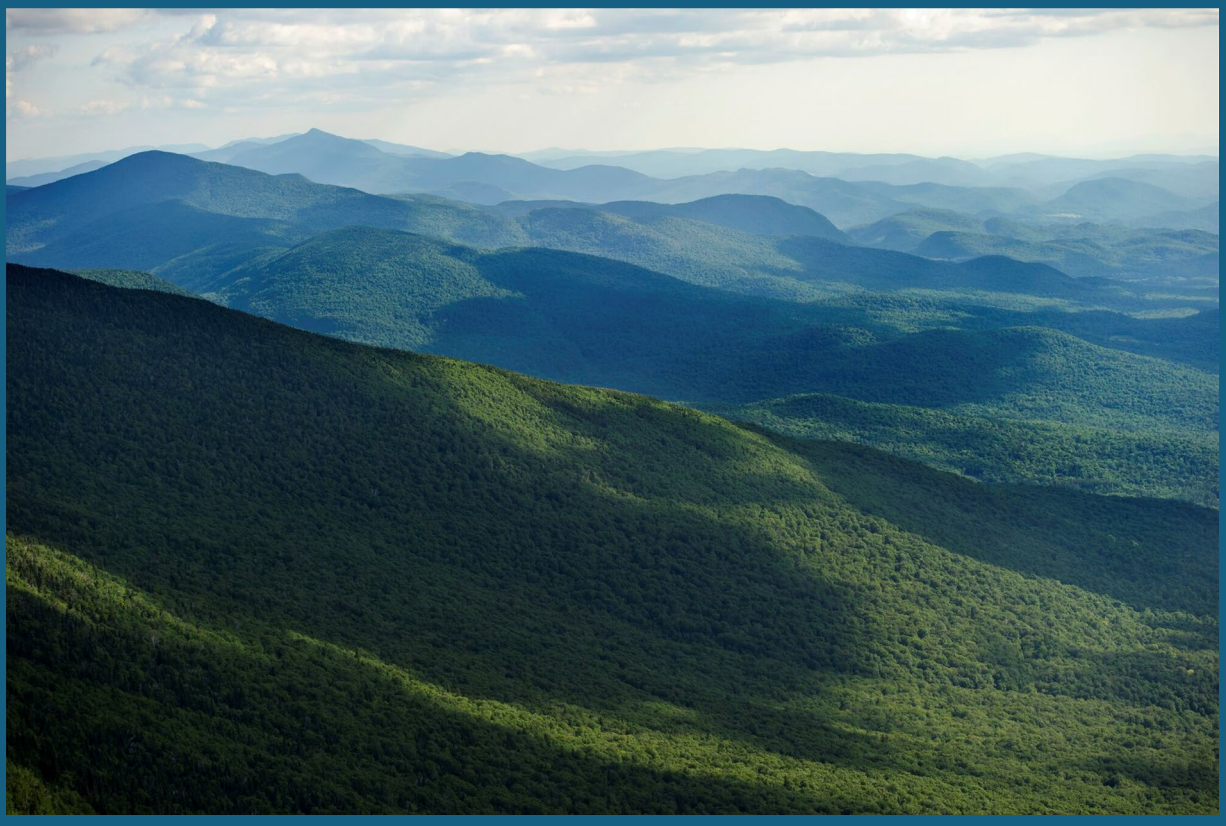
CLIMATE POLLUTION REDUCTION GRANT

Submitted by the **Vermont Agency of Natural Resources, Climate Action Office** on December 1, 2025

COMPREHENSIVE CLIMATE ACTION PLAN



VERMONT
AGENCY OF NATURAL RESOURCES

State of Vermont Comprehensive Climate Action Plan (CCAP)

Prepared by the Agency of Natural Resources for the United States Environmental Protection Agency's Climate Pollution Reduction Grant (CPRG) Program

December 2025

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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VERMONT CLIMATE ACTION OFFICE STAFF

Thank you to the staff of the Climate Action Office in the Agency of Natural Resources for leading the development of the Comprehensive Climate Action Plan.

VERMONT CLIMATE COUNCIL AND SUBCOMMITTEE MEMBERS

Thank you to the Vermont Climate Council for leading the development of the updated Climate Action Plan (2025), which served as the basis for the Comprehensive Climate Action Plan.

STATE AGENCIES AND PARTNERS

State Agencies and partners across Vermont contributed to the development of the updated Climate Action Plan (2025), which serves as the foundation for the Comprehensive Climate Action Plan. This plan draws heavily on their contributions. The list of state contributors to the Climate Action Plan includes but is not limited to:

Agency of Natural Resources (ANR), Department of Environmental Conservation (DEC), Fish and Wildlife Department (FWD), Department of Forests, Parks and Recreation (FPR), Agency of Transportation (VTrans), Department of Public Service (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).

CONSULTANTS

Thank you to the Stockholm Environment Institute (SEI) for providing reporting on Business as Usual and Scenario Modeling to the Climate Council and contributing to the Greenhouse Gas Emissions and Benefits Analysis of the measures for the Comprehensive Climate Action Plan. Thank you to staff from Consensus Building Institute for meeting facilitation and public engagement support for the Climate Action Plan.

2. Introduction

Climate Pollution Reduction Grant Overview

The Climate Pollution Reduction Grants (CPRG) program, authorized under Section 60114 of the Inflation Reduction Act, is designed to empower states, local governments, tribes, and territories in their efforts to combat climate change. With nearly $5 billion allocated for this purpose, the CPRG program advances the development and implementation of climate plans to reduce emissions of greenhouse gases and other harmful air pollutants. This two-phase program includes $250 million for noncompetitive planning grants and approximately $4.6 billion for competitive implementation grants.

In 2023, the Climate Action Office at the Agency of Natural Resources received a $3 million Climate Pollution Reduction Planning Grant as part of the Inflation Reduction Act. This grant, running from 2023 through 2026, is instrumental in supporting community engagement, communications, regional and municipal planning, and staffing in service of climate action in Vermont. Vermont also developed an application for $99 million Climate Pollution Reduction Implementation Grant in 2024 to fund 15 climate action priorities, but the state was not selected as a recipient. However, the state is actively seeking alternative funding sources to advance Vermont's priority actions.

Comprehensive Climate Action Plan Overview

The Comprehensive Climate Action Plan (CCAP) is the result of a thorough and ongoing effort that includes collaboration across various levels of government, significant public engagement, and stakeholder and community outreach. It serves as a roadmap for climate action, tailored to reflect local contexts and needs across the state. Building upon the Priority Climate Action Plan (PCAP), the CCAP updates and expands the understanding of greenhouse gas (GHG) sources and sinks, establishes both near-term and long-term GHG emissions reduction targets, and identifies measures across Transportation, Residential, Commercial, and Industrial (RCI), Non-Energy, and Agricultural sectors to achieve greenhouse gas reductions. Additionally, it explores implementation authority, costs, co-benefits, and workforce needs.

The CCAP does not replace existing policies or plans but rather builds upon them, including the Vermont Initial Climate Action Plan (2021) and the Updated Vermont Climate Action Plan (2025). These plans are part of Vermont's ongoing commitment to climate mitigation, as outlined in the Global Warming Solutions Act (GWSA) passed by the Vermont

Legislature in 2020. The GWSA mandates legally binding emissions reduction requirements, aiming to reduce greenhouse gas pollution to 26% below 2005 levels by January 1, 2025, 40% below 1990 levels by January 1, 2030, and 80% below 1990 levels by January 1, 2050. It also directs the Vermont Climate Council to consider opportunities for long-term carbon sequestration and strategies to help Vermont communities prepare for the impacts of climate change. The CCAP, therefore, is a critical component of Vermont's comprehensive approach to addressing climate change while enhancing resilience and adaptation across sectors.

Vermont Context

Vermont Climate Policies and Plans

The Comprehensive Climate Action Plan (CCAP) builds upon existing Vermont climate policies and State plans, including:

- Global Warming Solutions Act: In 2020, the Vermont Legislature passed the Global Warming Solutions Act (Act 153 as Enacted), which created legally binding emissions reduction requirements.
    - The Act was created in response to concerns around Vermont's changing climate and the magnitude of what must be done to reduce greenhouse gas emissions and prepare for the impacts of climate change on Vermont's landscape.
    - The Act requires Vermont to reduce greenhouse gas pollution to 26% below 2005 levels by January 1, 2025. Emissions would need to be 40% below 1990 levels by January 1, 2030, and 80% below 1990 levels by January 1, 2050.
    - In addition to the emissions reductions required by the statute, the law also directs the Council to consider opportunities for long-term carbon sequestration and strategies for helping Vermont communities prepare for the impacts of climate change.
- Vermont Initial Climate Action Plan (2021): The Initial Vermont Climate Action Plan was adopted on December 1, 2021 and includes 234 unique actions to mitigate, adapt to, or improve resilience to climate change. The actions are organized by Pathways, which are further defined by specific strategies to achieve the requirements of the GWSA.

- Updated Vermont Climate Action Plan (2025): Vermont adopted the updated Climate Action Plan on July 1, 2025. This Plan further refines and identifies new actions building on the Initial CAP, culminating in 52 priority actions.
- Comprehensive Energy Plan: The Comprehensive Energy Plan (CEP) is a strategic framework designed to implement Vermont's statutory energy policies through a thorough analysis of the state's energy challenges and opportunities. The Global Warming Solutions Act (GWSA) mandates that the CAP be coordinated with the CEP, ensuring that energy consumption, which drives the majority of Vermont's greenhouse gas emissions, is addressed in a manner consistent with the state's climate goals. Although the CEP is updated every six years and is not currently under revision, it must remain consistent with the requirements of the GWSA and the CAP. The Department of Public Service and the Agency of Natural Resources continue to collaborate on modeling efforts and public engagement to ensure that both plans effectively support Vermont's environmental and energy goals.
- Resilience Implementation Strategy: 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 policymakers 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.
- Vermont State Hazard Mitigation Plan: 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.

- Climate Policy Study (Act 148): In 2024, the Vermont State Legislature passed Act 148 (the Transportation Bill), which requires the Agency of Natural Resources and the Agency of Transportation to study a cap-and-invest program as a strategy that could support meeting the State's requirements for cutting climate pollution. The Agency of Natural Resources has executed a Memorandum of Agreement with the Agency of Transportation to undertake this work. Cap-and-invest programs work by placing a declining cap on greenhouse gas emissions and reinvesting the proceeds in climate action, such as energy efficiency, weatherization, and resilience. The study evaluated the options for joining a cap-and-invest program and the potential benefits and costs of such a program to Vermonters. This work is required by the legislature and happening concurrently with the update to the Climate Action Plan. The technical analysis was completed in January 2025 and provided to the Treasurer's Office. The Treasurer's Office then reviewed it and drafted recommendations based on the analysis for the Legislature, which were submitted in February 2025. These recommendations formed the basis of several actions in the 2025 Climate Action Plan.

Impacts of Climate Change in Vermont

The last decade was the warmest on record. The disruptions are already being felt, from extremely hot days in the summer to increasingly severe storms. If action isn't taken soon, by the end of the century, Vermont will see at least 57 days above 86°F a year under a high emissions trajectory. The impacts of climate change in Vermont include, but are not limited to:

- **Rising Temperatures:** Temperatures in Vermont have risen about 3°F since the early 20th century, marking a significant warming trend. For comparison, the Last Glacial Maximum was 11°F cooler globally than today. The decade from 2010 to 2020 was Vermont's warmest on record, and without substantial emissions reductions, unprecedented warming is expected to continue. Already, extreme winter cold is less intense, with the freeze-free period extending by three weeks since 1960, and lakes and ponds thawing earlier each decade. These changes disrupt ecosystems, agriculture, and water resources, posing risks to Vermont's environment and residents' quality of life.
- **Increased Precipitation:** Since the 1960s, Vermont's annual average precipitation has increased by nearly 6 inches, with the most significant rises in mountainous areas. As warming continues, winter and spring precipitation is expected to

increase, with more falling as rain rather than snow. Heavier rainstorms will have widespread effects, disrupting farm and forestry operations and damaging homes,

roads, and bridges. Heavy rain throughout the summer of 2023 caused severe flooding in Vermont, leaving lasting damage and a changed landscape throughout the state. Due to climate change, these storms and weather patterns are the new normal, and Vermonters will continue to be impacted by the hazards caused by severe storms.

