026, which includes, as proposed, a 100% ZEV sales requirement by 2035, more stringent criteria pollutant emissions standards, robust vehicle durability standard, warranty provisions, battery state of health standardization, battery labeling, and availability of repair information to independent repair shops. *Status updated June 2025 due to Executive Order 04-25	Paused
Strategy Ib: Light Duty Electric Vehicle Purchase Incentives	
Fund incentives for and further administration of the Incentive Program for New Plug-in Electric Vehicles (PEVs), MileageSmart, Replace Your Ride Incentive Program and Electric Bike Incentive Program. New PEV is currently being administered by DEV and utilities, and VTrans is planning to procure an administrator for three of the aforementioned programs, except Mileage Smart which is being administered by Capstone Community Action. Amend program parameters (incentive amounts, income threshold requirements, etc.) based on analysis of current program, consumer data and the anticipated scale of need correlated to this and corresponding recommendations. Specifically, expand EV incentives; fund used EV vehicle incentives, determine the dollar amounts and makeup of purchase incentive needed to achieve EV deployment and equity goals, such as, if incentives are tiered, create income tiers instead of vehicle price tiers. Include eligibility for business and municipal fleet EV purchases. Maximize existing revenue streams, maximize American Rescue Plan Act and other potential federal funding streams to expand these programs and determine long term funding source(s) as needed.	Being Implemented
Further fund and implement the Replace Your Ride purchase incentives, which can be accessed in combination with programs like Mileage Smart.	Being Implemented
Design and implement a vehicle efficiency price adjustment linked to new vehicle purchase and use tax within vehicle classes to incentivize purchase of more efficient vehicles (electric vehicles in particular) and disincentivize purchase of less efficient vehicles. Factor income and business use into the rate for potential fee relief. Determine how to best integrate this program with the purchase incentives implemented in complimentary actions.	Advancing (Action Modified)
Strategy Ic: Public Investment in Electric Vehicle Supply Equipment (EVSE)	

Fund further build-out of DCFC (Level 3) and Level 2 EVSE based on the EVSE Deployment Plan developed by Drive Electric Vermont pursuant to VTrans' Multipronged Vehicle Electrification Strategy and continue to coordinate regional efforts. Incorporate prioritization of multi-family and workplace charging availability, such as equity principles and environmental justice mapping tools into implementation of program and funding decisions.	Advancing
Direct the PUC to work with electric utilities in developing beneficial EV charging electricity rates and alternative demand charge rate designs for low utilization, high power charging locations.	Advancing
Strategy Id: Join the Transportation and Climate Initiative Program {TCI-P} when regional market viability exists	
Join the Transportation and Climate Initiative Program, when regional market viability exists; adopt rules to participate in the TCI program starting in 2023. Enact a complementary policy that goes further to ensure equity outcomes (consider a firewalled fund, establish an expanded equity board, direct a minimum/significant investment in LI, rural, overburdened and underserved communities, e.g. 70%) and have funds go to transportation related or efficient transportation enabling investments.	No Action Taken
Strategy Ie: Educate drivers on benefits of electrification and other transportation options to reduce vehicle miles traveled {VMT}	
Fund implementation and further enhancement of a unit within Vermont's driver education curriculum to educate student drivers about electric and high efficiency transportation options, as well as how to reduce VMT via use of other transportation options.	Being Implemented (Action Modified)
Pathway 2 {Transportation}: Heavy Duty Electrification	
Strategy 2a: Market Driving, Technology-Forcing Regulatory Programs	
Adopt California Air Resources Board Advanced Clean Trucks Rule (an increasing percent ZEV sales requirement for manufacturers), Low Nox Omnibus Rule (includes a more stringent NOx emission standard and lengthened useful life and warranty), and Phase II GHG Rule for Truck Trailers beginning no later than Model Year 2025. Fund incentives for medium and heavy duty electric fleet purchases.	Being Implemented
Strategy 2b: Electrify medium and heavy-duty vehicle auxiliary systems	

Fund programs that incentivize electric auxiliary systems, such as (but not limited to) hybrid-electric bucket trucks and electric transport refrigeration units.	Advancing (Action Modified)
Strategy 2c: Same as Strategy 1d	

See Strategy 1d	
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Pathway 3 (Transportation): Reduction in Vehicle Miles Traveled

Strategy 3a: Increase state, regional and local capacity to plan for VMT reduction and implement sustainable transportation strategies.

Require VTrans, in coordination with the Climate Council and legislative committees of jurisdiction, to develop a state sustainable transportation implementation plan to include: 1) Identification of VMT benefits of Smart Growth, 2) VMT reduction targets, 4) Determination of the appropriate level of investment across transportation modes to achieve short and long-term goals and funding necessary to achieve those goals, 4) Support of RPCs and municipalities to develop local and regional transportation planning. Plan should incorporate recommendations from UVM Transportation Research Center's and Transportation for America/State Smart Transportation Initiative's analyses, respectively.	Advancing (Action Modified)
Extend fare-free transit to all public transit users.	Advancing (Action Modified)
Continue and expand the state's commitment to Amtrak and inter-city bus service, including micro-transit	Advancing
As a core component of developing a state sustainable transportation implementation plan, require VTrans to develop a multi-year plan to increase availability and use of transit and micro-transit to achieve a more robust, integrated public transportation system.	Advancing
Fund and expand the state's Complete Streets, trails, and other bike/ped funding programs.	Being Implemented

Pathway 4 (Transportation): Lower the carbon intensity of fuels

Strategy 4a: Same as Strategy 1d

See Strategy 1d	
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Pathway 5 (Buildings & Thermal): 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.

Strategy 5a: Develop and implement a multi-year statewide Weatherization at Scale initiative

Legislature authorizes administration to coordinate WWG recommendations into Vermont Climate Action Plan.	Action not defined
Adopt legislative or administrative recommendations made by the Weatherization at Scale EAN Action Team (WWG)	Being Implemented
Develop and implement a plan for coordinating and enhancing counseling services to Vermonters with low and moderate- income who could benefit from the State's energy savings programs (Public Service Department)	Being Implemented
Encourage utilities to develop and submit tariff on-bill financing proposals to fund efficiency investments to the Public Utilities Commission for review and approval pursuant to 30 V.S.A. § 209	Being Implemented
Administration appoints lead agency to coordinate government workforce development efforts to avoid duplication of effort across state government	Being Implemented (Action Modified)
Strategy Sb: Institute a rental property efficiency standard (RPES)	
Authorize the adoption of efficiency standards for existing rental properties, allowing for an 8-year implementation plan, the first 5 years of which would be marked by significant education and funding to ease the implementation for property owners. This would be a relatively *modest standard. For example, the approach adopted for this purpose in Boulder CO, uses a point scale that roughly equates to the 1999 IECC. *For reference, in 1998 Vermont enacted a more stringent statewide residential energy code than what is being proposed here. that code was based on the 1995 CABO/MEC and Vermont amendments to the 2000 IECC.	No Action Taken
Strategy Sc: Improve the energy performance of all new buildings in Vermont	
Regular update of the statewide residential and commercial building and energy codes by the Public Service Department culminating in a net-zero requirement by 2030	Advancing
Develop and fund a state-level Energy Code Circuit Rider initiative that provides code training and enforcement assistance to municipalities throughout the state to ensure awareness of and compliance with existing and future building and energy codes (Public Service Department)	No Action Taken
Pathway 6 (Buildings & Thermal): Reduce building-related carbon emissions by reducing the carbon content of the fuels they use	
Strategy 6a: Implement a Clean Heat Standard	
Adopt legislation authorizing the PUC to administer a Clean Heat Standard	Advancing

Strategy 6b: 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.	
Authorize the Department of Public Service to engage with neighboring states and stakeholders to adopt appliance standards for Vermont and the region that require electric storage water heaters for sale in Vermont to have a modular demand response communications port that complies with the ANSI/CTA-2045-A or an equivalent communication interface standard	No Action Taken
Pathway 7 (Electricity): Further decrease GHG emissions from electric sector purchases	
Strategy 7a: 100% Carbon-free or Renewable Electricity	

Review design parameters of 100% carbon-free electric portfolio standard that equitably promotes electrification - Here are the questions reviewed by the CC previously that we would expect to include: Mechanisms to support equitable access to renewable energy Supporting existing versus new resources In-state versus out-of-state generation Supporting generation of all sizes (ex. small scale distributed energy resources (DERs) versus utility-scale/larger DERs) • Scale of deployment • Energy storage (both short and long duration) Time scale on which renewability is measured (ex, annual, quarterly, monthly, hourly) • Incentivizing resources to deliver when needed (e.g. during peak hours, noting that these are likely to shift over time; seasonal needs such as winter loads; how storage may fit in) Siting, including environmental, community, and transmission system considerations Carbon impact of resources; what source/criteria are utilized • Informed by GHG inventory recommendations Timeline for reaching 100%	Advancing (Action Modified)
Pathway 8 {Electricity}: Enable All Vermonters to Choose Electrification	
Strategy Sa: Providing financial and technical assistance for Vermonters to upgrade electric service and to purchase and install equipment.	

Develop programs for implementation regarding 200-amp service and related building upgrades, coordinated with weatherization, efficiency, and equipment incentive programs (EV chargers, HP, storage, etc.) and ensure that any potentially related statewide programs (such as Clean Heat Standard, if adopted, or enhanced weatherization efforts) includes building electrical upgrades in their design and funding models in order to enable decarbonization.	Being Implemented
Pathway 9 {Electricity}: Load Management and Grid Optimization	
Strategy 9a: Support and expand on existing programs and policies that encourage load management and grid optimization.	
Support direct utility load control programs, including implementation of management platform	Advancing
Encourage dynamic rate offerings, including those designed to encourage direct load/generation matching, and rate design to support electrification through shared customer savings	Advancing
Pathway 10 {Agriculture & Ecosystems}: Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse gases.	
Strategies	

Expand Capital Equipment Assistance Program (CEAP) program to extend beyond water quality and incorporate climate change criteria	Advancing
Implement agroforestry and silvopasture practices that integrate woody vegetation in agricultural production.	Advancing
Implement agronomic practices that reduce tillage and increase vegetative cover, e.g., no-till, cover crop.	Advancing
Implement edge-of-field practices that increase herbaceous and woody vegetation, e.g. riparian forest buffer (e.g. CREP).	Advancing
Implement grazing practices that increase vegetative cover and forage quality, e.g. rotational grazing.	Advancing
Implement methane capture and energy generation on farms, e.g., anaerobic digesters and covers.	Advancing
Implement Nutrient Management and Amendments (e.g., biochar, compost) on cropland and grazing land.	Advancing

Research and develop a climate feed management program, including both feed amendments (e.g. seaweed, biochar) and feed quality (e.g. forage quality) to reduce enteric methane emissions; consider downstream impacts, sustainability and equity.	Advancing
Research and pilot improved manure management and storage programs.	Advancing
Implement natural resource restoration practices that support climate mitigation and resilience, including river corridor easements, wetland restoration, and afforestation practices with consideration to agricultural land loss.	Being Implemented
Pathway 11 {Non-Energy}: Reducing Emissions of Refrigerants in Vermont	
Strategy 11a: Adopting a Refrigerant Management Program (RMP) and Related Actions	
Work with VEIC and additional stakeholders to better understand the number and type of entities that would be potentially subject to a refrigerant management program (RMP) and the associated costs and benefits. 2) Work with VEIC to perform additional outreach and education to help determine the scope and thresholds for such a program. 3) Consider whether to require permanent leak detection systems for entities using over a certain threshold of high GWP refrigerant and if a cost share should be provided, with additional outreach through work with VEIC and other stakeholders to better understand the number of applicable entities and the costs and benefits of such a requirement.	Advancing
Provide incentives for businesses to transition from high GWP refrigerants to lower GWP alternatives using data from outreach for RMP development to target appropriate facilities. This would be a voluntary program that would speed the transition to lower GWP refrigerants and supplement/compliment reductions achieved through the Act 65 rulemaking.	No Action Taken
Pathway 12 {Non-Energy}: Reduce Process Emissions from Semiconductor Manufacturing in Vermont	
Strategy 12a: Continue to Explore Efficiencies and Alternatives to High GWP Fluorinated Gases in the Semiconductor Manufacturing Process	

Global Foundries has been pursuing several actions (use of technologies in the manufacturing process to destroy high GWP gases when emitted and chemical substitutions) already and discussions have been ongoing between Global Foundries, the Public Service Department (PSD), and the Agency of Natural Resources (ANR) through a pending Public Utilities Commission (PUC) proceeding considering Global Foundries' petition to become a Self-Managed Utility (SMU). The PUC proceeding may or may not result in emission reductions for Global Foundries consistent with the GWSA requirements. As of the date of this plan, the PUC proceeding has not been concluded. In the absence of sufficient and/or binding emissions reductions consistent with the GWSA requirements, ANR will promulgate rules in a timely manner necessary to ensure the 2025, 2030, and 2050 emissions reductions requirements are met. In the event that the PUC proceeding has not concluded by December 1, 2022, ANR will commence rulemaking.	No Action Taken
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Pathway 13 {Non-Energy}: Reduce Fugitive Emissions from Wastewater Treatment Facilities

Strategy 13a: Ensure Flares are Operational at Existing Anaerobic Digesters at Wastewater Treatment Facilities

1. Complete a survey of WWTFs with Anaerobic Digestors (ADs) and their operational status.
 2. For ADs without current beneficial use, require an engineering evaluation (cost subsidized) to determine cost of capital investment and asset management to install beneficial use system.
 3. Work with municipalities to discuss funding options for implementation of beneficial use systems.
 4. Provide subsidies to encourage the implementation of beneficial use or flaring of methane where beneficial use systems cannot be implemented.
 4. Require all applicable facilities that are not implementing beneficial use to have functional flares installed by January 1, 2030.

Action not defined

Pathway 14: Increase capacity for climate resilience planning and implementation, and address inequities of under-resourced communities.

Strategy 14a: Provide tools and resources to help communities assess climate vulnerabilities and create climate resilience plans.

Develop a climate planning toolkit to help towns assess vulnerabilities to climate change impacts, such as heat, air quality, drought, flooding, high winds, heavy rain, hail and sleet, and identify and prioritize actions to increase their resilience to climate change. Include newly developed tools, such as the vulnerability index, and existing tools, such as the AOT Repeat Flood Damage Inventory Tool, and the NOAA Climate Resilience Toolkit.

Being Implemented

Strategy 14b: Establish permanent statewide funding and technical support for local and regional climate resilience planning and project implementation to enhance rural resilience to impacts of climate change.

Create and fund one natural resource staff position at every Regional Planning Commissions to assist with implementation of climate policies and natural resources requirements such as Act 171 (forestry and habitat blocks). Use the Transportation Planning Initiative as a model to fund RPC natural resource staff and support trainings with ANR and other partners.	Advancing
Provide technical assistance to municipalities to assess the flood and erosion risks facing their drinking water and wastewater systems and identify potential mitigation improvements.	Advancing
Increase funding to Regional Planning Commissions and local municipalities to support climate and energy planning and target funds to support towns with limited staff and marginalized populations that score high on the climate vulnerability index.	Advancing
Increase and create a permanent state fund for design and implementation of local and regional climate adaptation and resilience projects.	No Action Taken
Establish a state level individual assistance program to provide financial assistance to uninsured or underinsured households impacted by disasters not federally declared. Program should incorporate Community Action Agencies and supporting networks to ensure assistance is received expeditiously by those that need it most.	No Action Taken
Strategy 14c: Expand cross-sector collaboration to align efforts, share best practices, and leverage resources to advance resilience and preparedness efforts statewide.	
Identify and develop new programs to address the full range of climate impacts, especially those that impact important Vermont industries, including drought, less or irregular snowfall, and shorter or irregular sugaring season.	Advancing
Complete a Statewide climate change impact assessment for Vermont's commercial sector and natural resource based industries including but not limited to the ski, sugaring, and logging industries.	No Action Taken
Strategy 14d: Increase community participation in local governance and support civic engagement and citizen involvement.	
Require remote meeting options, including a call-in option for all meetings of public bodies; allow fully virtual meetings of public bodies with guidelines similar to the State of Emergencies; evaluate options for online collaboration in preparation for a meeting that can be done with transparency.	Completed

Pathway 15: Proactively and strategically invest to enhance resilience in transportation, communications, water/wastewater, and energy infrastructure statewide.

Strategy 15a: Create a policy, planning and organizational foundation to support effective investments in infrastructure resilience.

Create a framework for identifying and evaluating climate resilience threats and impacts to energy systems serving rural communities.	Advancing (Action Modified)
Increase funding for floodplain restoration, including buy-out programs.	Advancing
Seek federal stimulus (ARPA), infrastructure bill, and other non-ratepayer funding to defray costs of utility resilience upgrades that exceed benefits to ratepayers, such as: - Ubiquitous communications networks that enable full utilization and participation of distributed energy resources in an interactive grid. - Resilience Zones: batteries installed at or near critical facilities, potentially paired with solar (and/or small wind) and with a microgrid /islanding where possible, to allow them to continue to operate in the event of extended disruptions to electric service. - Strategic upgrades to substations, distribution, and transmission capacity across the Vermont grid needed to enable the state's renewable and electrification goals, after first exploring feasibility of any lower-cost options, e.g. flexible load management, curtailment, and storage. - Emerging non-wires technologies that address major challenges system resilience (e.g. long-duration outages).	Advancing
Complete the flood vulnerability assessment of all bridges, culverts and road segments on the state and town highway systems, identify and prioritize needed investments. This action includes completing the statewide expansion of the Transportation Resilience Planning Tool.	Being Implemented
Develop a vulnerability index methodology and tool for broad use by stakeholders to identify priority areas for investment. The index will account for the vulnerability communication, energy, transportation, and water infrastructure in addition to socioeconomic and equity factors that affect community resilience.	Being Implemented
Increase the number of public water systems and publicly owned wastewater treatment works implementing an asset management program. Expanding programs, funding opportunities, and incentives to develop and implement these programs.	Being Implemented
Incorporate GHG reduction goals and CAP strategies, and actions related to resilience in the VTTrans transportation planning and project development process.	Being Implemented
Update or adopt as appropriate infrastructure planning and design standards to reflect impacts from a changing climate, such as more frequent extreme weather as well as an increasing range of high and low temperatures, freeze/thaw cycles, and mixed precipitation (harden, incorporate redundancies, maximize life span, reduce annual maintenance and operational costs. etc.)	No Action Taken

Understand source water vulnerabilities and invest in planning efforts to assist communities, especially those that are vulnerable for their long-term water supply needs. Revamp funding programs for source protection programs, increase funding for programs (include existing and new water sources) and conservation easements.	No Action Taken
Complete a flood vulnerability assessment of state-owned rail infrastructure to identify and prioritize needed improvements.	Being Implemented
Encourage adoption of low impact development regulations for municipal zoning, including low water usage landscaping practices and increased density outside of flood prone areas.	No Action Taken
Increase investment to municipalities to support reductions in inflow and infiltration into wastewater collection systems.	Action not defined
Examine the climate impacts of sludge and biosolids to determine if regional facilities can reduce utility costs and climate impacts. Support investment in strategically placed facilities for sludge and septage processing (much is currently trucked to Montpelier/Chittenden Co.)	Advancing
Increase efforts and funding towards pollution prevention programs at wastewater facilities to ensure that facilities protect available treatment capacity, which can focus development on already-served designated centers.	Being Implemented
Continue investments in traditional and green infrastructure to intercept, sink and treat stormwater.	Being Implemented
Strategy 15b: Public, private, and nonprofit entities should be prepared to respond and recover quickly to disruptions caused by severe weather and other climate change threats.	
Strategically integrate planning and preparedness across disciplines and geographies addressing the interdependencies of transportation, energy, communications, and other systems.	No Action Taken
Strategy 15c: Increase the resilience of critical infrastructure to severe weather and other climate change threats by reducing vulnerabilities of specific facilities.	
Increase infrastructure investment needed to for walking, biking and transit; support planning for regional bike corridors to improve safety and transportation options between community centers. Identify and eliminate barriers to development, including inequities resulting from match, maintenance, and other requirements.	Advancing
Strategy 15d: Increase the resilience of critical infrastructure to severe weather and other climate change threats by improving system efficiency, reliability and redundancies.	

Deploy foundational informational and operational technology statewide to enable and optimize storage and other distributed energy resources (e.g., GridLogic, Virtual Peaker, other emerging distributed energy resource management systems, in particular those that are open-source to various technologies and vendors)	Advancing
Expand broadband to support remote work and tele-services to reduce the impact of travel disruptions.	Advancing
Update the 1995 Vermont State Highway Design Standards to create context sensitive, multi-modal projects that support smart growth per the Act 167 (2014) Sec 26 Report - VT State Standards Work Plan.	Advancing
Evaluate the risks and opportunities created by potential climate change in- migration to VT's critical infrastructure.	No Action Taken
Create a transportation flood resilience funding program to meet the requirements and related funding that are anticipated to be part of the 2021 reauthorization of the federal transportation act.	Advancing (Action Modified)
Improve road drainage around lakes/ ponds to reduce stormwater runoff and erosion, especially on municipal roads.	Being Implemented (Action Modified)
Replace aging electric and communication infrastructure with the most appropriate resilient alternative when cost effective. For example, during normal replacement schedules for aging and unreliable lines, evaluate and where cost effective and feasible, improve resilience by relocating lines underground or through other options.	Advancing
Identify mission critical facilities in collaboration with local and regional planners, utilities and transportation providers to identify actions, procedures, or investments to mitigate the impact of extreme weather events to services provided by these facilities Examples of mission-critical facilities include designated emergency shelters, first responder facilities, hospitals and other medical facilities, key infrastructure such as water/wastewater pumping and treatment and sewer, key communications infrastructure such as fiber nodes, government offices, fuel suppliers, transportation hubs, supermarkets and other facilities municipalities identify as critical to serving communities during extreme weather events.	No Action Taken
Work with Vermont villages and property owners to relocate septic systems and public or private drinking water wells that are at risk due to floods.	No Action Taken
Develop programs to achieve net zero energy drinking water and wastewater treatment facilities Including microhydro, solar energy, heat exchange, building envelope; AND operational and technological efficiencies.	No Action Taken

Expand public investment, particularly hazard mitigation funding to flood-proof or relocate drinking water and wastewater treatment infrastructure at significant risk of flooding, when flood damaged, or during end-of-life refurbishment.	Being Implemented
Pathway 16: Support the reduction of municipal, school district, residential, university, and hospital fossil fuel use in rural areas through equitable best practices that address the unique challenges of rural communities.	
Strategy 16a: Provide tools and resources to help assess data needs and establish best practices for rural communities, businesses, and institutions to reduce fossil fuel use.	

