Central Vermont 2026 Regional Plan



Adopted: 10/20/2026

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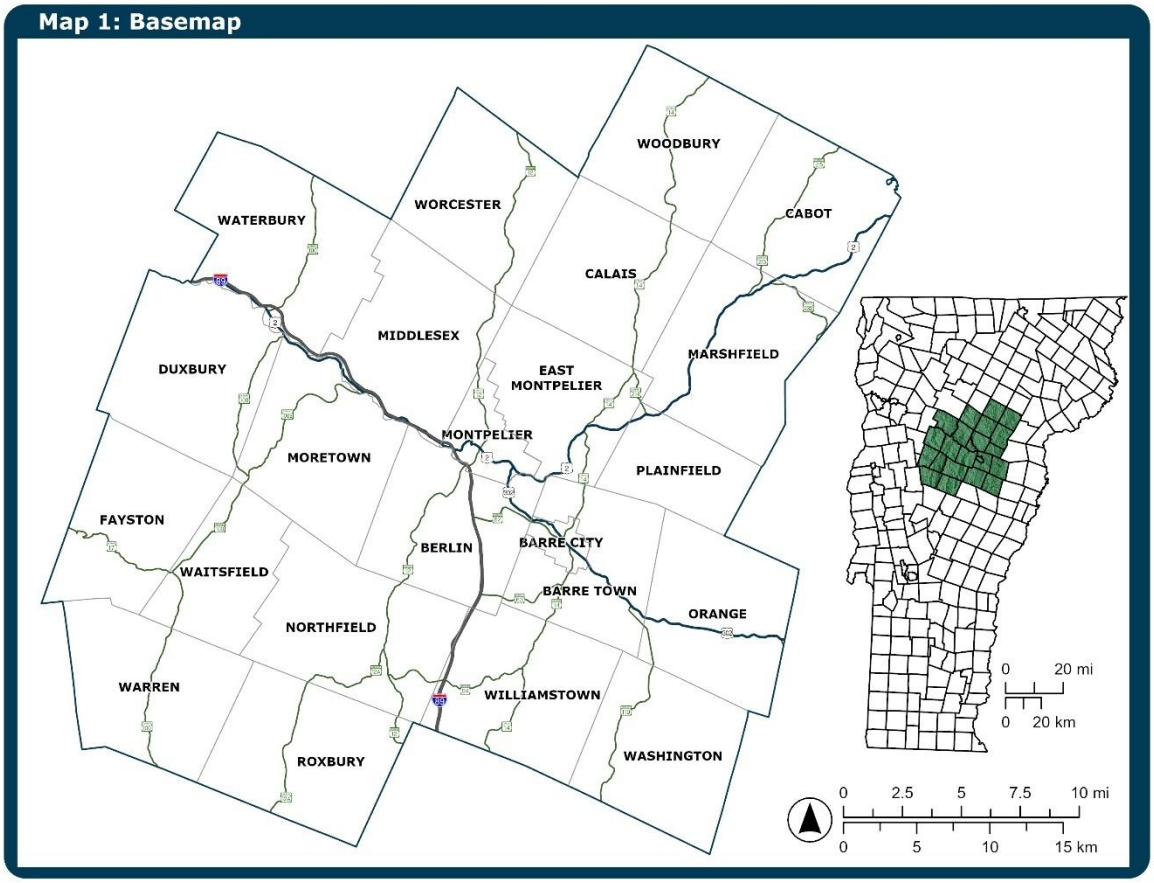
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Woodbury	Michael Gray
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Map of Central Vermont

Map 1: Basemap



Acknowledgements

The Central Vermont Regional Planning Commission would like to recognize and thank all past and present Commissioners and staff members for their contributions and expertise to the 2026 update of the Central Vermont Regional Plan.

A note about accessibility: Verdana is used as the primary font in this document to enhance on-screen readability and create an accessible text for a wide range of readers.

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1. INTRODUCTION AND STATEMENT OF POLICY

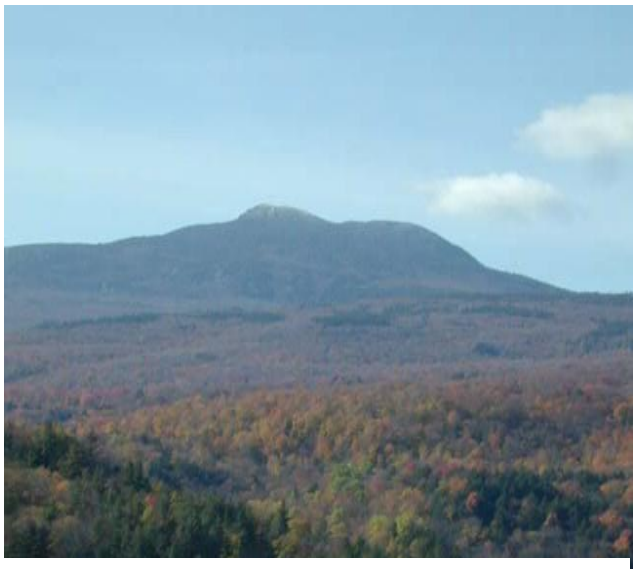
Preamble

The Central Vermont Regional Planning Commission (CVRPC) was created in 1967 under Vermont Statute Title 24, Chapter 117, to provide planning assistance to municipalities within the Region and create a forum for addressing those issues which transcend municipal boundaries. This same piece of legislation requires Regional planning agencies to prepare plans which are consistent with statewide goals and compatible with the plans of their member municipalities and adjoining Regions. This document seeks to satisfy that mandate.

CVRPC is not a part of state government but is a creature of State Statute and bound by that Statute. Representatives appointed by the legislative bodies of its member communities govern the Commission's activities and policies.

Overview of the Region

The Central Vermont Region is comprised of 23 municipalities in Washington and Orange Counties. As its name implies, the Region lies at the geographic heart of the State. Accordingly, it embodies many of the most celebrated qualities of Vermont's culture and landscape, and serves as its political hub, as well. Unfortunately, our problems are also typical of those in evidence throughout the State: a sluggish economy, inefficient use of resource lands, stressed infrastructure, and increased energy costs and consumption,



Located along the northern spine of the Green Mountain range in the Central Vermont Region, Camels Hump, elevation 4,083 feet, is the highest undeveloped mountain in the state.

among them.

Physically, the Region is transected by several north-south running mountain chains (e.g. Green Mountains, Northfield Range, Worcester Range, Irish Hills, Woodbury Mountains, and Groton Range) separated by fertile river valleys. The valley of the Winooski River is the exception to this pattern cutting across the mountains as it flows west to Lake Champlain.



Robinson sawmill, Calais, constructed 1803, is the oldest standing sawmill in Vermont.

Often, early settlement began in the valleys where population, commerce, and infrastructure have historically been concentrated in compact hamlets, villages, and cities. The surrounding countryside and wilderness supplied the raw materials (e.g. lumber, granite, wool, grains, milk, etc.) for the manufacturing concerns of these centers.

In recent decades, however, people, and to a lesser extent, commerce has shifted into the countryside. The reasons for shifting land use and habitation patterns are several: the emergence of commuter lifestyles, a population seeking rural environs, and the growth of resort areas and second home development, among them. All of these have been enabled by the advent and subsequent dominance of the automobile.

The fact that much of the Region's new growth has occurred along transportation corridors is no accident, and is often encouraged by land use regulations. The impacts of "strip development" and suburban sprawl are notable on the landscape.

Still, while Central Vermont is no longer immune to the perils and pitfalls of life in modern America, it remains a place of unique beauty, character, and promise. We are not yet "just like everywhere else." In fact, Central Vermont is diverse beyond its size. We are home to a golden dome, and an interstate highway, remote logging roads, covered bridges, fast food restaurants, a military college, road houses, opera houses, ski condos, hunting camps, conservatives, liberals, farmers, artisans, lawyers, activists, teachers, bureaucrats, politicians, merchants, the unemployed, the elderly, and perhaps most importantly, children.

Purpose of the Plan

Title 24 VSA Chapter 117 Section 4347 "Purposes of Regional Plan" states:

"A Regional plan shall be made with the general purpose of guiding and accomplishing a coordinated, efficient and economic development of the Region which will, in accordance with present and future needs and resources, best promote the health, safety, order, convenience, prosperity and welfare of the inhabitants as well as efficiency and economy in the process of development. This general purpose includes, but is not limited to recommending a distribution of population and of the uses of the land for urbanization, trade, industry, habitation, recreation, agriculture, forestry and other uses as will tend to:

> 1) create conditions favorable to transportation, health safety, civic activities and educational and cultural opportunities;
>
> 2) reduce the waste of financial, energy and human resources which result from either excessive congestion or excessive scattering of population;
>
> 3) promote an efficient and economic utilization of drainage, energy, sanitary and other facilities and resources;
>
> 4) promote the conservation of the supply of food, water, energy and minerals;
>
> 5) promote the production of food and fiber resources and the reasonable use of mineral, water, and renewable energy resources;
>
> 6) promote the development of housing suitable to the needs of the Region and its communities; and
>
> 7) help communities equitably build resilience to address the effects of climate change through mitigation and adaptation consistent with the Vermont Climate Action Plan adopted pursuant to 10 V.S.A. § 592 and 3 V.S.A. chapter 72."

While the above language outlines the purposes of the Plan from a statutory standpoint, CVRPC views the Plan primarily as a means to enhance the lives

of the Region’s residents. Accordingly, the preservation and enhancement of the "quality of life" for all Central Vermont residents is the guiding principle of this Plan and the work of the Central Vermont Regional Planning Commission (CVRPC).

The term "quality of life" encompasses an array of factors that influence the level of satisfaction and enjoyment we are able to achieve in our day-to-day lives. As such, any analysis of quality of life must address both our basic needs and our desires and aspirations. Among these are:

1) A Safe Environment - Central Vermonters desire clean air, water, and land, a safe multi-modal transportation system, and access to quality health care and emergency services;
2) Job Opportunities - We desire meaningful, secure jobs paying livable wages.
3) Natural Beauty - We place a high value on the scenery and resources the landscape provides.
4) Educational Quality - Central Vermonters of all ages should have access to affordable, quality educational opportunities to enrich their lives and improve their skills.
5) Low Crime Rate - Central Vermont residents should live safely from crime.

CVRPC hopes this Plan reflects our desire to live in a Region that will be a model of health, wealth, knowledge, beauty, culture, and community for many generations to come. It is a goal of CVRPC to define, quantify, and track these elusive concepts over the next eight-year planning period.

Implementation

Throughout this document are specific policies, recommendations, strategies, offers, and proposals designed to reflect the values of Central Vermont residents and help realize the goals of this Plan. It is primarily through the statutory functions and obligations of CVRPC, and the initiative of the Region's municipalities, that these and other aspects of the Plan will be implemented. Title 3 Section 4021 of the Vermont Statutes also stipulates that State agency plans must be compatible with Regional plans, as well as approved municipal plans. In this regard, CVRPC believes that the definition of growth centers used by State agencies should be compatible with that of the Regions. An implementation program is included in Chapter 9.

Acknowledgement of Changing Conditions

By law, Regional plans in Vermont have a statutory life of eight years. The information and policies presented in this document represent CVRPC's best effort to present an accurate and useful picture of conditions in Central Vermont. We recognize, however, that we live in dynamic times and that some of the facts, issues, and concerns presented here may change over the life of this Plan. If conditions warrant amendments to the Plan prior to its expiration date, the Commission will respond accordingly.

Compatibility Statement

It is the Commission's understanding that this Plan is compatible with the plans of our neighboring Regions and with those of municipalities within the Central Vermont Region. In other words, and in accordance with V.S.A 24 Chapter 117 mandates, this Plan "as implemented, will not significantly reduce the desired effect of the implementation of the other plan(s)."

Compatibility with Adjacent Regions

It can be seen that where the Central Vermont Region abuts other Regional commissions' jurisdictions, land uses are either very low intensity or near wilderness in nature as significant mountain ranges bound us to the west and east. In addition, most human activity is focused toward the center of the Region. Because of this geography, opportunities for land use (or other conflicts) with neighboring Regions are limited.

CVRPC is economically and culturally closely tied to its neighboring RPCs. And while CVRPC regularly communicates with each of the RPCs and collaborates on various initiatives, more pointed consultation and coordination is on an as needed basis where demand merits as outlined in the examples below.

Five regional planning commissions border CVRPC:

- Lamoille County Planning Commission
- Northeastern Vermont Development Association
- Two Rivers-Ottauquechee Regional Commission
- Addison County Regional Planning Commission
- Chittenden County Regional Planning Commission

Lamoille County Planning Commission (LCPC)

Neighboring municipalities: Stowe, Morristown/Morrisville, Elmore

The strongest inter-regional connections between Lamoille County to the north and the Central Vermont Region are in housing and employment. Stowe's proximity to Waterbury and its resort economy could create additional housing pressure on nearby Waterbury while also offering employment opportunities for CVRPC residents. In addition, the Montpelier-Barre area is a civic hub for many Lamoille County residents. LCPC and CVRPC maintain an open dialogue on planning that affects both communities in both regions, and abutting land uses are rural general or rural conservation.