- **Environmental Damage:** Climate change is intensifying the threats posed by invasive plants, insects, and diseases to Vermont's forests, compounded by worsening storms, irregular precipitation, and drought. Warming trends often enable invasive species to spread more rapidly by reducing winter mortality and boosting reproduction rates. Vermont faces droughts ranging from severe, multi-year events affecting the entire state to shorter, localized occurrences, with the most intense drought recorded in September 2020 impacting a third of the state. Additionally, increased heavy precipitation jeopardizes water quality, as storms lead to significant runoff, erosion, and nutrient loading, creating conditions conducive to cyanobacteria blooms.
- **Biodiversity Impacts:** As climate change intensifies, Vermont faces the potential loss of 92 bird species, including the common loon and hermit thrush, within the next 25 years. Warming trends are expected to increase white-tailed deer populations while decreasing moose numbers, potentially altering forest composition. Heavier rainstorms will impact natural and human communities, disrupting farm and forestry operations and damaging infrastructure. Additionally, milder winters and warming waters threaten lake and river systems, increasing the risk of harmful algal blooms and reducing overall biodiversity and ecosystem health.
- **Public Health Impacts:** Certain groups, including children, the elderly, those of low socioeconomic status, Indigenous peoples, and individuals with pre-existing health conditions, are particularly vulnerable to the health effects of climate change. In Vermont, warmer and more humid conditions are expected to expand habitats for disease-carrying ticks and mosquitoes, increasing the risk of vector-borne illnesses. Additionally, declining air quality may worsen chronic diseases and further degrade water quality. The connection between environmental health and mental health is significant, as the impacts of climate change can contribute to mental health challenges.
- **Agriculture and Food Systems Impacts:** Vermont's climate is changing in ways that offer benefits to its agricultural system, such as longer growing periods—freeze-free periods have lengthened by twenty-one days since the early 1900s—and

milder temperatures, with an annual average temperature increase of 2°F (1.1°C) since the 1990s. These changes allow farmers to experiment with new crops and practices that were not previously viable in Vermont. However, the changing climate also presents challenges, negatively impacting fruit-bearing species like apple trees that need sufficient overwintering periods for successful growth in the next season. The maple syrup industry faces risks due to fluctuations in winter temperatures. Climate models predict tougher growing conditions due to increased variability in temperature and precipitation, including heavy rainfall and drought, which can lead to crop damage and failure.

- **Economic Impacts:** All sectors of Vermont's economy—including tourism, forestry, agriculture, maple sugaring, and recreation—will experience the impacts of climate change. As temperatures rise nationwide, Vermont may attract more summer "seasonal climate refugees" seeking relief from extreme heat. However, the state's winter recreation industry faces challenges; by 2080, the ski season could be shortened by two weeks under a low emissions scenario or by a month under a high emissions scenario, with only some ski areas remaining viable.
- **Equity in the Energy Economy:** Climate change significantly impacts equity and the energy economy, with disproportionate energy burdens affecting various segments of the Vermont population. The Vermont Climate Economy chapter of the Climate Action Plan demonstrates that low-income households may spend over 20% of their income on fossil fuels. Recognizing that energy burdens above 6% are high and those above 10% are severe, it is critical to understand the distribution of energy costs and income across different portions of the Vermont population.

3. Public Engagement

As described above, the Comprehensive Climate Action Plan builds upon the 2025 Climate Action Plan to meet the objectives set by the Global Warming Solutions Act. The following Public Engagement section is adapted from the Climate Action Plan. In service to the update of the Climate Action Plan, the Climate Action Office staff, in partnership with the Vermont Climate Council, provided public engagement and stakeholder input opportunities throughout the process of updating the Climate Action Plan. 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.

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. 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 1: Focus Groups hosted for the Climate Action Plan 2025 Update

January - 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
May 2025	
Youth Input Session in partnership with Vermont Energy Education Program	Virtual

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. 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 2: Public meetings hosted for the Climate Action Plan 2025 Update

June 2024	
Kick-Off Public Meeting	Virtual
Kick-Off Public Meeting	Virtual
October 2024	
Buildings and Thermal	Virtual
November 2024	
Municipal Day	Montpelier
Transportation	Virtual
Rural Resilience and Businesses	Virtual
Rural Resilience and Town Support	Virtual
Agriculture	Virtual
Municipal	Virtual
Municipal	Virtual

Natural Lands and Forestry Input Session	Virtual
April 2025	
Public Input Session	Virtual
Public Input Session	Hardwick
Public Input Session	Hinesburg
Public Input Session	St. Albans
Public Input Session	Bennington
Public Input Session	Rockingham
Public Input Session	Barre
Public Input Session	Rutland
May 2025	
Public Input Session	Virtual

Figure 1

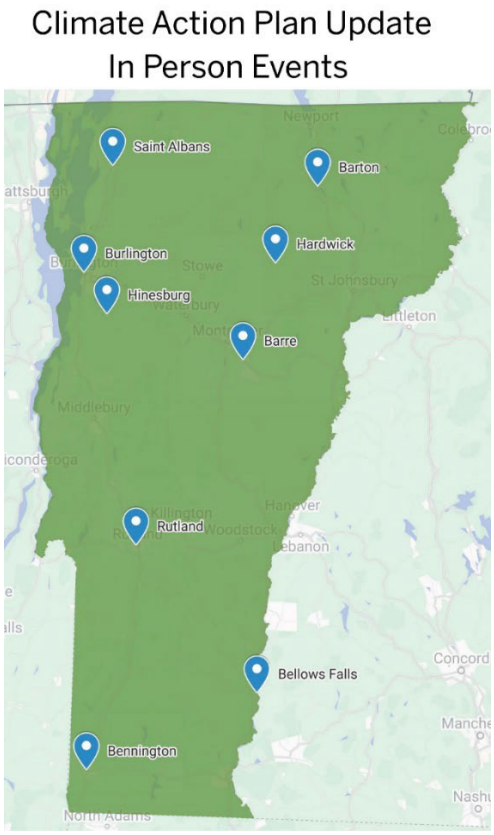

Figure 2

View summaries of fall and spring input sessions.

Climate Action Plan 2025 Public Engagement Timeline

	June 2024	Oct-Nov 2024	Oct-Nov 2024	April 2025	April-May 2025
ENGAGEMENT ACTIVITIES	Virtual kick-off events (2) 117 participants	Virtual topic-specific input sessions (8) 300 participants	In-person focus groups with frontline and impacted communities (2) 25 participants	In person input sessions (9) 245 participants	Virtual input sessions (3) 190 participants
CAP UPDATE STEP	Setting the stage, beginning subcommittee work	Before events, subcommittee recommendations were drafted/in progress. After events, subcommittee recommendations were finalized.		Before events, Climate Council recommendations were drafted. After events, Climate Council recommendations were finalized.	

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.

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 Climate Action 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. The priority actions related to emissions reductions served as a basis for the development of the measures in this Comprehensive Climate Action Plan. Many participants expressed that the Climate Action 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 Climate Action Plan will be released as well.

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.

4. Greenhouse Gas Inventory

The State of Vermont publishes the Vermont Greenhouse Gas Emissions Inventory and Forecast Report (GHG Inventory) annually, as required under Vermont statute 10 V.S.A. § 582. The inventory tracks emissions trends over time in units of million metric tons of carbon dioxide (CO2) equivalent (MMTCO2e) estimates for Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur hexafluoride (SF_6) to assess progress toward the state's legally mandated GHG reduction targets outlined in 10 V.S.A. § 578. These requirements were updated with the passage of the Global Warming Solutions Act (GWSA) (Act 153 as Enacted) in 2020. The GWSA sets the following reduction targets:

- 26% below 2005 levels by January 1, 2025
- 40% below 1990 levels by January 1, 2030
- 80% below 1990 levels by January 1, 2050

Due to the time lag in the release of federal datasets, the most recent GHG Inventory, released in July 2025, includes estimates for the years 1990 through 2022. The GHG Inventory quantifies historical greenhouse gas levels for two baseline years, 1990 and 2005. Historical emissions estimates are revised as necessary in each inventory update to reflect the latest data sources, changes in global warming potential (GWP) values, and methodological improvements. Emissions are tracked for the following sectors:

- Transportation
- Residential, Commercial, and Industrial (RCI) Fuel Use
- Agriculture
- Industrial Processes
- Electricity
- Waste
- Fossil Fuel Industry
- Land Use, Land-Use Change, and Forestry (LULUCF)

The GHG Inventory uses a gross accounting framework, meaning that carbon sequestration is not deducted within individual sector totals or the overall total.

Sequestration from carbon dioxide (CO_2) removal is accounted for and reported in the LULUCF sector. Biogenic CO_2 emissions are also tracked and presented as supplemental information in several sectors, though they are also not included in overall emission totals.

Inventory Methodology

The Vermont Greenhouse Gas Emissions Inventory and Forecast-Methodologies companion document discusses the methods and datasets used to generate the GHG Inventory estimates. The global warming potential (GWP) values have been updated from the previous 1990-2021 report to match the 100-year values used in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) per IPCC inventory guidelines. Estimates of emissions using the AR5 20-year GWP values are available for select years in the companion methodology document linked above.

The inventory is required to incorporate data from several state agencies and must be compatible with the Governor's Commission on Climate Change final report. Estimates of emissions in the GHG inventory have been calculated using methodologies based mainly on methods used in, or developed for, the Greenhouse Gas Inventory and Reference Case Projections, 1990-2030 report, and are compatible with the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Data availability determines the methodologies used in Vermont's Greenhouse Gas Emissions Inventory. Whenever possible, Vermont-specific datasets are used in each sector to estimate emissions. However, due to limitations in the availability of state-specific data that both cover the entire state and extend back to the 1990 baseline year, the inventory also relies on default federal datasets to ensure completeness and consistency across time that the U.S. Environmental Protection Agency (EPA) provides in the State Inventory Tool (SIT). This standardized framework facilitates emissions estimation while promoting consistency nationwide. The SIT incorporates major federal data sources—including those from the U.S. Department of Agriculture (USDA), the Energy Information Administration (EIA), and others—which can be replaced with more accurate state-level data when available and appropriate. In addition to SIT-based calculations, the inventory includes EPA-derived state-level emissions estimates based on the disaggregation of national data.

Inventory Results

In 2022, the Transportation and RCI Fuel Use sectors remained the most significant contributors to greenhouse gas (GHG) emissions in Vermont, continuing a long-standing trend. As illustrated in Figure 4, these two sectors represent almost three-quarters of Vermont's emissions profile.

Historically, the Transportation sector has been Vermont's highest-emitting sector. However, in the 2020 inventory, emissions from the RCI sector temporarily surpassed those from Transportation, as seen in Figure 5, largely due to the significant drop in travel during the COVID-19 pandemic. By 2021, statewide vehicle miles traveled (VMT) and gasoline sales had rebounded. VMT continued to rise in 2022, although gasoline and diesel sales remained relatively flat.

The Electricity sector, by contrast, continues to be one of Vermont's lowest-emitting sectors, contributing only 2.9% of statewide GHG emissions in 2022—a stark contrast to the national average, where nearly 25% of emissions are attributed to electricity use. Vermont's emissions from this sector include only those associated with electricity consumed in-state, regardless of where the electricity is generated. This accounting approach reflects the interconnected nature of the New England electric grid and Vermont's dependence on imported electricity, as the state consumes more than three times the amount of electricity it generates.

Vermont's low emissions totals from the electricity sector are due mainly to our reliance on hydroelectric and renewable energy generation. In the last several years, roughly 60% to 70% of the electricity in Vermont has been from hydroelectric generation, with electricity and renewable energy certificates (RECs) from Hydro-Québec (HQ) being over half of that total. Declines in emissions in the electric sector in recent years, shown in Figure 5, can be attributed to distribution utilities meeting and exceeding Renewable Energy Standard (RES) requirements for their electricity portfolios. Modifications to the Renewable Energy Standard (Act 179) were passed by the Vermont legislature in June 2024. Act 179 contains more ambitious requirements for in-state renewable energy generation and requires utilities to provide 100% renewable electricity to their customers by 2035.

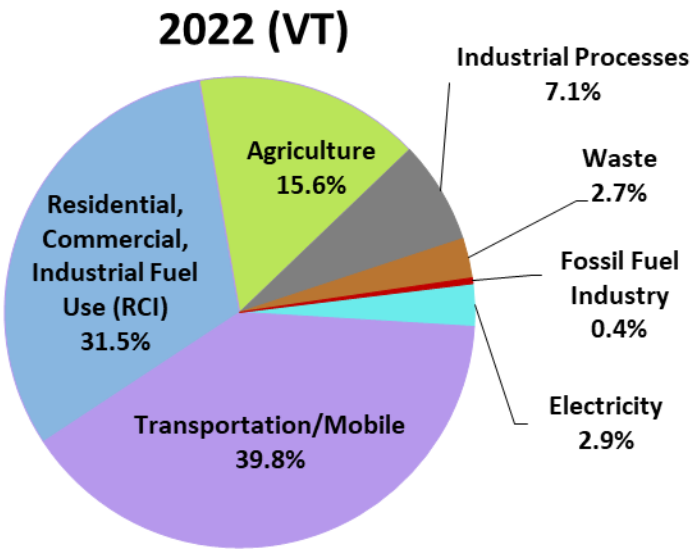

Figure 4: Vermont GHG percent contributions by sector.