Ensure data on fossil fuel usage at the municipal level is available and accessible in one location for municipal and public use.	No Action Taken
Require the collection of fossil fuel usage data for municipal operations for buildings, vehicle fleets, and utilities; identify data gaps and ways to collect that data for measuring change in fossil fuel use going forward.	No Action Taken
Identify, develop, and share best practices for reducing municipal, school district, residential, commercial, and industrial fossil fuel consumption. Identify and assess existing practices and note gaps.	Advancing
Engage higher education institutions to actively participate in developing systems to gather, compile, update, extrapolate fossil fuel data and make that available to the public.	No Action Taken
Strategy 16b: Equitably expand access to programs that provide options to rural homeowners, landlords, municipalities, school districts, universities, and hospitals for weatherization, electrification, and utility upgrades.	
Develop cost-effective programs to support renewable energy development on school and other municipal property and evaluate and eliminate unnecessary statutory barriers related to capital financing and land purchase/lease.	Advancing (Action Modified)
Entities that provide rebates for weatherization should stabilize rebate values year to year.	Advancing (Action Modified)
Evaluate all existing state-funded programs for effectiveness, access, and equity and consider increased funding for weatherization, energy efficiency and electrification programs in order to expand access to all Vermonters, and to expand programs with zero up-front costs. Existing programs may include Efficiency Vermont rebates, HEAT Squad - NeighborWorks of Western Vermont home energy audit program, and the Shared Equity program . In addition, the private sector should be engaged to provide innovative third-party financing opportunities that are paid for over time by the customer	Advancing

Provide funding to assist low-income homeowners to upgrade electric service to 200 Amps. Electric utilities and renewable energy developers could provide new incentives and financing options through third-party financing mechanisms, on bill financing, RES Tier III incentives, third-party power purchase agreements, and grants. All programs must include equal access to renters.	Advancing
Implement a statewide program to support electrification of municipal fleet vehicles ensuring it is designed to allow equitable access and participation to municipalities regardless of tax base.	Advancing
Ensure that there is broad and statewide public education and promotion of benefits, economic and otherwise, and opportunities for fossil fuel reduction.	Being Implemented
Revise state building energy codes and standards to require a minimum 200 Amp service for new construction as electrification expands.	Completed

Help individuals, municipalities, and businesses through the process of weatherization, energy efficiency and fuel switching upgrades by establishing and funding Weatherization and Efficiency Navigators at each Regional Planning Commission (RPC), expanding the services currently available at CAA agencies and VEIC, and ensuring coordination and a whole systems approach among the entities providing services.	No Action Taken
Explore Commercial PACE (Property Assessment Clean Energy) program for municipalities and other programs to elevate, such as bonding to support a statewide Tariffed On-Bill Finance Pilot and funding for a revolving loan fund for Public-Serving Institutions with retrofits. There may also be a need to continue providing the funding to support interest rate buydown (IRB) in EVT's Home Energy Loan and Business Energy Loan programs.	No Action Taken
The Public Service Department should ensure that all utilities provide similar opportunities for all customers (rebates, incentives) to encourage fossil fuel reduction, electrification, and energy savings.	No Action Taken
Support water and wastewater systems in conducting and implementing energy audits and recommendations for energy reduction and electrification.	More Information Needed
Create new educational programs to increase public outreach for existing energy efficiency, electrification, and utility upgrade programs.	More Information Needed
Review and expand existing programs to support landlords in weatherizing rental properties, including St. Johnsbury Rental Housing Improvement Program, and other programs in counties and towns.	Advancing (Action Modified)
Increase low-income weatherization through the State Weatherization Assistance Program including technical assistance to help households and landlords manage the process.	Being Implemented

Expand workforce development programs such as the VT Training Program or the Department of Labor's Workforce Education & Training Fund; cover costs for businesses to train in-house auditors/technicians. Pilot new programs in rural areas where workforce needed is greater.	Action not defined
Pathway 17: Change Vermont's land-use policies so current and future land development will be adaptive and resilient to climate change impacts	
Strategy 17a: Increase investment in the infrastructure (sewer, water, stormwater, sidewalks, bike lanes, EV charging, broadband, energy supply) needed to support communities that are more resilient to climate disruptions, equitable, resource efficient, and protects the adaptive capacity of natural resources.	
Invest in enhancing water sources in vulnerable communities to enhance resilience to long-term drought.	Advancing
Increase investment to municipalities for new and expanded water and wastewater facilities to support reductions in inflow and infiltration into wastewater collection systems.	Advancing

Monitor and update stormwater permitting process as needed to ensure green infrastructure is preferred in design considerations.	Being Implemented
Complete a Climate Readiness assessments of drinking water, stormwater, and wastewater infrastructure. (This is an EPA tool that looks at all climate impacts including, fires, droughts, flooding, etc.).	No Action Taken
Examine regionalization efforts and sharing of resources for all water utilities.	No Action Taken
Increase investment in stormwater and green infrastructure, including separating combined wastewater and storm water systems, to protect public health and water quality.	Being Implemented
Strategy 17b: Develop permanent private and public funding sources to floodproof, elevate and purchase commercial and residential properties, as well as conserve and restore ecosystem services upstream to protect our people, property, environment, and economy from flooding.	
Fund ERAF for non-federal disasters in towns that have adopted floodplain and/or river corridor bylaws and to support the 25% non-federal match for buyouts and develop criteria for distribution when funding is limited.	No Action Taken
Establish a dedicated, comprehensive state level program with funding to strategically purchase or match funding for hazard-prone properties, easements to conserve river corridors, floodplains, forests, and wetlands to reduce overall flood risk and enhance flood storage statewide.	Advancing
Expand the eligibility criteria and increase funding for VHCB's conservation and buyout program, to address any flood-vulnerable structures.	No Action Taken

Pathway 18: Ensure that all people have access to safe, accessible, energy efficient, and affordable housing.	
Strategy 18a: Update state and local land-use governance, regulations, practices, and investments to eliminate barriers to housing development.	
Increase manufactured housing tax credits to replace older and inefficient manufactured homes.	Being Implemented
Expand pilot program to train a network of local builders in the design and building of small and mid-sized and accessory dwelling units (mother-in-law apartments) and fund homes starts within communities planning and investing in development-ready infrastructure, building development partnerships, and updating zoning bylaws to welcome new homes.	Being Implemented
Convene a statewide conversation on the Vermont Municipal and Regional Planning and Development Act's (24 VSA, Chapter 117) provisions on land use and housing to outline amendments and strategies that will expand housing choice, opportunity, and improve community resilience.	Completed
Expand the existing program to relocate mobile home park homes and residents outside of flood vulnerable locations.	No Action Taken

Create a rental registry and inspection program to locate all of Vermont's rental housing and improve their quality and safety.	No Action Taken
Strategy 18b: Increase investments in the preservation and development of both private-market and nonprofit- owned affordable housing.	
Continue to fund housing investments that leverage private initiative and funding to cost-effectively create housing units under models like the Re-Housing Recovery Program funding and the proposed Vermont Housing Investment Program.	Being Implemented
Create programs to assist prospective homebuyers to purchase and make improvements to homes that are energy inefficient and otherwise in need of immediate investment.	Being Implemented
Increase support for mission-driven, non-profit housing developers to maintain their ability to produce high-quality, energy- and location-efficient housing.	Being Implemented
Strategy 18c: Increase access to fair and affordable housing for Vermonters who are housing instable	
Implement the recommendations of the Analysis of Impediments to Fair Housing.	Being Implemented

Increase funding for community-based homelessness prevention and rapid re- housing.	Advancing
Audit existing residential building codes to ensure that standards account for anticipated climate change impacts to Vermont, including but not limited to increased temperatures extremes and precipitation (combine into a single building code action)	No Action Taken
Pathway 19: Adaptation-Sustain, restore, and enhance the health and function of Vermont's lands and water to help both natural and human communities adapt to climate change	
Strategy 19a: Increase technical assistance, capacity, education, and resources to support private and municipal farm and forestland owners, planners, and managers for climate change adaptation.	
Develop & fund climate adaptation planning and training for all farmers and foresters.	Advancing (Action Modified)
Increase funding to Regional Planning Commissions (RPCs) to hire and support natural resource staff, potentially through Natural Resource Conservation districts.	Advancing
Enhance and support funding for technical assistance to farmers (e.g. fully fund UVM Extension to support climate adaptation training for agriculture and support other institutions of higher education in this endeavor), landowners (e.g. fund climate adaptation training through FPR's Forests & Climate program), and municipalities (e.g. fully implement Act 171).	Being Implemented
Strategy 19b: Promote and incentivize Climate Adaptation forest management practices	

Make the state guide to maintaining and creating resilient forests more usable	Advancing
Develop education/outreach materials and training regarding climate adaptation forestry specific for Vermont forest types and conditions.	Being Implemented
Where appropriate, promote planting future climate adapted tree and crop species	Being Implemented
Strategy 19c: Promote funding for nature-based solutions and traditional ecological knowledge efforts and incorporate into state funding and planning efforts.	
Develop financial mechanisms (e.g. a revolving loan fund, green bank, loan guarantees, pension fund investments, etc.) to de-risk capital investment in and support for NBS and TEK projects	Advancing
Elevate the role traditional ecological knowledge (TEK) plays in climate adaptation and resilience and incorporate TEK into state- led climate assessments, planning efforts, and prioritization frameworks	Advancing

Incentivize nature-based solutions and traditional ecological knowledge (TEK) in state regulatory processes and funding programs	Advancing
Include Tribal members, traditional ecological knowledge traditional ecological knowledge (TEK), youth in state, regional and municipal resource management planning	Being Implemented
Complete a statewide audit of technical assistance, funding, and regulatory programs to review support for NBS and TEK and assess the degree to which they support or hinder climate adaptation, and use the findings to create planning and/or funding prioritization criteria that better align state programs	No Action Taken
Strategy 19d: Manage natural and working lands for biodiversity, forest health, and climate resilience.	
Fund support for local academic institutions, researchers, and applied research to evaluate best climate management practices for our lands	Advancing
Through direction to VT Fish & Wildlife and VT Forests, Parks and Recreation, establish primary land management objectives of protecting and improving forest health and biodiversity on state lands, and private lands enrolled in UVA; and promote adoption of these objectives through outreach to regional and municipal planners.	Being Implemented
Support research efforts to better understand forest ecosystems, local climate change and impacts to forests and ecosystem services	Being Implemented
Enhance resilience funds to support the financial capacity of land managers to respond and adapt to natural hazard and climate impacts	Being Implemented
Incentivize and provide appropriate support for invasive species control efforts, specifically where populations threaten the perpetuation of forest cover	Being Implemented
Fund increased investment in healthy soils education and implementation of practices	Being Implemented

Strategy 19e: Plan and regulate for climate resilience and adaptation.	
Establish "climate resilience zones" informed by existing data, bolstered with new research/science, to identify locations that have high resilience potential for both the natural and built environments and use to inform land use development and regulations	No Action Taken
Per the formula in statute, fully fund Regional Planning Commissions (RPCs) to ensure sufficient capacity necessary to address climate change in regional and municipal plans	More Information Needed
Strategy 19f: Increase flood resilience of the natural and built environments.	

Invest transportation funding in improving flood resilience and aquatic and terrestrial connectivity	Being Implemented
Incentivize water storage in natural areas to promote flood resilience and biodiversity through expansion of wetland, floodplain, and/or river corridor easements that better compensate landowners/managers	Action not defined
Ensure opportunities for floodplain reconnection and nature-based solutions are considered a high priority in the Statewide Conservation & Buyout Program through incorporation of multi-stakeholder developed prioritization criteria	Being Implemented
Strategy 19g: Promote healthy, connected river corridors, floodplains, and wetlands.	
Support and fund research and design to strategically invest in floodplain and river corridor reforestation efforts. Specifically, develop an inventory of priority/critical headwater and floodplain storage areas, prioritize investments for restoration and protection in these areas, and use to inform Compact Settlement planning efforts	No Action Taken
Expand support for riparian buffer enhancements to easements with a goal of increasing the amount of vegetation and biodiversity in riparian areas	Being Implemented
Increase support for wetland restoration and protection	Action not defined
Develop a 'pay-for-practice' incentive program and explore state tax policy incentives for forest landowners and farmers to adopt climate adaptive management practices	No Action Taken
Create a mechanism, position, or body within the Executive Branch to ensure coordinated climate action across state government with just transitions and environmental justice expertise. This interagency body or mechanism is intended to connect actions both within and beyond the scope of the GWSA-required Climate Action Plan, with a goal of ensuring effective communication across agencies that work together to promote climate change mitigation/adaptation/resilience, and adding a consistent climate lens to the myriad of regulatory and funding programs.	Completed
Pathway 20: Viability-Support and empower Vermont's natural and working lands owners, managers, and caretakers to enhance farm and forest viability and to make informed decisions to increase resilience and adaptation to climate change.	

Strategy 20a: Support and enhance local food markets for greater viability, mitigation, and resilience benefits.	
	More Information Needed

Strategy 20b: Foster partnerships at all levels (state, federal, nonprofit, and private sector): essential to recognizing, capacitating, and building strategies for landowners to address climate change and enhance community resilience.	
Dedicate funds to support Vermont Natural Resources Conservation Districts and farmer watershed organizations with the specific objective of allowing them to reach other farmers and do farmer-to-farmer education about improved soil and manure management.	Being Implemented
Maintain Ag & Ecosystems Subcommittee through development and implementation of GWSA and CAP to cultivate, build and reinforce state, federal, nonprofit, and private sector collaborations	No Action Taken
Fund a research project to fully understand household food insecurity in Vermont and how to invest in its elimination. The design and implementation of the research project should engage academics, advocacy groups, and impacted individuals, and include research on geographic spread, root causes, and costs to the health care, educational, and emergency response systems (as written in the 2021-2030 F2P Strategic Plan pg. 158). (collaborate with Hunger Free Vermont, Vermont Foodbank, VT Releaf Collective)	No Action Taken
Strategy 20c: Expand funding for existing programs dedicated to farmland access, forestland ownership, and conservation, and leverage this funding to increase land access through flexible and new ownership financing mechanisms, policies, and models.	
Assist food and farm businesses with navigation of municipal and state permit requirements and regulations. This will create a more supportive environment for business growth and diversification, especially as it relates to on-farm accessory businesses, farm employee housing, and development of off-farm processing, distribution, and storage infrastructure (as written in the 2021-2030 F2P Strategic Plan pg. 33).	Advancing
Investigate innovative funding mechanisms for assisting with implementation of climate smart agriculture practices, crop insurance for diversified Vermont-scale farms, and emergency recovery following extreme weather events, to better respond when climate change related events occur	Being Implemented
Pathway 21: Economies-Grow and connect local and sustainable natural and working lands' economies, markets, and food systems while ensuring and providing equitable access to said economies, markets, and food systems for Vermont's people.	

Strategy 21a: Develop, expand, and sustain local markets specifically for food, agricultural, and forest products in ways that ensure food sovereignty and security and provide for all Vermont's peoples.	
Support research and development efforts, and expansion of new markets and opportunities for local wood products processing and manufacturing in Vermont	Advancing
Develop supply chain substitutions which better support local products	Advancing
Research the efficacy of food hubs as public infrastructure (e.g. libraries and public infrastructure)	Advancing
Map Vermont's agricultural land base and production capacity, including geographic data about predicted climate change impacts, aggregation and distribution infrastructure, and regional dietary needs (as written in the 2021-2030 F2P Strategic Plan pg. 32)	Advancing
Provide additional support for critical programs that help Vermont's agricultural sustainability and ability to address climate issues including: • Support the growth of VAAFM Meat Inspection and Agricultural Development programs, which will help expand Vermont products into the regional marketplace and develop consumer education and public awareness campaigns around the steps involved in getting meat products from farm to table; • Fund a pilot aggregation and sales system that effectively serves both the charitable food system and institutional and other market channels, through a structured partnership among established processors, aggregators, and gleaners. The pilot would include data collection on specific marketable surplus food products; • Support the Vermont Farm to School Network; • Support organizations in the charitable food system to source food directly from Vermont farmers; • Create a Local Food Access Funding Program; • Develop a distribution and logistics infrastructure investment plan to guide strategic transportation investments with the express purpose of improving the efficiency and cost-effectiveness of in-state and regional food distribution. Include a business plan analysis for a public/private Vermont wholesale terminal market that would provide cross-docking, cold storage, and logistical service between Vermont producers and regional wholesale buyers; • Using the infrastructure study as a guide, increase public-private investment in intermediated market distributors to improve operational efficiencies and overall sales through improved marketing, infrastructure, route optimization and shared transportation-management software, and access to logistics professional development and consulting.	Advancing
Develop a strategic plan for the forest economy, modeled on the Farm-to-Plate strategic plan but improved to better incorporate impacted stakeholders and principles of equity, as well as examining our current language and approach to forest management.	Being Implemented

Develop alternative markets for residue, by-products and otherwise not used wood, focusing on cellulose insulation, bioplastic composites, or biofuels	No Action Taken
Support robust funding for Working Lands Enterprise Initiative and prioritize funding to businesses that have climate/low carbon goals	Being Implemented
Strategy 21b: Promote workforce development in all working lands sectors along all points of the supply chain.	
Develop, endorse and implement fair trade and equitable labor practices and just livelihoods for the natural and working lands sector	Action not defined
Better resource state programs to support landowners' personal and professional development, and where needed, develop additional affordable and accessible training programs such as apprenticeships, certificates, stackable credentials, and concurrent degrees. Provide training to natural land managers in securing, retaining and supporting employees	Action not defined
Strategy 21c: Strengthen all aspects of working lands' supply chains and the associated infrastructure to support them.	
Make significant investment in storage, processing, and distribution infrastructure in order to enhance product innovation and quality across all Vermont food and forest products.	Advancing
Support product-specific value chain development through facilitation of producer, distributor and buyer matchups and supporting producer-driven aggregation, distribution, and marketing enterprises.	Advancing
Strategy 21d: Ensure equitable access to local foods, culturally relevant foods, land, funds, grants, and technical assistance for people who have been historically marginalized and come from impacted communities.	
Uplift and resource the work of the Vermont Releaf Collective and other BIPOC led organizations	Advancing
Build out and utilize TEK to build out connections to our Tribal and Indigenous communities in the development and utilization of traditional products, e.g. birch syrup, sumac spices, etc.	No Action Taken
Improve funding opportunities and create equitable access for BIPOC organizations and BIPOC owned businesses by developing multi-year, unrestricted BIPOC centered grants and loan programs.	Action not defined
Strategy 21e: Develop a Vermont food security and sovereignty plan, centered around a thriving food system, and inspired by community-based responses to food insecurity and disruptive events.	