Northeastern Vermont Development Association (NVDA)

Neighboring municipalities: Hardwick, Walden, Danville, Peacham, Groton

NVDA's general planning goals around protecting recreational land uses, wetlands, and the historical settlement patterns of its communities are compatible with the land uses of abutting CVRPC communities. In addition, the renaissance of Hardwick's agricultural economy has the potential to increase opportunities for Central Vermont communities, especially allowing farmers in northern Washington County towns to access new markets. The Route 2 corridor serves as a commuter route for many Northeast Kingdom residents working in Central Vermont, as well as Central Vermonters traveling to St. Johnsbury for employment opportunities. The Rural Community Transit US 2 Commuter travels between Montpelier and St. Johnsbury, with stops in East Montpelier, Plainfield, and Marshfield.

Two Rivers Ottaqueechee Regional Commission (TRORC)

Neighboring municipalities: Granville, Braintree, Brookfield, Chelsea, Brookfield, Corinth, and Topsham.

Of the five Regional Planning Commissions that connect to CVRPC, TRORC has the most neighboring municipalities. These abutting communities are of similar size and character, with residents living in rural, low-density areas. For these towns, land on both sides is mainly rural agriculture or forestry, with much of that land being conserved. In addition, two of Central Vermont's communities without zoning regulations – Orange and Roxbury-share borders with Two Rivers communities that also do not have zoning –

Topsham, Corinth and Granville. The headwaters of the Mad River and the Route 100 corridor, following the valley on the east side of the Green Mountains, effectively extend the Mad River Valley into Granville. For employment opportunities, I-89 creates access to jobs in the Montpelier/Barre City/Berlin area for residents of Brookfield and Braintree, while manufacturing positions in Randolph offer a highway commute for residents in Central Vermont.

Addison County Regional Planning Commission (ACRPC)

Neighboring Municipality: Lincoln

The Central Vermont town of Warren climbs up the forested eastern flanks of the Green Mountains where it meets Lincoln in Addison County, descending the western side. While the Warren side is used intensively for resource-based recreation with Sugarbush North and South Ski areas, and the Lincoln side is a single 1,000+ acre rural conservation parcel, the spine of the Green Mountains and the single, seasonal crossing at Lincoln Gap separate the two and limit the impacts on either community from activities on the other side.

Chittenden County Regional Planning Commission (CCRPC)

Neighboring municipalities: Buell's Gore, Huntington, Bolton

Moving west from Central Vermont, we reach our final neighboring region with whom we arguably have the most substantial ties, Chittenden County. Fayston, Duxbury, and Waterbury are separated by the Green Mountains from their neighbors in Buell's Gore, Huntington and Bolton, with similar rural conservation areas along the mountains on both sides. The exception is where Fayston abuts Buell's Gore, with parts of Mad Riber Glen's ski area crossing the town boundary and VT 17's steep and winding App Gap (Appalachian Gap) crossing a notch west of the base area. This route stays open in the winter, closing as needed due to storms. The opposite situation exists where Bolton's resource-based recreation ski trails come close to the Waterbury town line on the ridge. A few backcountry trails cross the ridge, but no roads. As elsewhere, much of the land on both sides of the Green Mountains is rural conservation and owned by the State of Vermont

The east-west Winooski River valley and the I-89/US Route 2 corridor create easy connections for Central Vermonters to services, shopping, housing and employment opportunities. Increasingly, Waterbury is considered a bedroom community of Burlington, which in turn affects housing prices and

availability. In the reverse direction, many Chittenden County residents commute to Washington County for jobs, especially for jobs in health care or for the State of Vermont. As noted below, collaborative transportation planning has been a priority for both regions, and the success of the Green Mountain Transit Montpelier Link Express, with a loop route beginning in Montpelier and a stop at the Park and Ride in Waterbury before traveling to the Burlington Downtown Transit Center, facilitates these employment connections.

Collaborative Planning

Land Use

CVRPC, like its neighbors, publishes a Future Land Use (FLU) Map as a requirement of its Regional Plan. This is a starting point for how RPCs can relate their development goals to neighboring jurisdictions. Where CVRPC abuts other RPCs, the dominant land uses are, as defined by the CVRPC Future Land Use Map, Rural. This includes some portion of Rural-General, Rural-Agriculture and Forestry, and Rural-Conservation. Generally, the goals and policies that guide rural development across the regions are compatible, encouraging low-density development and the protection of working lands. CVRPC engaged in collaborative discussions with adjoining RPCs during the drafting process to ensure compatible land uses across regional boundaries.

Watershed Planning

CVRPC primarily lies in The Winooski River Water Basin (Basin 8). However, Basin 8 extends well beyond the CVRPC boundaries. To facilitate investment and planning in Basin 8, CVRPC serves as the designated Clean Water Service Provider (CWSP). The coordinating body for the CWSP, the Basin Water Quality Council (BWQC), comprises representatives from within and outside the CVRPC planning area. In addition to the local representatives, this council includes representatives from CCRPC, the Town of Essex, the Town of Stowe and neighboring Natural Resource Conservation Districts. CVRPC also participates in the meetings of the neighboring BWQC associated with the Lamoille River Basin to represent the interests of those areas of the Central Vermont jurisdiction that are in that river basin.

Transportation

Interstate 89, as well as other significant routes, including U.S. Route 2 and Route 302, Vermont Routes 12, 14 and 100, play an integral part in connecting Central Vermont to our neighboring regions and support

substantial economic connectivity and commuting. To address major needs, CVRPC participates in steering committees related to major projects even when they lie beyond the regional jurisdiction. This has included participation in the Chittenden County I-89 2050 Study and coordination with AOT, LCPC and municipal partners on managing the impacts of ongoing development in Waterbury and Stowe and the resulting congestion issues observed along Route 100. CVRPC will continue to engage with its neighbors and encourage them to engage in local studies that may have wider impacts.

Economic Development

CVRPC participated in developing the Western Central Vermont Comprehensive Economic Development Strategy (CEDS) for a four-county planning area. Partners in the Western Central Vermont CEDS include:

Addison County Economic Development Corporation (ACEDC)
Addison County Regional Planning Commission (ACRPC)
Central Vermont Economic Development Corporation (CVEDC)
Chamber and Economic Development of the Rutland Region (CEDRR)
Chittenden County Regional Planning Commission (CCRPC)
Greater Burlington Industrial Corporation (GBIC)
Rutland Regional Planning Commission (RRPC)

The West Central Vermont CEDS partners are now working to form an Economic Development District that will build on this experience of participatory and cooperative planning.

Statewide Planning

In the early 1970s, the Agency of Commerce and Community Development (ACCD) took responsibility for directing local planning efforts. In addition to the ACCD, various State agencies have adopted statewide plans that affect local and regional planning, especially by defining priorities for State funding. All statewide plans must further the Statewide Planning Goals and conform with regional plans.

Unlike at the local level, where the municipal plan directs land use regulation, there is no statewide land use plan that guides State land use regulation. Instead, state agencies consider how a proposed development conforms to regional plans and municipal plans when involved with Act 250 and Section 248 permitting.

Compatibility with Plans of Member Municipalities

There was a conscious effort in the writing of this Plan not to usurp the authority or planning functions of Central Vermont's municipalities. This is made clear in the Plan's purpose statement, and elsewhere, in policies which support local initiatives and offer Commission assistance in the realization of the same.

The Regional Planning Commission does not believe there are any significant conflicts between this Plan and any municipal plan that has received the approval of this Commission. Situations may arise where relevant goals or policies of the Plan and a town plan are in conflict. Such conflict should generally be resolved at the most locally appropriate level. In Act 250 proceedings, the District Environmental Commission or, in rare cases of an appeal decision, the Environmental Court, is faced with determining which portions of a local or Regional Plan apply. Municipal conformance will override regional conformance in such cases, except for when projects have "substantial regional impact[1]", in which case, the project must be in accord with the Regional Plan (see Appendix E for definition of substantial regional impact).

The municipal plan should take precedence on impacts that are local in scope, while the Regional Plan should prevail where "substantial Regional impact" may result. Individual projects may have aspects that fall under either jurisdiction. For instance, a large, new commercial development could have transportation impacts that extend beyond the host community, but have aesthetic concerns that are purely local. In accordance with CVRPC's Act 250 Review Policies, the Commission's position on any Act 250 project shall be based solely upon those aspects of a project that may have substantial Regional impact.

CVRPC is a statutory party in utility infrastructure (Section 248) hearings

[1] Development projects of substantial Regional impact are those that will have substantial and ongoing impact on two or more municipalities, including the host municipality. Among the development projects of substantial Regional impact are those that will likely impact on a resource within the Region which is widely used or appreciated by people outside of the locality in which it is located. Development projects of substantial Regional impact are those which may affect settlement patterns to the extent that the character or identity of the Region (or its sub-Regions) is significantly affected. Development projects of substantial Regional impact are those that are likely to alter the cost of living, availability of choices, access to traditional way of life or resources widely used or appreciated by Regional residents. In addition, because CVRPC has defined housing as a critical need for the Region, CVRPC will participate in the Act 250 review for any project which proposes to: increase the total number of year round housing units (according to the most recent U.S. Census) in its host municipality by more than 2%; or create more than 30 housing units of any type; or create more than 5 "affordable" housing units, as defined by VSA Chapter 117 Section 4303.

before the Vermont Public Utility Commission. CVRPC staff, with oversight from the Project Review Committee, reviews proposed projects to determine whether a project conforms to the regional plan, has substantial regional impact, and/or qualifies as a preferred site (depending on project type), as well as is in conformance with 248 criteria (24 V.S.A. § 4345a (14))[2]. To reduce potential conflicts between Municipal and Regional Plans, local siting constraints, preferred sites, and policies for municipalities are directly integrated into project review[3], this ensures enhanced municipal-level siting policies are given substantial deference including overriding regional conformance in Section 248 proceedings and potential conflicts are mitigated during plan drafting and review.

Nevertheless, where cited or otherwise utilized in regulatory processes for the siting and permitting (licensing) of energy projects, housing projects, telecommunication projects or other commercial or industrial projects, this plan shall not be construed or otherwise be used in evidence in Act 250 (10 V.S.A. Chapter 151) proceedings, in the Public Utility Commission (30 V.S.A.) proceedings or proceedings of other regulatory bodies which regulate such projects, to support a finding of a beneficial regional impact or beneficial substantial regional impact to override a municipality's stated position or otherwise operate to impose such project or projects upon a municipality or group of municipalities without their full support and approval of such development projects.

The CVRPC shall not participate in any regulatory process to support development as providing a beneficial substantial regional impact where it is not supported by a duly adopted municipal plan, enhanced energy plan, and local zoning regulations.

Copies of the proposed Plan have been sent to neighboring Regional Planning Commissions and all Central Vermont municipalities in order to solicit feedback, comments and suggestions.

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[22] Municipal siting constraints, preferences, and policies are integrated into these reviews. Projects seeking a Certificate of Public Good (CPG) are exempt from local permitting, although the PUC considers local plan policies during project review giving them "due consideration", or if they have an Enhanced Energy Plan, "substantial deference" (30 V.S.A. § 248a).

[3] These are summarized by municipality in the Regional Energy chapter, and municipalities with determinations of energy compliance (by meeting Enhanced Energy Plan requirements) are included directly in regional mapping.

Statement of Policies to Guide Future Growth

The Central Vermont Regional Planning Commission is charged with promoting mutual cooperation among its member towns in the planning and development of sites and infrastructure necessary to meet the future needs of the Region's residents. This Plan is intended to guide future growth and development, infrastructure investment, and environmental protection in Central Vermont by providing a framework within which the basic human needs of clean air and water, access to employment, food and shelter, and emergency services sufficient to provide personal safety can be satisfied. In doing so, it strives to promote a healthy, natural environment, quality educational systems, and broad access to recreational and cultural opportunities for all residents.

Attainment of goals set by this Plan will require a commitment to a vision of the Region as a community. In planning for the long-term public interest of the Region, CVRPC can play a vital role in assessing the strengths and opportunities by finding and building solutions to those issues that transcend town boundaries. Towns no longer function as self-sufficient islands in providing services, employment, and education. The interrelationships and interdependence between towns within the Region are clear. The goals and objectives of each element of this Plan implement the following broad policies of the Central Vermont Regional Planning Commission:

- CVRPC in cooperation with its member municipalities and neighboring Regions seeks to guide the future of development to gain the maximum benefit for the least cost.
- CVRPC is dedicated to the promotion of the economic, social, and educational well-being of the Region and its residents by supporting the creation of opportunities for self-improvement while protecting individual rights and liberties.
- CVRPC encourages planning that identifies, respects and preserves our important historic, natural, cultural, and recreational resources.
- CVRPC promotes housing availability to meet the needs of people of all socioeconomic levels.

- CVRPC seeks to maintain a healthy environment and to respect the Region's historic settlement patterns.
- CVRPC promotes diversified economic development and the creation and/or maintenance of sufficient jobs for all residents.
- CVRPC encourages development patterns which result in more energy efficient transportation patterns.
- CVRPC encourages investment in public facilities and services in areas of population and economic growth.
- CVRPC supports the identification and utilization of economic growth centers as a method of achieving development patterns that are mutually advantageous to the environment and the socioeconomic needs of the Region's towns.

(The use of the word "encourage" in this Plan is intended to mean “to foster or give support to” and is not intended to indicate any mandates.)

Equitable Planning

In 2022, the Vermont Legislature passed Act 154, the Vermont Environmental Justice Law, and in 2024 added the 15th state planning goal, pertaining to the equitable distribution of environmental benefits and burdens as described in 3 V.S.A. Chapter 72. These changes to statute ensure environmental justice (EJ) and the analysis of environmental burdens and benefits are a foundational element of this Regional Plan.