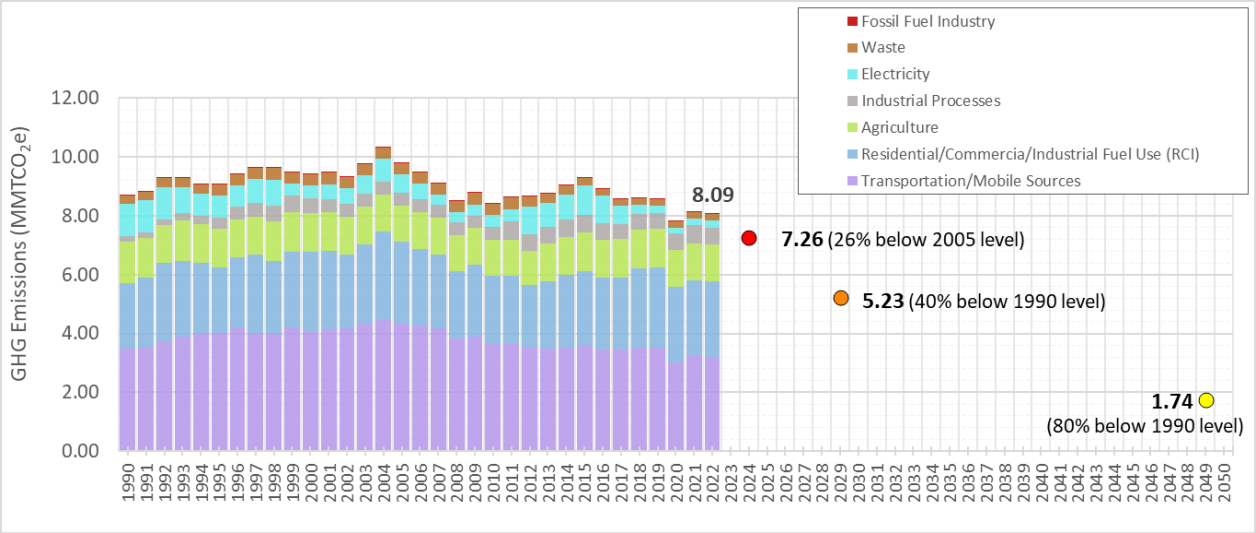

Figure 5: Vermont statewide greenhouse gas emissions levels and mandated reduction targets as defined in 10 V.S.A. § 578.

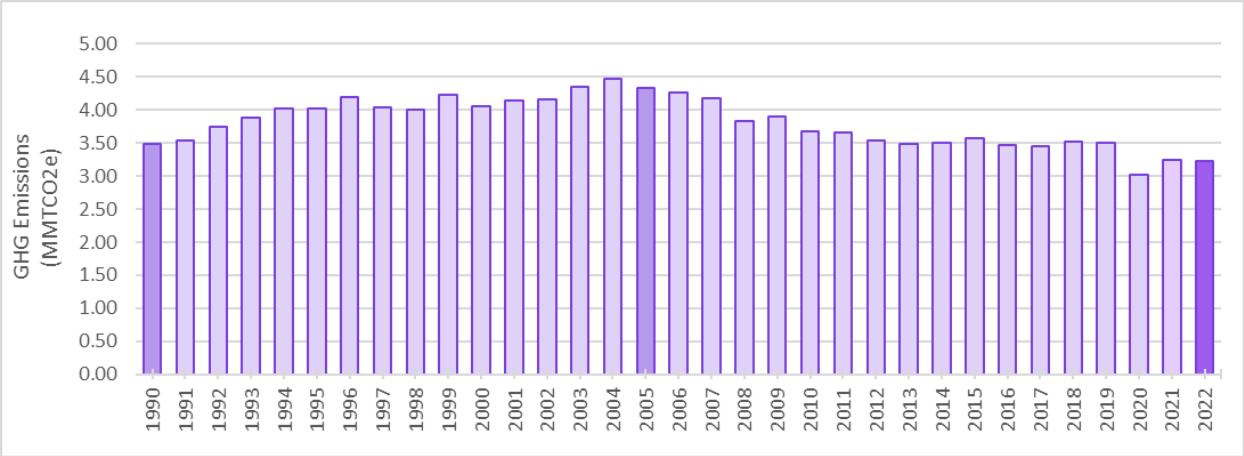

Figure 6: Vermont GHG emissions from transportation/mobile sources sector, 1990-2022; current inventory year (2022) and the 1990 and 2005 baseline years are highlighted.

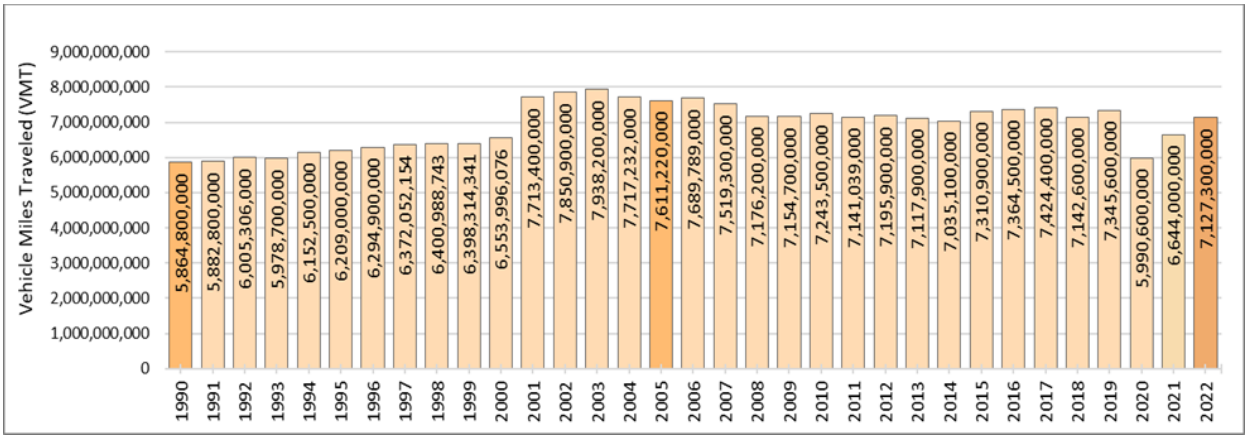

Figure 7: Vehicle miles traveled in Vermont by year, 1990-2022; current inventory year (2022) and the 1990 and 2005 baseline years are highlighted. (Data source: VTrans)

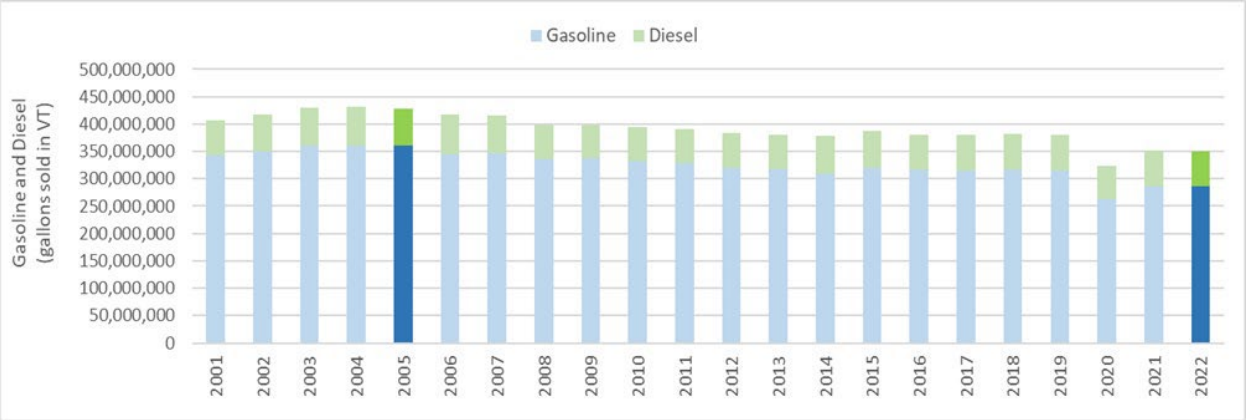

Figure 8: Gallons of gasoline and diesel sold in Vermont by year, 2001-2022; current inventory year (2022) and the 2005 baseline year are highlighted. (Data source: Joint Fiscal Office)

Table 3: Million Metric Tons CO_2 Equivalent by Sector for Select Years

Sector	Million Metric Tons CO_2 Equivalent: $MMTCO_2e$									
	1990	1995	2000	2005	2010	2015	2019	2020	2021	2022
Electricity Supply & Demand (consumption based)	**1.09**	**0.77**	**0.43**	**0.64**	**0.43**	**1.00**	**0.25**	**0.18**	**0.22**	**0.24**
Coal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.05	0.00	0.02	0.00	0.01	0.02	0.00	0.00	0.00	0.00
Oil	0.01	0.01	0.06	0.01	0.04	0.01	0.00	0.00	0.00	0.00
Wood (CH_4 & N_2O)	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Residual System Mix	1.03	0.75	0.35	0.62	0.36	0.96	0.24	0.16	0.21	0.22
Residential / Commercial / Industrial (RCI) Fuel Use	**2.25**	**2.24**	**2.73**	**2.78**	**2.31**	**2.56**	**2.75**	**2.57**	**2.56**	**2.55**
Coal	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.32	0.38	0.49	0.44	0.44	0.64	0.75	0.71	0.72	0.73
Oil, Propane & Other Petroleum	1.84	1.78	2.17	2.26	1.78	1.82	1.89	1.75	1.74	1.72
Wood (CH_4 & N_2O)	0.07	0.08	0.07	0.08	0.09	0.10	0.11	0.11	0.10	0.10
Transportation/Mobile Sources	**3.48**	**4.02**	**4.06**	**4.33**	**3.67**	**3.57**	**3.51**	**3.02**	**3.25**	**3.22**
Motor Gasoline (Onroad and Nonroad) (CO_2)	2.54	2.74	3.00	3.05	2.63	2.48	2.42	2.01	2.19	2.19
Diesel (Onroad and Nonroad) (CO_2)	0.72	1.07	0.84	1.02	0.88	0.94	0.96	0.90	0.92	0.90
Hydrocarbon Gas Liquids, Residual Fuel, Natural Gas (CO_2)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
Jet Fuel & Aviation Gasoline (CO_2)	0.08	0.06	0.07	0.13	0.07	0.08	0.07	0.06	0.09	0.09
Non-Energy Consumption - Lubricants (CO_2)	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01
All Mobile (CH_4, N_2O)	0.12	0.13	0.12	0.10	0.07	0.04	0.04	0.04	0.04	0.02
Fossil Fuel Industry	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**	**0.03**	**0.03**	**0.03**	**0.03**
Natural Gas Distribution	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Natural Gas Transmission	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03
Industrial Processes	**0.20**	**0.38**	**0.51**	**0.44**	**0.43**	**0.60**	**0.54**	**0.59**	**0.62**	**0.57**
ODS Substitutes	0.00	0.06	0.14	0.19	0.22	0.31	0.29	0.33	0.34	0.35
Electric Utilities (SF_6)	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Semiconductor Manufacturing (HFCs, PFCs & SF_6)	0.15	0.26	0.31	0.20	0.17	0.24	0.21	0.23	0.24	0.19
Limestone & Dolomite Use	0.00	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02
Soda Ash Use	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Urea Consumption	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waste Management	**0.29**	**0.35**	**0.39**	**0.37**	**0.39**	**0.25**	**0.23**	**0.22**	**0.23**	**0.22**
Solid Waste	0.24	0.30	0.33	0.31	0.32	0.18	0.16	0.15	0.15	0.15
Composting	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Wastewater	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Agriculture	**1.40**	**1.29**	**1.31**	**1.23**	**1.21**	**1.31**	**1.30**	**1.24**	**1.25**	**1.26**
Enteric Fermentation	0.82	0.78	0.82	0.76	0.74	0.77	0.78	0.76	0.75	0.75
Manure Management	0.18	0.16	0.15	0.13	0.11	0.10	0.10	0.10	0.09	0.10
Agricultural Soils	0.40	0.35	0.33	0.33	0.34	0.40	0.39	0.33	0.35	0.32
Liming and Urea Fertilization	0.00	0.00	0.00	0.00	0.01	0.05	0.04	0.05	0.06	0.10
TOTAL GROSS EMISSIONS	**8.72**	**9.07**	**9.44**	**9.81**	**8.44**	**9.31**	**8.60**	**7.85**	**8.16**	**8.09**
Land-use, Land Use Change, and Forestry (LULUCF)	**-8.34**	**-7.68**	**-7.01**	**-6.59**	**-6.31**	**-6.12**	**-5.84**	**-5.81**	**-5.75**	**-5.70**
Estimated Net Emissions Total	**0.38**	**1.39**	**2.43**	**3.22**	**2.13**	**3.19**	**2.76**	**2.04**	**2.40**	**2.40**

5. Near and Long-Term Greenhouse Gas Reduction Targets

In 2020, the Vermont Legislature passed the Global Warming Solutions Act (Act 153 as Enacted), which created legally binding emissions reduction requirements.