Involve food insecure individuals as well as farmers in the planning, and investigate questions including, but not limited to, affordable housing, health care, transportation, siting of retail grocery stores, food distribution, and ensuring the continued production of food in Vermont.	Advancing
Work to adopt state and regional level policies, procedures, and plans to ensure that the Vermont food supply is sufficient to withstand global or national food supply chain disruptions caused by climate change and other disasters (as written in the 2021-2030 F2P Strategic Plan pg. 32).	Advancing

Pathway 22: Land Use-Shape land use and development that support carbon sequestration and storage, climate resilience and adaptation, and natural and human communities for a sustainable and equitable future.	
Strategy 22a: Promote and incentivize compact settlement and reduce forest fragmentation.	
Develop required climate-based framework and/or criteria for state grant and regulatory programs.	Advancing
Provide enhanced technical assistance and support to municipalities and regions, including outreach and education for landowners and community members, to develop and implement town plans intended to maintain forest blocks and connecting habitat as authorized by Act 171, and effective zoning and subdivision bylaws to maintain forest blocks and connecting habitat.	Being Implemented
Strategy 22b: Include biodiversity and resilience goals in the planning and management of natural and working lands (both public and private).	
Support efforts to research, educate about, and implement practices informed by traditional ecological knowledge such as using fire to promote regeneration and coppicing, where appropriate for Vermont's forests and ecosystems	Advancing
Identify lands needing conservation because they are in or adjacent to the built environment that have large impact to human health, wellbeing, and equity	Advancing
Improve statewide forest planning efforts on State and Federal Lands, including development of an action plan by ANR for how State Lands will help accomplish Vermont Conservation Design targets by 2030 and 2050, and collaborate with the U.S. Forest Service (Green Mountain National Forest) planners for more unified forest planning across the state.	Being Implemented

Examine the implications and consider establishing a state policy of no net-loss of natural and working lands (including active and passively managed forests, agricultural lands, and wetlands) accounting for the transitions of lands within and between these conditions, with aspiration for a net gain. As part of this effort, track land use trends to quantify degree of no net-loss, including aggregating data on subdivision, land transfers, and the loss and/or fragmentation of forests, agricultural lands and wetlands to inform progress and state policy. Develop a strategy to increase the area of land in functioning wetlands, with an initial focus on protecting and recovering the highest quality wetlands ("Class I Wetlands" in ANR's wetlands rules), consistent with the goal of ensuring no net loss of other categories of natural and working lands.	Being Implemented
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Recommend amending the Use Value Appraisal (UVA) program to allow for (4) greater development of old forest structure as articulated in the targets of Vermont Conservation Design; the enrollment of wildland reserves under the existing forestland category where conditions and eligibility criteria are met as defined by Forest Parks and Recreation, facilitating the development of old forest conditions through active restoration and/or passive management as a means of enrollment in the Old Forest ESTA (ecologically significant treatment area) category; (4) privately held parcels with 'Forever Wild' easements on them, held by a qualified 501c(3), to be enrolled in the UVA Program in the Conservation Category; and (4) the potential for, and implications of, developing a new category of enrollment for land in UVA which allows for passive management modeled on the 'open-space' designation included in similar programs elsewhere in New England.	Completed
Adopt legislation to authorize ANR to revise the Flood Hazard Area & River Corridor (FHARC) rule to incorporate statewide jurisdiction and permitting authority for river corridors for all kinds of development.	Advancing
Strategy 22c: Invest in strategic conservation in order to increase the pace of permanent conservation towards 30x30 targets (described in federal report "Conserving and Restoring America the Beautiful"), with Vermont Conservation Design acting as the guiding plan for prioritization of efforts.	
Expand use of the Water Infrastructure Sponsorship Program (WISPr) to improve accessibility and use for restoration projects.	Advancing
Use best available data and mapping to analyze existing portfolio of conserved agricultural lands to identify forest, wetland or natural community restoration opportunities and prioritize funding for these projects	Advancing

Maintain a suite of Farmland Conservation & Protection tool ranging from voluntary, regulatory and planning (e.g. easements, Act 250, planning, zoning).	Advancing
Per the formula in statute, fully fund the Vermont Housing & Conservation Board (VHCB); including \$3M for the Farm & Forest Viability Program, and increase annaul VHCB funding abouve the statutoy amount by 15%, targetting those funds for implimentation of conservation actions recommended in CAP, especially those related to forests.	No Action Taken
Promote statewide landscape connectivity and forest blocks conservation planning through robust support of the Staying Connective Initiative and use of Vermont Conservation Design and TNC's Resilient and Connected Landscape in state program prioritization frameworks.	Being Implemented
Through permanent conservation coupled with both active and passive restoration efforts on both public and private lands, allow approximately 9% of Vermont's forest to become (or be maintained as) old forest, specifically targeting 15% of the matrix forest within the highest priority forest blocks identified in Vermont Conservation Design to achieve this condition.	Advancing

Identify and protect climate refugia.	Action not defined
Strategy 22d: Increase technical assistance, capacity, education, and resources to support private farm and forest landowners in addressing the trends relating to intergenerational transfer.	
Support forestland succession/estate planning efforts to reduce forest parcelization and fragmentation through implementation of the Act 171 'Intergenerational Transfer of Forestland Working Group Recommendations' of 2017.	Being Implemented
Develop and implement a farmer retirement program to facilitate the transfer of intact farmland.	Being Implemented
Strategy 22e: Avoid, minimize, and mitigate the negative impacts of renewable energy generation, like other land development, on natural and working lands.	
Incentivize or carefully consider mandating solar and wind capacity on new buildings as well as in previously-disturbed/developed areas and avoid and minimize forest clearing for renewables through incentives and other siting polices, rules, and regulations	Advancing (Action Modified)
Consider the need for incentives to site new renewable energy generation on parking lots, rooftops, and already altered locations. And discourage and penalize siting of new renewable energy generation on intact ecosystems, forests, and natural land	Advancing (Action Modified)

Evaluate the effectiveness of the program of Regional Enhanced Energy Plans and the application of these plans to decisions by the PUC in terms of their ability to direct the siting of renewable energy projects in a manner that avoids the conversion of working and natural lands and the loss of the carbon storage and sequestration, climate resilience, and other co-benefits that are associated with those lands. If the process of developing and implementing the system of Regional Enhanced Energy Plans is not achieving this goal, then adjust the laws and regulations applicable to renewable energy siting to ensure the effectiveness of the plans	No Action Taken
Create statewide environmental justice policy.	Completed
Pathway 23: Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse gases.	
Strategy 23a: Leverage, expand, and adapt existing State of Vermont programs that support the agricultural sector's mitigation of climate change.	
	More Information Needed
Strategy 23b: Create a system for tracking and accounting metrics and indicators for natural and working lands.	

Based on the findings of the technical RFP mentioned in action step (b) of this strategy, the VCC should consider recommending that the State of Vermont GHG emissions inventory protocol established in 10 V.S.A. § 582 be amended to include an inventory of GHG emissions that align with the intent and standards of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories that will include a net GHG emission accounting for the agriculture, forestry and other land use (AFOLU) sector.	Advancing
Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance Report. The Clean Water Initiative Performance Report "summarizes the State of Vermont's clean water efforts and demonstrates how investments are making a difference through accountability measures." As mentioned, most water quality conservation practices and programs also have climate mitigation, resilience, and adaptation benefits. Recommend using existing tracking systems and quantify the climate benefits from this existing implementation and data tracking. The data spans state and federal funding programs and regulatory programs that drive clean water efforts and coordinates across agencies to track these efforts and monitor progress.	No Action Taken

The Vermont Climate Council has recommended developing and issuing a Request for Proposals (RFP) that will review and analyze methodological gaps of emission inventory tools currently used by the State of Vermont to quantify greenhouse gas emissions for evaluating changes in the Agriculture, Forestry and Other Land Use (AFOLU) sector and the tools' alignment with the Intergovernmental Panel on Climate Change (IPCC), Environmental Protection Agency (EPA), and peer state methodologies and approaches. The specific recommendations for this RFP can be found in the Carbon Budget Report memo found in Appendix 10.	Completed
Strategy 23c: Implement a Payment for Ecosystem Services (PES) program for natural and working lands.	
Develop and implement a PES program for healthy soils and soil carbon sequestration on farms. Act 83 of 2019 convened the Payment for Ecosystems Services Working Group whose purpose is to recommend financial incentives designed to encourage farmers in Vermont to implement agricultural practices that improve soil health, enhance crop resilience, increase carbon storage and stormwater storage capacity, and reduce agricultural runoff to waters. Final program recommendations from the PES Working Group are due in January 2023.	Advancing
Develop and implement a PES program for forestland owners including water filtration/cycling, carbon sequestration, etc.	No Action Taken
Incentivize management for ecosystem services through a tax credit system that compensates landowners/managers for maintaining or restoring ecosystem services.	No Action Taken
Strategy 23d: Address upstream waste and downstream emissions from food waste and synthetic fossil-fuel based inputs.	

Develop program for tracking and limiting the use of chemicals, substances, or products that contribute to climate change in Vermont and leverage existing legislative activity on this topic i. VAAFM currently tracks statewide commercial pesticide use as well as statewide fertilizer use. This data is currently used to establish trends in the use of these inputs as our agricultural systems evolve. Programs to track these agricultural inputs already exist at VAAFM but have not been assessed through the lens of contributions to climate change. VAAFM or the new newly established Agricultural Innovation Board (AIB) established by Act 49 of 2021 can prioritize an assessment of the impacts and benefits our agronomic management systems have on offsetting climate change. An assessment of Vermont's different agronomic practices and management, such as, conventional, organic, no-till, and cover cropping, should be weighted for impacts on climate change based on agricultural inputs, fuel consumption, carbon	Being Implemented
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sequestration and other measurable factors	
The state should identify simple, low- and no-cost mechanisms to increase organics diversion and provide incentives and business and workforce development to private organics haulers and composters (including farms). Act 41 of 2021 created an Agricultural Residuals Management Program to be administered by VAAFM. The purpose of this new chapter of law is to establish a program for the management of residual wastes generated, imported to, or managed on a farm for farming in Vermont	Being Implemented
Strategy 23e: Develop and implement programs which incentivize management practices which maintain or increase forest carbon storage.	
Apply these certification standards to the procurement of forest products utilized in energy or thermal generation facilities subject to PUC oversight (parallel to the existing review for state mapped deer winter yard, etc.) through potential revisions to the renewable energy standard.	No Action Taken
Create or adopt existing certification standards where management activities account for principles of Improved Forest Management towards increased carbon storage, as well as maintaining and creating resiliency (as described in existing state guidance such as Maintaining and Creating Resilient Forests in Vermont: Adapting Forests to Climate Change, VTFRP 2015, or as modeled in existing programs such as the American Forest Foundation's Family Forest Carbon Program).	No Action Taken
Explore additional market opportunities for certified products, expanding the potential revenue base to support Improved Forest Management (parallel FSC, SFI, etc.)	No Action Taken
Strategy 23f: Leverage market-based solutions, such as existing or new regional carbon market opportunities, to incentivize forest management practices which sequester and store greater amounts of carbon in our forests.	

Incentivize in-state purchase of carbon credits developed by Vermont-based or regional carbon projects through a system which addresses concerns of accounting (i.e. additionality and leakage)	No Action Taken
Work to develop a new Vermont-Based or regional (modeled on RGGI) Carbon Credit marketplace with necessary research and standards which address concerns around the efficacy of baseline establishment, accounting for additionality, the potential for leakage, and address equity for the diversity of wood lot owners across the state	No Action Taken
Strategy 23g: Increase tree coverage.	
Expand tree and other planting efforts on private land to promote restoration efforts to reforest riparian areas, wetland buffers, and degraded lands	Advancing
Increase funding to tree planting via Renewable Energy Standard (RES).	No Action Taken
Expand funding and support to the Vermont Community Canopy Program	Being Implemented
Increase support, funding, and education for increased urban tree planting efforts expansion to increase access to natural spaces and improve carbon sequestration/storage in the urban environment	Being Implemented
Provide incentives for restoration and expansion of floodplain forests	Being Implemented
Pathway 24: Support and empower Vermont's farmers, foresters, and land workers to capacitate renewable energy and building product transitions.	
Strategy 24a: Educate, track, and appropriately reward on-farm renewable energy.	
Increase outreach and incentives to on-farm solar installation on existing built infrastructure.	Advancing
Reward and support renewables on farms on rooftops, barns, storage facilities, and minimize or avoid loss of working and natural lands to renewables development by siting solar in areas that retain some agricultural use, such as grazing, or in locations that do not meaningfully diminish the agricultural viability of a farm.	Advancing
Strategy 24b: Promote and incentivize use of local wood and agricultural products to reduce embodied carbon footprint.	

Develop alternative markets for non-timber wood, focusing on cellulose insulation, bioplastic composites, or biofuels	Advancing
Promote and incentivize use of agricultural and sustainably harvested wood -based construction materials (subject to existing certification criteria or procurement standards to be developed) over imported wood and/or non-wood materials with high carbon footprints (such as steel, concrete, etc.) Continue to research life-cycle accounting of these products for greatest impact.	No Action Taken

Develop a regional certification standard for forestry to validate carbon storage values for forest building products (methodologies supporting supply chain validation for carbon storage are frequently using FSC as a proxy; regional-scale certification standards focused around net carbon benefit are needed for product transparency)	No Action Taken
Through state procurement standards, require that publicly funded building projects use chain of custody certified wood products (MASS timber, cellulose insulation, etc.) that have been harvested under sustainable procurement standards over materials with a higher carbon footprint (such as steel, concrete, etc.), prioritize locally sourced wood products when possible.	No Action Taken
Strategy 24c: Transition fuel sources for the forestry and maple sector.	
Provide funding to incentivize sugar makers to switch evaporators from fossil fuels to wood pellets and incentivize elimination of diesel generators for sap vacuum pumps.	Being Implemented
incentivize alternative fuels such as biofuels or offsets for logging equipment.	No Action Taken
Strategy 24d: Sustainably source renewable energy products and materials.	
Fund competitive research to track and innovate on the sustainability and ethical implications of renewable energy materials and products being consumed to meet the CAP	Advancing (Action Modified)
Pathway 25: Support compact settlement patterns that contribute to the reduction of GHG emissions, enhance community and built environment resilience, and help conserve natural and working lands.	

Strategy 25a: Increase investment in the infrastructure (sewer, water, stormwater, mixed-use development, housing, sidewalks, bike lanes, EV charging, broadband, energy supply) needed to support compact, walkable development.	
Expand the eligibility of the existing downtown and village center tax credit programs to revitalize neighborhood housing in and around state designated centers.	Advancing (Action Modified)
Support public private partnerships to fund the design and construction of new infill housing in existing neighborhoods.	Advancing
Increase Municipal Planning Grant (MPG) funds to support physical planning and design, zoning modernization and bylaw adoption that creates housing growth opportunities and more housing choices.	Completed

Expand the existing downtown and village tax credit program eligibility to offset the cost to elevate or flood proof existing buildings located in areas with increased flood risks.	No Action Taken
Increase investment in municipalities to improve, expand and build new drinking water and wastewater infrastructure to support compact development, including asset management tools to support long-term operation and maintenance.	More Information Needed
Establish a rolling planning grant for communities in need of consulting assistance to prepare Neighborhood Development Area (NDAs) applications. This designation works to align state and local regulations to increase housing options within compact centers.	Advancing
Make village centers permanently eligible for the downtown transportation fund that builds infrastructure needed to increase walking, biking and transit.	More Information Needed
Strategy 25b: Update state and local land-use governance, regulations, and practices to remove barriers to compact settlement and improve coordination on land use issues across agencies, departments, municipalities, boards, commissions, and authorities.	
Prioritize public funding for mixed-use developments near transit hubs in regional and rural centers	Advancing

Align development regulations and remove financial barriers to compact development in and around downtowns and village centers (i.e., Act 250, local zoning, aging infrastructure, etc.). Provide statewide guidance and incentivize housing in built up areas to encourage development away from open fields and forests, and river corridors.	Advancing
If a statewide land use planning policy and implementation plan is authorized, explore creation of a State Planning Office and/or other potential structures within the executive branch to implement the Plan at the state level.	No Action Taken
Create an office of Strategic Investment and Coordination that supports achievement of land use planning goals by aligning and resolving conflicts in state and local regulations and funding and provides a permitting platform from both the customer and policy objective perspective.	No Action Taken
Hire a consultant to review and assess the state designation programs that recognize and support Vermont's compact settlement areas.	Completed

Encourage the Legislature to authorize the creation a multi-stakeholder committee process with funding to support the development of a statewide land use planning policy and implementation plan that guides development to growth areas, town centers, and appropriate rural locations, and limits the development within ecologically sensitive/risk-prone areas. The Legislature should clarify how and if this plan informs or directs land use planning, policy and regulation at the local, regional, and state level.	Advancing (Action Modified)
Create a State-wide redevelopment authority to bank land, underwrite acceptable risk, address blight, vacancy, and brownfields, improve building flood resilience in settled areas, and plan for new neighborhood development and infrastructure.	No Action Taken

Provide enhanced technical assistance and support to municipalities and regions, including outreach and education for landowners and community members, to develop and implement town plans intended to maintain forest blocks and connecting habitat as authorized by Act 171, and effective zoning and subdivision bylaws to maintain forest blocks and connecting habitat. Because forest and habitat blocks do not end at state and national boundaries, support engagement in interstate and bi-national forest block and habitat connectivity efforts such as the Staying Connected Initiative at both the state and regional levels.	Advancing
Update Act 250 to promote compact settlement by: i. updating the mitigation fees for prime agricultural soils for alternative or community wastewater systems that will serve a state designated center. ii. removing the population-based caps on the Act 250 exemption for priority housing projects iii. including criteria that better address climate change, forest fragmentation and forest loss, to incentivize growth in the state's designated centers and better address the specific challenges to working lands enterprises; iv. updating its governance, staffing, public engagement, and the role of State Agency permits in the Act 250 process to create the enterprise capacity necessary to implement new climate related criteria and respond to future land use pressure from climate change and in-migration of climate refugees. v. removing Act 250 jurisdictional thresholds for housing development within and immediately adjacent to certain state designated centers to incentivize compact, dense settlement in areas with adequate local land use laws and existing infrastructure, reducing development pressures on open spaces such as greenfields and forested locations. These centers should grow in a manner by which walking and biking are preferred means of mobility, and mobility infrastructure should be designed for universal accessibility.	Advancing
Amend Neighborhood Development Area (NDA) enabling statute to allow the inclusion of river corridors upon local adoption of River Corridor bylaws.	Advancing (Action Modified)
Strategy 25c: Fund research, data collection and digital maps to provide insights on land use decisions in Vermont and the impact it can have on climate and resilience goals and outcomes.	

Fund a study that quantifies the vehicle miles traveled and GHGs for both compact and dispersed areas of development as well as the co-benefits of compact centers.	Advancing
Pathway 26: Education: Create accessible, equitable research, partnerships, and education; promote shared understanding; and invest in sustainable workforce development for the natural and working lands sector.	
Strategy 26a: Provide funding for climate-related education at all levels, outreach, research, and technical assistance programs.	
Develop and make available accessible outreach and educational materials that communicate climate change science and local impacts to the general public, which include and highlight the role that Vermont's natural and working lands play in providing solutions to climate change.	Advancing

Enhance education, outreach, and technical assistance programming to support farmer learning and adoption of climate smart agricultural practices and ensure equitable access through the creation of two full time UVM Extension staff and part time staff for each National Resource Conservation District.	Being Implemented
Grow the capacity of additional VT academic institutions and indigenous-led & BIPOC organizations to offer technical support to farmers and foresters, such as Middlebury College perennial program with TEK.	
Establish and fund an educational program that explains the role that Vermont farmers and foragers and their high-quality, local food products play in maintaining a low climate impact	Being Implemented
Establish stronger relationships between state agencies and regional planning commissions, and faculty at Vermont and adjacent state institutes of higher learning, creating opportunities for state and regional research needs to become an aspect of faculty research agendas.	Advancing
Create a climate curriculum teachers fellowship program to engage teachers in leading and sharing their climate curriculum ideas with other teachers	Advancing

Amend the Vermont State Board of Education's Education Quality Standards to incorporate environmental and climate change education at all grade levels (consider folding under "Science" and "Social Studies" curricula)	No Action Taken
Redesign the state education funding model so that Career and Technical Education centers have independent funding streams and budgets, and create and fund legislation to support other educational programs that strengthen the workforce pipeline, including a range of accessible postsecondary educational models (e.g. apprenticeships, concurrent enrollment, and stackable credentials)	More Information Needed
Support increased investment in healthy soil education through educational mini- grants for teachers to all audiences (including agriculture, homeowner, forestry, publications, K-12 schools and institutions of higher learning) and implementation of practices through funding of Best Management Practices challenges, technical assistance programs, and cost shares.	Action not defined
Strategy 2Gb: Develop and promote climate-related educational materials for private landowners to empower them to make climate-informed decisions about their land and waters.	
Expand infrastructure and educational programs around community and backyard composting and recycling	Being Implemented

Further educate Vermont landowners about the benefits of reducing lawn mowing frequency, and amount of mowed lawns to increase biodiversity and ecosystem health, and ultimately reduce emissions.	No Action Taken
Promote the values of planting of future climate adapted tree species and crops in an effort to expand tree planting efforts on private land. Thereby promoting restoration efforts to 304 reforest riparian areas, wetland buffers, and unhealthy soil.	Advancing
Create and deploy a river corridor and floodplain buffers extension-type program that provides educational material and technical assistance for private landowners	No Action Taken
Strategy 26c: The language in Vermont agencies must be reviewed and updated to be more equitable.	
Educate state staff on the history of Vermont, the harm that has been done in the name of conservation, the history of state involvement in the eugenics movement, and the role that language plays in the continuation of oppression and misunderstandings.	Advancing

Identify and develop alternative terms and words to those that are rooted in historical injustices, and invest in community outreach to create broad understanding of de-colonized words.	Advancing
Recommend that the legislature create a board to systematically review state government institutions to ensure that language intrinsically tied to historical injustices is removed from all active documents and policies.	Advancing (Action Modified)
Leadership in all levels of state government must make this a top priority.	Advancing

Table 7: Legislative Actions that have advanced since the Initial Climate Action Plan, Page 98, Progress & Assessment Chapter

Bill	Year	Summary
S.213 – Flood Safety Act	2024	The act establishes a minimum state floodplain standard, expands regulation of development in river corridors, improves dam safety, and enhances wetland restoration to improve our collective flood preparedness, climate resilience, and water quality.

S.310 - Flood Response	2024	Creates the Community Resilience and Disaster Mitigation Fund to assist municipalities with infrastructure projects, creates stronger coordination of first responders, includes public works employees in planning and benefits, requires more comprehensive local & regional emergency planning, updates and clarifies stormwater utility statutes, improves emergency communications translation & interpretation services, supports the state swift water rescue operations, and provides additional support to all communities that were flooded last year.
S.259 – Make Big Oil Pay	2024	Authorizes the state to recover financial damages from fossil fuel companies for the impacts of climate change to Vermont. Funds recovered would support climate adaptation projects.
H.289 – Renewable Energy Standard	2024	Require Vermont’s electric distribution utilities to source 100% of their power from renewable sources by 2030 for large utilities and by 2035 for smaller, municipal utilities.
H.687 – Act 250 Reform and Housing	2024	Comprehensive reform of Act 250 jurisdiction, criteria and administration that supports expanded housing opportunities, smart growth and new protections for forest blocks, connecting habitat, and other critical resource areas.
H.868 – Transportation Bill	2024	Contains numerous statutory amendments and funding authorizations related to transportation. It also required Vtrans and ANR to study the impacts and benefits of Vermont joining a cap and invest program.
S.305 – PUC Miscellaneous Bill (Includes Tweaks to the Clean Heat Standard)	2024	Makes technical clarifications to certain fees related to energy storage facilities, expand the jurisdiction of the PUC, require a report focused on low- and moderate-income households, and establish new Energy Savings Account requirements

Table 8: Foundational Criteria, Page 103, Transition Chapter from Opening to Recommendations

Impact	Mitigation: Impact is the consideration of actions' contribution to achieving 2025, 2030, and 2050 emission reduction requirements. The gross GHG emissions reductions required by 2025 are 1.26 MMTCO₂e below our most recent (2018) levels. 3.46 MMTCO₂e of reductions are required by 2030.	Resilience: The assessment of impact for adaptation, resilience, and sequestration actions takes into consideration both the scale at which a particular action occurs and the effects (both short and long term) of that action.
Cost-Effectiveness	Mitigation: Cost-effectiveness refers to the lifetime net cost per ton of GHG emissions avoided (acknowledging that some mitigation measures do not generate net costs and save money). Cost effectiveness shall also be understood to account for lifetime or dynamic costs, not merely upfront or static costs.	Resilience: Cost-effectiveness for actions seeking to build resilience, further adaptation, and enhance sequestration and carbon storage refers to the relative lifetime net cost of the action compared to the desired outcome or impact. This definition only deals with the true cost to Vermonters and 43 does not speak to the cost of avoided damages which we know is very important.
Co-Benefits	Comprehensive climate policy will advance actions that work to mitigate climate pollution, while also building resilience, adaptation and storing and sequestering carbon. Actions must also seek to advance broader societal benefits such as public health, equity (specific focus on impacted communities), economic prosperity, biodiversity conservation, workforce opportunities and other benefits that improve the quality of life in Vermont broadly.	