Because environmental burdens and benefits are not evenly distributed across communities, planning decisions may disproportionately affect some communities. Equitable planning seeks to recognize and understand these differences to ensure that all communities, most particularly those who have historically experienced marginalization, discrimination, or barriers to opportunity, will have meaningful access to decision-making processes and share in the benefits of public investments, policies and services. CVRPC incorporates equity considerations throughout the Plan to support outcomes that are more inclusive, resilient, and responsive to the diverse needs of regional residents.

In creating this Plan and the EJ analysis, CVRPC realized the need for a consistent framework to evaluate how equity considerations were integrated across chapters. To this end, CVRPC created an Equity Integration Tool, based off of the Guiding Principles for a Just Transition and Scoring Rubric, which will serve a valuable resource in assessing future iterations of the Regional Plan. The tool helps to ensure that frontline communities are identified and well-defined in chapters, analyzes how frontline communities are prioritized to receive benefits from each chapter's actions, and seeks to elevate their voices so that they can be meaningfully incorporated. It is the intention that this tool be used iteratively throughout the drafting process and should remain a breathing document, adapted to each particular chapter or theme discussed.

Environmental Justice Definitions

When discussing Environmental Justice, the Regional Plan uses the following definitions. CVRPC looked more broadly at how residents and communities in the region may face compounded challenges when they have overlapping identities and experiences. In analyzing these factors, CVRPC used the following definitions:

Environmental Justice: All individuals are afforded equitable access to and distribution of environmental benefits; equitable distribution of environmental burdens; and fair and equitable treatment and meaningful participation in decision-making processes, including the development, implementation, and enforcement of environmental laws, regulations, and policies. (3 V.S.A. § 6002)

Environmental Benefits: The assets and services that enhance the capability of communities and individuals to function and flourish in society. (3 V.S.A. § 6002)

Environmental Burdens: Any significant impact to clean air, water, and land, including any destruction, damage, or impairment of natural resources resulting from intentional or reasonably foreseeable causes. (3 V.S.A. § 6002)

Environmental Justice Focus Populations (EJFP): Any Census Block Group in which:

1. The annual median household income is not more than 80 percent of the State median household income;
2. Persons of Color and Indigenous Peoples comprise at least six percent or more of the population; or
3. At least one percent or more of households have limited English proficiency. (3 V.S.A. § 6002)

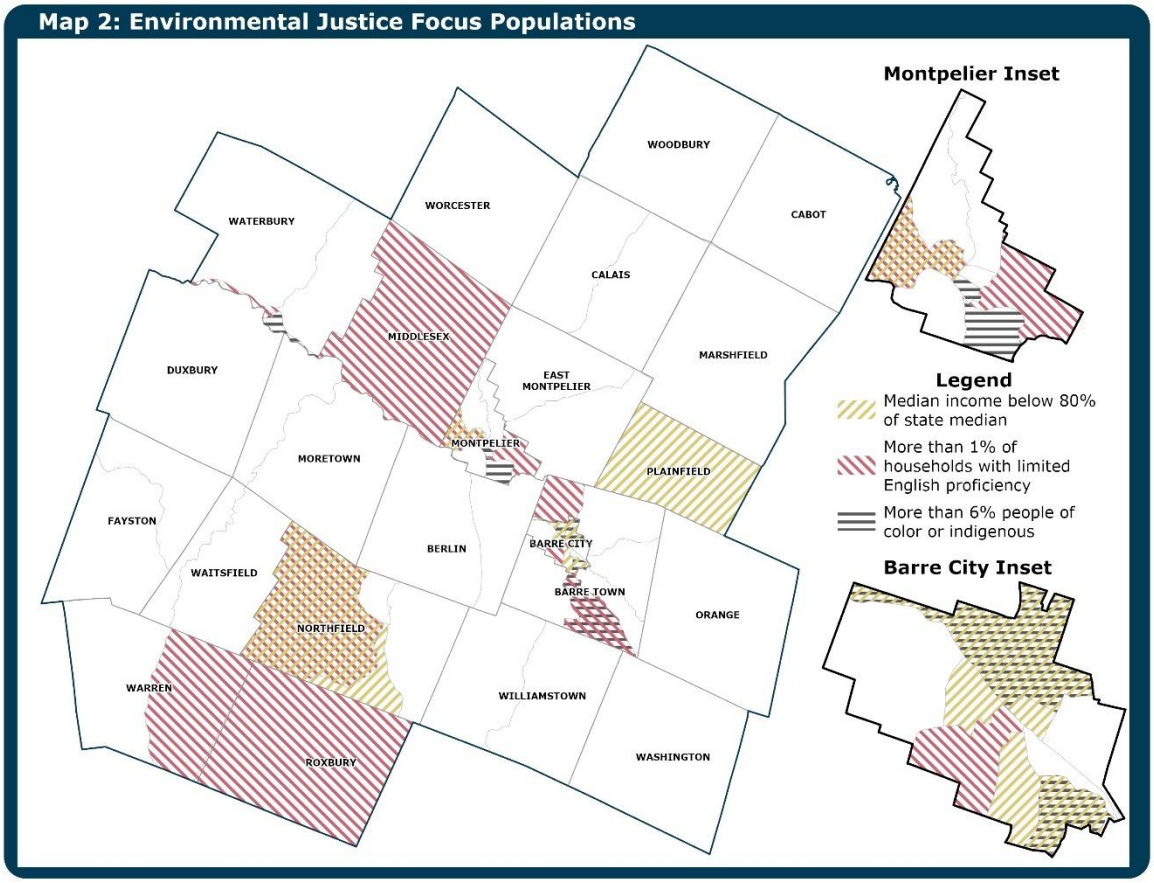
Frontline Communities*:* Communities that have historically experienced marginalization, discrimination, and other barriers to accessing resources and opportunities, and that are disproportionately burdened by policies, projects, or events while receiving fewer of their benefits. Due to geographic, social, economic, or environmental factors, these communities often experience the first and worst effects of climate change. (Adapted from the Vermont Climate Action Plan)

Intersectionality*:* A framework that considers how people's multiple identities and circumstances intersect and overlap, resulting in unique experiences of discrimination, disadvantage, and privilege. These identities and circumstances may include gender, race, ethnicity, sexual orientation, age, disability, income, immigration status, housing status, employment status, and other factors. (Adapted from the Vermont Climate Action Plan)

Frontline/Vulnerable Communities

CVRPC recognizes that planning efforts can affect the distribution of environmental benefits and burdens, and that actions at the regional scale should intentionally prioritize support for vulnerable communities. CVRPC identified and mapped EJFPs as defined in 3 V.S.A. § 6002(4), which showed that 21 census block groups in the Region are considered focus populations.

Map 2: Environmental Justice Focus Populations



To understand the distribution of environmental benefits and burdens across the Region, CVRPC adapted the environmental justice impact analysis methodology used by the Northwest Regional Planning Commission. CVRPC compared available data indicators to determine if EJFPs carried higher burdens than the region as a whole. This analysis can be found in Appendix D.

As well, to further understand vulnerable communities in the region, CVRPC

consulted the following mapping tools:

1. The Vermont Environmental Disparity Index (VTEDI)[4]
2. Climate and Economic Justice Screening Tool(CEJST)[5]
3. Environmental Justice Mapping and Screening Tool (EJScreen)[6]
4. Economically Disadvantaged and Rural Communities (EDRCs)[7]

VTEDI:

This mapping tool identifies communities that are most susceptible to environmental hazards and have underlying socio-economic factors that could exacerbate the environmental risk level. The index compiles environmental exposure, health risk factors and social vulnerability, comparing a range of variables from traffic noise to cancer levels, and age of the population. The darker census tracts indicate that, relative to the rest of the state, that community carries a higher burden of the environmental, health and social variables, increasing their vulnerability.

In Central Vermont, Berlin, Barre City, Barre Town, and Montpelier have at least one census tract that has the highest cumulative impact (Barre City has two census tracts which meet this threshold). Air pollutants and heat vulnerability emerged as two of the dominant risks. In all five census tracts with the highest VTEDI in the region, air pollution was in or above the 95th percentile compared to the rest of the state. Similarly, for four of the five census tracts, heat vulnerability was above the 90th percentile. Air pollution and heat vulnerability are addressed in the Natural Resources and Working Lands, Energy and Transportation chapters.

CEJST:

Through the CEJST, a national database, Barre City was identified as disadvantaged area because it met more than one burden threshold and associated socioeconomic threshold. Specifically, Barre City was above the 90th percentile for expected building loss, projected flood risk, energy cost,

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[4] VT Environmental Disparity Index
[5] This tool was developed by the Council on Environmental Quality but was removed from the White House website in January 2025. Explore the map - Climate & Economic Justice Screening Tool.
[6] This tool was developed by the EPA but was removed from the EPA website January 2025. EJScreen.
[7] 2023 SHMP_Adopted Draft Jan2024.pdf

asthma, and underground storage tanks and releases.

EJ Screen:

The EJScreen maps 13 environmental burden indicators and nine socioeconomic indicators across the country, which are integrated into environmental justice indexes. The environmental justice indexes show areas which may have heightened vulnerability. In the Region, Barre City had one census tract which was in the 90th percentile for the environmental justice indexes. Specifically, Barre City was flagged for the underground storage tanks indicator.

EDRCs:

Economically Disadvantaged and Rural Communities are mapped by Vermont Emergency Management (VEM) to determine communities that may be eligible for more equitable funding through FEMA's hazard mitigation assistance programs. Specifically, EDRCs are eligible to receive a 90% federal cost share and 10% non-federal cost share for the Building Resilient Infrastructure and Communities Program (BRIC), which lessens the burden on local taxpayers. EDRCs often have reduced capacity and fewer socioeconomic resources, requiring targeted funding opportunities to expand adaptation and resilience efforts.

Based on VEM mapping of Central Vermont, Roxbury, Cabot and Washington were identified as EDRCs based on income. These towns have populations which are less than 3,000 and have average per capita incomes that do not exceed 80% of the national per capita income. In future iterations of EDRC mapping, VEM has discussed adding additional state-level factors that could qualify a community as an EDRC, including the integration of the Municipal Vulnerability Index (MVI) and environmental justice communities. Considering the ways that rurality influences the distribution of benefits and burdens will continue to be an important consideration in achieving equity across the Region.

Community Outreach and Meaningful Participation

Throughout the planning process, CVRPC has sought meaningful public participation and actively engaged with the community to gather input on the development of the Plan. One important resource to connect with a broader range of people was libraries, who serve a unique and valuable function as established community centers located in most EJFPs in the

region. For increased accessibility, all surveys and information were written in plain, simple text to allow all members of the public the opportunity to weigh in with their priorities and concerns. Both digital and hard copies of the survey were provided.

While drafting the regional plan and Future Land Use Map, CVRPC:

1. Conducted stakeholder outreach and interviews with community-based and partner organizations such as Downstreet Housing, Let's Grow Kids, Friends of the Mad River, and Good Samaritan Haven,
2. Met with all 23 towns in the Central Vermont region to discuss the development of the Regional Future Land Use map. Meetings with Select Boards and Planning Commissions focused on the new tier-based framework outlined in Act 181, the planning implications of opting-in to Tier 1a or 1b status, the statewide mapping approach, and opportunities for local input,
3. Held round table discussions at 10 libraries in Central Vermont discussing regional plan mapping and housing,
4. Distributed a survey on the Future Land Use map and housing targets which was included in CVRPC's monthly staff newsletter, published to the CVRPC website, available at the library tabling sessions and posted on the Front Porch Forum for several towns,

Once the first draft of the Regional Plan and the Future Land Use map were completed, CVRPC began a second round of engagement with community members, municipal legislative bodies and Planning Commissions, municipal administrators and planning and zoning staff, and public libraries by:

1. Posting and publicizing the online, interactive draft of the Future Land Use map to solicit location-specific community input;
2. Holding office hours for commissioners to discuss the Future Land Use map, housing targets, and answer questions more generally about the Plan;
3. Sending updates and invitations to comment on the FLU map and Regional Plan draft via the CVRPC "Weekly Roundup" to almost 600 Commissioners, Town Administrators, interested municipal officials, media outlets, and interested members of the public;
4. Meeting with Planning Commissions and/or Selectboards/City Councils of each municipality to share the proposed FLU map and ensure that the Plan and FLU Map reflected both municipal and regional priorities;

5. Distributing hard copies of the draft Regional Plan and 24” x 36” copies of each municipality’s section of the Regional FLU map to all Town Offices/City Halls and public libraries;
6. Holding seven Q&A sessions in August, including one evening session, for community members, municipal staff, librarians, Planning Commission and Selectboard members to clarify the distinction between FLU classifications and local/state land use decision making; explain the repeal of the Road Rule and Tier 3; share information and resources about the state designation program rollover; discuss the implications of Tier 1 enrollment; and explore other topics participants were interested in with follow-ups as needed to answer specific individual questions;
7. Sharing updates and invitations to participate in the review process through local Front Porch Forum posts by CVRPC commissioners, and front-page announcements on the CVRPC website.

In addition to the outreach activities described above, CVRPC has participated in a number of other programs and processes that allow for community and stakeholder engagement. CVRPC:

1. Participated in the process of creating the Transportation Equity Framework, a VTrans report focused on understanding how transportation investments can reach and benefit all Vermonters,
2. Serves as an active member in THRIVE, a collaborative to improve health outcomes and contain costs by identifying and addressing social drivers of health. This includes health care, public health, social services, planning, nonprofits, community members, and other local partners,
3. Tabled at Waterbury LEAP, educating the public about emissions reductions, renewable energy and energy efficiency, as well as gathering comments on the energy components of the Plan, and
4. Held a Planning Essentials training for new Development Review Board and Planning Commission members, answering questions about Act 181 and new future land use designations.