The Act was created in response to concerns around Vermont's changing climate and the magnitude of what must be done to reduce greenhouse gas emissions and prepare for the impacts of climate change on Vermont's landscape.

The Act requires Vermont to reduce greenhouse gas pollution to 26% below 2005 levels by January 1, 2025, achieve a reduction of 40% below 1990 levels by January 1, 2030, and reach 80% below 1990 levels by January 1, 2050. To determine whether Vermont met these statutory requirements, the state will use data from inventory years 2029 and 2049.

In addition to the emissions reductions required by the statute, the law also directs the Vermont Climate Council to consider opportunities for long-term carbon sequestration and strategies for helping Vermont communities prepare for the impacts of climate change.

6. Business as Usual (BAU) Greenhouse Gas Emissions Reductions

BAU Projections Methodologies

The Agency of Natural Resources utilized the Stockholm Environment Institute's Low Emissions Analysis Platform (LEAP) to model Vermont's economy-wide emissions. As described on the LEAP website:

> "LEAP is an integrated, scenario-based modeling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. It can be used to account for both energy sector and non-energy sector greenhouse gas (GHG) emission sources and sinks. In addition to tracking GHGs, LEAP can also be used to analyze emissions of local and regional air pollutants, and short-lived climate pollutants (SLCPs) making it well-suited to studies of the climate co-benefits of local air pollution reduction."

The model of the Vermont economy developed in LEAP, called Vermont Pathways, was used in Vermont as the modeling tool in support of both the 2021 Climate Action Plan and the 2022 Comprehensive Energy Plan. Vermont Pathways was updated in 2023 to support an analysis of policy options for reducing emissions in the thermal energy sector, and was updated again in 2025.

Key assumptions in the BAU scenario include the following:

- 2024 Renewable Energy Standard – 100% renewable electricity by 2035
- Low and Zero Emission Vehicles (LEV/ZEV) regulations; consistent residential weatherization funding levels from the Department of Public Service
- 100-year global warming potential values from the IPCC AR5 report[1]
- Fuel emission factors from Energy Sector Emissions Factors for Use in LEAP

[1] Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)). IPCC, Geneva, Switzerland, 2014.

Vermont Pathways incorporates data from numerous references. Key data sources include the Energy Information Administration Annual Energy Outlook 2025 for many energy-related assumptions, the World Bank Climate Change Knowledge Portal for heating and cooling degree day forecasts, the U.S. Bureau of Economic Analysis for gross state product, the Vermont Greenhouse Gas Inventory and Forecast for historical emissions by sector, and the National Renewable Energy Laboratory for costs of various technologies.

BAU Projection Results

The Agency of Natural Resources has developed near-term (by 2030) and long-term (by 2050) projections of GHG emissions that would occur in a "business-as-usual" (BAU) scenario. This scenario was updated in 2025 and accounts for the emissions impacts of all known state and federal programs currently applicable to Vermont and available to Vermonters to mitigate GHG emissions. Table 2 lists base year GHG emissions and near-term and long-term GHG emissions projections for Vermont under the BAU, and compared to the GHG reductions requirements of the Vermont GWSA. The GWSA requirements for Vermont are 40% below 1990 GHG emission levels by January 1, 2030; and 80% below 1990 GHG emission levels by January 1, 2050. The GWSA required emissions are shown here based on the most recent Vermont GHG Inventory report.

Table 4 indicates that Vermont needs to implement further mitigation measures to meet our required emissions requirements.

Table 4: Vermont Modeled Business as Usual and GWSA Target Emissions in Million Metric Tons CO2e (MMTCO2e)

Scenario	**1990** (MMTCO2e)	**2029** (MMTCO2e)	**2049** (MMTCO2e)
BAU MMT CO2e	8.72	7.49	5.1
GWSA Requirements	N/A (Base Year)	5.23	1.74

7. GHG Emissions Reduction Measures and Implementation Scenario Projections

GHG Emissions Reduction Measure Summary

The Greenhouse Gas (GHG) Emissions Reduction Measures Summary is a key element of the Comprehensive Climate Action Plan (CCAP), designed to address climate action across the state by targeting critical sectors such as Transportation, Residential, Commercial, and Industrial (RCI), Non-Energy, and Agriculture.

Table 5: GHG Emissions Reduction Measures Summary

Geographic Scope for all measures: Statewide	
Transportation	
CCAP Measure 1: Reduce Vehicle Miles Traveled	Reduce vehicle miles traveled (VMT) by increasing access to public transit, walking and biking, and compact settlement.
CCAP Measure 2: Reduce greenhouse gas emissions from vehicles	Reduce greenhouse gas emissions from vehicles by continuing to monitor and maintain Vermont's adoption of the California Advanced Clean Cars II (ACC II) and Advanced Clean Trucks (ACT), including adopting rule amendments adopted by the California Air Resources Board (CARB) that provide increased compliance flexibility.
Residential, Commercial, and Industrial (RCI)	
CCAP Measure 3: Weatherization and Energy Efficiency	Reduce greenhouse gas (GHG) emissions associated with buildings and facilities through cost-effective and affordable weatherization and energy efficiency improvements.

CCAP Measure 4: Electrification of Building Heating	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.
Non-Energy	
CCAP Measure 5: Non-combustion emissions reductions	Further reduce non-combustion emissions through development of strategies that look at refrigerants, semiconductors, waste, and wastewater.
Agriculture	
CCAP Measure 6: Soil health and sequestration	Improve soil health and increase carbon sequestration.

Implementation Scenario Projections

The Implementation Scenario Projections show greenhouse gas emissions across various sectors, illustrating the impact of proposed implementation measures. Table 6 presents emissions data in million metric tons of carbon dioxide equivalents (MMTCO2e) for each sector, starting from the base year of 1990, through the most recent inventory year of 2022, and projecting into the short-term scenario year of 2029 and the long-term scenario year of 2049.

This table highlights the changes in emissions for each sector, comparing baseline emissions to the projected emissions when implementing specific reduction measures. It is important to note that measure implementation in each of the sectors below is likely to have GHG emissions impacts on sectors that are not directly addressed, such as the electricity sector. Consequently, the total potential for emissions reduction across all sectors is likely greater than what is depicted in this table. The projections serve as a focused representation of sector-specific impacts, providing a clear view of how targeted strategies through measure implementation can contribute to overall emissions reduction goals.

Table 6: Implementation Scenario Projections for 2029 and 2049

Sector (Subsector[s])	Base Year (1990) Emissions in MMTCO2e	Most Recent Inventory Year (2022) Emissions in MMTCO2e	Short-Term Implementation Scenario Year (2029) Emissions in MMTCO2e	Long-Term Implementation Scenario Year (2049) Emissions in MMTCO2e
Transportation	3.26	3.09	2.69	0.38
Residential, Commercial, Industrial	2.25	2.55	1.68	0.77
Industrial Processes (Ozone Depleting Substances Substitution), Semiconductor Manufacturing)	0.15	0.54	0.33	0.23
Waste (Wastewater Methane)	0.05	0.06	0.06	0.20
Agriculture (Agricultural Soils)	0.40	0.32	0.28	0.27

GHG Emissions Reduction Measures

The following sections outline each measure of the CCAP and the necessary components to carry implementation forward.

Transportation

Greenhouse gas emissions from the transportation sector have consistently been higher than any other sector. Only during the COVID pandemic did emissions from this sector fall below the RCI Sector. The state has implemented regulations aimed at requiring manufacturers to deliver for sale cleaner vehicles to the market, and the legislature has authorized and funded programs to incentivize the purchase and use of these vehicles in

Vermont, as well as expand and accelerate other transportation solutions that reduce reliance on single occupancy vehicles. The success of these policies and programs in driving innovation in the automobile industry to produce cleaner technologies, coupled with the recent development of more robust state vehicle purchase incentives and investments in electric vehicle charging stations, has yielded a slow but steady increase in electric vehicles in the Vermont fleet.

Measure 1: Reduce vehicle miles traveled by increasing access to public transit, walking and biking, and compact settlement

Measure Description

Vehicle Miles Traveled (VMT) reduction in a largely rural state presents a significant challenge. This measure responds to this challenge with a range of programs and policies that can reduce emissions, improve public health, and provide improved mobility options across the state. 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. This measure incorporates near, medium, and long-term strategies for reducing vehicle miles traveled. Some strategies (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. Building out a planned "smart growth" community center will take decades to meaningfully affect climate emissions.

Measure 2: Reduce greenhouse gas emissions from vehicles by continuing to monitor and maintain Vermont's adoption of the California Advanced Clean Cars II (ACC II) and Advanced Clean Trucks (ACT), including adopting rule amendments adopted by the California Air Resource Board (CARB) that provide increased compliance flexibility.

Measure Description

Acceleration of electric vehicle adoption is a critical component to achieving emissions reductions. In 2022, Vermont adopted both the Advanced Clean Cars (ACC) II program and the Advanced Clean Trucks (ACT) regulations. 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 ensure that cleaner, more affordable vehicles are delivered to Vermont.

Implementation Authority and Responsibilities:

The implementation of transportation measures aimed at reducing greenhouse gas emissions in Vermont involves multiple authorities and stakeholders. The Vermont Agency of Transportation (VTrans) is primarily responsible for overseeing the execution of transportation policies and programs. VTrans collaborates with other state agencies, such as the Vermont Agency of Natural Resources, to ensure alignment with environmental goals. The Vermont Agency of Natural Resources plays a crucial role in program monitoring and evaluation, ensuring that initiatives meet environmental standards and contribute effectively to emissions reduction targets. Local governments and regional planning commissions are involved in implementing community-specific initiatives, such as public transit improvements and infrastructure development for biking and walking. The legislature provides the necessary legal framework and funding to support these initiatives. Additionally, partnerships with community-based organizations and private sector entities, including vehicle manufacturers and charging station providers, are essential for advancing electric vehicle adoption and infrastructure development.

Metrics for Tracking Progress:

Progress in reducing transportation-related emissions can be tracked using the following key metrics:

- Measure 1 Reduce Vehicle Miles Traveled: Reduction in Vehicle Miles Traveled
- Measure 2 Advanced Clean Cars II and Advanced Clean Trucks:
    - Reduction in on-road transportation greenhouse gas emissions
    - Number of battery electric vehicles (BEVs) and plug in hybrid electric vehicles (PHEVs)

Table 7: Quantified Cumulative GHG Emissions Reductions from 2025 to 2029 and 2025 to 2049 measured in million metric tons of carbon dioxide equivalents (MMTCO2e)

Measures	**2025 – 2029** (MMTCO2e)	**2025 – 2049** (MMTCO2e)
Measure 1: Reduce Vehicle Miles Traveled	0.21	2.12
Measure 2: Reduce greenhouse gas emissions from vehicles	0.43	15.32

Measure Costs

The cost encompasses both the expenses of implementing the measure and any other costs or savings that result from implementation, such as additional costs or savings (savings indicated by parentheses) in fuel or externalities. The cost also includes the social cost of greenhouse gases.[2]

Table 8:Transportation Measure Costs

Measures	**2025-2029** (USD)	**2025-2049** (USD)
Measure 1: Reduce Vehicle Miles Traveled	$61,734,000	$1,114,176,000
Measure 2: Reduce greenhouse gas emissions from vehicles	$427,506,000	$1,655,172,000

Intersection with other funding availability:

The implementation of transportation measures intersects with various funding sources, including federal, state, and local funds. Federal programs, such as those administered by the U.S. Department of Transportation, offer grants and incentives for infrastructure development and clean vehicle adoption. State funding, authorized by the Vermont legislature, supports specific initiatives like vehicle purchase incentives and public transit improvements. Local governments may allocate funds for community-specific projects, such as bike paths and smart growth developments. Additionally, private sector investments, particularly in electric vehicle infrastructure, complement public funding efforts. Coordination among these funding sources is crucial to maximize the impact of transportation measures and ensure comprehensive coverage across the state.

Implementation Schedule and Milestones:

[2] Environmental Protection Agency, *EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* (EPA, 2023).