Technical Feasibility	This speaks to the degree to which the required technologies are developed and reasonably available. As this is called out in the GWSA, it is important to simply answer yes or no to ensure the action is implementable.
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Table 9: Percent Greenhouse Gas Emission Reductions as compared to 1990, Page 141, Scientific Underpinning of Emissions Reductions

	2029	2034	2049
GWSA Requirement	40%	N/A	80%
Baseline	14%	26%	41%
Scenario 1: all mitigation measures implemented over the entire modeling period (2024-2050)	29%	53%	78%
Scenario 2: societally cost-effective measures ⁴ implemented over the modeling period, with non-cost-effective measures implemented 2039-2050	25%	44%	72%
Scenario 3: implementation of societally cost-effective measures only through 2050	28%	49%	69%
Scenario 4: societally cost-effective measures plus weatherization implemented over the entire modeling period, with the remainder of the non-cost-effective measures implemented 2039-2050	25%	44%	72%

Table 10: EV/PHEVs, Page 146, Scientific Underpinning of Emissions Reductions

	Number of Vehicles					Percent of Fleet			
	2025	2029	2034	2050		2025	2029	2034	2050

Baseline	21,870	66,543	153,342	281,920		4.0%	12.2%	29.3%	64.0%
Scenario 1	22,633	79,075	187,724	418,759		4.1%	14.5%	35.9%	95.0%
Scenario 2	21,870	66,543	153,342	339,341		4.0%	12.2%	29.3%	77%

Table 11: Heavy-Duty EV/PHEV- Number of Vehicles / Percent of Fleet, Page 146, Scientific Underpinning of Emissions Reductions

	Number of Vehicles					Percent of Fleet			
	2025	2029	2034	2050		2025	2029	2034	2050
Baseline	510	784	1,957	4,246		1.0%	1.4%	3.3%	6.7%
Scenario 1	793	4,727	15,044	51,343		1.5%	8.3%	25.1%	80.1%
Scenario 2	525	834	2,050	20,878		1.0%	1.5%	3.4%	32.9%

Table 12: Residential Weatherization Retrofits, Page 146, Scientific Underpinning of Emissions Reductions

	Average Annual Retrofits					Cumulative Retrofits			
	2025	2026-2029	2030-2034	2045-2049		2025	2029	2034	2049
Baseline & Scenario 3	5,845	3,969	2,254	2,199		5,845	21,722	32,992	65,719
Scenarios 1 & 4	11,613	11,613	7,262	6,174		11,613	58,064	94,373	186,987
Scenario 2	2,345	2,345	2,345	20,591		2,345	11,726	23,452	166,243

Table 13: Heat Pump Installations, Page 146, Scientific Underpinning of Emissions Reductions

	Average Annual Housing Units Switching to Heat Pumps				Cumulative Housing Units			
	2025	2026-2029	2030-2034	2045-2049	2025	2029	2034	2049
Baseline	5,003	1,118	4,927	2,362	5,003	9,474	34,108	96,430
Scenario 1	6,018	1,859	5,973	3,147	6,018	13,452	43,317	117,502
Scenario 2	5,251	1,086	5,558	3,759	5,251	9,594	37,384	117,049
Scenario 3	5,538	1,218	5,552	3,242	5,538	10,409	38,168	113,721

Figures

Climate Action Plan Update Virtual Event Participants

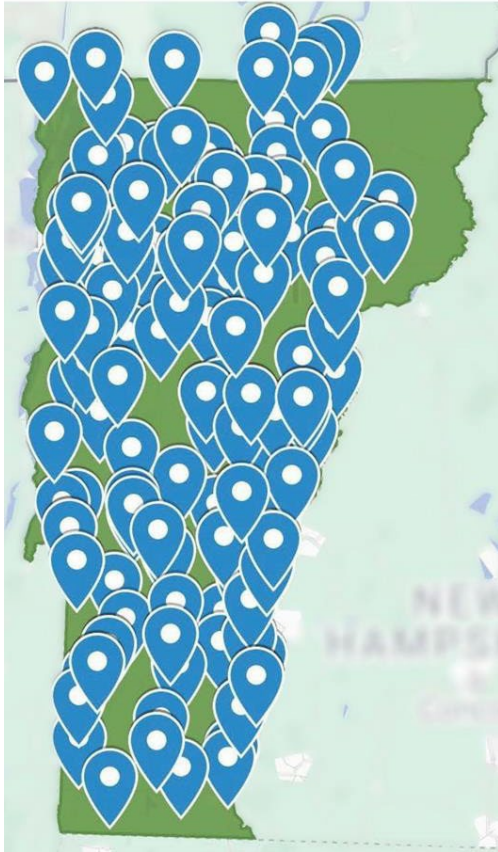


Figure 1: Page 23, Public Engagement Chapter

Climate Action Plan Update In Person Events

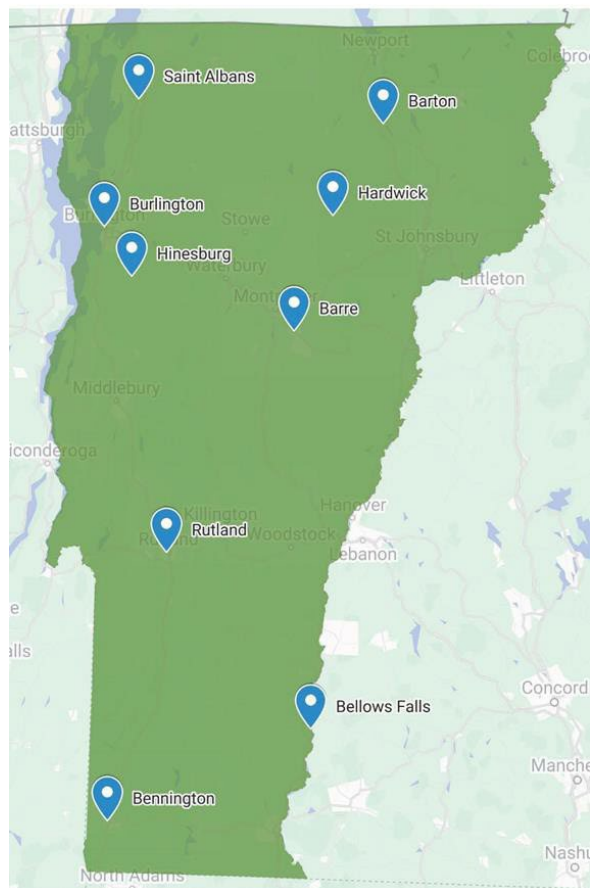


Figure 2: Page 24, Public Engagement Chapter



Figure 3: Page 25, Public Engagement Chapter

The number of billion-dollar weather and climate disasters occurring each year in the U.S. is increasing.

Average # of events per year, adjusted for inflation

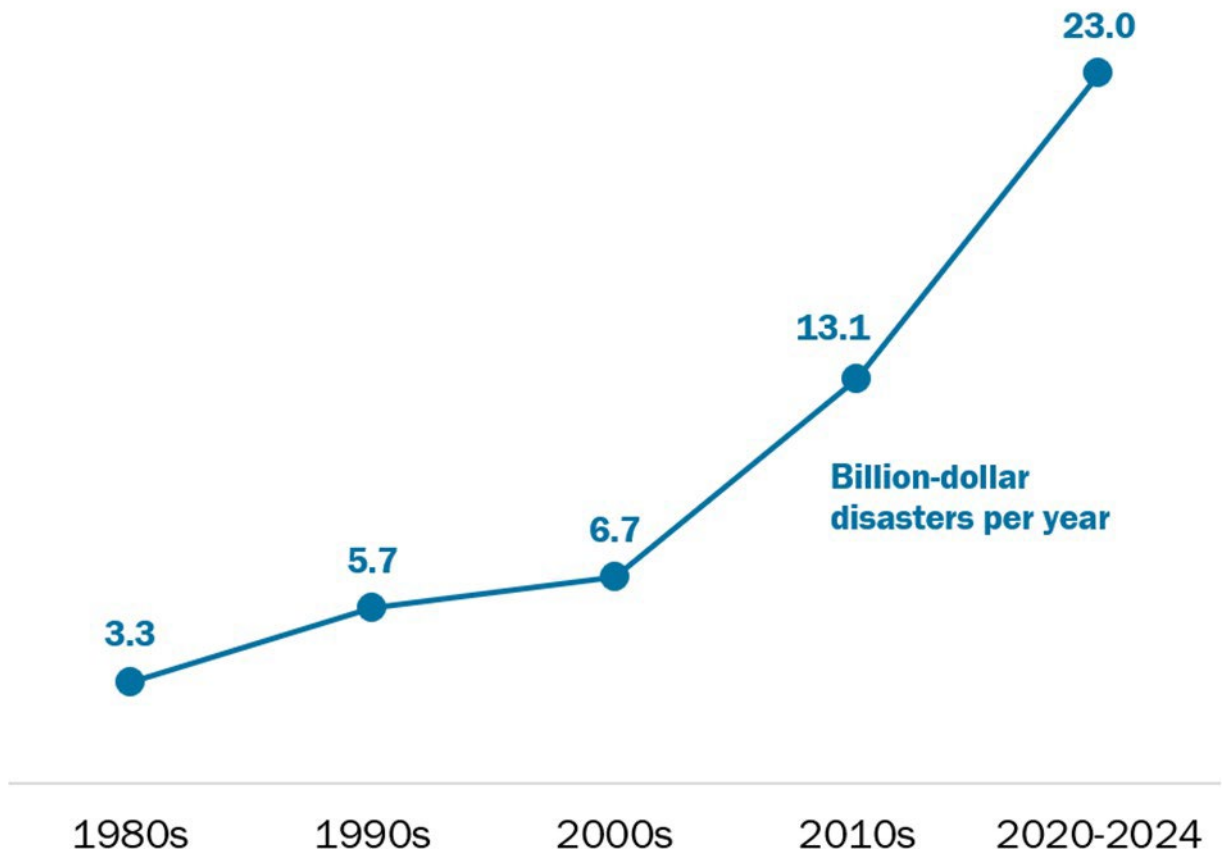


Figure 4: The average number of weather and climate disasters with overall damages/costs exceeding one billion dollars occurring in the United States each year, grouped by decade. Page 59, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

Direct Health Impacts

result from direct exposure to climate hazards

Hot weather or drought
Wildfire smoke or ozone
Intense precipitation & wind
Flooding and landslides

Heat-related illness
Lung or heart disease due to air pollution
Drowning or injuries due to flooding
Allergies or asthma due to pollen
Mosquito and tick-borne diseases

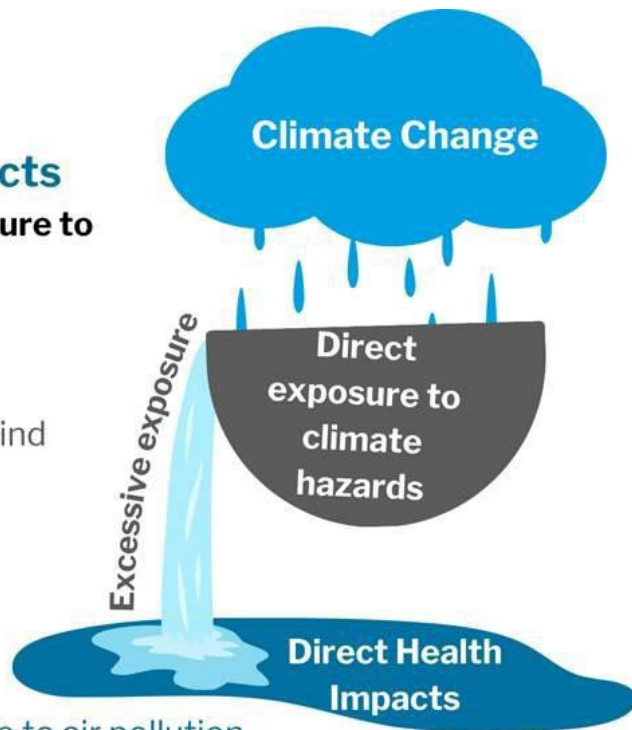


Figure 5: Direct health impacts of climate change, Page 61, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

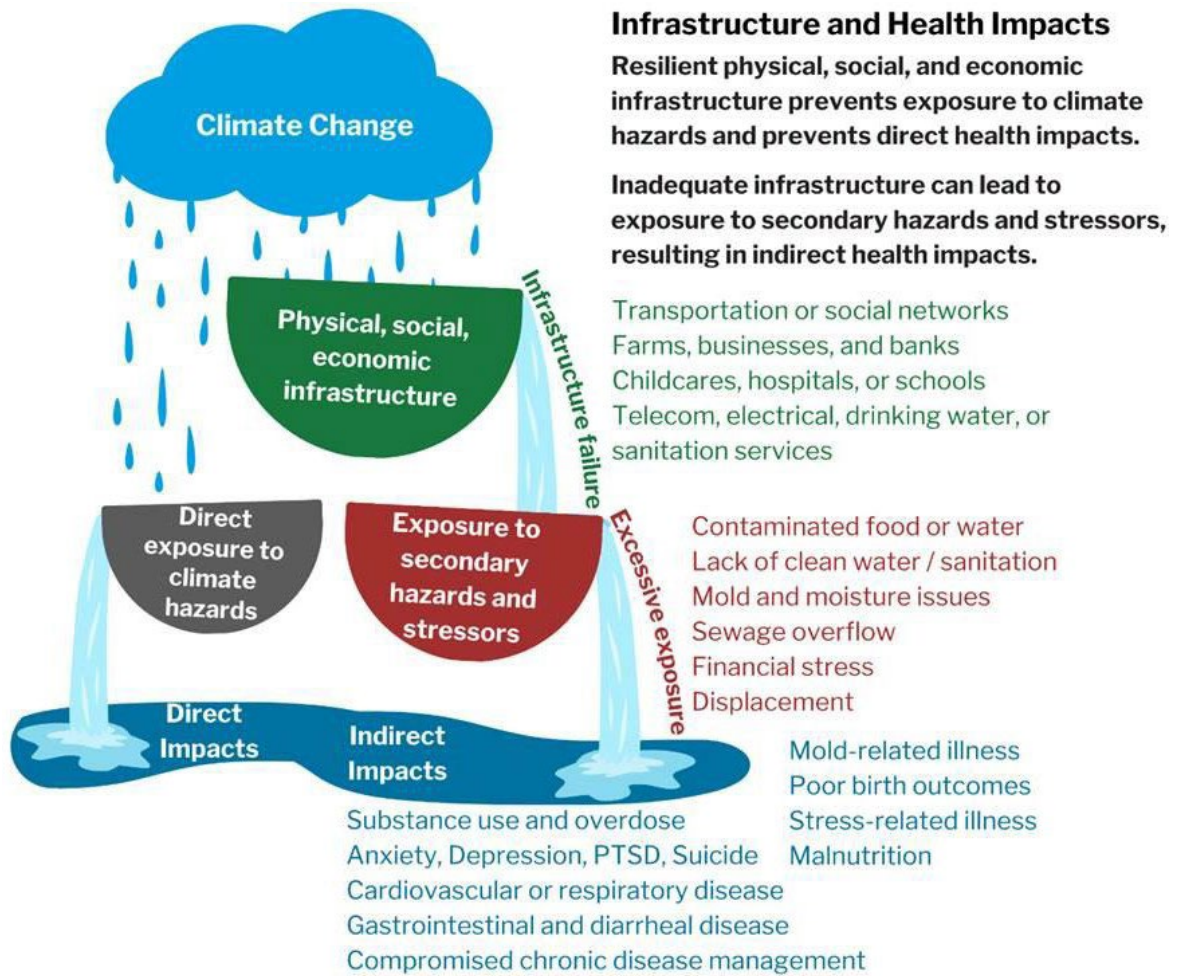


Figure 6. Indirect health impacts result from climate-related damage to physical, social, and economic infrastructure, natural systems or essential services. Page 62, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

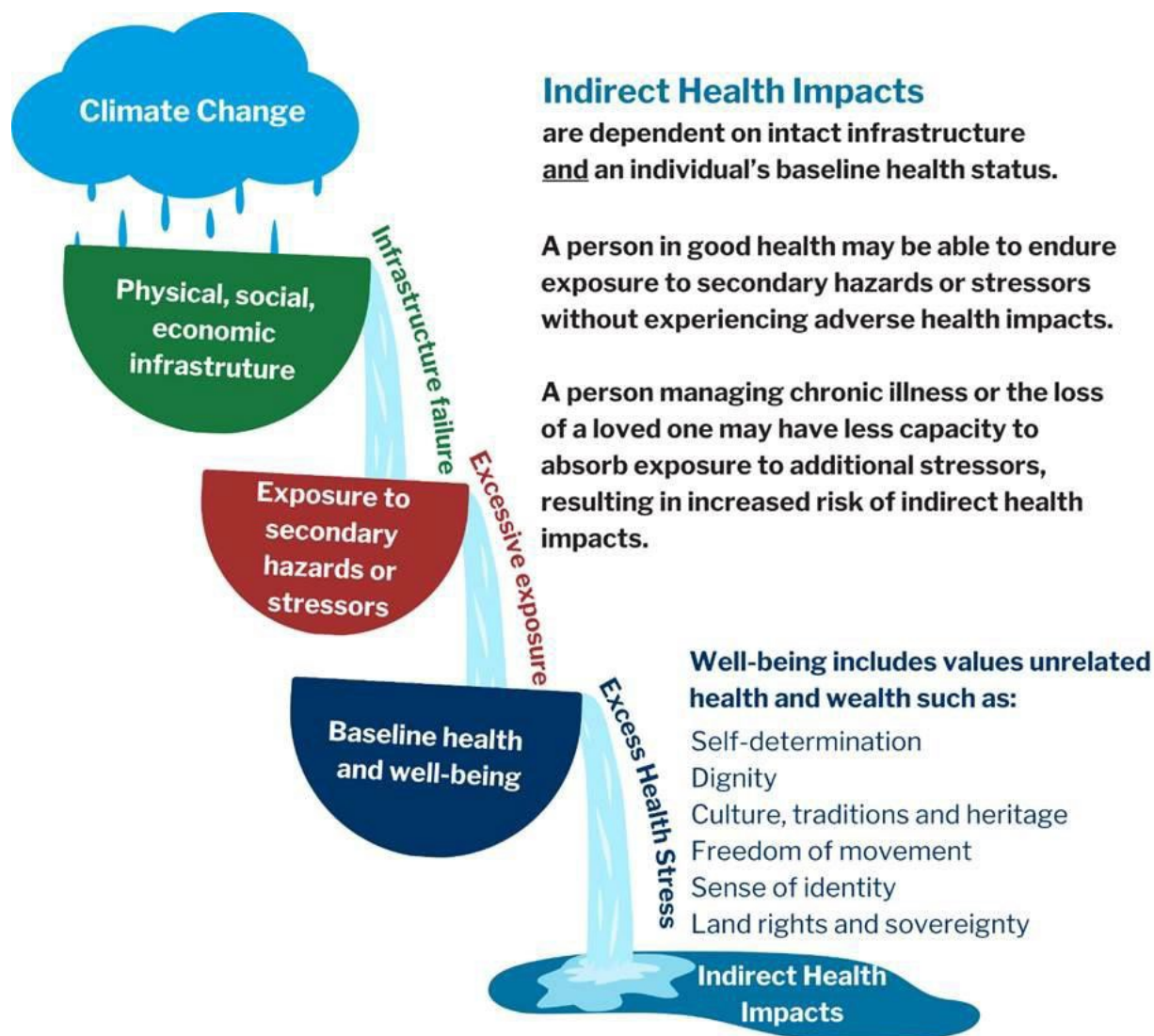


Figure 7: People's baseline health and well-being impacts their resilience to harm when exposed to secondary climate hazards stressors like contaminated food or water, financial stress, or loss of their home, Page 65, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

Examples of groups at increased risk of exposure due to physical, social or economic infrastructure

- People who work outdoors, including farmworkers
- People experiencing homelessness
- People who are incarcerated
- People living in flood plains
- People living on upper stories of buildings in urban areas (due to heat risk)
- People living at home alone with few social ties

Examples of groups at increased risk of harm due to baseline health or well-being

- People with disabilities
- People with poor mental health, prior trauma, or adverse childhood experiences
- People with substance use disorder/s
- People at greater risk due to age (e.g. the elderly, babies, and children)
- People with a chronic or pre-existing medical condition
- People on medications that increase the risk of harm in hot weather