Flood Resilience

Flooding is Vermont's most common form of natural disaster, the costliest and most dangerous to public health and safety. Floods damage and destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and sometimes result in fatalities. Washington County is at the highest risk for river flooding, landslides, and infrastructure losses in Vermont according to the 2023 National Risk Index Report. This is due in large part to the historical development of industry and commerce throughout the Region occurring along rivers and other bodies of water. The increase of heavy rain events and severe flooding due to climate change has increased the general awareness of the risks statewide. Avoiding or limiting development and investment in identified flood hazard areas, where feasible, is a central goal in this plan.

Moreover, CVRPC recognizes that the impacts of climate change are felt disproportionately by the Region's most vulnerable residents. Individuals on fixed incomes, with physical challenges, older adults, BIPOC Vermonters, and the unhoused often have the hardest time preparing for and recovering from these climate-induced disasters. Older residents specifically are more vulnerable to disasters and account for the highest rate of disaster related deaths nationwide.[8] There is a need to plan at the community and regional scale to reduce the impacts of climate change on older adults and account for the limitations of individual and institutional preparedness. The future of resilience planning will require improved communications and social networks for vulnerable residents who require greater assistance before, during, and after disasters.

Given the wide-ranging implications of flooding on the region, flood resilience is incorporated into the Natural Systems and Working Lands Element, the Future Land Use Element, the Utilities, Facilities and Services Element and the Economic Element. Further, proactive steps to mitigate flood risk, such as engaging with, and providing technical assistance to, towns in enhancing their flood regulations and emergency preparedness, are embedded into the goals, policies and actions of the Plan.

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[8] Older adults and disasters: How to be prepared and assist others

2. NATURAL RESOURCES AND WORKING LANDS ELEMENT

The land, or more broadly, the natural earth, is the source of all that sustains human life. This fact is sometimes easy to forget in modern America. Water pours from our taps. Food is purchased, often already prepared, under the fluorescent lights of the supermarket. Clothing hangs from a rack at the corner boutique. Shelter is erected for us out of "construction materials" on "building lots."

Yet, we remain inextricably dependent upon natural systems. Traced to their origins, all of life's necessities are products of the earth and its processes. So are we.

Over the past several decades, Vermont has witnessed dramatic cultural change. Technological advances in the areas of transportation and telecommunications have been the primary agents of this transformation, opening up what was a fairly insular, self-sufficient rural society to the "outside world." With this exposure came new people, new development, and new social, economic, and land use patterns, and new demands on existing systems. Some of the changes the State has experienced have been beneficial; some have not.

While people may argue about the pros and cons of technology and land development, they are part of our current reality. The challenge before us now is to guide these forces of change so as to bring about a marriage between our culture and our place that is sustainable, harmonious, and beneficial. In the years to come, nothing will say more about the success of our efforts than the way in which people use the land and its resources.

Discussion: Trends

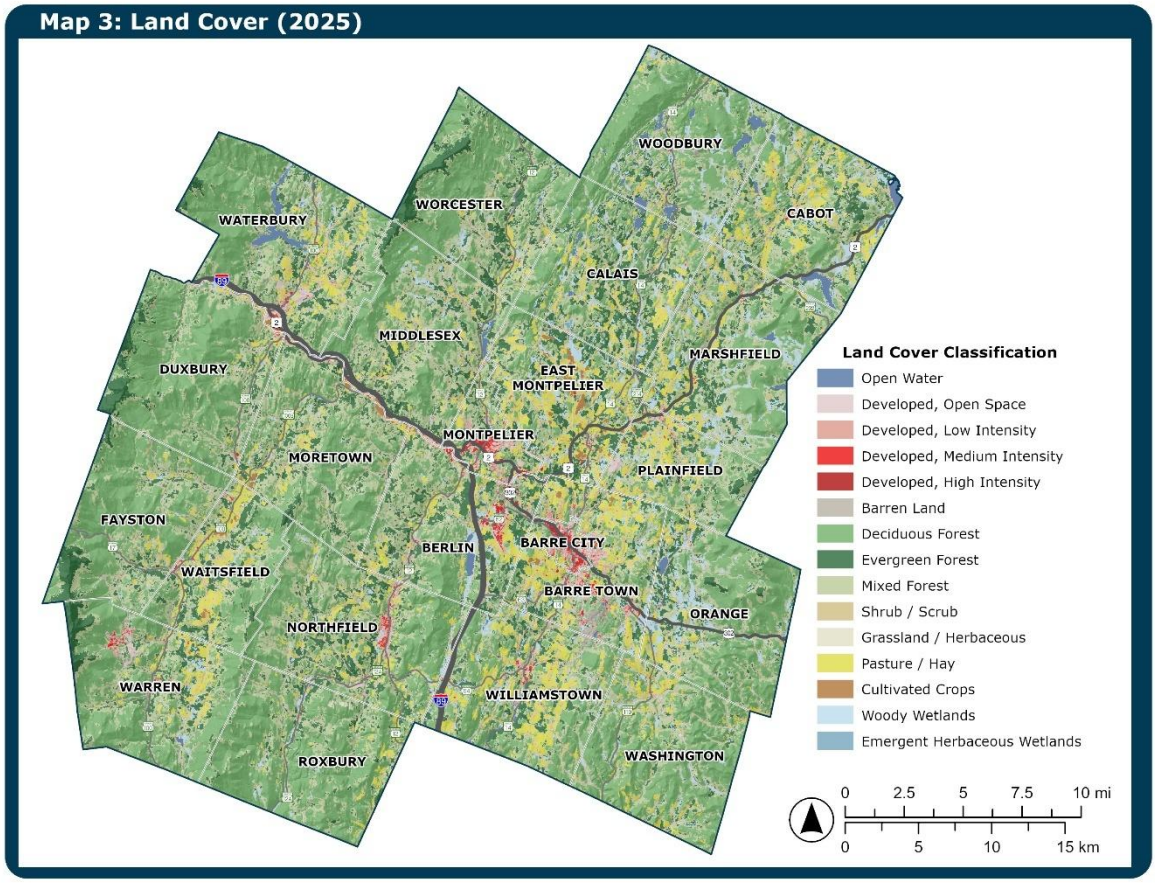
In recent decades, the amount of land in agricultural production and wetlands has diminished, as forested and developed lands have expanded. While it is difficult to predict the future, certain expectations regarding land use seem reasonable, at least over the life of this Plan. Among them are:

- Land in agricultural production will continue to decrease. While the rate of change could depend on a number of factors, including Federal

policies and pricing, development pressures, market influences, and taxation policy, the rate of loss is expected to slow given stronger protective measures now in existence, the emergence of land trusts, and the fact that most of the marginal farms are no longer in business leaving only the finest soils still in production.

- Wetland acreage will stabilize due to the existence of strict, protective regulations at the Federal, State, and sometimes local level.
- Acreage in forestland may increase slightly, but will not change dramatically. Conversion to development will probably be offset by vegetative succession of abandoned farmland.
- Developed land will increase. The amount of land converted to development will be a function of several variables, including: the Regional economy, population trends, regulatory controls, and the patterns of growth.

Map 3: Land Cover (2025)



Resource Protection

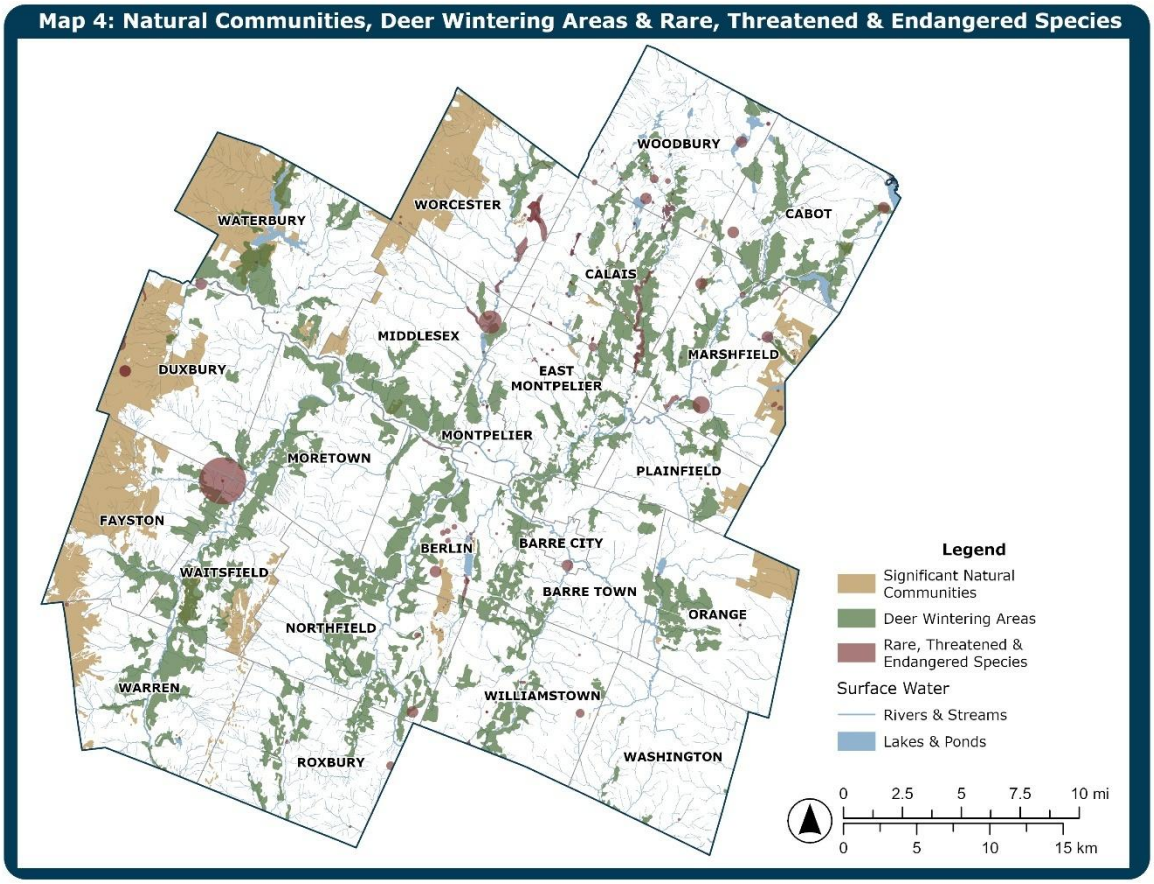
Within our Region's boundaries are many ecologically sensitive areas and resources that serve as symbols of the Region’s natural heritage and barometers of environmental health.

These environmentally sensitive lands are not mere amenities. They have great value for education and research and for the understanding and appreciation of natural systems and processes. They perform critical ecological functions, enhancing the stability and diversity of ecosystems.

The preservation of ecologically sensitive places is a goal of this Plan. Human use of such areas should be accomplished in a manner which protects their integrity and function.

Resource protection lands include: protected lands, wildlife habitat, high elevation areas, steep slopes, critical resource areas, groundwater recharge areas, surface waters, wetlands, floodplains and scenic areas. Many of these areas are regulated under Act 250, Criterion 8, Rare and Irreplaceable Natural Areas (RINAs), which include Significant Natural Communities, Rare, Threatened and Endangered species, and Significant Wildlife Habitat; while many are also included as constraints in enhanced energy planning (see Energy Element Tables 14 and 15 below).

Map 4: Natural Communities, Deer Wintering Areas & Rare, Threatened & Endangered Species



Wildlife Habitat

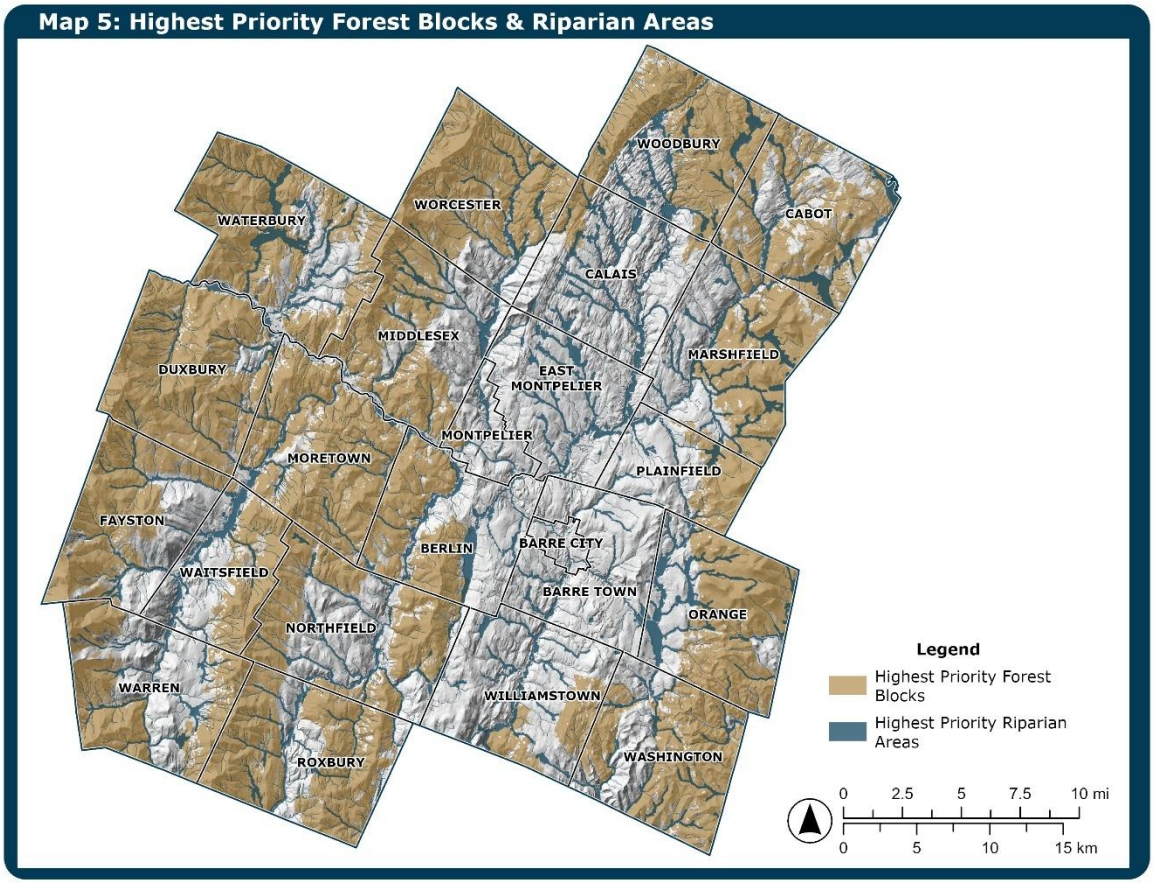
Our native wildlife species are valued by Central Vermont residents in a variety of ways. Some merely enjoy their presence as a reflection of nature's spirit. Some rely on wildlife for sport, food, or income (direct and indirect). Others have scientific or academic interests in wild creatures. For many of us, a combination of the above factors plays a role in our appreciation of wildlife.