The implementation schedule and milestones associated with these measures will advance progress towards meeting the greenhouse gas emissions reductions mandated by Vermont's Global Warming Solutions Act (GWSA): 26% below 2005 levels by January 1, 2025, 40% below 1990 levels by January 1, 2030, and 80% below 1990 levels by January 1, 2050. For GHG emissions reductions milestones associated with transportation measures, please refer to Table 7 above. These milestones represent targets. To achieve these targets, the changes from baseline levels for electric vehicle deployment and VMT reductions in the years 2029 and 2049 are as follows:

Table 9:Target Changes from Baseline Levels in Transportation Metrics

Measures	**Metric**	**2029**	**2049**
Measure 1: Reduce Vehicle Miles Traveled	Decrease in VMT (miles)	98,425,000 (-2.2%)	648,891,722 (-9.6%)
Measure 2: Advanced Clean Cars II and Advanced Clean Trucks	Number of additional EV/PHEVs	16,474 (+24.5%)	180,047 (+63%)

Vermont is not yet on pace to meet these targets: progress to date reflects the "business as usual" scenario described above and funding rollbacks continue. That said, the State is working to meet the pace and scale required to reach these targets. In the transportation sector, the State is engaged in programs to accelerate the reduction of greenhouse gas emissions. This includes monitoring and supporting the implementation of California's Advanced Clean Cars II (ACC II) and Advanced Clean Trucks (ACT) regulations. These regulations are crucial for ensuring that Vermont receives cleaner, more efficient vehicles, thereby contributing to the state's emissions reduction goals.

Residential, Commercial, and Industrial (RCI)

Vermont has some of the oldest housing stock in the country, making decarbonization extremely challenging in this sector. The heating and cooling requirements of those buildings impose substantial energy costs and produce nearly a third of the state's GHG emissions. Energy use in residential homes dominates the thermal sector. The cost of heat

disproportionately burdens lower-income Vermonters with high energy related expenses relative to their income.

Measure 3: Reduce GHG emissions associated with buildings and facilities through weatherization and energy efficiency improvements.

Measure Description

There is a significant need for energy efficiency upgrades to single households and multi-family buildings in Vermont, including weatherization activities and the complementary work required to facilitate these projects, such as electric panel service upgrades. A robust suite of efficiency and weatherization programs are currently administered by Vermont's energy efficiency utilities and the Weatherization Assistance Program. This measure aims to further reduce GHG emissions, while providing substantial benefits to low- and moderate-income Vermonters with higher energy burdens in the form of cost-savings and reduced exposure to poor air quality (indoor and ambient). This measure will complement existing funding and programs by capitalizing on existing administrative structures and partnerships.

Measure 4: Reduce GHG emissions by promoting 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

Measure Description

Heat in Vermont comes predominantly from fossil fuels (72%) with smaller fractions from wood heat (24%), electricity (3%), and some alternative fuels. This measure promotes the installation of high-efficiency electric space and water heating equipment, such as heat pumps. Electrification of carbon intensive, fossil-fueled building space and water heating systems can greatly lower costs over time and contribute to Vermont meeting its climate commitments. Moreover, by focusing on the most burdened households and businesses, Vermont can pair clean fuel options with weatherization programs to deliver low-carbon building solutions to those who need them the most.

Implementation Authority and Responsibilities:

The implementation of measures to reduce greenhouse gas emissions in Vermont's RCI sector involves several key authorities and stakeholders. The Vermont Department of Public Service (PSD) is responsible for overseeing energy policy and ensuring compliance with state energy goals. Additionally, PSD currently manages contracts with several

entities for the deployment of thermal efficiency programs across Vermont. The Vermont Agency of Natural Resources, in consultation with PSD, plays a crucial role in reviewing and understanding the potential benefit of adopting emissions standards for heating equipment. Efficiency Vermont, along with other utility efficiency programs, administers weatherization and energy efficiency initiatives, providing technical assistance and financial incentives to households and businesses. The Weatherization Assistance Program specifically serves low-income households, helping them reduce energy costs and improve living conditions. Local governments and housing authorities are involved in implementing building codes and standards, particularly for new construction and affordable housing projects. Collaboration with private developers and housing organizations is essential to incentivize high-performance building standards and ensure equitable access to energy-efficient technologies.

Metrics for Tracking Progress:

Progress in reducing emissions and improving energy efficiency in the RCI sector can be tracked using the following key metric:

- Measure 3 Weatherization and Energy Efficiency & Measure 4 Electrification of Building Heating: Reduction in greenhouse gas emissions associated with weatherization and beneficial electrification efforts
- Measure 3 Weatherization and Energy Efficiency: Number of additional weatherization retrofit projects completed since 2025
- Measure 4 Electrification of Building Heating: Number of additional residential heat pumps installed since 2025

Table 10: Quantified Cumulative GHG Emissions Reduction 2025 to 2029, 2049

Measures	**2025 - 2029** (MMTCO2e)	**2025 - 2049** (MMTCO2e)
Measure 3: Weatherization and Energy Efficiency	0.08	0.80
Measure 4: Electrification of Building Heating	1.59	14.33

Measure Costs

The cost encompasses both the expenses of implementing the measure and any other costs or savings (savings indicated by parentheses) that result from implementation, such as additional costs or savings in fuel or externalities. The cost also includes the social cost of greenhouse gases.[3]

Table 11: Residential Commercial Industrial (RCI) Measure Costs

Measures	**2025-2029 (USD)**	**2025-2049** (USD)
Measure 3: Weatherization and Energy Efficiency	$309,294,000	$589,165,000
Measure 4: Electrification of Building Heating	($476,902,000)	($5,163,493,000)

Intersection with other funding availability:

The implementation of RCI measures in Vermont is supported by a diverse array of funding sources that support energy efficiency and emissions reduction efforts. Federal programs, such as those from the U.S. Department of Energy, provide essential grants and incentives for weatherization and energy efficiency upgrades. At the state level, funding directed by legislative priorities focuses on alleviating energy burdens for low- and moderate-income households through initiatives like the Weatherization Assistance Program and Efficiency Vermont. Local governments contribute by facilitating community-specific projects, such as enforcing enhanced building codes and supporting affordable housing developments that exceed energy standards. Additionally, private sector investments play a crucial role in advancing high-performance building technologies and renewable energy systems, often leveraging public funds to expand the reach and effectiveness of energy efficiency

[3] Environmental Protection Agency, *EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* (EPA, 2023).

programs. However, the changing landscape of federal funding poses challenges and potential risks of reduced support for energy programs, which could impact the continuity and expansion of these initiatives. This collaborative approach, which aligns federal, state, local, and private resources, ensures that energy efficiency measures are accessible to all residents, particularly those most affected by high energy costs, maximizing the impact of funding and supporting Vermont's broader climate and economic goals.

Implementation Schedule and Milestones:

As described above for transportation measures, the implementation schedule and milestones associated with RCI measures will advance progress towards meeting the greenhouse gas emissions reductions mandated by Vermont's GWSA. For GHG emissions reductions milestones associated with RCI measures, please refer to Table 11 above. These milestones represent targets. To achieve these targets, the required implementation schedules for residential weatherization retrofits and heat pump installations, relative to the baseline, are included below:

Table 12: Target Changes from Baseline Levels in RCI Metrics

Measures	**Metric**	**2029**	**2049**
Measure 3: Weatherization and Energy Efficiency	Number of additional weatherization retrofit projects completed since 2025	36,342 (+167%)	121,268 (+185%)
Measure 4: Electrification of Building Heating	Number of additional residential heat pumps installed since 2025	2,858 (+10.8%)	20,396 (+16.9%)

Although Vermont is currently not on track to meet these targets and federal funding rollbacks present further challenges, the state is actively working to align with the required pace and scale. The "business as usual" scenario modeling, described above in this plan, illustrates Vermont's current progress relative to these targets.

To support these goals, Vermont is leveraging key programs such as the Weatherization Assistance Program and Efficiency Vermont to enhance energy efficiency in buildings. Additionally, the state is promoting the electrification of heating systems. These programs are integral to the implementation schedule, providing the necessary infrastructure and incentives to accelerate progress towards the state's emissions reduction milestones.

Non-Energy

Non-energy encompasses emissions from industrial processes, solid waste, wastewater, and other sectors that comprise about 10.5% of Vermont's GHG emissions. Key sources include the use of ozone-depleting substance substitutes, semiconductor manufacturing, fugitive methane emissions, and others. 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) than carbon dioxide (CO2). 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 near-term GHG reductions in Vermont. By addressing emissions from refrigerants, semiconductor manufacturing, wastewater, and waste management, Vermont is taking steps to reduce its greenhouse gas footprint.

Measure 5: Further reduce non-combustion emissions through development of strategies that look at refrigerants, semiconductors, waste, and wastewater.

Measure Description:

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, 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.

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.

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 emissions 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. 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.

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. A critical next step in this measure is installing or repairing functional flares at the next facility upgrades. Additionally, requiring waste heat recovery capabilities in new wastewater system projects and significant expansions is 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.

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 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 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 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. These waste prevention and reduction strategies will continue to contribute to overall non-energy emissions reductions across Vermont.

Implementation Authority and Responsibilities

The Agency of Natural Resources (ANR) and the Vermont Department of Environmental Conservation (DEC) serve as the lead implementers in the effort to reduce non-energy emissions across the state. ANR is responsible for overseeing and coordinating the various strategies aimed at addressing emissions from industrial processes, waste management, and wastewater treatment facilities. DEC manages initiatives such as the Reduce, Reuse, and Repair Network and ensures the functionality of flares at wastewater treatment facilities. Supporting these efforts, private sector partners such as the Vermont Energy Investment Corporation (VEIC) play a critical role by providing incentives and technical support for upgrading refrigeration systems, utilizing grant funding managed by ANR. Additionally, Global Foundries is actively involved in implementing emissions reduction technologies within the semiconductor manufacturing sector.

Metrics for Tracking Progress

- Measure 5: Reduction in emissions from refrigeration systems, measured in CO2-equivalent tons.
- Measure 5: Reduction in emissions from semiconductor manufacturing, measured in CO2-equivalent tons.
- Measure 5: Reduction in methane emissions from WWTFs, measured in CO2-equivalent tons.

Table 13: Quantified Cumulative GHG Emissions Reduction 2025 to 2029, 2049

Measures	**2025 - 2029** (MMTCO2e)	**2025 – 2049** (MMTCO2e)
Measure 5: Reduction in emissions from refrigeration systems	0.97	7.96
Measure 5: Reduction in emissions from semiconductor Manufacturing	0.05	0.41
Measure 5: Reduction in emissions from wastewater	0.01	0.29

Scenario		**2025 - 2029** (USD)	**2025 – 2049 (USD)**
Measure 5: Reduction in emissions from refrigeration systems	ODS Substitution	($71,458,000)	($691,150,000)
Measure 5: Reduction in emissions from semiconductor Manufacturing	Semiconductor Manufacturing	($8,472,000)	($71,075,000)
Measure 5: Reduction in emissions from wastewater	Wastewater Methane	($749,000)	($20,393,000)

Table 14: Non-Energy Measure Costs

Measure Costs

The cost encompasses both the expenses of implementing the measure and any other costs or savings (savings indicated by parentheses) that result from implementation, such as additional costs or savings in fuel or externalities. The cost also includes the social cost of greenhouse gases.[4]

[4] Environmental Protection Agency, *EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* (EPA, 2023).

Intersection with other funding availability

The successful implementation of Vermont's strategies to reduce non-energy emissions is closely tied to the availability of state and federal funding. State funding plays a crucial role in supporting initiatives such as waste reduction programs and the integration of waste heat recovery capabilities at wastewater treatment facilities. The Vermont Energy Investment Corporation (VEIC) receives funding from ANR to provide incentives and technical support for upgrading refrigeration systems. Additionally, the CHIPS Act, a federal funding source, offers opportunities for Global Foundries to secure financial support for research and development of emissions reduction technologies in semiconductor manufacturing. By effectively coordinating these state and federal funding streams, Vermont aims to achieve substantial reductions in non-energy emissions.

Implementation Schedule and Milestones

Key milestones for achieving emissions reductions in three segments of Vermont's non-energy sector are detailed above in Table 13. Although Vermont is not currently on track to meet these targets, the state is actively working to achieve the required pace and scale. The "business as usual" scenario modeling presented above illustrates Vermont's current progress relative to these targets.

To advance towards these milestones, ANR is implementing strategies outlined in the Measure 5 description. These include incentivizing the use of lower GWP refrigerants, enhancing semiconductor manufacturing processes, and improving methane management at wastewater treatment facilities. Additionally, waste reduction initiatives are being promoted by the Vermont DEC. These efforts highlight the state's attempts to accelerate non-energy sector decarbonization activities, working toward an implementation schedule that meets emissions reduction goals.

Agriculture

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

Measure 6: Improve soil health and increase carbon sequestration.