Examples of groups at increased risk due to social and institutional inequities

- People with lower-income or few assets
- Black, Indigenous, and People of Color
- Veterans
- Immigrants, Refugees, Asylees, and Asylum-Seekers
- People who live in rural settings
- People with limited English proficiency
- Members of the LGBTQ+ community
- Renters

Figure 8. Examples of groups that may be disproportionately affected by climate change impacts on individual health and community resilience, Page 68, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

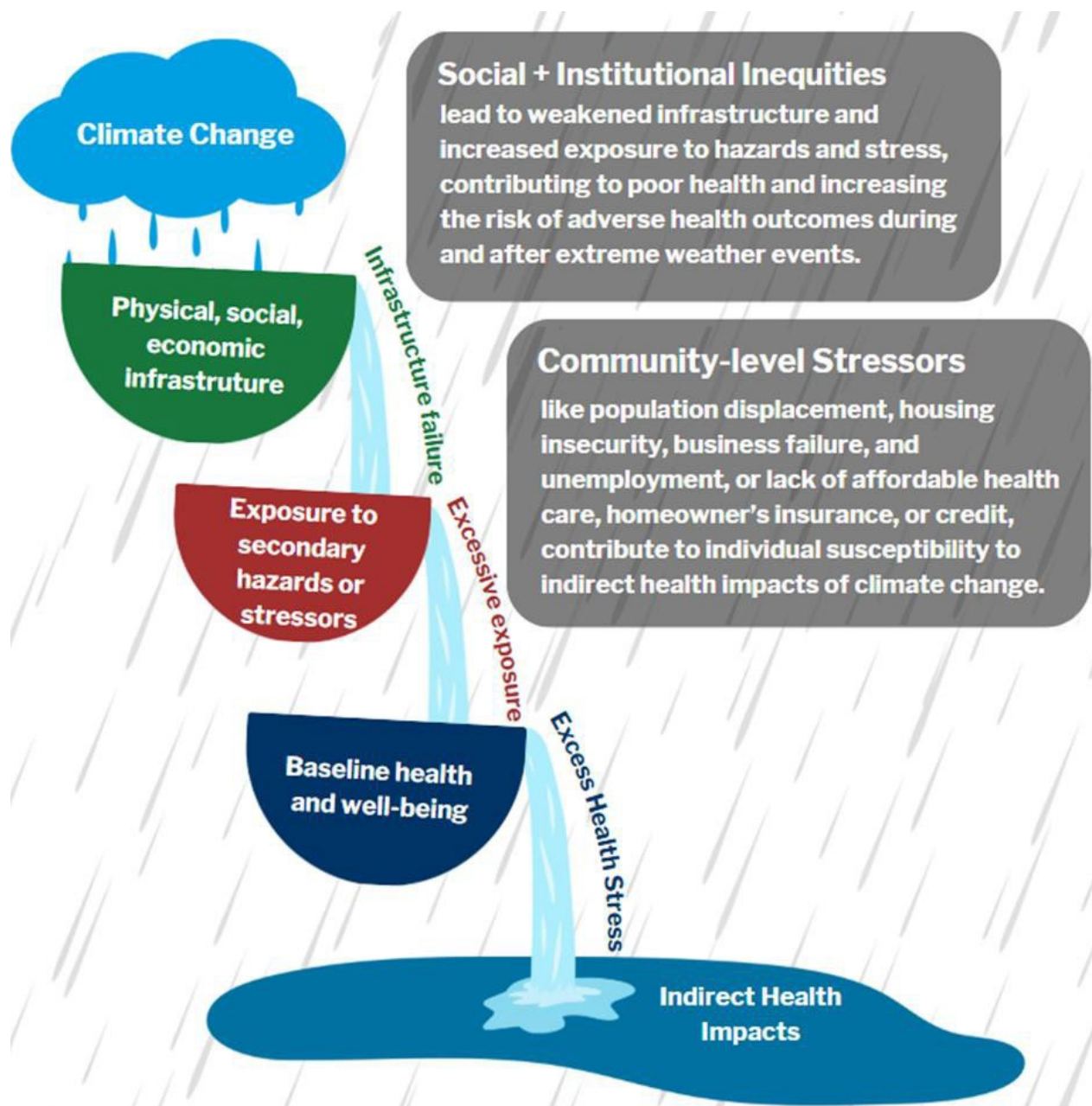


Figure 9. Climate-related hazards and stressors add to a person's cumulative exposure to chronic stress. Repeated climate disasters exacerbate social and institutional inequities and community-level stressors, reducing individual and community resilience during subsequent emergencies.

Page 69, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

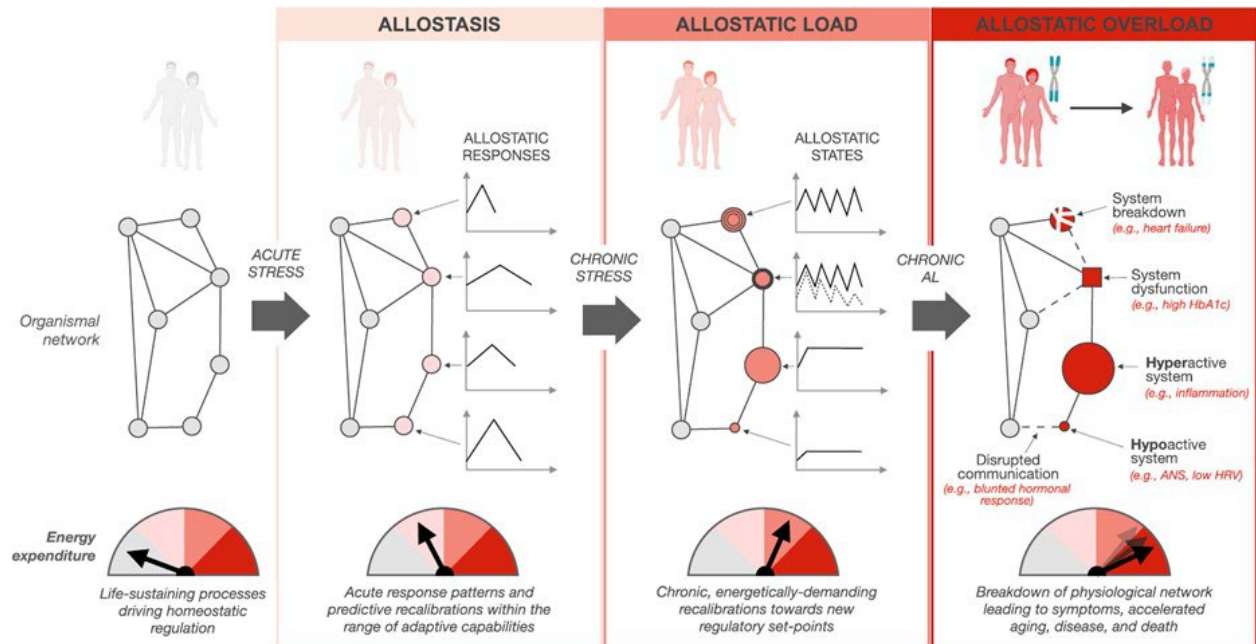


Figure 10: The Allostatic Load model for how stress leads to disease, Page 70, Understanding the Indirect Impacts of Climate Change on Human Health and Well-being in Vermont Chapter

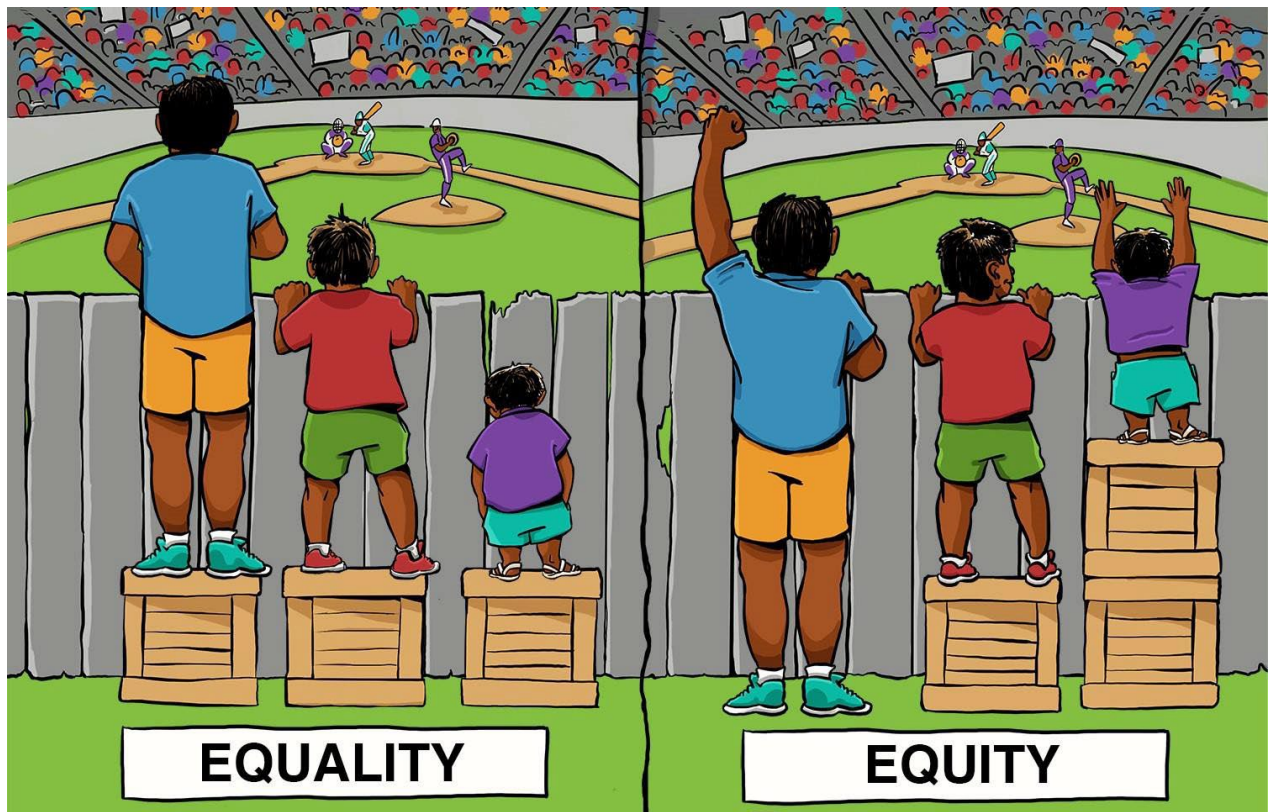
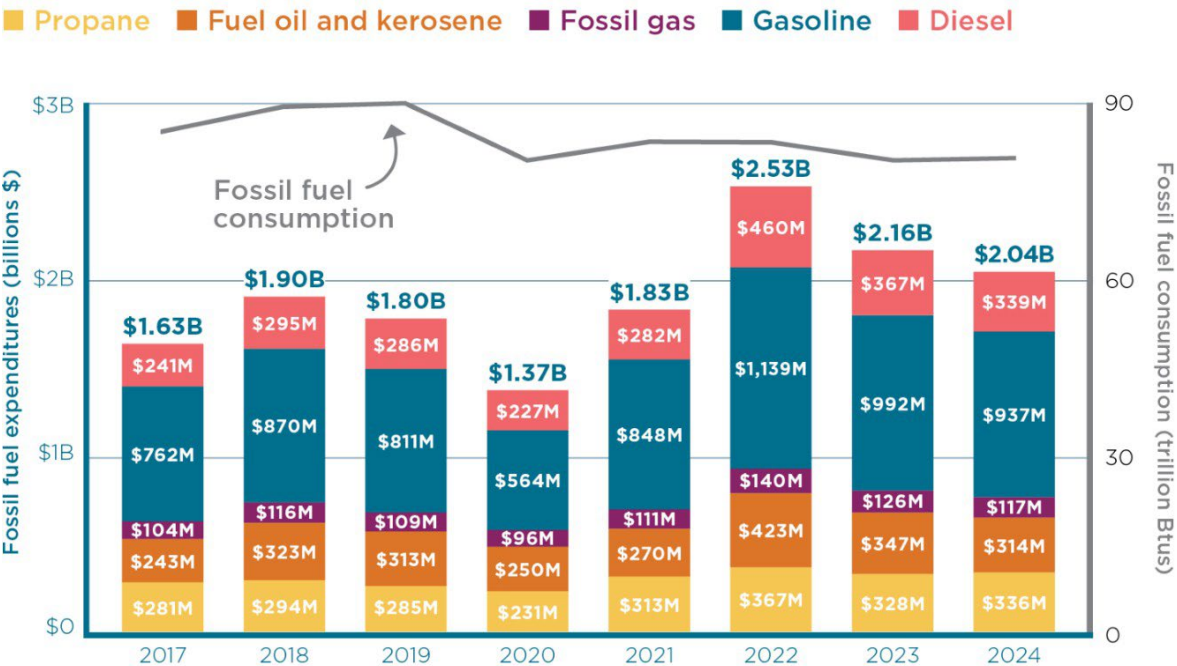


Figure 11: Page 76, Building Equity into the Climate Action Plan Chapter

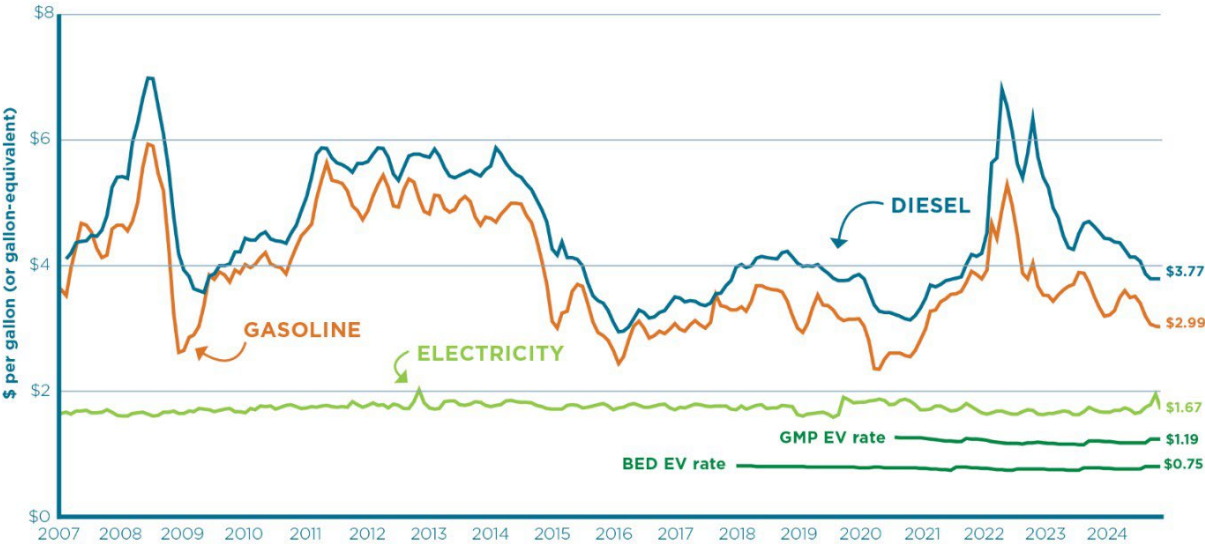
Fossil fuel price volatility has led to large cost swings for Vermont, despite relatively flat consumption



Sources: Gasoline and diesel sales volumes from Vermont Department of Taxes via the Joint Fiscal Office; fuel oil, kerosene, and propane sales volumes from Vermont Department of Taxes; fossil gas sales volumes and prices from VGS; other fuel prices from Vermont Department of Public Service and EIA. **Note:** This estimate only includes Vermont sales of gasoline, diesel, propane, fuel oil and kerosene, and fossil gas. It does not include sales of aviation gasoline or jet fuel from the transportation sector or of fossil fuel-based electricity generation (less than 10% of Vermont's electricity portfolio).

Figure 12: Page 83, The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action Chapter

**Cost comparison of different transportation fuels over time
in VT (adjusted for inflation, December 2024 dollars)**



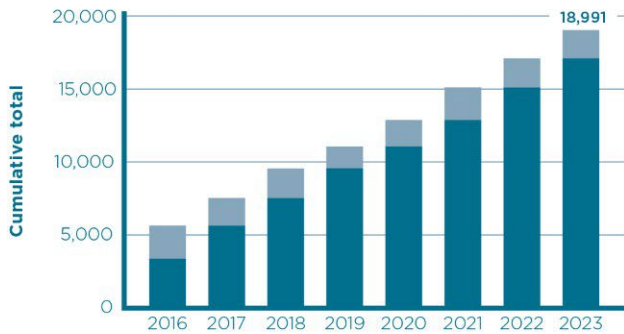
Sources: VT electricity, gasoline, and diesel prices: EIA, 2025; Off-peak EV rates: Green Mountain Power and Burlington Electric Department, 2025. **Notes:** Data through December 2024. Prices shown are in December 2024 dollars, using the U.S. Bureau of Labor Statistics Consumer Price Index. The electricity prices shown in light green are average statewide residential rates.

Figure 13: Page 84, The Vermont Climate Economy: Energy, Resilience, and Opportunities
Related to Climate Action Chapter

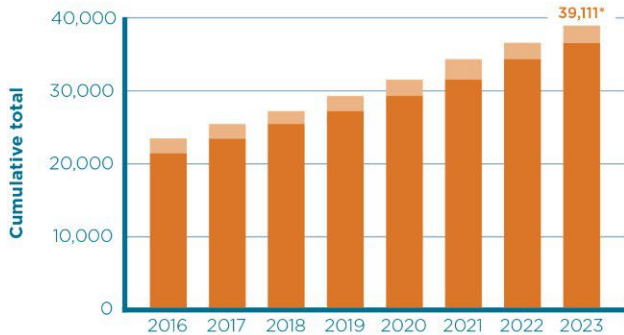
Vermont thermal measures: Historical uptake and Climate Action Plan pathways

■ Pre-existing total ■ Annual addition

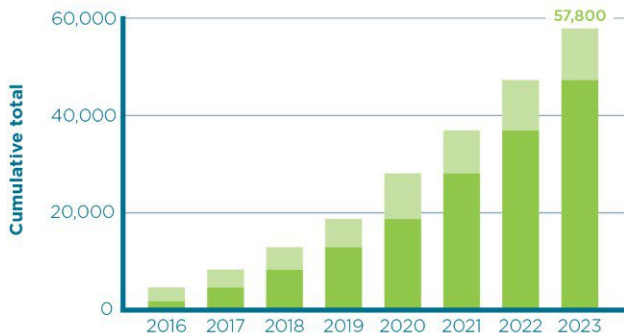
Residential heat pump water heaters



Housing units comprehensively weatherized



Residential cold-climate heat pumps



Sources: Cold-climate heat pump and heat pump water heater incentive data from Efficiency Vermont, 2024, and Burlington Electric Department, 2024. Weatherization data from the Vermont Department of Public Service, 2024. 2030 targets from Energy Futures Group/VT ANR, "Vermont Pathways Analysis Report 2.0," 2022. **Notes:** Data include residential measures only. *2023 weatherization data are preliminary.



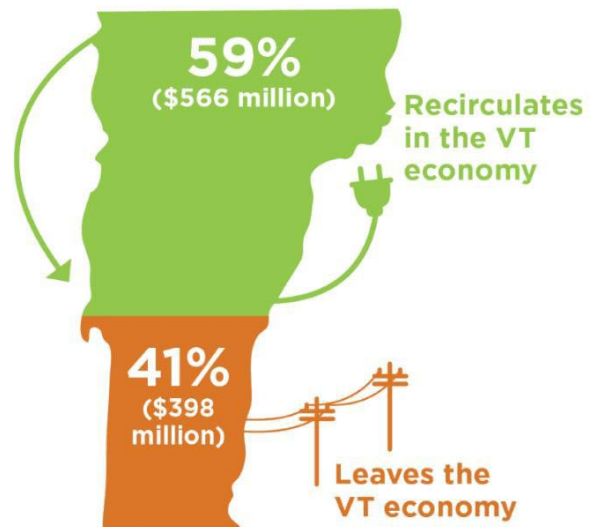
Figure 14: Page 87, The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action Chapter

VT average annual fossil fuel spending



Sources: Fossil fuel spending: VT Department of Taxes, 2025; VGS, 2025; EIA, 2025; Dollar recirculation share: Ken Jones, EAN Senior Fellow for Economic Analysis, 2025. **Note:** Data shown are an average of 2021-2024. This graph includes spending on thermal and transportation fuels only.