Our most critical wildlife species are generally thought of as those which yield significant economic return, provide for sport and subsistence hunting, are symbolic of wilderness values, or face the threat of extirpation or extinction. We know that viable habitat is the single most important survival need for most of these species; yet for many, habitat loss and fragmentation is a real and present threat.

Based upon information contained within the 12/14/17 draft Agency of Natural Resources (ANR) Act 171 Guidance document titled "Planning: A Key Step Towards Protecting Forest and Wildlife Resources", "habitat connectors" are those areas of land or water that links larger patches of habitat within a landscape to allow for the movement, migration, and dispersal of animals and plants. They can be a forest block, riparian area, or a specific road crossing that wildlife repeatedly use. Forest fragmentation contributes to the loss of wildlife habitat, and the loss or decline of habitat connectivity and minimizes a species' ability to travel between hunting, breeding and migration grounds.

As noted below within the Forest Lands section of this chapter, the State of Vermont maps and ranks lands and waters that support important ecosystems, natural communities, habitats, and species. The Region's Highest Priority Connectivity Blocks are comprised of habitat blocks that are of the greatest importance for wildlife movement and genetic exchange on a regional scale. Together with the Region's Highest Priority Interior Forest Blocks these data layers represent a regionally connected network of forest that provides high-quality interior forest habitat. The inclusion of Highest Priority Surface Water and Riparian Areas identifies additional lands along streams, rivers, lakes and ponds which also serve as wildlife corridors. See Map 5: Highest Priority Blocks and Riparian Areas below.

Map 5: Highest Priority Forest Blocks and Riparian Areas



Additionally, the Vermont Department of Environmental Conservation (DEC) has defined and mapped the following significant habitats: deer wintering habitat, bear reproduction zones, natural communities and any areas necessary to support the food, shelter or breeding needs of endangered species (See Map 4: Natural Communities, Deer Wintering Areas & Rare, Threatened & Endangered Species).[9]

In 2023, Vermont passed Act 59: Community Resilience and Biodiversity Protection Act, which addresses the overlap of conservation priorities with environmental justice, and the statewide housing crisis. It outlines a vision for conserving 30% of the state's land by 2030 and 50% by 2050. According to preliminary mapping conducted by the VT Fish and Wildlife Department, the average town in Central Vermont is approximately 20% conserved.

[9] Vermont. Department of Environmental Conservation. Critical Habitats

Certain towns in Central Vermont have already set goals encouraging or requiring conservation subdivisions to guide development into preferred areas while protecting natural resources.

High Elevation Areas and Steep Slopes

Areas of high elevation and steep slopes garner multiple considerations for resource protection. Slopes between 15-25% grade are typically considered "steep" in Vermont and elevations about 2,500 feet are regulated at the State level, with some communities regulating at lower elevations. Soils in these areas are often more sensitive to erosion, as at high elevation they can be shallow to bedrock, and on steep slopes soils are more erodible. Disturbance of such soils is likely to lead to effects on water quality, as soils and their nutrients are washed into surface waters. Additional sediment in rivers can lead to bank destabilization and streambank erosion. High elevation areas also have an important role in the watershed overall, as the starting point for much precipitation that will eventually run over the land to valley water bodies.

Special scenic and wildlife habitat values are connected to high elevation areas as well. At some elevations, climatic conditions are just right for supporting certain species that are rare at lower elevations. Vermont has long identified with the scenery of its mountains, and ridgeline vistas are inherently formed by lands at highest elevation. In Central Vermont the Camels Hump State Park is established as an ecological area, to protect scarce and rare plants and preserve natural habitat and wilderness aspect.

Critical Resource Areas

For the purposes of this plan critical resource areas include:

- National Natural Landmarks: a designation that encourages and supports the voluntary conservation of sites that illustrate the nation's geological and biological history, and to strengthen the public's appreciation of America's natural heritage;
- State-designated Natural Areas: limited areas of land which have retained their wilderness character, although not necessarily completely natural and undisturbed, or have rare or vanishing species of plant or animal life or similar features of interest which are worthy of preservation for the use of present and future residents of the State and may include unique ecological, geological, scenic, and

contemplative recreational areas on State lands;
- Sites listed on the Vermont Rare, Threatened and Endangered Species, and Significant Natural Communities as designated by the Vermont Natural Heritage Inventory; and
- Elevations over 2,500 feet as shown on USGS topographic maps.

Watersheds

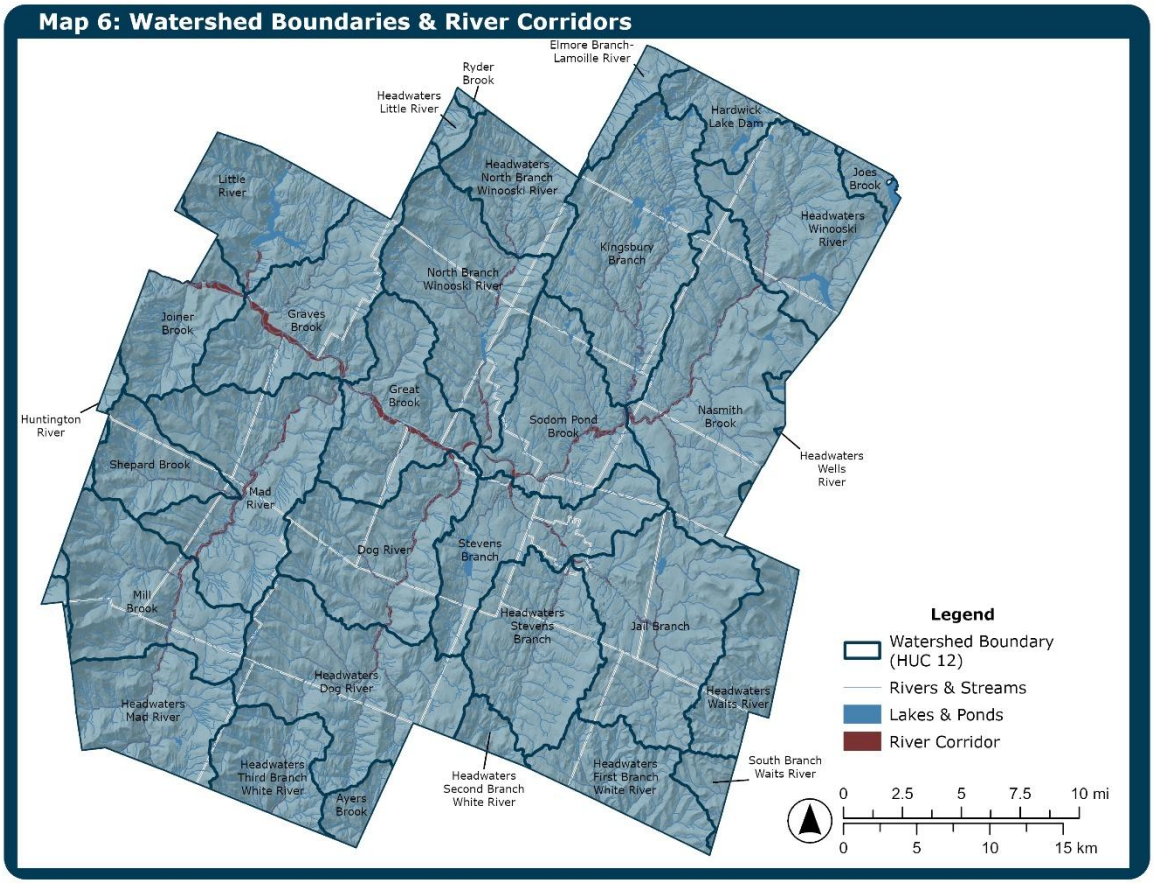
Planning on the watershed scale is a holistic process that involves local, regional, and state partners working together towards a common goal. The Winooski River Tactical Basin Plan[10] is updated every five years and is a strategic guidebook to protect and restore Vermont's surface waters. Proposed strategies focus on meeting goals through voluntary participation and project implementation by watershed partners and the Basin's Clean Water Service Provider.

Town plans throughout the Region share similar priorities for protecting water resources. River corridor and shoreland overlay districts are widely used to increase protection. Collaboration with the basin's watershed partners is critical in protecting and restoring our shared water resources. Towns have partnered with a variety of organizations to restore riparian habitat and implement town wide water quality projects, including Friends of the Winooski, Friends of the Mad River, Mad River Watershed Conservation Partnership, Vermont River Conservancy, the Winooski Natural Resource Conservation District, and the Montpelier Commission for Recovery and Resilience.

CVRPC has been involved with assessment and planning for the Winooski River and its major tributaries along with partners such as Friends of the Winooski River, Friends of the Mad River, Vermont River Conservancy, Vermont Natural Resources Council, Winooski Natural Resource Conservation District, the DEC River Management Program, and the municipalities of Central Vermont.

[10] 2024 Winooski River Tactical Basin Plan: https://dec.vermont.gov/sites/dec/files/WID/WPP/Winooski_TBP_2023_signedFinal.pdf

Map 6: Watershed Boundaries & River Corridors



Groundwater Recharge Areas

Well over half of Central Vermont's residents, and many of its businesses and industries receive their water from subterranean sources. In our rural areas, this figure rises to almost 100%. In general, groundwater sources in Central Vermont are plentiful and of good quality. In addition, groundwater is usually less susceptible to seasonal fluctuations and contamination than surface water making it an ideal source for public, urban supplies.

Incidents of groundwater contamination are on the rise, however, primarily due to improper activities within those areas which serve to replenish supplies.[11] Sources of groundwater contamination in Central Vermont include domestic sewage, landfills, improperly disposed of hazardous

[11]Greenberg, A.S/ Groundwater Quality Protection and Planning: A Guide for Local Government, UVM, 1991

wastes, leaky underground storage tanks, pesticides and fertilizers. Supply quantity is threatened in some locations, as well, because of an increase in impermeable surfaces in aquifer recharge areas.

Once contaminated, groundwater supplies are difficult and expensive to rehabilitate. New sources may be hard to find, costly to develop, and susceptible to the same fate as the tainted source, if treated similarly. It is critical, therefore, that our existing and future groundwater supplies are protected. The future of our municipalities and their prospects for new growth and development depend upon the quality and quantity of this important resource.