Measure Description

Vermont's 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. There is an opportunity to expand existing state programs that support agricultural practices that sequester carbon. These programs are administered by the Vermont Agency of Agriculture, Food, and Markets (AAFM) and include the Capital Equipment Assistance Program, Pasture and Surface Water Fencing Program, and the Grassed Waterway and Filter Strip Program. Funded practices would include: 1) agroforestry and silvopasture practices that integrate woody vegetation into agricultural land, 2) grazing practices that increase vegetative cover and forage, 3) edge-of-field practices that increase herbaceous and woody vegetation, and 4) agronomic practices that reduce tillage and increase vegetative cover. Expanding these programs not only achieves emissions reductions through sequestration but also positively impacts farmers in low-income communities by supporting their work to improve practices.

Implementation Authority and Responsibilities

The Vermont Agency of Agriculture, Food, and Markets (AAFM) is the primary implementer of measures to improve soil health and increase carbon sequestration in the agricultural sector. AAFM is responsible for coordinating efforts to enhance carbon sequestration and support climate-smart practices on agricultural lands. By leveraging its expertise and relationships with private landowners, AAFM aims to enhance Vermont's agricultural management practices. AAFM administers programs such as the Capital Equipment Assistance Program (CEAP), Farm Agronomic Practices (FAP), and others that support sustainable agricultural practices.

Metric for tracking Progress

- Measure 6: Increase in the amount of carbon sequestered annually by agricultural soils, measured in metric tons of CO2-equivalent.

Table 15: Quantified Cumulative GHG Emissions Reduction 2025 to 2029, 2049

Measures	**2025 - 2029** (MMTCO2e)	**2025 – 2049** **(**MMTCO2e)
Measure 6: Soil health and sequestration	0.08	1.28

Measure Costs

The cost encompasses both the expenses of implementing the measure and any other costs or savings that result from implementation, such as additional costs or savings (savings indicated by parentheses) in fuel or externalities. The cost also includes the social cost of greenhouse gases.[5]

Table 16: Agriculture Measure Costs

Measures	**2025 - 2029** (USD)	**2025 - 2049** (USD)
Measure 6: Soil health and sequestration	($5,698,000)	($89,551,000)

Intersection with other funding availability:

The implementation of agricultural strategies to improve soil health and increase carbon sequestration in Vermont is supported by a combination of state and federal funding sources. State programs administered by AAFM provide financial assistance for practices that enhance carbon sequestration and soil health. These programs, such as the Capital Equipment Assistance Program (CEAP) and Farm Agronomic Practices (FAP), are crucial

[5] Environmental Protection Agency, *EPA Report on the Social Cost of Greenhouse Gases: Estimates Incorporating Recent Scientific Advances* (EPA, 2023).

for supporting farmers in adopting sustainable practices. Additionally, federal funding sources, such as the Conservation Reserve Enhancement Program (CREP), complement state efforts by providing resources for land conservation and restoration projects. The integration of these funding streams allows Vermont to expand its capacity to meet the growing demand for carbon-benefit programs in the agricultural sector. Furthermore, the development of Payment for Ecosystem Services programs and dedicated climate impact emergency recovery funding will provide additional financial support to encourage the adoption of practices that improve soil health, increase carbon storage, and enhance climate resilience.

Implementation Schedule and Milestones

Key milestones for achieving soil sequestration targets, and thus overall emissions reductions associated with the agriculture sector, are detailed in Table 15. Although Vermont is not currently on track to meet these targets, the state is actively working to achieve the required pace and scale. The “business as usual” scenario modeling presented above illustrates Vermont's current progress relative to these targets.

To advance towards these milestones, the Vermont Agency of Agriculture, Food, and Markets (AAFM) administers programs that continue to enhance carbon sequestration across the state. This includes but is not limited to programs such as the Capital Equipment Assistance Program, Pasture and Surface Water Fencing Program, and the Grassed Waterway and Filter Strip Program to promote practices such as agroforestry, silvopasture, and reduced tillage.

8. Benefits Analysis

Benefits Analysis Methodologies

As described in the Business as Usual (BAU) Projections Methodologies section, the LEAP model can estimate emissions of local and regional air pollutants and short-lived climate pollutants. The model incorporates emission factors for these pollutants. It can calculate the non-greenhouse gas emission reductions expected from mitigation measures primarily intended to reduce greenhouse gas emissions, such as electrification in the transportation or RCI sectors.

Table 17: Co-pollutant Emission Reductions, metric tons (MT) from baseline

Pollutant: PM2.5	**2025-2029** (MT)	**2025-2049** (MT)
VMT Reduction	33	349
Internal Combustion Engine (ICE) Sales Phase Out	156	2,617
Weatherization at Scale	569	7,414
Beneficial Electrification	270	3,142
Ozone Depleting Substances (ODS) Substitution	0	0
Semiconductor Manufacturing	0	0
Wastewater Methane	0	0

Pollutant: N2O	**2025-2029** (MT)	**2025-2049** (MT)
VMT Reduction	1,564	24,099
ICE Sales Phase Out	5,672	231,833
Weatherization at Scale	233	2,367
Beneficial Electrification	2,826	26,881

ODS Substitution	0	0
Semiconductor Manufacturing	0	0
Wastewater Methane	0	0

Pollutant: non-methane VOC	**2025-2029** (MT)	**2025-2049** (MT)
VMT Reduction	3,471	29,032
ICE Sales Phase Out	4,343	172,622
Weatherization at Scale	585	7,761
Beneficial Electrification	6,900	54,036
ODS Substitution	0	0
Semiconductor Manufacturing	0	0
Wastewater Methane	0	0

Pollutant: SO2	**2025-2029** (MT)	**2025-2049** (MT)
VMT Reduction	6	76
ICE Sales Phase Out	78	660
Weatherization at Scale	17	114
Beneficial Electrification	67	647
ODS Substitution	0	0
Semiconductor Manufacturing	0	0
Wastewater Methane	0	0

Resilience and Adaptation Benefits

Many of the measures described here have strong co-benefits of increased resilience and adaptation to the conditions caused by climate change. A discussion of these co-benefits is below.

Public Health

The more greenhouse gases emitted into the atmosphere, the more we can expect the planet to warm, resulting in more severe extreme weather and health impacts. Many, if not all, of the measures included will also improve public health. Often, these actions provide immediate health, environmental, economic, or other benefits today while also reducing potential impacts of climate change in the future. Many of these actions are considered "win-win" strategies because they will provide multiple benefits to society even if future climate change has less impact than is currently expected. Measures that reduce greenhouse gas emissions will also bring about substantial improvements in human nutrition and human movement, two of the most important determinants of health. Vehicle electrification and increased use of transit will reduce vehicle emissions and therefore improve air quality. The development of compact, mixed-use city, town, and village centers with safe and complete pedestrian and bicycling facilities will increase physical activity, improve access to jobs, businesses, and other destinations, reduce vehicle emissions due to less travel, and improve air quality. Increased energy efficiency of buildings will increase indoor comfort with lower heating and cooling costs and improve air quality. Additional outcomes of Non-Energy include the avoided use of systems that use refrigerants that contain high GWP refrigerants and toxic compounds that can harm human health.

Working Lands

Vermont's working lands are not only a key component of climate mitigation but also serve the function of safeguarding ecosystems, promoting biodiversity, and mitigating the impact of extreme weather events on agriculture, forestry, and water resources. Carbon sequestration in agricultural landscapes is closely linked to soil health: healthy soils store more carbon through the development of soil aggregates, root exudates that feed microbial life, and the formation of stable organic matter. Investing in soil health has numerous co-benefits, which include making agricultural land more resilient to extreme weather events, such as droughts and floods, and reducing runoff, leading to improved water quality.

Buildings

Measures that mitigate emissions from buildings by improving building envelopes and switching fossil fueled appliances to electric solutions will have a significant impact on Vermont's ability to reduce GHG emissions economy wide. There is also an opportunity for this important work to consider how a building and its systems can be more resilient to recent and severe weather events, like the devastating flooding events that occurred throughout Vermont in 2023 and 2024. Improved building envelopes and electric appliances can also aid in the increased resilience of individuals to other climate change impacts such as extreme heat and poor air quality due to wildfire smoke. More efficient building heating and cooling systems result in lower costs for residents, and ultimately an increased capacity to recover from climate change stressors.

Potential Disbenefits

For a discussion of potential disbenefits and recognizing the important aspect of equity in the energy economy, please refer to the Equity in the Energy Economy discussion of Impacts of Climate Change in Vermont, Introduction Chapter of this Comprehensive Climate Action Plan and the Vermont Climate Economy chapter in the Climate Action Plan.

9. Workforce Planning Analysis

The following analysis considers the impact of CCAP measures on Vermont's workforce, highlighting priority occupations and roles in the clean energy sector. It also discusses the challenges faced by the workforce and strategies to strengthen Vermont's clean energy workforce.

Recognizing that Vermont's current workforce capacity presents challenges to achieving climate goals, developing a clean energy workforce is essential for equipping workers to meet the demands of a climate-resilient economy. This section offers data and insights into the historical and projected growth of the clean energy workforce, providing a comprehensive understanding of an evolving industry landscape.

Transportation Workforce

- In the transportation sector, job opportunities are expected to arise from retraining and trade transition in the electric vehicles and truck space, as well as opportunities in the technical education space for students interested in pursuing an auto mechanical career. The Agency of Natural Resources and Agency of Transportation will continue to coordinate with Drive Electric Vermont. This initiative, operated by VEIC and funded by the Vermont Agency of Transportation, the Agency of Natural Resources, Efficiency Vermont, and other public and private partners, promotes electric vehicle adoption through education, incentives, charging infrastructure, and stakeholder collaboration.

Residential, Commercial, and Industrial (RCI) Workforce

- Measures in the residential, commercial, and industrial space are likely to create even greater demand for thermal efficiency contractors, plumbers, electricians, and Heating, Ventilation, and Cooling technicians, and therefore existing workforce development programs will need to further support this need. Current programs include incentives for contractors to deploy thermal efficiency projects in impacted and frontline communities, helping to focus the demand for this work where it will have the most impact.

Non-Energy Workforce

- High-quality jobs are likely to be created to increase the capacity for refrigerant recovery at waste management entities. The refrigerant recovery measure will include funding to train the workforce that will be required to realize the avoided emissions associated with the increased staff capacity to implement a refrigerant recovery program.

Agriculture Workforce

- There are likely to be new workforce opportunities for those interested in assisting farmers in their adoption of soil health practices that increase rates of carbon sequestration. Additionally, tree nursery and planting resources will likely be an increased need as programs that promote increased vegetation and land conservation rise in demand. Land acquisition and conversation measures are expected to yield the creation of additional workforce opportunities in transitioning marginal farmland to wetlands and making the remaining farmland more economically viable, keeping land forested and supporting the forest economy workforce, and supporting public land acquisition that grows the outdoor recreation economy in Vermont.

Clean Energy Workforce Overview

Vermont leads the nation in clean energy jobs per capita. According to the 2025 Vermont Clean Energy Industry Report (VCEIR), as of 2025, there were over 18,300 clean energy jobs across Vermont, representing approximately 6 percent of the total workforce. Clean energy jobs have increased by 16 percent over the past decade.[15]

The 2025 VCEIR examined clean energy employment by technology sector, identifying 10,802 jobs in energy efficiency, 5,066 jobs in renewable energy, and 1,708 jobs in clean transportation. The VCEIR also examined employment by value chain segment: installation, maintenance, and repair operations accounted for the largest share of clean energy jobs, followed by engineering, research, and professional services, trade and distribution, manufacturing, and utilities.[15]

In an exploration of Vermont's clean energy workforce demographics, the VCEIR highlights that the state’s clean energy workforce is significantly younger than its overall workforce, with 15 percent of clean energy jobs held by those over the age of 55 compared to 27 percent statewide.

Priority Occupations and Primary Roles

The table below lists priority occupations for implementing this plan's GHG emission reductions measures. These occupations are closely tied to the value chain segments in which the VCEIR identified clean energy jobs, particularly the 'installation, maintenance, and repair operations' segment. This segment represents not only the largest, but also the fastest growing share of clean energy jobs.

Table 18: Priority Occupations for implementing CCAP Measures

Priority Occupations for implementing Vermont CCAP Measures	Bureau of Labor Statistics SOC Code	Vermont Employment - May 2024	U.S. Employment - May 2024	Vermont Annual Median Wage - May 2024	U.S. Annual Median Wage - May 2024
Maintenance and Repair Workers, General	49-9071	2,320	1,531,700	$53,290	$48,620
Home Appliance Repairers	49-9031	60	31,940	$57,500	$49,410
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	49-9021	1,050	396,870	$60,170	$59,810
Automotive Service Technicians and Mechanics	49-3023	1,730	688,840	$50,010	$49,670
Solar Photovoltaic Installers	47-2231	60	28,280	$64,230	$51,860
Plumbers, Pipefitters, and Steamfitters	47-2152	960	455,940	$60,550	$62,970
Insulation Workers, Floor, Ceiling, and Wall	47-2131	80	38,610	$52,000	$48,680

Electricians	47-2111	1,410	742,580	$59,670	$62,350
Construction Laborers	47-2061	1,560	1,057,660	$46,700	$46,730
Urban and Regional Planners	19-3051	140	43,040	$82,230	$83,720
Environmental Engineers	17-2081	70	37,950	$85,950	$104,170
Civil Engineers	17-2051	750	355,410	$85,720	$99,590

Wage and employment data from the U.S. Bureau of Labor Statistics Occupational Employment and Wage Statistics program.[5]

The primary roles filled by these priority occupations are summarized below.