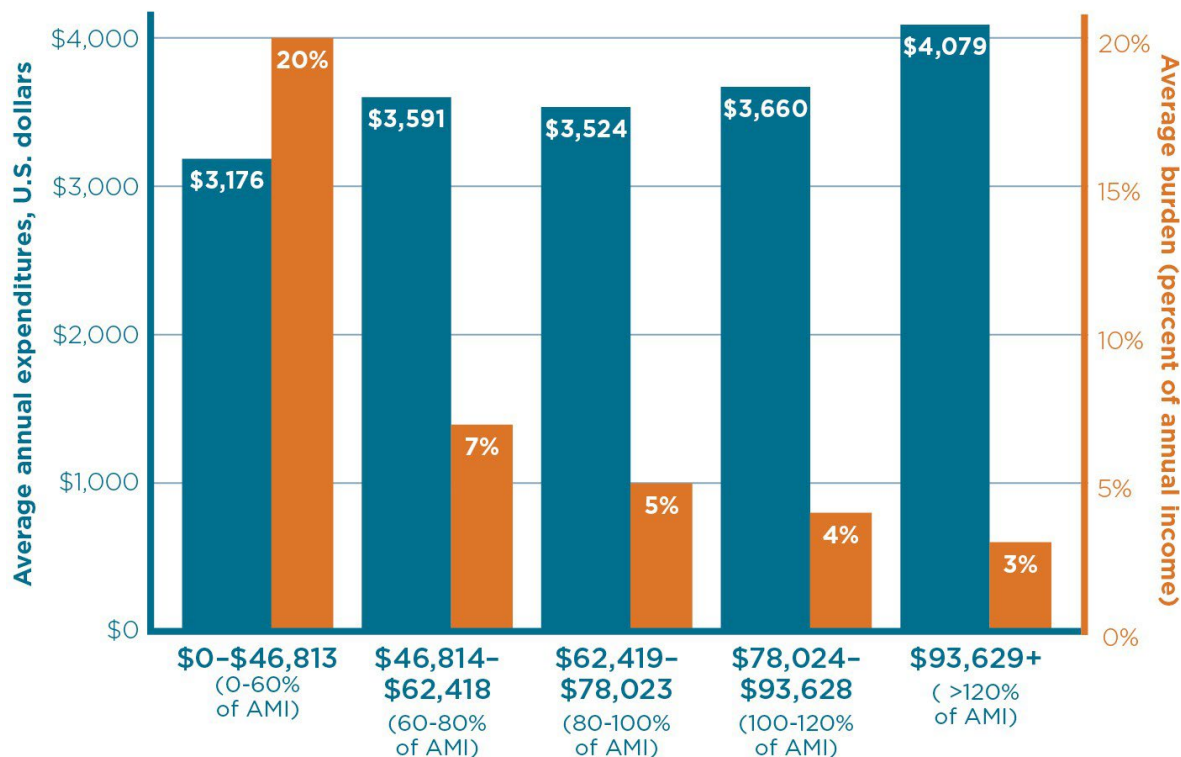
VT average annual electricity spending



Sources: Electricity spending: Vermont Department of Public Service and VT electric utilities. Dollar recirculation share: Ken Jones, EAN Senior Fellow for Economic Analysis, 2025. **Note:** Data shown are an average of 2021-2024. The methodology for the dollar recirculation share was updated in January 2025 to account for out-of-state transmission costs.

Figure 15: Page 89, The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action Chapter

Vermont combined average household heating and electricity fuel costs and burden by income level, 2019–2023



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.

Figure 16: Page 166 & Page 93, Buildings & Thermal Pathways for Mitigation, The Vermont Climate Economy: Energy, Resilience, and Opportunities Related to Climate Action Chapter

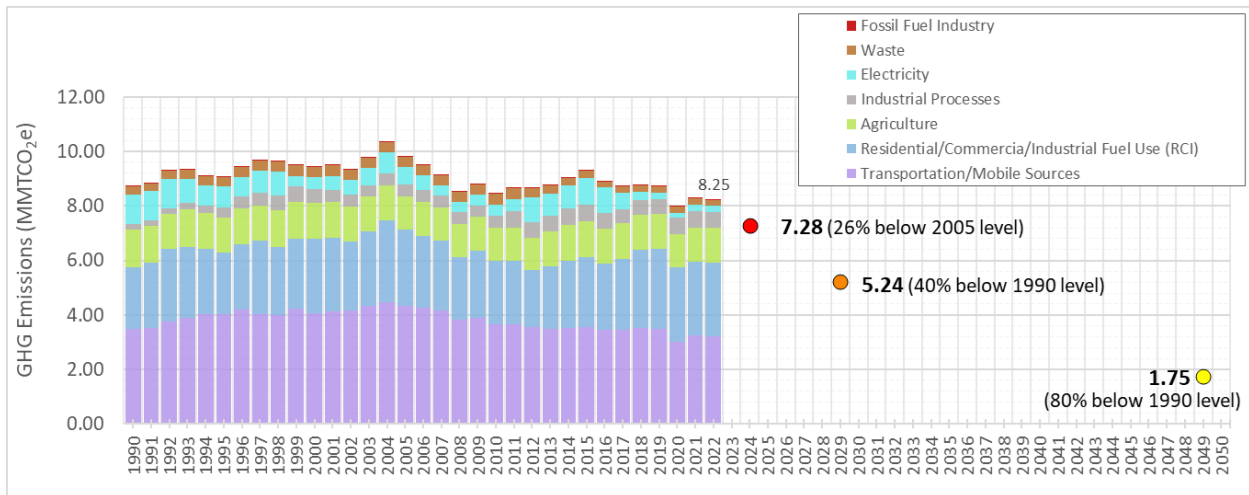


Figure 18: Vermont Greenhouse Gas Inventory historical emissions and future requirements, Page 139, Scientific Underpinning of Emissions Reductions

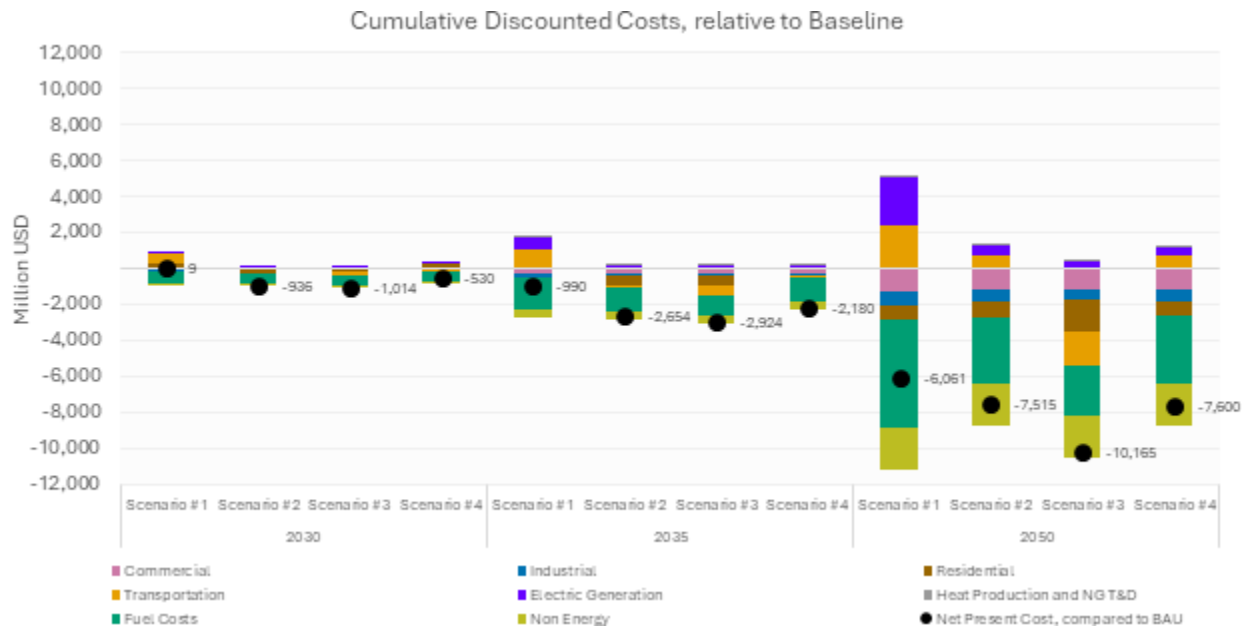


Figure 19: Page 143, Costs/Savings of Scenarios versus Baseline, including social costs of GHGs,

Scientific Underpinning of Emissions Reductions

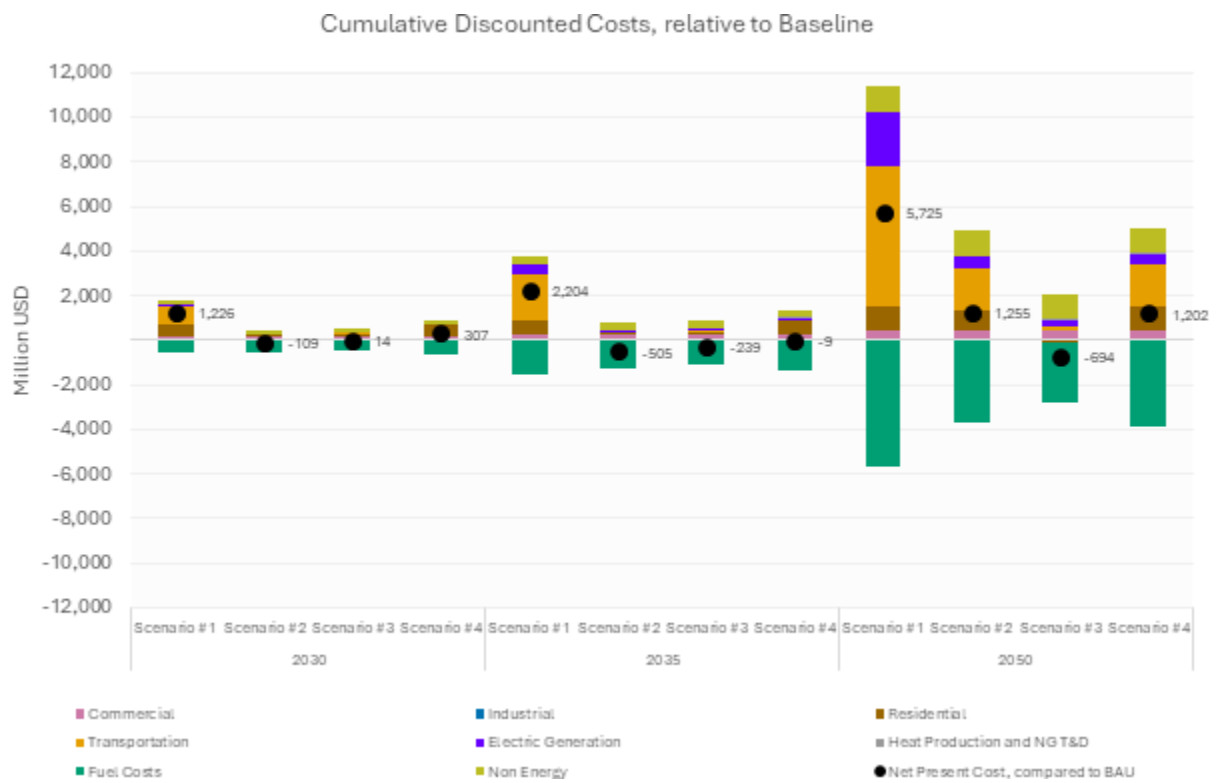


Figure 20: Costs/Savings of Scenarios versus Baseline, excluding social costs of GHGs. Page 145, Scientific Underpinning of Emissions Reduction

Guiding Principles for a Just Transition

Vermont Climate Council, Just Transitions Subcommittee

August 2021

Introduction

The Global Warming Solutions Act (GWSA), also known as Act 153, was passed by the Vermont State Legislature in September of 2020 to require the State to reduce greenhouse gas emissions by 80 percent of its 1990 levels by 2050. The GWSA also stood up the Vermont Climate Council (Council) and five subcommittees, including the Just Transitions Subcommittee.

Historically, the term “Just Transitions” is a way of framing for government and business action on climate change. Its work encompasses both public policies and business action to deal with the impacts of industry transition away from greenhouse gas emissions for jobs and livelihoods (the transition “out”) and aims to generate the low or zero greenhouse gas emission jobs and livelihoods of a sustainable society (the transition “in”). Through the GWSA, the Just Transitions Subcommittee is charged with ensuring that strategies to reduce greenhouse gas emissions and to build resilience to the effects of climate change benefit and support all residents of the State of Vermont fairly and equitably.

The Just Transitions Subcommittee believes in proactively centering equity in this work rather than reactively measuring it. These Guiding Principles are therefore meant to frame the work of the Council and subcommittees around an equity lens. While the Legislature has asked us to focus on Vermont, we recognize that the decisions we make in Vermont have repercussions outside of our borders, for which we are also accountable.

First, we offer key **definitions** and clarify indicators of “rural, low income, and marginalized communities” as outlined in the GWSA. Next, we lay out draft **guiding principles** for a Just Transition. These are intended for the Council and subcommittees to evaluate as they develop their respective recommendations. The Guiding Principles are meant to spark dialogue within subcommittees and to serve as a grounding checkpoint to ensure the inclusion of equity. They will be especially useful in policy areas that might not traditionally be considered within an equity lens and would otherwise reinforce historically marginalized, disadvantaged and underserved communities.

Finally, we translate the Guiding Principles into more precise **questions** that the Subcommittee should use directly in assessing the “equity & justice” implications of their ideas and strategies. The Guiding Principles and questions also provide a foundation for an equity assessment tool that the Just Transitions Subcommittee plans to build before draft strategies are proposed, which will include more measurable criteria and suggested information sources.

When developing these draft principles and questions, the subcommittee was influenced by the perspectives of Indigenous voices, who urged the group to expand our understanding of frontline communities to include the Earth and all living beings, as our human survival is not possible without taking all life into consideration. Indigenous communities have long held the belief that we, as humans, are here to steward the land that we thrive upon. Many Indigenous people have felt their voices have been unheard and this stewardship ignored. In this context, a Just Transition can help to establish reparations for the Earth’s healing.

“A Just Transition acknowledges the Earth is a living female organism – our Mother. Water is her lifeblood. The Earth and Father Sky, with its air and atmosphere, are the source of life to be protected, not merely a resource to be exploited, degraded, privatized and commodified.”

Excerpt from The Indigenous Principles of

Just Transitions Key Terms

In this section, the Just Transitions Subcommittee offers definitions for “equity” and “justice” – both vital components of a Just Transition and the implementation of the Guiding Principles. These words are defined differently across disciplines, but the meanings presented here served as the foundation for our work.

Equity



Distributive

Distributive equity

starts by recognizing disparities in the allocation of resources, health outcomes, the inequities in living conditions and lack of political power place frontline / impacted communities at greater risk.

Distributive equity strategies target resources to adaption and mitigation affecting the communities and populations most impacted.



Procedural

Procedural equity

is often referred to as equitable planning and implementation.

Equitable planning and implementation require that communities have a meaningful opportunity to participate. Policymakers must collaborate with communities to learn about their perspectives so that solutions meet community needs. Equitable planning focuses on the local level and ensures that local communities have the opportunity to provide input on policies that directly affect them.



Contextual

Contextual equity

ensures that mitigation and adaption strategies take into account that low-income communities, black communities, indigenous communities and people of color, and people with disabilities, amongst others, are often more vulnerable to climate change.

Contextual equity ensures that the development of mitigation and adaption strategies at statewide and local levels take these disparities into account.



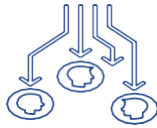
Corrective

Corrective equity

ensures that mitigation and adaption strategies provide communities with clear processes to hold the state accountable to its commitments to pursue equity.¹

¹ Equity & Environmental Justice Working Group, Connecticut. (2020). *Equity & Environmental Justice Working Group Report*. https://port.ct.gov/-/media/DEEP/climatechange/GC3/GC3-working-group-reports/GC3_equity_EJ_Final_Report_111320.pdf

Justice



Environmental

Environmental justice is the equitable access to environmental benefits, proportionate distribution of environmental burdens, fair and equitable treatment and meaningful involvement in decision making, and recognition of the unique needs of people of all racial and ethnic groups, cultures, socioeconomic statuses, and national origins.

It works to redress structural and institutional racism, colonialism, and other systems of oppression and harm done to Black, Indigenous and Communities of Color and other communities and ecosystems that have experienced marginalization and degradation.

Environmental Justice also seeks to address insufficient governmental responses at the local, state and federal level to environmental crises due to the racial/ethnic demographics, national origin, or socioeconomic status of highly-impacted communities.



Climate & Energy

Climate justice operates at the intersection of racial and social rights, environmental and economic justice. It focuses on the root causes of climate change, and call for a transformation to a sustainable, community-led economy.

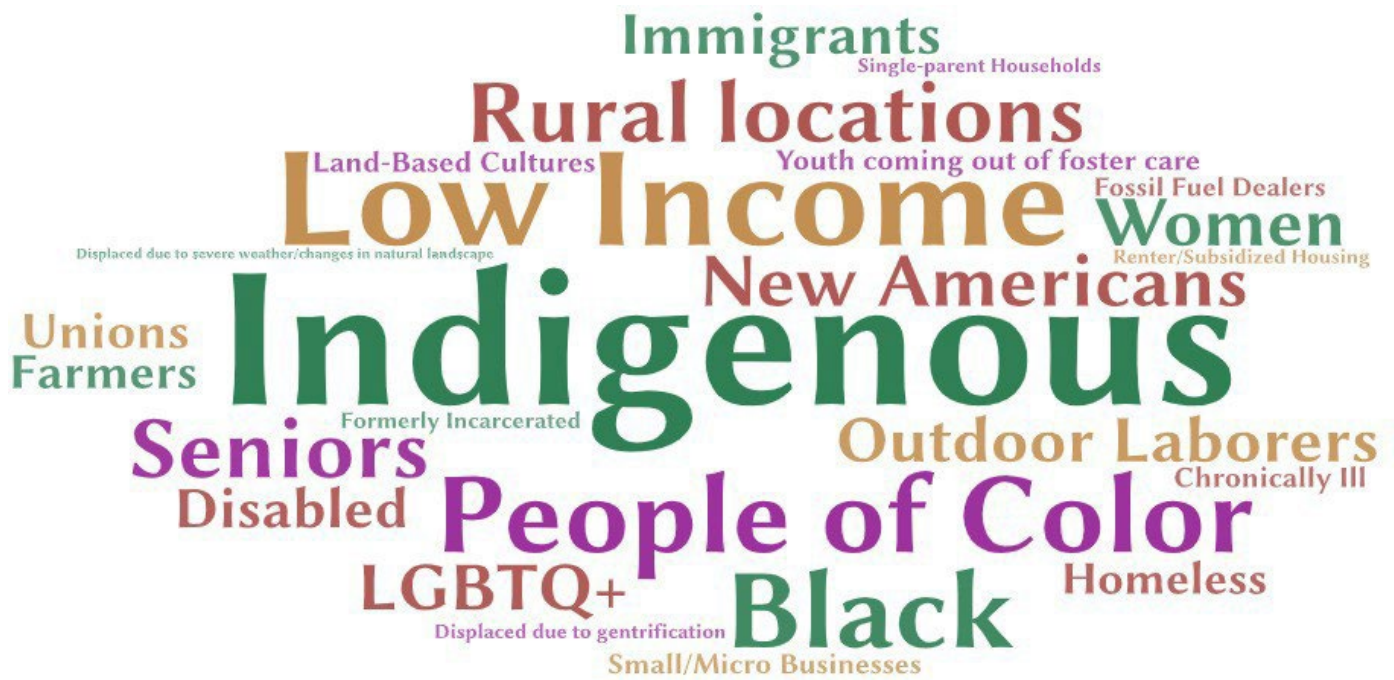
Climate justice begins with recognizing key groups are differently affected by climate change and connects the dots between civil rights and climate change.

Energy justice aims to make energy accessible, affordable, cleaner, and democratically managed for all communities.²

² Slightly Adapted from National Resources Defense Council. (July 2019). Definitions of Equity, Inclusion, Equality & Related Terms. https://www.broward.org/climate/documents/equityhandout_082019.pdf and The Initiative for Energy Justice <https://iejusa.org>.

Vermont's Impacted & Frontline Communities

As global warming accelerates, the Council and its Subcommittees must engage with those on the “frontlines” of the climate crisis. Studies continue to show that low-income communities, indigenous peoples, and black and other communities of color are among those who are particularly vulnerable to the impacts of climate change. In addition, as industry and jobs transition away from greenhouse gas emissions and towards “greener” jobs and livelihoods, particular focus must be given to the labor sector. Finally, some Vermonters may also be necessarily focused on achieving immediate goals of food, shelter, safety and health, which can impact ability to focus on long-term adaptation to climate and economic changes.



This word cloud provides a list of frontline and impacted communities and is not intended to be exhaustive, nor does it take into consideration the intersectionality of people's lives and the multiple vulnerabilities that one may experience.

Impacted and frontline communities draw from key criteria, identifying those who:

- Are highly exposed to climate risks, such as health impacts, flooding, and extreme temperatures;
- Experience oppression and racism, are excluded from opportunities, or have less resources to adapt to climate and economic change;
- Bear the brunt of pollution and negative effects from today's fossil fuel and extractive economies; and
- Are more likely to experience a job transition as Vermont addresses climate change.

Guiding Principles for a Just Transition

These principles set expectations regarding:

- How Vermont's Climate Council and its sub committees will conduct their work;
- What Recommendations³ are made by the Council; and
- How investments, implementation and oversight of climate action plans occur.

I. **INCLUSIVE, TRANSPARENT & INNOVATIVE ENGAGEMENT**

- All Vermonters are informed and able to participate throughout decision-making and drafting of Recommendations, as well as future administration and oversight.
- The Council's process and public engagement must recognize that people are experts of their own climate and energy experience.
- Impacted communities must be recognized and their voices prioritized in conversations surrounding equity, climate change, and the effects of specific Recommendations.
- Transition planning must involve innovative and wide community engagement that prioritizes various stakeholders and community-based groups to assess Recommendations at local, state and/or regional levels.
- Recommendations must be clear and understandable to all Vermonters, with plain language that is easy to understand. Goals must be clearly identified. To ensure accessibility, the Council must consider the needs of people with limited English, those living with a visual or hearing impairment, and those with limited or no access to technology.
- Potential impacts, benefits, and burdens of recommended climate actions are identified and shared publicly. This includes considering and naming known potential impacts, benefits and burdens outside of Vermont's borders.

II. **ACCOUNTABLE & RESTORATIVE**

- Recommendations must acknowledge that the status quo continues to perpetuate ingrained systems of discrimination, inequality, inequity and racism. Recommendations must examine existing practices and redress historical injustices through concrete actions that will lead to a more equitable future.
- Ongoing assessment tools used by the Council should identify intended and unintended inequities and their root causes.
- Recommendations must recognize inequality and seek to resolve them using clearly identified strategies.
- Recommendations must recognize their potential impacts on the whole natural environment – including air, water, soil and all living things.
- Recommendations must identify and consider barriers to implementation and include strategies to overcome them.