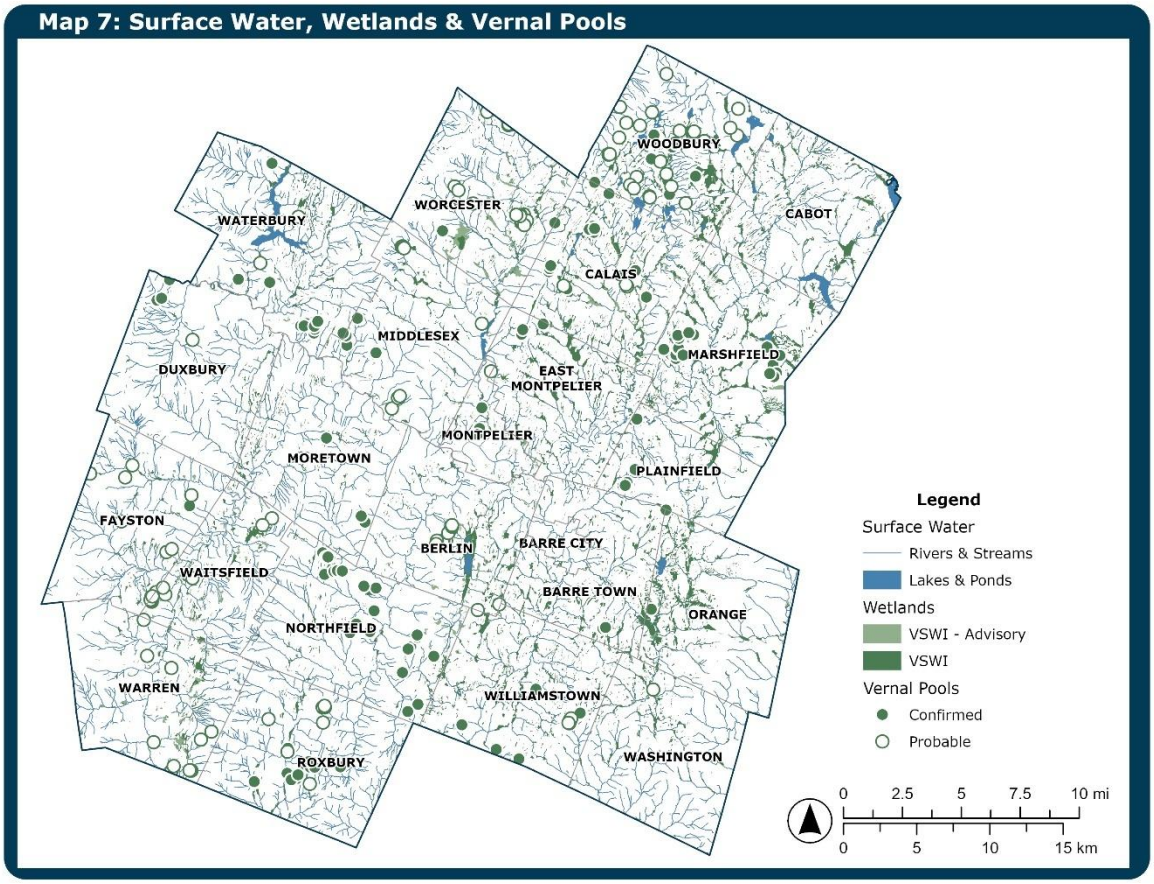
The State of Vermont has adopted an aggressive groundwater management strategy designed to promote a proactive approach to the protection of subterranean water supplies. This strategy includes the delineation of critical recharge zones (known as Source Protection Areas or SPAs) for public water supply systems and the establishment of land use guidelines to reduce contamination potential on these sites. Although SPAs have no individual regulations attached to them, existing State regulatory programs will regard them as "red flags" indicating the need for special consideration of proposed development activities. In addition, the DEC requires the development of a "source protection plan" that minimizes the contamination risk within SPAs.

Surface Waters

The Region's lakes, ponds, rivers and streams represent an invaluable resource. They provide water for drinking, and domestic and industrial uses. They generate hydroelectric power. They dilute and assimilate various effluent. They provide recreational and aesthetic values for public use and enjoyment. They also contribute to the propagation of fish and wildlife and to economic development.

Streams, rivers and lakes with adequate vegetative buffers on their shorelines enhance the benefits of the resource. Vegetative buffers protect shorelines from flood flow and ice damage, prevent bank erosion, and are aesthetically pleasing. They also assist in mitigating heat transfer from earth to water and help maintain adequate oxygen level for fish habitat, as well as abetting effluent assimilation capacity.

Map 7: Surface Water, Wetlands & Vernal Pools

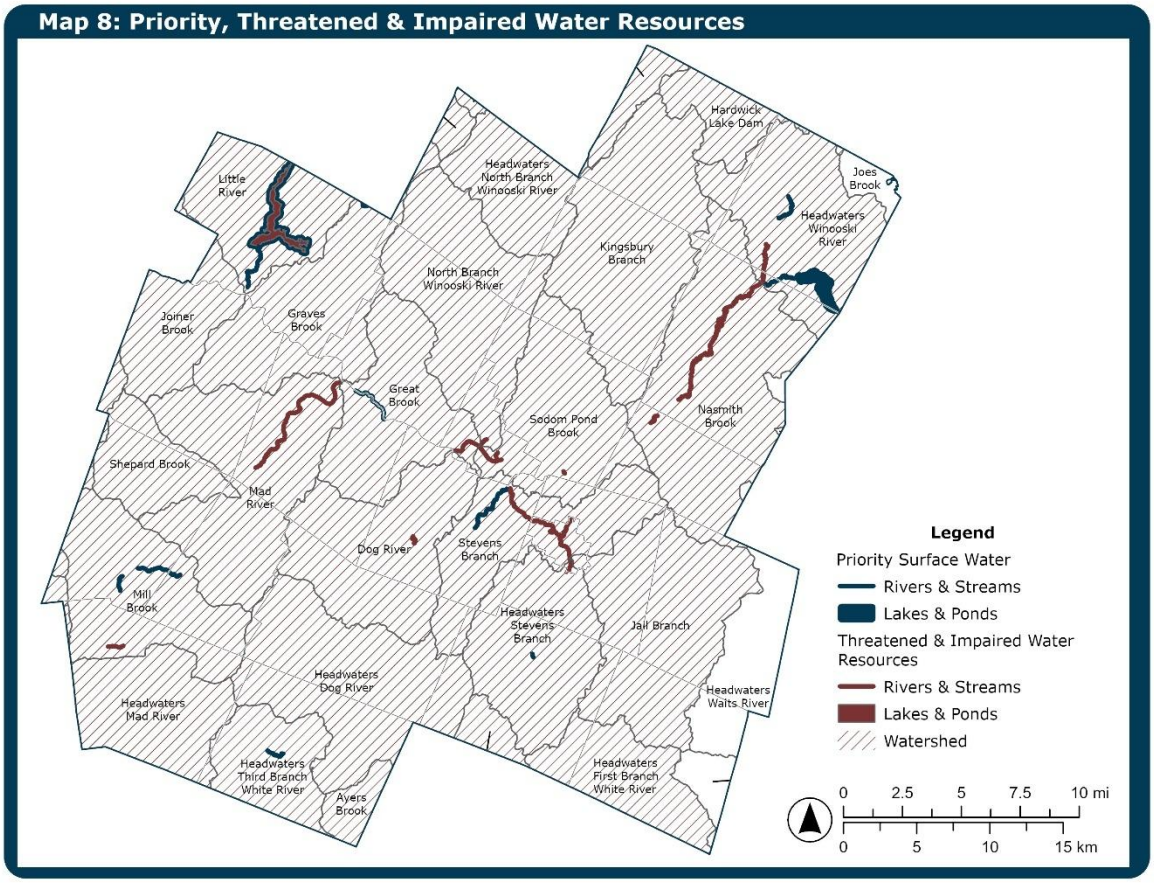


Unfortunately, the demands that we place upon surface waters are often incompatible and detrimental to their overall quality and function. The 2024 Tactical Basin Plan identifies Nelson Pond in Calais and Sabin Pond in Woodbury as candidates for Lake Watershed Action Plans due to increasing nutrient trends, fair shoreline conditions, and moderately disturbed watersheds. These communities are currently undergoing Lake Wise Assessments. Waterbury Reservoir is considered an impaired lake due to sedimentation and turbidity. Lakeshore communities looking to address the major threats to water quality can work with the DEC to conduct Lake Wise[12] Assessments and consider adopting a Lake Watershed Action Plan.[13]

[12] DEC Lake Wise: https://dec.vermont.gov/watershed/lakes-ponds/lakeshores-lake-wise/what-lake-wise
[13] DEC Lake Watershed Action Plan: https://dec.vermont.gov/watershed/lakes-ponds/lakeshores-lake-wise/lake-watershed-action-plans

Our challenge is to balance our needs with respect to surface waters and to adjust current development practices so as to minimize their harmful impacts.

Map 8: Priority, Threatened & Impaired Water Resources



Floodplains and Fluvial Erosion



Canoeing on Wrightsville Reservoir, Middlesex, Vermont.

Floodplains are areas of land adjacent to a water body that are frequently inundated by water. These places serve important ecological functions, including floodwater storage, sediment trapping, nutrient filtering and aquifer recharge. Arising from a variety of causes, including heavy rain, melting snow, ice jams, poor drainage and dam breaks, flooding is the most frequent, damaging and costly type of natural disaster experienced in the State and Region. After the July 2023 storms and flooding, Washington County sustained over $350 million in damages.

Floods cause damage in two distinct, but related, ways. Inundation can fill structures with water and cause property damage and drowning. It is a great concern for those living in or near flood hazard zones. However, fluvial erosion, including bank failure and changes in river channel courses during floods, actually cause more damage.



Fluvial erosion along the Mad River, Waitsfield, Vermont. Image courtesy of VTDEC River Management Program.

Our society's historical response to floods has been to treat the symptoms rather than the causes of floods – repairing damages rather than preventing them. Furthermore, some of the traditional "cures" actually exacerbate the problem they attempt to fix. The disaster response paradigm is changing, however, and CVRPC has been taking an active role in both inundation mitigation and fluvial erosion hazard mitigation.

In response to recent program and mapping changes made by the Federal Emergency Management Agency (FEMA) to the National Flood Insurance Program (NFIP), CVRPC has been working with our member municipalities to help them identify and correct any deficiencies in their flood hazard regulations and/or maps. This program identifies those areas within a flood hazard zone (the area inundated by water during a flood with a statistical probability of occurring once every 100 years – i.e., the "One Hundred Year Flood ") and prescribes development review guidelines and procedures for lands within regulated areas. Compliance with these Federal standards is required for continued NFIP eligibility. In 2026, all 23 towns were eligible for NFIP. Residents of municipalities that lose eligibility face prohibitive costs for insurance protection outside of the program.

The health of the Region's rivers and streams are best addressed through a comprehensive river corridor planning process. This involves the integration of fluvial geomorphic assessment data and the goals and objectives of the State and local community. Together, these contribute to the identification of scientifically sound and ecologically beneficial river restoration and conservation projects. Such projects help to improve water quality and the community's relationship with the river. No new river and tributary assessments have been completed since 2018. Limited resources requires that Stream Geomorphic Assessments and River Corridor Plan updates are prioritized with respect to their need for collecting current data.

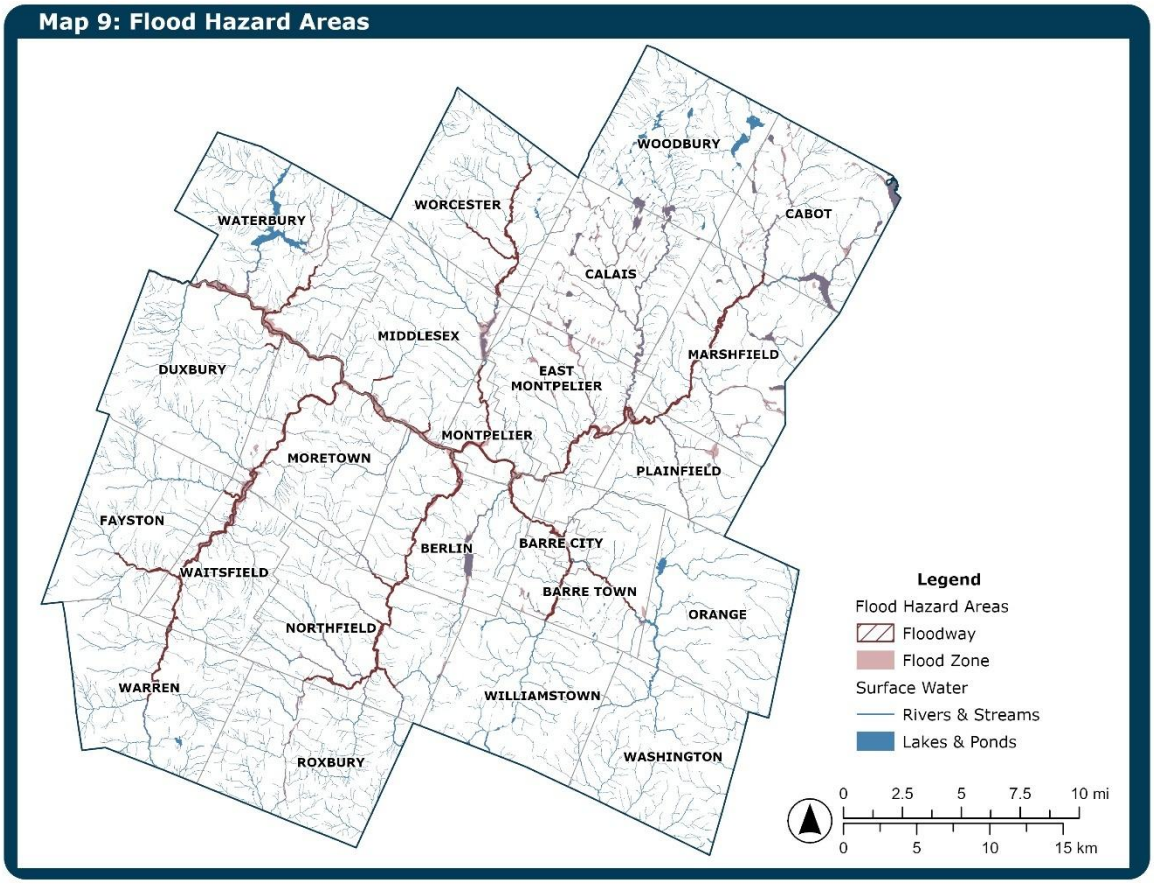
The 2024 Tactical Basin Plan recommends that partners work with the Vermont Rivers Program to pilot an assessment update process in either the Dog River or Stevens and Jail Branches. In both locations, partners have previously expressed concern that river corridor plans are out-of-date while communities have expressed interest in new project development. After the flooding of July 2023 and 2024 several towns have expressed an urgent need to reevaluate rivers and streams that are exacerbating downstream flooding. It is hoped that municipalities will use this information to help avoid future loss of life and property damage.