- Whole-home weatherization activities, such as:
  - Attic, basement, and wall insulation
  - Window and door sealing
  - Repairs or upgrades to heating and cooling systems
- Electrification of buildings and water heating through the installation of solar panels and high-efficiency cold-climate heat pumps.
- Construction of public electric vehicle charging stations.
- Installation of home-charging stations for electric vehicles.
- Routine maintenance of electric vehicles, including cars and trucks.
- Planning, construction, and expansion of pedestrian walkways and bike lanes.
- Planning and expansion of public transit networks and fleets.

It is worth noting that these priority occupations and primary roles are focused on the adoption of measures related to the transportation and RCI sectors. This reflects the fact that these sectors account for over 70% of statewide greenhouse gas emissions, and therefore represent priority areas for workforce expansion.[6]

[6] BW Research Partnership, Inc., *Vermont Clean Energy Industry Report* (Vermont Department of Public Service Clean Energy Development Fund, 2025).

Industrial Analysis for Priority Occupations

Historical Growth

The historical growth of Vermont's clean energy sector has been marked by fluctuations over the past decade. According to the 2025 VCEIR, clean energy employment in Vermont has seen various phases of growth and decline from 2014 to 2025. The report highlights that the number of clean energy workers increased from 15,286 in 2014 to a peak of 19,081 in 2017. However, this was followed by a period of decline and stabilization, with employment figures hovering around 18,300 by the start of 2025. This represents approximately 6 percent of Vermont's total workforce, maintaining the state's position as the leader in clean energy jobs per capita in the United States.

Despite overall stability in recent years, the growth within specific sectors of the clean energy industry has varied. For instance, the energy efficiency sector has consistently driven job growth, expanding by 1.9 percent in the last year alone and adding nearly 200 jobs. This sector's growth is attributed to Vermont's strategic focus on energy efficiency programs, which have been central to the state's decarbonization efforts. Conversely, other sectors such as clean transportation and renewable energy have experienced declines, with clean transportation jobs decreasing by 3.6 percent, reflecting broader national trends.

Projected Growth

Looking ahead, Vermont's clean energy sector presents a promising outlook while also facing challenges to overcome. The 2025 VCEIR report suggests that although the clean energy economy's growth has lagged behind the overall state economy since 2022, the gap has narrowed significantly in the past year. The state's clean energy employment grew by 0.3 percent, closely aligning with the total economic growth rate of 0.6 percent. This trend indicates a potential for more synchronized growth between the clean energy sector and the broader economy in the coming years.[7]

However, the report also cautions about potential obstacles that could impact future growth. Federal policy changes, such as the elimination of tax credits and incentives, pose a risk to the expansion of clean energy jobs. Vermont will need to navigate shifting federal policies, along with evolving supply chains and consumer preferences, to develop effective workforce strategies. These strategies will aim not only to meet statewide emissions goals

[7] BW Research Partnership, Inc., *Vermont Clean Energy Industry Report* (Vermont Department of Public Service Clean Energy Development Fund, 2025).

but also to ensure economic benefits for all Vermonters, including employers, communities, and residents.

Potential Workforce Shortages and Strategies to Address These Challenges

Challenges

Despite progress being made in expanding workforce, there are challenges that Vermont faces in advancing its clean energy workforce. The 2025 VCEIR report highlights several obstacles including the potential impact of shifting federal policies, such as the elimination of tax credits and incentives, which could impede the growth of clean energy jobs. Navigating these changes will require strategic workforce planning to ensure that Vermont can continue to meet its emissions reduction goals while also delivering economic benefits. Vermont's clean energy sector must also address demographic challenges within its workforce. The VCEIR notes that while the state's clean energy workforce is younger than the overall workforce, with only 15 percent of workers aged 55 and over compared to 27 percent statewide, there is still a need to attract and retain a diverse and skilled labor pool.[8]

Strategies

The Climate Action Office continues to consider its role in supporting workforce development. As a member of the US Climate Alliance, Vermont is working with the 24-member Governor's Alliance to advance state leadership on workforce development. Strategic partnerships with other states, especially our neighboring northeastern states, will be critical in driving the change we need to meet the demand. In addition, the Climate Action Office has been working with the Serve, Learn, and Earn Program in Vermont to advance a partnership to support climate jobs in the sectors that overlap with their programming. Serve Learn Earn is a collaboration of Vermont Youth Conservation Corps, Vermont Works for Women, Audubon Vermont, and ReSOURCE. Their vision is for every Vermont resident to have a viable pathway to employment and an affordable education. Their free programs provide paid service and learning opportunities across the state. The Vermont Legislature recognized the importance of this work – and this collaboration – with an appropriation in 2021, administered by the Vermont Department of Forests, Parks, and Recreation. This funding supports each organization's direct service training programs,

[8] BW Research Partnership, Inc., *Vermont Clean Energy Industry Report* (Vermont Department of Public Service Clean Energy Development Fund, 2025).

increasing opportunities for Vermonters to obtain good-paying jobs while also meeting the needs of Vermont businesses and communities. These programs have a strong focus on the climate workforce and economy.

To address labor supply constraints in Vermont's clean energy workforce the Vermont Innovation, Efficiency and Weatherization (VIEW) Training Center opened its doors in the summer of 2025. The development of the VIEW Center was made possible through a collaborative effort led by the Vermont Office of Economic Opportunity (OEO), with vital contributions from Efficiency Vermont, the Department for Children and Families, and other statewide partners. The VIEW Center's mission focuses on:

- Providing high-quality, accessible training in weatherization and related fields
- Building a diverse, qualified workforce to meet Vermont's growing clean energy needs
- Supporting the state's goal of weatherizing 120,000 homes by 2030
- Fostering lifelong learning and career advancement for individuals in the energy efficiency sector

The VIEW Training Center is dedicated to serving a diverse array of individuals and organizations throughout Vermont. This includes entry-level job seekers eager to enter the weatherization field, contractors and construction companies aiming to enhance their expertise in energy-efficient building practices, community organizations and workforce development boards that support individuals from underrepresented groups, and homeowners interested in learning about weatherization and energy efficiency. The VIEW Center's goal is to ensure training access for all Vermonters, with a particular focus on reaching rural and low-income communities, as well as individuals from diverse backgrounds.

To achieve this, VIEW Center staff have begun collaborating with community organizations to recruit and support trainees from underrepresented groups. To suit the various needs of Vermont's rural workforce the VIEW center offers online, in-person, and hybrid programs to suit different learning styles and schedules.

10. Conclusion

The Vermont Comprehensive Climate Action Plan (CCAP) supports the state's efforts to reduce greenhouse gas emissions and meet the targets outlined by the Global Warming Solutions Act. This plan draws from the Vermont Climate Action Plan, which was developed in collaboration among the Vermont Climate Council, state agencies, and the public. Building upon this foundation, the CCAP focuses on actionable measures across key sectors, including transportation; residential, commercial, and industrial; non-energy; and agriculture. Cost estimates were provided for these measures, which will require additional funding to implement, and Vermont is actively considering new sources to support these initiatives.

Central to the CCAP's progress and implementation is the Vermont Climate Action Office (CAO), which coordinates state-led climate initiatives and offers expertise in climate adaptation, mitigation, and resilience. As part of the Agency of Natural Resources, the CAO focuses on climate program coordination, community and public engagement, and inter-agency collaboration. The CAO collaborates closely with State agencies and stakeholders, including the Vermont Climate Council, to support ongoing climate action efforts. Additionally, the CAO in the Agency of Natural Resources has contracted with Eastern Research Group to plan for the development of the Climate Action Tracker tool. This tool will be used for monitoring and evaluating progress on key strategies and activities intended to drive emissions reductions and adaptation actions in line with the Global Warming Solutions Act requirements. The Climate Action Tracker will be essential for tracking the progress of climate action moving forward including those prioritized in the CCAP.

Public meetings and events hosted by the CAO are regularly updated and can be found on this website: climatechange.vermont.gov/learn-and-act. The website also provides information on how to get involved and learn more about CAO programs. Further information about the Vermont's participation in the Climate Pollution Reduction Grant program can be accessed here: https://climatechange.vermont.gov/cprg. The Climate Action Office is committed to working with Vermonters to advance the measures identified in this Plan and deliver transformative climate action for current and future generations.

11. Definitions and Acronyms

The Comprehensive Climate Action Plan (CCAP) Definitions and Acronyms are derived from the Climate Action Plan (CAP) Definitions and Acronyms, upon which this plan is based. For any additional definitions and acronyms not included in the CCAP, please refer to the CAP.

Term or Acronym	Definition	Source
AAFM	Agency of Agriculture Farms and Markets	
Act 121	The flood safety act grants the VT DEC and ANR the power to regulate wetlands, river corridor development, and dam safety.	Summary of Act 121
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.	Forest Blocks and Habitat Connectors
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.	Summary Act 179
Act 181	Enacted in 2024, Act 181 reformed land use and housing policies to build community resilience and improve biodiversity protection.	Act 181
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.	Act 250 Program

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.	Agricultural Residuals Management Program
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.	Vermont HOME Act 2023, Act 47
Act 49	An act relating to establishing the Agricultural Innovation Board.	Act 49
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.	Summary of Act 59
Act 65	Rulemaking regarding phase-down of the use of Hydrofluorocarbons in Vermont	Vermont Hydrofluorocarbons Rule
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
Adaptation	Reducing vulnerability and advancing resilience through planned and implemented enhancements to, or avoiding degradation of, natural and built systems and structures	10 V.S.A. § 590
Advanced Clean Cars II (ACC II)	The motor vehicle emissions regulatory program that implements LEV and ZEV rules	California Air Resources Board

	in California, and other states including Vermont.	
Advanced Clean Trucks (ACT)	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.	California Air Resources Board
AFOLU	Agriculture, Forestry and Other Land Use	
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.	Vermont Agriculture and Innovation Board
Agriculture-Clean Water Initiative Program (Ag-CWIP)	The Agricultural Clean Water Initiative Program (AgCWIP) 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.	The Agricultural Clean Water Initiative Program
AHJ	Authority having jurisdiction	
Anaerobic digester (ADs)	System in which bacteria break down organic material in the absence of oxygen and produce biogas (as well as solid and liquid end-products).	Environmental Protection Agency: How Anaerobic Digestion Works
ANR	Vermont Agency of Natural Resources	
Beneficial electrification	The growing recognition that using clean electricity to keep our homes and businesses	Natural Resources Defense Council:

	running is cheaper, greener, and a smarter way to meet our energy needs.	Definition of Beneficial Electrification
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem	Oxford English Dictionary
Biofuels	A fuel derived from living matter	Oxford English Dictionary
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	Biomass Energy Developing Working Group, Final Report, Vermont Legislative Council, January 2012
Bioplastic composites	Plastic materials produced from renewable biomass sources, such as vegetable fats and oils, corn starch, straw, woodchips, sawdust, recycled food waste	
BMP	Best Management Practice	
Business Emergency Gap Assistance Program (BEGAP)	A grant program for businesses and nonprofits that suffered physical damages from flooding events.	Vermont Agency of Commerce and Community Development: Business Emergency Gap Assistance Program
CAP	The Vermont Climate Action Plan	
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	Vermont Agency of Agriculture Food and Markets: Capital Equipment Assistance Program

	greenhouse gases, and reduce costs to farmers when they apply manure.	
Carbon Budget	The cumulative amount of carbon dioxide (CO_2) emissions permitted over a period of time to keep within a certain temperature threshold	Carbon Track Initiative Blog: Carbon Budgets Explained
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 (gCO_2e/MJ)	30 V.S.A. § 8123
Carbon sequestration	The process of capturing and storing atmospheric carbon dioxide.	United States Geological Survey Carbon Sequestration Definition
CBES	Commercial Building Energy Standards	Vermont Department of Public Service: Commercial Building Energy Standards
CCAP	Comprehensive Climate Action Plan	
Cellulose insulation	Cellulose insulation is made from recycled paper products, primarily newsprint, 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.	U.S. Department of Energy Insulation Materials
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))	Summary Chips Act of 2022
CHS	Clean Heat Standard	