³ In this document, the word "Recommendations" refers to the strategies, policies, programs or other recommendations that the Vermont Climate Council will make in its Climate Action Plan.

III. **MOVING AT THE SPEED OF TRUST**

- Candor and honesty are essential for public trust and to prepare business, industry, labor, communities and families for transition to a sustainable climate future.
- Planning and implementation must balance being time bound and honoring the varied ways of learning, understanding and agreement that exist in different cultures and communities.

IV. **SOLIDARITY**

- Recommendations create inclusionary spaces for all traditions and cultures, particularly for Indigenous communities, recognizing them as integral to a healthy and vibrant Vermont.

V. **THE MOST IMPACTED FIRST**

- Recommendations tackle the needs of impacted and frontline communities first, providing the greatest benefits of transitions to these communities.
- Recommendations must be broad enough for the well-being of all Vermonters and include targeted strategies for different groups that take into account their specific histories, sociocultural and economic realities. They should also recognize when negative impacts are being shifted onto frontline communities outside of the state.
- Where Recommendations create burdens, they also include ways to shift these burdens away from impacted communities.

VI. **SUPPORTS WORKERS, FAMILIES & COMMUNITIES**

- Recommendations are explicit in their identification of potential and likely impacts on workers, families and their communities based on the implementation of Vermont's Climate Action Plan.
- Recommendations should include transition plans to respond comprehensively to protect impacted workers, including those that are seasonal, clerical and part-time.
- Transition plans must prioritize the needs and aspirations of workers, unions and disproportionately impacted communities.
- Recommendations must consider diverse, economic regeneration and spur creation of well-paying jobs with benefits.
- Recommendations must promote strong, equitable labor standards, support access to unionization, and improve access to public services, particularly for groups most disproportionately impacted.
- Recommendations for job training programs for displaced, at-risk and new workers must lead to meaningful, life-sustaining, and valued work. These programs should be designed to be accessible and affordable regardless of income or geography.
- Communities, local and regional governments, organizations, and families require the capacity to implement recommendations both in the short and long-term. Recommendations will consider current capacity and how to build needed capacity.

Subcommittee Self-Assessment Questions

The following questions were developed by the Just Transitions Subcommittee to help each Subcommittee put the Guiding Principles into practice. They aim to better identify, understand, and address the social impacts, types of impacted populations, and engagement process of individual policy recommendations. These are not comprehensive, but rather indicative of the analysis required to ensure a Just Transition for Vermont.

IMPACTED & FRONTLINE COMMUNITIES

- Which frontline and impacted communities might be most impacted by this recommendation?
- How do these communities experience inequity today around this issue?

ANALYZING BURDENS & BENEFITS

- Does this recommendation maintain existing inequities, make them worse or improve the status quo?
- Who will benefit from this recommendation and how does this recommendation help benefits be shared or targeted to help frontline and impacted communities the most? Be specific about the communities and the ways these communities will benefit.
- Which communities will be burdened the most by this recommendation and how can that burden be shifted away from impacted communities?
- What are the long-term and potential intergenerational impacts of this recommendation for identified communities?

ENSURING EQUITABLE & JUST ENGAGEMENT

- How have frontline and impacted communities been part of creating and implementing this recommendation? And how will they in the future?
- In what ways does your engagement with frontline/impacted communities recognize different types of knowledge and expertise?
- In what ways can Vermonters hear their voices in the plan?
- Does the recommendation use plain language that is easy for all Vermonters to understand?

FUNDING & DATA

- How will this recommendation be funded? What percent of funding will be specifically to support frontline, low-income and impacted communities? Will there enough funding to make it affordable and accessible for identified communities?
- How will we know about the impacts of this recommendation on identified communities? Which data or indicators will be needed? What process was used to determine the indicators are resonate and relevant to most impacted community needs? How will it be collected and shared?

IMPLEMENTATION & OUTCOMES

- What kind of jobs will be created by this recommendation? Will those jobs be fair, high-paying jobs with good benefits? How will traditionally underserved Vermonters and unions be prioritized for these jobs?
- What capacity is needed for communities, local/regional governments, organizations and families to implement this recommendation? How will the recommendation build and/or strengthen capacity, community trust, cooperation, and mutual support?
- How does this recommendation make a specific commitment to a just transition? Is this commitment quantifiable and does it identify who is accountable?
- Does the recommendation support the natural environment? Does it promote fairness to all living things?

Scoring Rubric

The Rubric is intended to accompany a narrative response for each of the Assessment Questions in Section V. In reviewing the proposal, please consider the Rubric's prompts and their resonance to the goals and vision of this project. An area is provided for comments. The Rubric allows a score of 1 (low) to 3 (high) for each criterion.

1 (low): The proposal meets the criteria to some degree but provides limited explanation or there are significant opportunities to enhance these criteria in the proposal.

2 (moderate): The proposal meets the criteria. There are additional opportunities to enhance these criteria to better meet the goals of the Guiding Principles.

3 (high): The proposal excels in meeting the criteria.

If a recommendation does not yet address the criteria at all, additional work is required.

Policy/Proposal Title:

Policy/Proposal Summary:

Frontline/Impacted Communities Score 1 – 3 on impression of meeting criteria		Please select 1 low to high 3		
Frontline/Most Impacted Communities well defined in proposal		1	2	3
Comments:				
Proposal reflects understanding of existing inequities around the issue for frontline/most impacted communities		1	2	3
Comments:				
Total				
Analyzing Burdens and Benefits Score 1 – 3 on impression of meeting criteria		Please select 1 low to high 3		
Proposal clearly identifies how benefits are shared for frontline/most impacted communities		1	2	3
Comments:				
Proposal clearly identifies who/what carries the burdens from the recommendation, if any		1	2	3
Comments:				
Proposal includes solutions to shield frontline/most impacted communities from experiencing burdens from the recommendation, if applicable		1	2	3
Comments:				

Proposal outlines the long-term/intergenerational impacts (positive or negative) of recommendations on impacted communities	1	2	3
Comments:			
Proposal outlines how it will create a future that is more equitable than the unjust status quo	1	2	3
Comments:			
Total			
Ensuring Equitable & Just Engagement			
Score 1 – 3 on impression of meeting criteria	Please select 1 low to high 3		
Proposal reflects inclusion of frontline/impacted communities in design and implementation of recommendation	1	2	3
Comments:			
Vermonters can hear their voices in the recommendation	1	2	3
Comments:			
Recommendation written in plain language and easy to understand	1	2	3
Comments:			
Total			
Funding & Data			
Score 1 – 3 on impression of meeting criteria	Please select 1 low to high 3		
Funding mechanism for recommendation is clearly defined	1	2	3
Comments:			
Funding mechanism makes recommendation affordable and accessible to frontline/most impacted communities, if applicable	1	2	3
Comments:			
Proposal identifies data and indicators to determine success	1	2	3
Comments:			
Proposal includes process for consultation with frontline/most impacted communities in assessment activities	1	2	3
Comments:			
Proposal includes plan for collection and review of data with frontline/most impacted communities	1	2	3
Comments:			
Total			

Implementation & Outcomes Score 1 – 3 on impression of meeting criteria	Please select 1 low to high 3		
Proposal identifies new jobs/business/employment opportunities for the recommendation	1	2	3
Comments:			
Jobs created by recommendation offer fair, high paying positions with good benefits	1	2	3
Comments:			
A wide range of traditionally underserved Vermonters and unions are prioritized in the jobs created by the recommendation	1	2	3
Comments:			
Communities, local/regional governments, organizations and families have the capacity to implement the recommendation.	1	2	3
Comments:			
The recommendation provides a specific, quantifiable commitment to a just transition	1	2	3
Comments:			
The recommendation supports the natural environment and promotes fairness to all living things	1	2	3
Comments:			
Total			

Total scoring (21 low to 63 high):

Direct Benefits to Underrepresented/Most Impacted Communities (use blank spaces as needed to add)

The recommendation provides direct benefits for the following groups:		
Agricultural Sector	Yes	No
Black/African-American, Brown, Latinx, Asian, Pacific Islander, and Indigenous communities and Native nations	Yes	No
Disabled and chronically ill people	Yes	No
Displaced due to severe weather	Yes	No
Older Vermonters	Yes	No
Formerly incarcerated individuals	Yes	No
Immigrants, regardless of immigration status	Yes	No
LGBTQIAP+ individuals	Yes	No
People living with low or very low incomes	Yes	No
Outdoor laborers	Yes	No
Recent graduates of the foster care system	Yes	No
Unions/Organized Labor	Yes	No
Women	Yes	No
Young People	Yes	No
	Yes	No
	Yes	No
	Yes	No
	Yes	No
	Yes	No
	Yes	No
	Yes	No

Narrative on Impacted Communities:

Recommend: **Yes** **Yes with Changes** **No**

Explanation:

Signing Statements

The following statements are from Councilors to accompany their signatures and give context to their votes.

Michele Boomhower
Division Director, Policy, Planning & Intermodal Development, Vermont Agency of
Transportation

Councilors and staff to the Council have worked incredibly hard, both on the plan update, as well as the numerous related plans and analyses which are the underpinning of this work. The Agency of Transportation will continue to work towards advancement of the objectives of the Plan in the constraints before us in the transportation sector at the federal, state, and market levels.

I have grave reservations that the advancement of transportation emissions reductions is being significantly undermined by federal policies, funding, and tax credit elimination, as well as the scarcity of state funding to continue incentive programs and advancement of EV charging infrastructure.

Each of these are tied together in driving market forces which impact the availability of electric vehicles, the stability/continuation of charging network buildout and charging providers' business model, and the uptake of vehicles due to availability, affordability, and operational uncertainty.

Funding alone will not move us back to the progressive trajectory have been on, it will take both funding **and** policy mechanisms in alignment at the federal **and** state level to make significant progress in the transportation sector.

Balancing Climate Action with Economic and Environmental Realities

Why I Voted No on the Climate Action Plan

By Matt Cota, Vermont Climate Councilor

Appointed by Speaker Jill Krowinski (D-Burlington) in September 2024

I do not support the 2025 Climate Action Plan as drafted by the Vermont Climate Council.

Vermont's geography and climate make reliable energy and transportation a necessity, not a luxury. Policies that raise costs without providing affordable, practical alternatives risk doing more harm than good. They deepen inequity and erode public trust in the climate transition. The Climate Council should avoid punitive measures that target existing fuel users and instead prioritize workforce training and infrastructure investments that deliver long-term, affordable, and sustainable benefits. These are the foundations of a resilient economy and an effective energy transition.

While the Plan's emphasis on workforce development and technical training is essential, many of its other priorities would impose significant and regressive costs on Vermonters. Programs like the Clean Heat Standard and Cap-and-Invest are presented as climate solutions, but in practice, they function as energy taxes—raising the cost of essential fuels such as propane, kerosene, heating oil, diesel, and gasoline. These cost increases fall hardest on rural and working-class households that lack affordable or viable alternatives. The Plan's simultaneous push to electrify both the heating and transportation sectors compounds these challenges. Many homes and businesses simply do not have the electrical infrastructure needed to support heat pumps or EV chargers. One in four Vermont homes was built before 1940, and many still rely on knob-and-tube wiring, which is unsafe for modern electric loads. Replacing this wiring typically costs between \$13,000 and \$15,000 per home.¹ Even newer homes with underpowered electrical service often require \$2,000 or more in panel upgrades before any electrification can occur.

EV Issues

These infrastructure, workforce, and cost challenges are substantial. But even more concerning is the disconnect between the Climate Council's policy mandates and the choices Vermonters are making. The most popular car in Vermont is not a car, but a truck or SUV. It most likely runs on gas **and isn't new**. According to the Vermont Vehicle Index, 63% of vehicle purchases in 2024 were used, and 97% of all registered vehicles still rely on internal combustion engines.² Despite steady growth in **new** electric vehicle sales—8% BEVs and 4% PHEVs in 2024—the hurdles to greater EV adoption aren't just the upfront cost of a new car.

¹ Center for Energy and Environment, "Dealing With Knob-And-Tube Wiring," March 17, 2023

² Vermont Vehicle Index found at MeadowHillMedia.com/vehicleindex

One of Vermont's top EV dealers, Mark Alderman of Alderman Chevrolet in Rutland, describes how the lack of in-home Level 2 charging is the most significant barrier. He noted that customers who purchase EVs without home charging often become "anti-EV evangelists" after poor experiences.³ We are now seeing, for the first time, a decline in consumer interest in electric vehicles. Only 22% of Vermonters in the VEC service territory report they are likely to purchase an EV, down from 34% two years ago.⁴

Thermal Barriers

The Climate Action Plan lacks meaningful input from the Vermonters who sell, install, and service electric heat pumps. This is apparent by the Plan's repetition of the word "switch." The Plan refers to air-source heat pumps as a "switching" technology, implying a full transition away from fossil fuels. But that's not what is actually happening in Vermont. While heat pumps can reduce emissions when powered by clean electricity, their performance diminishes in cold weather. As outdoor temperatures fall, heat pump efficiency drops and electricity demand rises sharply. Field data cited during the Public Utility Commission's deliberations of the Clean Heat Standard shows that most homeowners stop using their heat pumps when the temperature dips below 30°F, precisely when reliable heat is most needed. On average, these systems provide heat for less than half the winter season. Heat pump installers—particularly those who also sell heating fuels—see this firsthand, and the data backs them up. In most existing homes, electric heat pumps function as supplemental systems during the coldest months, not full replacements.

The Vermont Department of Public Service is currently studying how heat pump adoption affects heating fuel use. So far, the answer is: not much. Despite the installation of more than 60,000 cold-climate heat pumps over the past decade, heating fuel sales—adjusted for weather—have remained largely unchanged, according to the Vermont Heat Index, which tracks heating fuel sales.⁵ In fact, propane sales continue to rise annually, despite the robust adoption of electric heat pumps.⁶

The Plan has chosen a "climate solution" for the thermal sector that is not delivering the results as advertised. Multiple field studies confirm this pattern: heat pumps are delivering only 20 to 40 percent of their expected heating capacity.⁷ This underutilization raises critical

³ Testimony by Mark Alderman before the House Transportation Committee, March 27, 2025

⁴ Testimony by Andrea Cohen, VEC, before the Senate Transportation Committee, February 5, 2025

⁵ Vermont Heat Index found at MeadowHillMedia.com/heatindex

⁶ "We're not seeing a huge impact on fuel sales right now due to electrification. The department is undertaking a study of heat pump usage, and it's really showing that folks are not offsetting the portion of their heating fuel that we would anticipate," Melissa Bailey, Public Service Department, at a hearing of the House Energy and Digital Infrastructure Committee, May 17, 2025.

⁷ Written testimony of Raymond J. Albrecht, PE, to the Clean Heat Technical Advisory Group, October 2024

questions about the cost-effectiveness of current incentive programs, particularly if they are used primarily for summer cooling. To meet Vermont's greenhouse gas reduction mandates, climate policy must reflect how technologies are actually used, not how they perform in ideal lab conditions. A successful thermal strategy must be technology-neutral, based on real-world performance, and aligned with the realities of Vermont's cold, rural environment. Heat pumps have a role to play—but not at the expense of reliability, affordability, or environmental integrity.

Net Zero Means Zero Growth

Vermont's Climate Action Plan pursues an emissions reduction strategy that conflicts with the state's broader public policy goals. The Stockholm Environment Institute based its "Pathways" recommendation to the Climate Council on an assumption of zero population growth. The Climate Council accepted this framework, even though stagnant population growth is widely acknowledged as a threat to Vermont's health, safety, and economic security. In reality, Vermont must grow its population by approximately 155,000 people by 2035—about 12,900 new residents per year—to meet workforce and economic demands.⁸

Supporting this growth will require tens of thousands of new homes, far beyond Vermont's current rate of housing production. This growth is especially critical to attract and retain essential workers, such as the electricians needed to install heat pumps, EV chargers, and upgraded service panels that the Climate Action Plan demands. Population growth is also essential for revitalizing Vermont's rural downtowns, many of which lie in river corridors that are adapting to climate change.

While such growth is vital to ensuring affordability, economic vitality, and preserving Vermont's rural character, more people—along with the homes, vehicles, and infrastructure they require—will inevitably *increase* greenhouse gas emissions. This makes achieving the mandates of the Global Warming Solutions Act even more difficult.

The Voices in the Field

The perspectives of heating equipment installers and vehicle sellers—along with their firsthand knowledge of Vermont consumers—were not reflected in the development of the 2025 Climate Action Plan. These voices will be crucial if we are to have constructive dialogue about meeting our energy and climate ambitions in the future. Instead, the Plan supports mandates that benefit those who have the economic means to purchase an EV or own new homes that are EV-ready. The Plan supports complex credit trading programs favored by large energy conglomerates but opposed by the small family-owned businesses that provide most of the energy, equipment, and vehicles in rural Vermont.

⁸ Vermont Futures Project, found at VTFuturesproject.org

Let's Be Real

While we all have a role to play in reducing greenhouse gas emissions, we must be honest about the limits of Vermont's impact on global climate trends. The idea that any of the policies suggested in the Climate Action Plan will meaningfully change the frequency of flooding or the depth of winter snowpack is not grounded in science. Our climate policies must serve not only the environment, but the people who live in it. No plan will succeed if it leaves rural and working-class Vermonters behind.

Rather than allow a 2020 law to dictate our energy, economic, and climate policies, the Climate Council should recommend that the Legislature remove the GHG mandates and pursue a more realistic, affordable, and environmentally sustainable path forward.

Thank you for the opportunity to serve on the Vermont Climate Council.

Sincerely,

A handwritten signature in blue ink that reads "Matt Cota". The signature is written in a cursive, slightly stylized font.

Matt Cota

Signing statement

Councilor Richard Cowart

Member appointed with expertise and professional experience in the design and implementation of programs to reduce greenhouse gas emissions

Cross-Sector Mitigation Subcommittee Co-Chair

I voted to approve this Climate Action Plan, and write separately to encourage action by the Legislature and the Administration to implement its most important priority actions. The CAP identifies many actions Vermont needs to take to reduce climate pollution and protect citizens and communities from the worst effects of climate change – but it cannot deliver the political leadership that is required to ensure progress.

As elected officials and administrative agencies consider next steps, we will need to overcome two misconceptions that have blocked climate action in recent years.

The first misconception is that we cannot afford to invest in more efficient cars, trucks, and home heating systems.

On the contrary, numerous studies have shown that a well-designed transition away from fossil fuels would save Vermonters billions of dollars in fuel bills and pollution costs over the lifetimes of those investments. The real affordability challenge is the fossil status quo.

Existing fuel costs are so baked into the status quo that we tend to forget that Vermont routinely spends well over \$2 Billion per year to import fossil fuels, an amount about equal to the state's budget for education. Since 2021, when the Climate Council began its work, Vermonters have spent \$8.6 Billion dollars on imported fossil fuels. Around three-quarters of that money simply left the state's economy.

Moreover, fossil fuel costs are highly volatile and fluctuate with world oil prices. For example, between 2021 and 2022, fossil fuel costs in Vermont rose by \$750 million in a single year, a huge sudden cost increase for Vermont families and businesses. International oil companies reaped trillions of dollars in windfall gains that year – but world oil prices did not include any low-income discounts, and never will.

Recommendations in this Climate Action Plan would help Vermont households and businesses move to cleaner and less costly energy sources. I join with others on the Council to urge Vermont's leaders to take actions now to support investments those lower-cost energy choices.

This leads to the second misconception, which is about the pace of action.

Because the physical climate crisis is real and the scientific consensus calls for rapid responses, climate policy debates sometimes lead to an “all or nothing” choice. In Vermont, we know from experience that meaningful progress can occur in stages and that programs can deliver large savings as they prove successful and are allowed to grow over time. Electricity and gas energy efficiency programs, for example, have grown over time to become among the largest and least costly “sources” of energy we rely on in Vermont. Efficiency Vermont’s programs are delivering over \$2 Billion in net energy bill savings to Vermont customers over the lifetimes of the measures installed to date.¹

Achieving savings of this scale requires raising the funds needed to make investments in buildings, heat pumps, weatherization, and EV charging points. This Climate Action Plan urges the Legislature and Administration to adopt one or more pathways to raise those funds and invest them, particularly to benefit those Vermonters who are most burdened by high energy bills.

But at what pace? I have long been a supporter of energy efficiency, renewable energy, and climate action, and I believe substantial progress can be made through smart policies. However, considering the many fiscal challenges we face today, the pending loss of federal funds, and the need to build new programs, it may not be possible right now to chart “moon-shot” progress. **But it is necessary to design programs that could grow over time and it is necessary to start them now.** Moderate progress, at a minimum, is necessary. Failure to begin is unacceptable.

This leads to one immediate, high-level recommendation as a point of beginning: the need to take near-term action to support the Weatherization Assistance Program, and to at least maintain if not enlarge its scope in coming years. Weatherization delivers bill savings, livable conditions and healthier homes to thousands of lower-income Vermont households each year. This program has grown slowly over many years but is still too small and now faces a sharp cutback in federal funding, threatening reductions in the crews of trained staff that would be difficult to rebuild. The Climate Action Plan specifically calls for actions to expand weatherization programs, and I write here to urge the Legislature and Administration to find ways to support weatherization efforts as an early action step in implementing the CAP.

In closing, I join other Councilors in giving deep thanks to the many people who have helped us to create the CAP, inform its recommendations, and provide multiple opportunities for the public to hear about it, voice their concerns and provide their suggestions. The Climate Office

¹ https://eanvt.org/wp-content/uploads/2024/04/EAN-APR-2023_Apr112024.pdf

staff and the facilitation support from CBI have been hugely helpful. I am also deeply appreciative of the excellent and dedicated work of the Committee Members and Co-Chairs of the Cross-Sector Mitigation Committee, who have shared their expertise, personal insights, and hundreds of hours over many months, to develop key recommendations in this plan. It has been an honor to work with you all.