According to the Vermont River Management Program, "the largest single source of flood losses, both in terms of cost and the number of people affected, is damage to transportation infrastructure." Undersized or blocked bridges and culverts are a main culprit in exacerbating flooding and erosion hazards. CVRPC has, through our Bridge and Culvert Program, completed detailed inventories of these structures to provide our municipalities with

information on the exact locations and specifications.

We continue to work with our communities on pre-disaster mitigation planning (see Utilities, Facilities and Services Element) in order that they meet the Federal eligibility requirements for disaster recovery and mitigation funding.

Map 9: Flood Hazard Areas



Wetlands

Wetlands are areas of land that are "inundated or saturated with water for varying periods of time during the growing season." [14] Wetlands help make the environment more livable. They are among our most productive and diverse biological communities. They help to purify surface and underground

[14] [5] Vermont Agency of Natural Resources, Department of Environmental Conservation, Vermont Wetlands Conservation

water supplies. They are natural flood storage areas during wet periods and assist in replenishing reservoirs during dry spells.

Wetlands can sometimes present significant and costly obstacles to development. Over the past century more than one half of the original wetland acreage in New England has been destroyed. Given the important ecological functions that wetlands perform, these special areas are receiving greater protection.

Recommendations for wetland restoration can be found in Stream Geomorphic Assessments, River Corridor Plans, and the Tactical Basin Plan.

The 2024 Tactical Basin Plan identifies the following factors that correlate to poor wetland condition:

- Presence of invasive plant species,
- disturbance to the wetland buffer or immediate surrounding area,
- disturbance to wetland soils, and
- disturbance to wetland hydrology (how water moves through a wetland) through ditching (e.g., agricultural), filling (e.g., roads) and draining (e.g., culverts).

Scenic Areas

Central Vermont is a place of celebrated natural beauty. Its scenic landscapes not only enrich lives and spirits and attract new businesses and residents, they also provide the basic ingredient for one of the Region's most important industries - tourism. Each year thousands of visitors travel here to see the mountain vistas, pastoral scenes, fertile valleys, historic villages, Interstate 89 (which has received awards for its scenery), remote back roads, and woodlands ablaze with autumn color. Scenic byways are discussed in the Transportation Element and Map:29 Recreation Trails and Scenic Byways can be found on page 250.

Viewsheds and the preservation of scenic vistas can be maintained through local zoning and bylaws. For example, the town of Fayston has mapped Designated Scenic Resources and included the protection of viewsheds within their development review standards. The town of Warren similarly has a Resource Protection District that includes scenic viewsheds and carefully defines scenic features in their Town Plan. Within the East Montpelier Town Plan, significant scenic resources and views along public roads are explicitly identified and mapped. The scenic or natural beauty of an area is protected

under Act 250 Criterion 8, but having a clear inventory and definition of scenic resources within town planning documents is vital to effectively regulating these resources. While the general aesthetics and character of an area may be referenced throughout many town plans, these descriptions are often too broad to apply to Act 250 and 248a proceedings. CVRPC will continue to work with towns, particularly through enhanced energy planning, to adequately define and identify scenic resources within towns. It is in our best interest to preserve the best of Central Vermont's visual splendor.

Productive Resources

Central Vermont possesses "working landscapes" where people manage, nurture, and harvest the resources of nature. Farmlands, forest lands, and lands containing mineral resources are vitally important to the economy and character of our Region. This Plan encourages the protection of resource production lands and the livelihoods of the people who use them by recognizing their benefits, promoting their products, and rethinking the attitudes, policies, and land use patterns that threaten their existence.

Agricultural Land

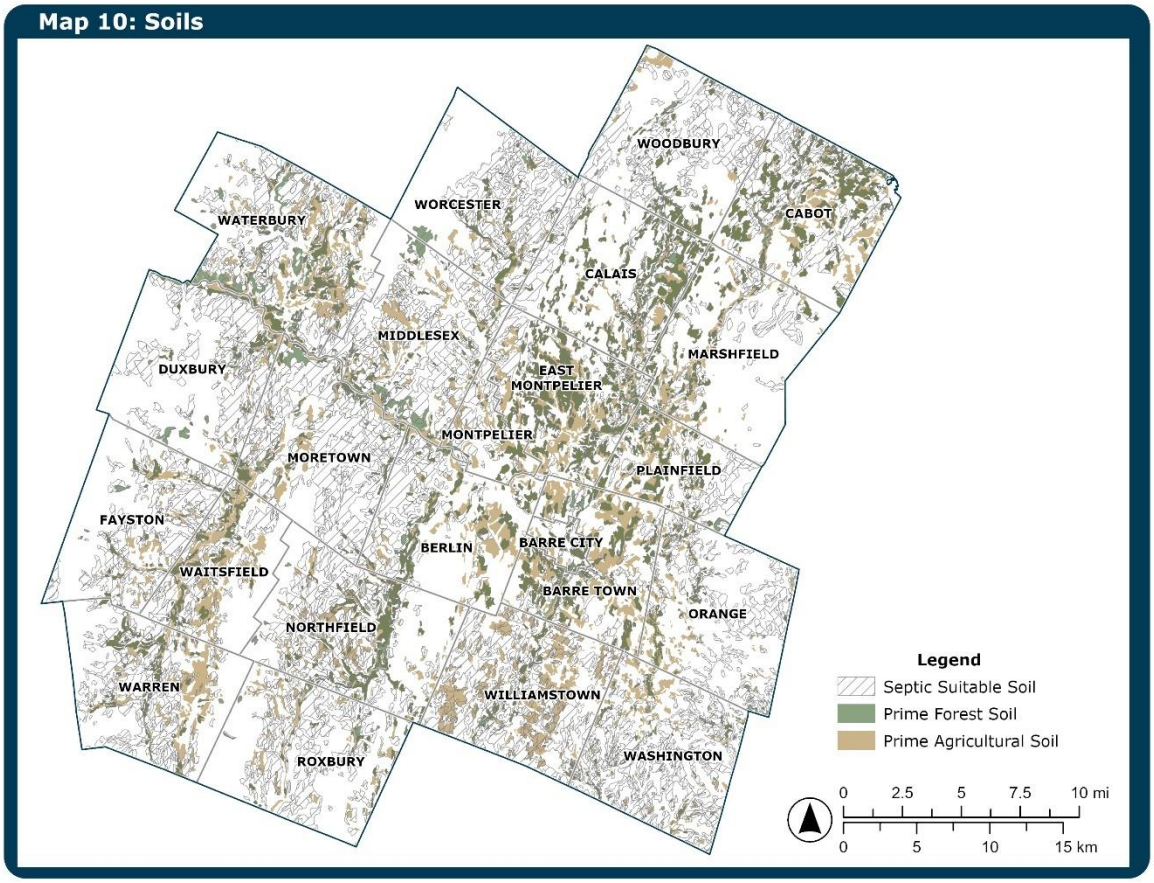
Farming and farmlands continue to contribute many millions of dollars annually to the economy of the Region and provides employment opportunities to our residents. Agriculture and the pastoral landscape also contribute to tourism and provides substantial indirect economic benefits.

In addition, the case can be made that preserving farms and farmlands may help preserve urban economies. Sprawling suburbs, office parks and shopping malls in now agricultural areas would likely contribute to the demise of downtown businesses and neighborhoods.

Farming helps to define the Region's cultural identity and provides Central Vermont residents with open space, recreational opportunities, aesthetic pleasure, and a sense of place. More importantly, farms and farm soils, if protected now, can assure us of some degree of Regional self-sufficiency in the event that outside food supplies dwindle, are cut off, or become prohibitively expensive. While such scenarios may seem far-fetched for the short term, a number of circumstances already in motion could make them a reality within our lifetimes. Among such circumstances are: global climate change, dwindling and expensive energy reserves, disease susceptible

monoculture farming in major production areas, soil salinization and water shortages in these same locations, trade fluctuations, and worldwide population increases.

Map 10: Soils



Vermont Agricultural Soils

See Soils Map above.

Agricultural Value:

1, 2, and 3 have few limitations restricting their use; these soils are level to gently rolling and are the most productive.

Soils in classes 4, 5, 6, and 7 have more limited agricultural value due to slope, excessive wetness or shallow depth to bedrock.

Classes 4 and 7 are Federally classified as "statewide," but within Vermont agricultural values 1 through 7 are all categorized as "primary agricultural soils."

Vermont soils are identified by USDA/NRCS in its publication *Farm- land Classification Systems for Vermont Soils (June 2006 edition*).

USDA/NRCS acknowledges those soils with agricultural values of 1 through 7 as demonstrating the characteristics needed for various agricultural uses. This compilation is updated when necessary and is available in print, on the internet, and on CD-ROM.

Complete details are available at: Detailed Definitions - Vermont Soil Fact Sheets

The Vermont Center for Geographic Information: VT Data - Agriculturally Important Soil Units | Vermont Open Geodata Portal Your source for geospatial data

Your nearest office of the USDA/ NRCS, or online at: Vermont | Natural Resources Conservation Service

Farmlands provide a variety of environmental functions from which we all benefit. They provide wildlife habitat. They capture carbon dioxide, thereby maintaining air quality. They help protect the integrity and function of our flood plains and wetlands. They can help maintain water supplies through groundwater recharge. Farms, as they exist in Central Vermont, are part of, and contribute to, the natural systems that sustain life.

In light of all this, a strong, healthy agricultural economy is vital to the Region's well-being. The limited supply of primary agricultural soils, their general suitability for septic systems, combined with agriculture's increasing dependence on higher quality land make it crucial that land use decisions display foresight and recognize the importance of these soils to future generations. As such, it is a primary goal of this Regional Plan to preserve and promote a viable agricultural economy, culture, and land base.

Forest Land

Although forests cover 78% of the state today,[15] Vermont wasn't always the "Green Mountain" state. At the time of European settlement, forests covered almost all of Vermont, but wide scale clearing begun in the early 1800s significantly changed the landscape to an agricultural haven. Clearing reached its peak in the mid to late 1800s and reduced forest cover to about 35% of the state. Vermont's forests have since rebounded and remained largely unchanged since the 1980s.

Forests provide many benefits to Central Vermont residents. The timber industry contributes to the economy, providing jobs and important wood and paper products. Forests contain habitat essential to a variety of wildlife species and help protect and replenish surface and groundwater supplies. They also perform an important atmospheric cleansing function, protecting the quality of the air we breathe. Many recreational pursuits are dependent on, or enhanced by, forests, as is the aesthetic quality of the Region. Additionally outdoor recreation and tourism are major contributors to the Vermont economy.

Approximately 77% of the total land area in Central Vermont is forest land. Between 2005 and 2020, the total acreage of woodland parcels larger than 50 acres declined by 9.2% in the Region with an 18.2% loss statewide, according to the Vermont Natural Resources Council. Vermont is losing forest, in part, due to the subdivision of land. This trend, also known as parcelization, is the subdivision of land into smaller and smaller pieces and multiple ownerships.[16]

Forest fragmentation is due to the conversion of forests to agriculture and commercial uses, yet the main cause is scattered residential development. It occurs incrementally and over time non-forested pockets tend to multiply and expand. Eventually the forest is fragmented and reduced to scattered, disconnected forest islands. The remnant forest islands resulting from this fragmentation are surrounded by land uses that threaten the health, function, and value of those forest islands for animal and plant habitat, and for human use. As forest fragments become ever smaller, practicing forestry becomes operationally impractical, economically nonviable, and culturally

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[15] Overview of Vermont's Forests | Department of Forests, Parks and Recreation
[16] VT PARCELIZATION WEBSITE - Reports

unacceptable. Overall, economic and environmental sustainable forest management is very difficult on lands smaller than 50 acres.

In 2016, the Vermont Legislature passed Act 171 which amended multiple provisions related to timber harvesting and forest management. The act amends municipal and regional planning goals to encourage management of forestlands to improve forest blocks and habitat connectors and encourage the use of locally grown forest products. The Act defines a "forest block" as a contiguous area of forest in any stage of succession and not currently developed for non-forest use. A forest block may include recreational trails, wetlands, or other natural features that do not themselves possess tree cover. These can be different sizes, are identified by the land cover of an area and not bound by political or parcel boundaries.

The State of Vermont maps and ranks important and significant landscape features, as contained within the online mapping tool BioFinder. To view the Region's Highest Priority Interior Forest Blocks and the Region's Highest Priority Connectivity Blocks see Map 5: Highest Priority Forest Blocks and Riparian Areas. Together these data layers represent a connected network of forest that provides high-quality interior forest habitat.

This mapping does not identify all of the Region's productive forestland. Productive forestlands are defined as all large tracts which in themselves, or when combined, form a major economic unit for long-term timber production. It is important that these lands are conserved through sound, long-term forest management programs, and compatible patterns of growth and development.

Mineral Resources

The mineral deposits of Central Vermont are recognized as an important resource. The presently known mineral resources of the Region include granite, talc, asbestos, chromite, verde antique, sand and gravel.