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 resilience	The ability to prepare for, recover from, and adapt to climate change	Center for Climate and Energy Solutions: What is Climate Resilience and Why Does It Matter
Climate resilience zones	Areas defined by their respective resilience to climate change for both the natural and built environments	
Climate Smart	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.	National Oceanic and Atmospheric Administration News Release – Biden Harris Administration invests 12.7 Million to Develop Climate Smart Communities
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.	Vermont Climate Council Shared Document Definitions
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.	Environmental Protection Agency: Climate Showcase Community Tips Sheet

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.	Cornell Soil Health Laboratory
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.	Vermont Agency of Agriculture Food and Markets: Conservation Reserve Enhancement Program
Cross-docking	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.	What is Cross-docking - Understanding the concept & definition
CPRG	Climate Pollution Reduction Grant	Vermont Climate Pollution Reduction Grant
DEC	Vermont Department of Environmental Conservation	
Demand deposit accounts (DDA) payment	Allow the withdrawal of money with little or no advance notice.	Consumer Finance Protection Bureau Definition of Demand Deposit Account Payments
Demand response	Programs being used by electric system planners and operators as resource options for balancing supply and demand	U.S. Department of Energy Demand Response Definition

DFS	Division of Fire Safety	
Direct Current Fast Charging (DCFC)	Electric vehicle charging equipment which offers rapid charging along heavy-traffic corridors at installed stations.	U.S. Department of Transportation Charger Types and Speeds
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 sized to meet your particular needs and installed on site.	U.S. National Renewable Energy Laboratory
EAN	Energy Action Network	
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. § 3752
Electric vehicle (EV)	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.	23 V.S.A. §4
Electric vehicle supply equipment (EVSE)	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(85), 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

Emergency Relief and Assistance Fund (ERAF)	Provides State funding to match Federal Public Assistance after federally declared disasters.	Vermont Emergency Relief and Assistance Fund
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.	Vermont Energy Efficiency Utility Program
EPA	Environmental Protection Agency	
F2P	Vermont Farm To Plate strategic plan	
Farm Agronomic Practice (FAP)	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.	Vermont Agency of Agriculture Food and Markets: Farm Agronomic Practices Program
FEMA	Federal Emergency Management Agency	
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	Vermont Agency of Natural Resources, Department of Environmental Conservation: Vermont Flood Hazard Area and River Corridor Rule

	Certificate of Public Good from the Public Service Board	
Forest fragmentation	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	Northern Woodlands Article – Forest Fragmentation
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.	Forest Stewardship Council
Fossil fuel	Non-renewable energy resources (including oil, coil, and natural gas) formed from the remains of prehistoric plants and animals that produces carbon dioxide when combusted as a fuel source.	U.S. Department of Energy Fossil Definition
FPR / VTFPR	Vermont Department of Forests Parks and Recreation	
Frontline 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 were placed in the least desirable areas of cities, often with high exposure to climate impacts like flooding.	Vermont Climate Council Front Line and Impacted Communities Definitions

	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.	
Global warming potential (GWP)	A metric to allow for the comparison of global warming impacts of different greenhouse gases. It is a measure of how much energy the emission of one ton of a gas will absorb over a given period of time, relative to one ton of carbon dioxide. The larger the GWP value of a gas the more potent the warming as compared to CO2.	Environmental Protection Agency Understanding Global Warming Potentials
Grassed Waterway and Filter Strip (GWFS)	Filter Strip: A strip or area of herbaceous, perennial vegetation located primarily between a cropland field and an adjacent surface water or ditch. Grassed Waterway: A shaped or graded channel within a field of annual crops which has a broad and shallow cross section and suitable perennial vegetation designed to convey surface water at a nonerosive velocity to a stable outlet.	Seeding and Filter Strip Program Fact Sheet
Greenhouse gas (GHG)	Any chemical or physical substance that is emitted into the air and that the Secretary may reasonably anticipate to cause or contribute to climate change, including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.	10 V.S.A. § 552

GWSA	The Vermont Global Warming Solutions Act of 2020	Act 153 (2020)
Habitat connectivity	the degree to which blocks of suitable habitat are connected to each other.	Vermont Fish and Wildlife: Connectivity Blocks
Heat Pump (HP)	Heat pumps collect heat from the air, water, or ground outside a building and concentrate it for use inside.	Vermont Department of Public Service: Heat Pumps
HVAC	Heating, Ventilation, and Air Conditioning	
IBC	International Building Code	
IECC	International Energy Conservation Code	
Indigenous Knowledge (IK)	A body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes and Indigenous Peoples through interaction and experience with the environment.	National Park Service: Indigenous Knowledge and Traditional Ecological Knowledge
IRC	Inspection, repair, and cleaning	
Just Transitions	"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").	Vermont Climate Council, Guiding Principles for a Just Transition, August 2021
Land Access and Opportunity Board (LAOB)	A board created under Section 22 of Act 182 of 2022 to promote improvements in access to woodlands, farmland, and land and home ownership for Vermonters from historically marginalized or disadvantaged communities	The Vermont Statutes Online: Land Access and Opportunity Board

	who continue to face barriers to land and home ownership.	
Low-Income Energy Assistance Programs (LIHEAP)	LIHEAP provides federally funded assistance to reduce the costs associated with home energy bills, energy crises, weatherization, and minor energy-related home repairs.	U.S. Department of Health and Human Services Low Income Energy Assistance Program
Matrix forest	Large contiguous areas whose size and natural condition allow for the maintenance of ecological processes, viable occurrences of matrix forest communities, embedded large and small patch communities, and embedded species populations.	The Nature Conservancy
Medium and Heavy-Duty Vehicle	Medium and heavy-duty vehicles with a GVWR of more than 8,500 lbs.	Environmental Protection Agency
Mileage Smart	A Vermont program that provides up to $5,000 toward the purchase of a used hybrid or electric vehicle to households at or below 80% of median income.	Mileage Smart Website
Mitigation	Reduction of anthropogenic greenhouse gas emissions, and preservation and enhancement of natural systems to sequester and store carbon, in order to stabilize and reduce greenhouse gases in the atmosphere.	10 V.S.A. § 590
MMTCO2e	Million Metric Tonnes CO2 equivalent	
MPG	Municipal planning grant	
Municipal Vulnerability Index	As required by Act 153 (GWSA), a municipal vulnerability index shall be developed to include factors measuring a municipality's population, average age, employment, and grand list trends; active public and civic	Act 153

	organizations; and distance from emergency services and shelter.	
MWh	Mega-watt hour	
N2O	Nitrous oxide	
Natural and Working Lands	Pursuant to Vermont's membership in the U.S. Climate Alliance, "Natural and Working Lands" mean forests, farms and ranches, grasslands, wetlands, and urban greenspace – in effect, all lands that store carbon in biomass and soils.	2022 U.S. Climate Alliance State Guide to Enhance the Sector's contribution to State and National climate goals
Nature-based Solutions (NbS)	Actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.	
Neighborhood Development Area (NDAs)	Neighborhood Development Area designation encourages municipalities and/or developers to plan for new and infill housing in the area within walking distance of its designated downtown, village center, new town center, or within its designated growth center and incentivizes needed housing, further supporting the commercial establishments in the designated centers.	Vermont Agency of Commerce and Community Development Neighborhood Development Areas
Non-Energy Emissions	Greenhouse gas emissions that are not associated with the combustion of a fuel source.	
NRCS	Natural Resource Conservation Service	
NYCI	New York Cap and Invest	
OPR	Office of Professional Regulation	

Pasture and Surface Water Fencing (PSWF) program	The Pasture and Surface Water Fencing (PSWF) Program provides pasture management technical assistance and financial assistance to Vermont farmers to improve water quality and on-farm livestock exclusion from surface waters statewide.	Agency of Agriculture Food and Markets Pasture and Surface Water Fencing Program
Payment for Ecosystems Services (PES)	Quantifiable and verifiable framework to credit and compensate for the benefits of stewardship that produces numerous ecosystem goods and services.	
PCAP	Priority Climate Action Plan	Vermont Priority Climate Action Plan
Phase II GHG Rule	A rule adopted by the California Air Resources Board that improves on engine and vehicle efficiency required by the Phase 1 emission standards and represents a significant opportunity to achieve further GHG reductions for 2018 (2020 in California) and later model year heavy-duty vehicles, including trailers.	California Air Resources Board
PSD	Vermont Department of Public Service	
PUC	The Vermont Public Utilities Commission	
RBES	Residential Building Energy Standards	
RCI	Residential, Commercial, and Industrial Sectors	
Renewable energy	Energy produced using a technology that relies on a resource that is being consumed at a harvest rate at or below its natural regeneration rate.	30 V.S.A. §8002
Renewable Energy Standard (RES)	The Vermont Renewable Energy Standard requires retail electricity providers to not sell or otherwise provide or offer to sell or provide electricity in the State of Vermont without	30 V.S.A. §8004-8005

	ownership of sufficient energy produced by renewable energy plants or sufficient tradeable renewable energy credits from plants whose energy is capable of delivery in New England that reflect the required amounts of renewable energy set forth in section 8005 of this title or without support of energy transformation projects.	
Resilience	The capacity of individuals, communities, and natural and built systems to withstand and recover from climatic events, trends, and disruptions.	10 V.S.A. § 590
RFP	Request for Proposals	
Riparian	An area between aquatic (water) and terrestrial (land) ecosystems.	Oxford English Dictionary
RMP	Refrigerant Management Plan	
RPC	Regional Planning Commission	
Rural Communities	Any population, housing or territory not in an urban area.	United States Census Bureau
Sequestration of carbon	Also "carbon sequestration", the process by which atmospheric carbon dioxide is taken up by trees, grasses, and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage, and roots) and soils. The sink of carbon sequestration in forests and wood products helps to offset sources of carbon dioxide to the atmosphere, such as deforestation, forest fires, and fossil fuel emissions.	United States Department of Agriculture Forest Service Carbon Sequestration
Sewer Performance Assessment (SPAs)	Evaluates the system to prevent surfacing of sewage and the creation of a health hazard; prevent the pollution and contamination of drinking water supplies, groundwater, and	24 V.S.A. § 3631

	surface water; and maintain sanitary and healthful conditions during operation.	
SOV	Single Occupancy Vehicle	
Sustainable Forestry Initiative (SFI)	A comprehensive program of forestry and conservation practices which consists of forest principles that spell out five broad elements of sustainable forestry and 12 implementation guidelines that translate the principles into action by providing forest managers with the means to achieve sustainable forestry.	The Sustainable Forestry Initiative of the American Forest & Paper Association
TA	Technical assistance	
Traditional Ecological Knowledge (TEK)	A cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.	
Transportation Bill (T-Bill)	Legislation, typically annual, that relates generally to the Transportation Program in Vermont and miscellaneous changes to laws related to transportation.	Act 55 (2021)
USDA	United States Department of Agriculture	
UVA	Use Value and Appraisal Program at the Vermont Department of Taxes	Agency of Natural Resources, Department of Forests, Parks and Recreation: Use Value Appraisal
VAAFM	Vermont Agency of Agriculture Food and Markets	
VDOL	Vermont Department of Labor	
VEIC	Vermont Energy Investment Corporation	

VELCO	Vermont Electric Power Company	
VEM	Vermont Emergency Management	
Vermont Farmer Ecosystem Stewardship Program (VFESP)	A State incentive program that provides one-time payments to farmers for enrolling in federal programs.	Vermont Farmers Ecosystem Stewardship Program
Vermont Greenhouse Gas Emissions Inventory	An annual report published by the Vermont Agency of Natural Resources containing estimates of anthropogenic greenhouse gas emissions by sector with historic estimates back to 1990 to allow for tracking of emissions by sector through time.	
Vermont Pay for Phosphorus (VPFP) program	Provides performance-based payments to farmers for reductions of phosphorus (P) losses from their fields. Reductions represent how farm management has improved from the management assumed in the Lake Champlain Basin Total Maximum Daily Load (LCB TMDL).	Vermont Pay for Phosphorus Program
Vermont State Climate Office	The Vermont State Climate Office exists due to an Memorandum of Understanding between the UVM Provost's Office, the NOAA National Centers for Environmental Information, the National Weather Service and American Association of State Climatologists. State Climate Offices are credentialed by the federal government through NOAA to provide research, information and outreach to the people of their state and region.	
VCEIR	Vermont Clean Energy Industry Report	
VES	Vehicle Emissions Standards	
VGS	Vermont Gas Systems	

VHCB	Vermont Housing and Conservation Board	
VMT	Vehicle Miles Traveled	
VTrans	Vermont Agency of Transportation	
Vulnerability	The inability to withstand the effects of a hostile environment.	
WCI	Western Climate Initiative	
Weatherization (WX)	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	
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.	Agency of Natural Resources, Department of Environmental Conservation: What is a Wetland?
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
WWTF	Wastewater treatment facility	