Signing Statement

Councilor Jared Duval

Appointed to provide expertise in energy and data analysis

Chair, Science & Data subcommittee

Member, Cross-Sector Mitigation Subcommittee and Council Steering Committee

First, I want to thank my fellow Councilors and subcommittee members, as well as state staff, supporting consultants, and members of the public. This plan was a significant undertaking and would not have successfully come to completion without the contributions of dedicated individuals from each of these groups.

I voted for this Climate Action Plan (CAP) because I believe that it, like the one that preceded it in 2021, is capable of achieving Vermont's climate-related commitments in cost-effective and equitable ways, as is directed by the Global Warming Solutions Act.

However, the CAP, in and of itself, does not guarantee progress in reducing climate pollution, building climate resilience, or lowering energy costs. Crucially, those outcomes depend on whether and how this plan's recommendations are implemented.

Context

We have much to do to make progress in reducing climate pollution and energy costs while also building resilience. This is especially true because over the past four years the most meaningful recommendations that were designed to do so from the first CAP have either not been implemented (i.e., a Cap-and-Invest policy, a thermal-sector performance standard, and a feebate program) or, if they were initially acted on, have since been paused (Advanced Clean Cars II) or ended (electric vehicle incentives).

One of the most important recommendations in the first CAP was the Advanced Clean Cars II (ACCII) rules. While initially advanced via rulemaking, the crucial step of the actual enforcement of the ACCII rules has since been paused by the Governor, calling into question whether Vermonters will see the pollution reduction and cost-saving benefits from increased electric vehicle (EV) supply that we had been counting on in the first CAP (and that we are now counting on in this 2nd CAP).

The other two highest impact recommendations from the first CAP – joining a Cap-and-Invest program and implementing a thermal-sector performance standard – were each opposed by the administration, without alternatives that could achieve comparable pollution reductions being put forward. Other key pollution reduction recommendations from the first CAP, such as a fee and rebate (aka “feebate” or “true cost pricing”) program for vehicles have also not been advanced.

Affordability

I believe that all Councilors care about affordability and cost-effectiveness. However, the process of crafting this Climate Action Plan has made clear that various Councilors understand and use the terms “affordability” and “cost-effectiveness” differently.

Some speak about affordability in a limited, one-time way. Specifically, they note that many of the recommendations in the CAP, from weatherizing homes to incentivizing EVs and heat pump water heaters, involve an up-front cost.

It is true that, absent incentives, cleaner and more efficient vehicles and heating options can cost more up front than fossil fuel dependent vehicles and equipment. However, it is also important to consider the ongoing costs of fuel over time. Unlike equipment costs, fuel costs don’t just have to be paid once, but month after month and year after year.

In the end, whether one option ends up being more or less affordable than another depends on a fuller comparison than just up-front costs. My view is that we need to look at the whole equation rather than just one part of it. Specifically, we need to account for both upfront *and* ongoing costs, to get a full picture of total costs.

When we account for fuel costs, we find that gas cars cost much more to fuel and maintain than electric vehicles (EVs). On average, it costs over \$9,500 more to fuel and maintain a gas car over the life of the vehicle than a comparable EV.¹ Similarly, propane water heaters cost more to fuel than heat pump water heaters—on average, over \$3,000 more over the life of the water heater.² Coupled with up front vehicle or equipment purchase costs, these fuel and operations savings

¹ <https://eanvt.org/2024-annual-report/> page 5

² <https://eanvt.org/2024-annual-report/> page 29

make the *total* cost of EVs and heat pump water heaters less costly than gasoline cars and propane water heaters, respectively. Similarly, savings over time from weatherization have been found to be much larger than the initial expense.³

I believe that the desire for affordability should not just be for a single moment in time, but for long-term, *durable* affordability—month after month and year after year. Doing so will require helping more Vermonters get off the high-cost roller coaster of fossil fuel prices. That, in turn, will require investment—including grants and incentives to help lower- and middle-income Vermonters, in particular, access weatherization and more efficient renewably powered equipment that can save them money over time, but that they wouldn't otherwise be able to afford.

Many Vermonters with disposable income are already making investments that reduce their energy costs over time. It is primarily those who *can't* afford weatherization or upgrades to cleaner and more efficient vehicles and heating equipment who are most at risk of being left stranded with less efficient, higher polluting equipment and higher cost energy sources for years to come. And it is those Vermonters that I most hope the recommendations of this plan will help, including by providing more income-sensitive grants and incentives. Indeed, if one of the key barriers to durable affordability is the lack of sufficient incentives to help Vermonters purchase vehicles and equipment, then a key part of the answer should be expanding and increasing incentive programs, especially for lower- and middle-income Vermonters, rather than ending them.

An example may help illustrate the important distinction between costs and cost-effectiveness and short-term vs. durable affordability. If you have a leak in your roof, there's a cost to get it fixed. Does that mean it's not cost-effective to get it fixed? Of course not—because the cost of inaction is greater than the cost of action.

Right now, Vermont has a \$2 billion leak in its roof in the form of expensive fossil fuel spending, the vast majority of which is draining out of our state economy.⁴ Yet some are saying that making investments to reduce that cost for Vermonters isn't affordable.

³ https://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_CH_WxHealth.pdf

⁴ <https://eanvt.org/project/fossil-fuel-sales-2025/>

Such a view fails to recognize that continued inaction will not reduce costs that are right now too high and unaffordable—and that that unaffordability will continue as long as we are so dependent on high-cost, price-volatile fossil fuels. This is especially true for lower-income Vermonters who pay a disproportionate share of their income on fossil fuels, particularly propane, fuel oil, and gasoline. Such a view also fails to recognize that fossil fuels create pollution that is imposing escalating costs to society, including from the increasing frequency and severity of extreme weather events, such as flooding and heat waves.

Indeed, this distinction between up-front costs vs. savings over time is important to understand not just at a household level but also on a statewide and societal level. With complete accounting, we recognize that there are not just costs related to action but also costs related to inaction (as well as savings and benefits related to action). In fact, every comprehensive analysis that has been conducted for the CAP planning process has projected net savings and benefits from the modeled emissions reduction pathways over time.

Specifically, the economic analysis that was contracted by the Agency of Natural Resources in support of the initial Climate Action Plan in 2021 estimated net societal savings of \$6.4 billion resulting from the modeled economy-wide pollution reduction pathways for Vermont associated with meeting GWSA emissions reduction obligations through 2050.⁵

Most recently, benefit-cost analysis contracted by ANR and conducted by SEI projected that taking the pollution-reduction measures modeled for this Climate Action Plan would result in net savings/benefits in every modeled scenario. Specifically, the scenario that maximized emissions reduction measures toward GWSA targets resulted in projected net savings of nearly \$6.1 billion in 2050, as compared to the baseline scenario, with the primary benefit being savings from avoided fuel costs. That net savings resulted from this scenario is all the more notable given that it did not include savings from health-related benefits that are associated with measures such as weatherization and reduced particulate pollution from reduced combustion.

To be clear, all economic modeling done for our Climate Action Plans, the cost of inaction – or continuing the fossil fueled status quo – has always ultimately been projected to exceed the costs of acting to reduce climate pollution. In other words, continued inaction means a delay in the

⁵ https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2022-03/Pathways%20Analysis%20Report_Version%202.0.pdf

savings and benefits that come from cleaner and more efficient energy. Continued inaction also means escalating the fossil fueled harms that are hitting us and our children.

Emissions reduction targets

Members of the administration have recently expressed how difficult they think it will be to meet the 2030 emissions reduction obligation of the GWSA. I agree that meeting the 2030 requirement will be difficult—but not simply because the federal policy and funding environment has shifted so significantly in the last year.

The January 1, 2030, requirement will also be difficult to meet because, instead of moving with purpose over the last 5 years to cost-effectively reduce emissions in Vermont by following the recommendations in the initial CAP, the period of 2020-2025 has largely been lost to state level delay or inaction. The limited progress that we have made was primarily thanks to a historic investment of federal dollars that were delivered to Vermont by the previous presidential administration and Vermont's congressional delegation.

As someone whose career is dedicated to data tracking, research, and analysis, I appreciate that the Agency of Natural Resources has advanced numerous studies. However, the ultimate value of studies is not how many are conducted but whether and how well they inform well considered and effective action.

Furthermore, fixating on the difficulty of achieving Vermont's 2030 commitment to reduce climate pollution—rather than moving apace to do what we can—has become a kind of self-fulfilling prophecy. The closest analogy I can think of is a runner who has a goal of running a 10-minute mile. Then, once the timer begins, they spend the first 5 minutes standing on the starting line and then walking slowly. At the five-minute mark, with most of the distance still left to go, the runner says, “how can I possibly finish before 10 minutes?” The appropriate question: is it that running a 10-minute mile was impossible... or was it made nearly so by failing to try for the first half of the race? And at that point, even if finishing in 10 minutes will be incredibly difficult, it is still better to start trying.

Conclusion

Vermont is now in a difficult situation. Legal obligations to reduce pollution have not been followed and key compliance dates have almost certainly been missed (2025) or are increasingly likely to be missed (2030).⁶ Meanwhile, Vermont is producing the highest per person climate pollution of any state in New England; has made the least progress toward the Paris Climate Agreement targets of any state in New England; and continues to experience some of the highest energy cost burdens in the region—primarily due to our continued dependence on high-cost and price-volatile fuel oil, propane, and gasoline.⁷

That we are in this situation is not because we lack the technology or proven policy examples that could reduce climate pollution in line with legal commitments and in ways that would reduce overall costs. Other states have clearly shown that concerted policy and regulation can shift markets in a cleaner, more equitable, and lower-cost direction.

Indeed, many of the proven policies that have been successfully utilized by other states are recommended in this plan, from a cap-and-invest program to emissions-based performance standards. But neither emissions nor costs simply go down on their own—or by virtue of the mere existence of recommendations in a plan. Actual reductions require the implementation of policy and regulation.

A lower-cost, lower-pollution, more resilient future is possible. But we will not be able to achieve that future if we continue to fail to implement recommendations like those in this plan. This work is not easy—but we have an obligation to Vermont and Vermonters to try.

⁶ <https://eanvt.org/project/fossil-fuel-sales-2025/>. Specifically, EAN estimates that Vermont likely fell 18-39% short of Vermont's first statewide emissions reduction legal obligation under the GWSA.

⁷ <https://eanvt.org/project/vt-climate-responsibility/>

Climate Action Plan Signing Statement

Kelly Klein, Member to Represent the Small Business Community

Co-Chair of the Just Transitions Subcommittee, Member of the Steering Committee

June 25, 2025

I was proud to vote in support of this Climate Action Plan. Having been a member of the Climate Council since its inception as the representative for the small business community, I have had the honor of witnessing and being part of the process of drafting the initial Climate Action Plan in 2021 and now this revised Plan in 2025.

This updated Plan builds upon the work of the original, and I think we have a Plan that is more robust, easier to read and understand, and does more to promote equity and incorporate public feedback. The quality of public engagement that accompanied this version of the Plan was some of the best I've witnessed. Members of the public, with a particular focus on marginalized and frontline communities, were engaged throughout the process and through a variety of different avenues. I also saw members of Subcommittees and the Council engaging more deeply with the feedback we received from the public and incorporating recommendations directly into the Plan as a result.

That said, there is always more we can do to reach Vermonters and hear their voices. Now is the time to continue the work of engaging with the public. We need to find ways to communicate this Plan to more people - not just the people who are already concerned about climate change. If we can reach more Vermonters and hear their perspectives and feedback, I believe that we can create an even stronger Plan when we revise it again in four years.

The other challenge, and one that I know is on the minds of many other Council members, is that of funding. The dramatic reduction in funding from the federal government has left us without some of the resources we hoped we could count on as we started the revision process. The state legislature and the administration will need to come up with some creative solutions in order to fund the programs outlined in this Plan. But we must also consider the cost of inaction.

In the world of business there is a saying: You have to spend money to make money. For many of the recommendations in this Plan, I would hold that the maxim should be: You have to spend money to save money. It may sound counterintuitive, but there are many ways in which a dollar spent today to prepare us for future climate disasters or help Vermonters move away from fossil fuels will have a swift return on investment and ultimately save money for them and the state of Vermont on an ongoing basis. These savings won't just come in reduced energy costs or the cost to repair buildings and infrastructure after a disaster. We will see savings in healthcare costs as more buildings are weatherized to prevent heat- and cold-related health problems, as fewer people are injured or killed in natural disasters, and as we simply enjoy cleaner, less polluted air.

I believe that Vermont can, and must, figure out ways to enact the recommendations in this Plan. We are a state made up of creative, thoughtful, and hard-working people. While we may not be the wealthiest state, we have a wealth of other resources at our fingertips. Vermonters

have a long history of being adaptive, thinking outside the box, and working together to create the future we all want to see for our state and for future generations.

Signing Statement – 2025 Climate Action Plan

Liz Miller
Vermont House-appointed Utility Representative Member
Vermont Climate Council

Vermont's electric supply is among the cleanest in the nation. Utilities are fulfilling state laws that require more renewable energy in the years ahead, including more locally-based projects, and that support customers switching from fossil fuels to cleaner electricity with prices that are less volatile and are lower than the fuels Vermonters most often use to power their vehicles and heat their homes, saving them money.

I agree with the points raised by members of the governor's administration in their signing statement about the need for realistic implementation, equitable pacing, and affordability for all Vermonters — as we also work to achieve further reductions in climate pollution and help communities be prepared for increasingly severe weather. I appreciate the analysis and hard work from the agencies and others to help inform this plan, and I am also grateful for the collaborative approach from all through this process as we work to best serve Vermonters.

Signing Statement for the Vermont Climate Council's CAP:

Councilor Stephanie Moffett-Hynds

Appointed to represent rural communities

I have the honor of serving on the Vermont Climate Council as a representative of rural communities. It has been deeply reassuring to see the updated Climate Action Plan come together, carefully crafted by 23 appointees with a broad range of expertise and perspectives. In the face of the increasingly destructive consequences of a warming planet, Vermonters should take heart in knowing we are not shrinking from our responsibility. The Plan offers a clear suite of strategies and actions to help ensure that all Vermont communities — rural and urban alike — can build resilience.

Vermont is undeniably facing a range of urgent challenges — from the housing crisis and substance use disorder to a shrinking workforce and the erosion of key federal programs and funding. But turning away from the guidance of the Climate Action Plan would be a grave mistake. Climate change is not a separate issue; it is the backdrop against which all of these crises are unfolding — and it will continue to make them worse if left unaddressed. It is not a question of selecting one issue to address over another. We are capable of doing many things at the same time. And we must.

The impacts of global warming — from increased flooding and infrastructure strain to economic disruption — threaten to deepen inequality and hardship across the board. That's why policies like Cap and Invest are so important. While just one tool among many, it is designed with equity in mind, directing resources and support to low- and moderate-income Vermonters. It recognizes that affordability and sustainability must go hand in hand.

Without bold, inclusive climate action, we risk a future defined by competition for scarce resources — a survival-of-the-fittest scenario that is both unjust and preventable. The Climate Action Plan provides a roadmap that, if implemented, will ensure not only a more sustainable Vermont, but also a more equitable and resilient one. We cannot afford to ignore it.

Just as importantly, our commitment to this plan sends a vital message to current and future generations: that their well-being matters, and that their state is stepping up to confront this existential crisis. In a time of growing uncertainty, this kind of leadership offers both practical solutions and a sense of hope. It's a clear reminder that we are — and must remain — Vermont strong.

Signing Statement for Vermont's Climate Action Plan
Julie Moore, Secretary of Agency of Natural Resources

Vermont stands at a critical juncture as federal climate funding all but disappears while climate impacts are intensifying. Since the initial Climate Action Plan was adopted in 2021, Vermont has taken full advantage of unprecedented federal investment to reduce emissions and build climate resilience. Now that funding is ending abruptly, fundamentally altering underlying assumptions about Vermont and Vermonters capacity for this work.

During these last four years, Vermont also experienced a series of weather-related disasters that caused hundreds of millions of dollars in damage and resulted in the destruction of scores of homes and businesses. These mounting demands and costs are straining everyone – individuals, businesses, and municipalities – regardless of their capacity. Moving forward requires a clear-eyed acknowledgment of these financial and operational constraints while maintaining our commitment to climate action.

This Climate Action Plan represents the culmination of extraordinary effort by Councilors, subcommittee members, state agency staff, community stakeholders, and countless Vermonters who have contributed their expertise and passion to this vital work.

There are many good ideas reflected in the revised Climate Action Plan. However, there is also a significant gap between the actions identified in the Plan and what will be required to operationalize this work. Successful implementation requires a commitment to finding solutions that are both environmentally effective and economically sustainable for all Vermonters. We are concerned that in striving to fulfill the obligations created by the Global Warming Solutions Act, this plan does not provide a clear pathway for resolving the tension between real-world constraints – funding limitations, technical challenges, and implementation capacity – and its ideals.

The financial challenges we face are significant. The investments required to reduce emissions, repair damage from on-going climate disasters, and adapt and become more resilient in the face of a changing climate far exceed the financial capacity of Vermont and Vermonters, especially as federal funding becomes much less reliable. This means making difficult decisions about prioritizing our collective efforts.

We recognize climate action offers significant long-term economic benefits, but without careful program design and adequate financial protections, the substantial upfront costs risk imposing unfair burdens on low- and middle-income Vermonters. Due to the constraints of time and available resources, the Council was not able to systematically evaluate the near-term financial impacts many of the policy proposals in this Plan could have on Vermont households and municipalities.

The Climate Action Plan identifies numerous areas where funding is needed to fulfill its vision, support equitable implementation and meet the obligations created by the Global Warming Solutions Act. While a worthy aspiration, it is doubtful Vermont can fully fund the scale and pace of the work envisioned during the term of this Plan.

We must be direct and open with Vermonters about the full breadth of the challenge presented by the upfront costs of climate-driven investments. It is critical that the State develop an implementation strategy that works to fill the gap in information about the costs of implementation, more fully develops options for funding this work in a manner that minimizes financial hardship for low- and middle-income Vermonters and proposes thoughtful pacing for its execution. We see this as essential to having a workable approach that both drives progress and is realistic about the myriad other societal challenges currently facing our small state – from education reform and electric grid transformation, to the short-supply of housing, rising costs of health care and public safety concerns.

It is also important to acknowledge that despite extensive outreach efforts, we continue to struggle with reaching a broad cross-section of Vermonters and are hearing primarily from those already committed to climate action. This reality underscores the need for continued engagement and inclusive dialogue as this work continues to advance.

Each of us remain committed to meaningful climate action. Moving forward, we must focus on strategic approaches that carefully balance multiple priorities. The good news is that many climate solutions can save money over time – like reducing energy costs and limiting the impact of expensive climate disasters – and can also create good, local jobs. But we need to be honest about the costs upfront and figure out fair ways to pay for them. This requires hard conversations about trade-offs, realistic timelines, and creative financing mechanisms that distribute costs equitably and maintain momentum toward our climate goals.

Only through this balanced approach can we earn the broad public support necessary to sustain long-term climate action that truly serves all Vermonters.

Julie Moore, Secretary, Agency of Natural Resources

Chris Campany, Windham Regional Commission, member to represent the municipal governments

Sarah Clark, Secretary, Agency of Administration

Matt Cota, Meadow Hill Consulting, member to represent the fuel sector

Michele Boomhower, on behalf of Joe Flynn, Secretary, Agency of Transportation

Eric Forand, Director of Vermont Emergency Management, Department of Public Safety

Kerrick Johnson, Commissioner, Department of Public Service

Lindsay Kurrle, Secretary, Agency of Commerce and Community Development

Shayla Livingston, Agency of Human Services

David Mears, member with expertise in the design and implementation of programs to increase resilience to and respond to natural disasters resulting from climate change

Anson Tebbetts, Secretary, Agency of Agriculture, Food, and Markets

Climate Action Plan Signing Statement
Jaiel Pulskamp, Member to Represent the Farm and Forest Sector
Agriculture & Ecosystems Subcommittee Co-Chair

The Vermont Climate Action Plan is a hopeful and ambitious roadmap for a more just, sustainable, and resilient future. It offers a vision grounded in care for our communities and a respectful partnership with nature. It lays out the steps we must take to transition away from systems that pollute and deplete, toward those that regenerate, uplift, and sustain.

While my choice for Priority Recommendations included the expansion of public transportation and scaling up community solar, I recognize that this plan is a foundation. I also support ending the burning of trees for large-scale biomass energy. However, I support the study on biomass facilities, which was included in the priorities. I urge continued emphasis on responsible development, protection of our working lands, and meaningful investments in community-scale solutions that keep people and ecosystems at the center.

Equally important, and central to solving the climate crisis, is strong support for our farmers and food producers. A resilient, regenerative food system is one of our most powerful climate solutions. Prioritizing healthy, locally grown food ensures that Vermonters are nourished while reducing emissions, protecting ecosystems, and strengthening local economies.

To meet this challenge, we need to support small and mid-sized farms, expand local food infrastructure, invest in soil health and regenerative practices, and protect farmland and forests from sprawl and speculative development.

We need to think creatively in the face of federal fiscal constraints. Chemistry and physics are non-negotiable—the laws of thermodynamics don't wait for budget cycles. Economics is a human construct. With ingenuity, economic systems can emerge that support Vermonters and respect these laws of nature. We can and must reimagine our financial systems to support this transition, charging for pollution and extraction to fund the regeneration of our communities, ecosystems, and energy systems.

I voted yes in support of the Climate Action Plan because it represents more than policy; it's a promise to our children and grandchildren that we will not use up resources today and leave them with the consequences tomorrow. This Climate Action Plan is a promise that Vermont will act with courage, creativity, and compassion in the face of the climate crisis.

We are the caretakers of this little corner of the Earth. Let's rise to the occasion.