The granite quarries of Barre Town and granite industries of Barre City, Berlin, Calais and Montpelier are major contributors to our economy and living monuments to a colorful part of our Regional heritage. The first quarries and stone sheds in the Region opened during the 1800s, expanding into a booming granite industry with the introduction of rail to Barre in 1875. Between 1830 and 1910, the population in Barre increased from 2,012 to over 12,000, demonstrating the immense impact of the industry on

the Region. The E.L. Smith Quarry, owned by Rock of Ages, is the largest operational deep-hole dimension granite quarry in the world, which sits on a granite deposit that is 50 acres wide and roughly 570 feet deep.[17] The Woodbury Gray Quarry, operated by Swenson Grantie Works, is another active quarry in the Region. Give the fine, uniform grain and durability of the granite found in Central Vermont, it has been used in monuments, cemeteries and notable buildings across the country. Though many quarries have closed or been consolidated, the granite industry continues to adapt to external pressures and changes in market conditions. Granite processing, wholesaling, and manufacturing remain important to the culture and economy of Central Vermont.

While sand and gravel deposits are less renowned, they are an important regional resource that provides practical and economic benefits. Individuals and private enterprises rely on local resource extraction for convenience and cost savings. On a larger scale, municipalities rely on access to these local materials for road building, maintenance, and emergency response to save money on transportation costs, including time, fuel, wear and tear on expensive heavy equipment. Enterprise Areas, shown on the Future Land Use Map, include mineral extraction areas.

Generally, current extraction is occurring at sustainable levels but given the scale of the industry on the landscape, environmental impacts and land use disputes do occur. Extraction activities are regulated under Act 250 Criteria 9D and 9E and are reviewed by both the Vermont Geological Survey and ANR. This includes an evaluation of potential impacts on the environment, surrounding land uses and development, as well as a required site rehabilitation plan. ANR has published the following practices to mitigate the effects of extraction and blasting: VGS Practice for Review of Rock Extraction under Act 250 Criteria 9D and 9E[18]; DWGPD Practice for Review of Groundwater Monitoring Plan under Act 250 Criteria 1 and 9E[19]; and DEC Best Management Practices for Blasting to Avoid Environmental Contamination.[20] Moreover, individual towns can influence the location and use of extractive activities through their local zoning. Town plans across the

[17] Granite | Department of Environmental Conservation
[18] VGS Review of Rock Extraction under Criteria 9D & 9E (Dec 2016).pdf
[19] DWGPD Review of Groundwater Monitoring Plan under Criteria 1 & 9E (Mar 2017).pdf
[20] Best Management Practices for Blasting to Avoid Environmental Contamination (Dec 2016).pdf

region have adopted goals to establish standards regulating mineral extraction, encouraging locations and operating procedures that minimize the disturbances of resource extraction.

The products of earth resource operations are so important that we must accommodate them even as we guard against their more harmful aspects. This is an example where the planning process can be used to encourage locations and operating procedures that could minimize the conflicts and uncertainties of the regulatory process.

Natural Resources and Working Lands Goals, Policies and Strategies

Goal 1

To promote sound management, conservation and use of the Region's natural resources.

Policies and Strategies

1. Municipalities are encouraged to establish conservation commissions (under V.S.A.24, Chapter 118) to assist in the identification, study, maintenance and protection of important natural resources.

2. Encourage the improved identification and mapping of surface and groundwater resources.

> Strategy 2a. Work with State and Federal partners, such as U.S. Geological Survey, VT Geological Survey, and the Agency of Natural Resources in delineating ground water supply, aquifers, and groundwater protection areas.
>
> Strategy 2b. Support towns in identifying wetlands and vernal pools that are not already mapped by the State of Vermont.

3. Support the betterment of surface water quality in the Region.

> Strategy 3a. Storage and utilization of fertilizers, pesticides, petrochemicals, herbicides, sludge, or other potentially harmful industrial, agricultural, commercial or residential materials, must be accomplished in a manner compatible with existing regulations.
>
> Strategy 3b. CVRPC opposes the downgrading of surface water

classifications unless such action is required to accommodate treated effluent from new or expanded municipal sewage treatment facilities. The Commission also opposes the upgrading of surface water classifications where such upgrading might be misleading or dangerous to users.

Strategy 3c. Where a proposed project involves a discharge into, or withdrawal from, any of the Region's surface waters, consideration should be given to the short- and long-term impact on such waters and to applicable health and water regulations. The potential degradation of water quality, the impact on wildlife, the assimilative capacity of waters, and the effect on the Region's ability to support future growth should be evaluated. Protection of the public health, safety, and welfare shall be the primary objectives.

Strategy 3d. Native vegetated buffer strips in riparian zones and shoreland areas should be protected or maintained according to Best Management Practices outlined in the Vermont Handbook for Shoreland Development and VT ANR Guidance Regarding Riparian Buffers to protect functional habitat and improve water quality.

Strategy 3e. Encourage and assist with the acquisition of conservation easements along waterways according to priorities identified in River Corridor Plans.

Strategy 3f. Assist with and support efforts to remove dams that are not serving a useful purpose and other artificial barriers from rivers and streams. Help identify dams that are not serving a useful purpose, and that should be listed for removal in conformance with state and federal rules and regulations.

Strategy 3g. Assist landowners in identifying funding opportunities to support buffer plantings on their properties that would support stream bank and shoreland restoration.

Strategy 3h. High-density development in proximity to surface waters should consider community septic systems to permit adequate setback of the leaching area, or connections to public systems, if possible.

Strategy 3i. Support the implementation of the Winooski River Tactical Basin Plan priority strategies.

Strategy 3j. Require water quality restoration funding requests to demonstrate alignment with tactical basin plan priority strategies before Regional Planning Commission support is offered.

4. Encourage enhanced educational opportunities on watershed functions, protection, and restoration, particularly those targeted to youth.

Strategy 4a. Develop a clearinghouse of resources that could be used by teachers and other groups working with youth to provide education on these topics.

5. Avoid or limit development and investment in identified flood hazard areas. Where established economic and institutional centers exist, development in these centers shall adhere to strict floodplain management standards to minimize flood damage and public safety risk.

Strategy 5a. Continue to conduct outreach to municipalities regarding the most recent state River Corridor maps as delineated by the VT Agency of Natural Resources and their implications.

Strategy 5b. Encourage and provide technical assistance to municipalities in enhancing the regulatory standards in their municipal flood hazard regulations, including the incorporation of River Corridor regulations.

Strategy 5c. Fill and new structures within mapped floodways as identified on FEMA Flood Insurance Rate Maps shall be prohibited, except where a substantial public benefit is provided.

Strategy 5d. Wetlands that provide a flood storage function as determined by the VT Wetlands Program, should be left undisturbed, or development should be required to provide compensatory storage or restoration on-site or in the immediate vicinity, if disturbed.

Strategy 5e. Assist municipalities in identifying and limiting development on lands adjacent to waterways that provide flood storage or other beneficial functions through acquisition, easement, deed restriction, or zoning that encourages cluster design, particularly for those upstream floodplains that provide flood protection functions for the Region’ s downtowns and village centers.

Strategy 5f. CVRPC will have a FEMA Certified Floodplain Manager on the Commission staff.

6. Improve flood resilience planning, education, and outreach activities to create a citizenry aware of flood risks, potential costs, and actions that can serve to reduce risk and future property loss.

Strategy 6a. Continue to assist municipalities in developing local hazard mitigation plans and flood resilience elements as part of municipal plans.

Strategy 6b. Promote participation in FEMA' s Community Rating System, where appropriate; Assist unenrolled towns in applying for the Community Ratings System and assist towns already involved in the Community Ratings System in improving their rating.

Strategy 6c. Consider coordination of a multi-jurisdictional Program for Public Information, an ongoing effort to prepare, implement, and monitor a range of public information activities.

Strategy 6d. If requested, perform an audit of municipal websites and communication methods and recommend additional information and communication methods that will increase local awareness of flood risks, municipal flood resilience planning, and actions property owners and residents can take.

Strategy 6e. Partner with the Vermont Agency of Natural Resources to coordinate Region-wide flood resilience-related trainings targeted to real estate agents, developers, business owners, and other stakeholders with an interest in floodplain management.

7. Minimize fragmentation of forest blocks and habitat connectors.

Strategy 7a. Promote the Use Value Appraisal (Current Use Program) and other non-regulatory approaches to forest conservation and management, including support of forest products and conservation easements.

Strategy 7b. Encourage municipalities to identify forest blocks and habitat connectors and plan for the minimization of forest fragmentation.

Strategy 7c. Work with municipalities to incorporate development review standards in zoning and subdivision regulations that address forest and wildlife resources.

Goal 2

To enhance and support the viability of the Region's resource-based industries.

Policies

1. CVRPC supports and encourages the protection and continued productivity of viable primary agricultural soils, productive forest land, and mineral resources. Sound land use planning, including flexible development options, fair government pricing, taxation, and subsidy programs, agricultural diversity, and promotion of value-added products and industries, is viewed as a means to this end.

2. Public improvements are considered a significant reason for farmland's metamorphosis into prime development land. The installation of sewer or water lines, and roads across or into the immediate vicinity of agricultural parcels or primary agricultural soils can encourage the development of farmland. For this reason, they require careful review. Such improvements will be discouraged unless:

a) such a position would conflict with the local plan; or
b) the improvements are required to implement the settlement pattern goals set forth in this Plan or in that of a Central Vermont municipality;
c) there is an overriding public need being served; or
d) adequate permanent protection is inherent in the development proposal; or
e) parcels or soils affected are determined to be "not viable" for reasons of size, topography, surrounding land use, or potential productivity.

3. CVRPC encourages municipalities to identify locally significant agricultural and forest parcels and/or districts through locally and consensually developed land evaluation and site assessment programs (e.g. LESA and FLESA). Such identification can assist in establishing protection priorities and programs.

4. CVRPC recommends continuation of, and participation in, the Use Value Appraisal Program as a means to promote continuing sound management of resource lands by taxing them fairly and according to their current use.

5. CVRPC will, in conjunction with other stakeholders and relevant organizations, consider methods to determine the amount of agricultural

land required to meet the Region's long term requirements under a "worst case scenario" regarding food importation.

6. The extraction of sand and gravel should not be unduly detrimental to surrounding land uses or the environmental quality of the area. A reclamation plan should be included as part of any extraction proposal. Possible alternative uses should be identified in local plans. Municipalities are encouraged to map the important, accessible sources.

7. New developments that encroach upon resource lands, and the occupants thereof, are encouraged to respect the rights of resource land owners to continue existing operations, and undertake appropriate expansions, according to accepted practices.

Goal 3

To protect environmentally sensitive or unique areas.

Policies and Strategies

1. Natural and fragile areas identified in this Plan should receive protection from harmful uses.

2. Where natural and fragile areas occur on developable private lands and where their adequate protection would preclude any other reasonable use of those properties, acquisition in fee simple or less than fee simple is recommended.

3. Where a potentially harmful development or activity is proposed in proximity to a natural or fragile area, measures should be taken to ensure adequate protection.

4. CVRPC encourages the inclusion of natural and fragile areas information and mapping in local plans. (Municipalities should not be limited by the definitions and designations included here, as it is recognized that this Plan may not include all locally significant sites.)

5. It is the policy of CVRPC to encourage the maintenance of existing wildlife habitats and habitat connectors. Municipalities are encouraged to identify those of local importance.

> Strategy 5a. Work closely with partners such as The Nature Conservancy, the Staying Connected Initiative and Vermont Fish and Wildlife to identify areas within the Region that are sensitive to

development, which contains the most recorded species, the most diverse communities, etc., and have this data available for incorporation in member town plans.

6. Any activity that would degrade important groundwater supplies is discouraged. Specifically, development activities in designated SPA's shall be carefully reviewed for groundwater impacts.

7. Hazardous wastes shall be disposed of properly to prevent any degradation of groundwater.

8. It is the policy of CVRPC to encourage the preservation of wetlands so as to protect their function and productivity. Efforts (including consideration of site design options) should be made to mitigate against the possible adverse impacts of development on the Region's wetlands.

9. Prevent the spread of terrestrial invasive species and forest pests.

Strategy 9a. Work with partners to implement coordinated invasive species and forest pest education, detection, prevention and control measures.

Strategy 9b. Encourage landscaping with native species over the use of non-native species, particularly in non-urban environments. Work with UVM Extension Master Gardeners on educating homeowners on the use of native trees and plants.

3. FUTURE LAND USE ELEMENT

Land Development Issues

As our population increases and ages, more people require shelter, jobs, and places to purchase and manufacture goods. Consequently, growing areas, or areas preparing for growth, must find the ways and means to accommodate new construction.

Growth and development will continue at some level, and the Region must be prepared to accommodate this growth for the good of its residents and its economy. At the same time, it is important to acknowledge that there are physical, ecological, and economic limits to current patterns of growth and development. The development policies presented in this element are intended to guide new land development so as to maximize the economic and societal benefits while avoiding, to the extent practicable, its environmental and societal pitfalls.

Residential

Over the past few decades, Vermont has experienced a decrease in average household size, a larger adult population, and an increase in the number of vacation homes and short-term rentals. This has led to a misalignment between the existing housing stock and housing demand. (For more discussion see: Housing Element.)

Commercial/Industrial

Often, new businesses have located along the state highways and collector roads which bring commuters back and forth to work and tourists to and from their destinations. While only a few locations have experienced full blown "strip development," most of the Region's major corridors are witnessing this impact. The above generalizations are not intended to apply to traditional home occupations or modestly scaled self-employment enterprises. Such activities generally do not alter the character of the areas in which they are situated, offer goods and services which may be inappropriate or unnecessary in densely settled locations, and are usually so small in scale and impact so as to have, individually, no Regional significance. (For more discussion see: Economic Element.)

Brownfields

Brownfields are defined by the United States Environmental Protection Agency (U.S. EPA) as "real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant." Typical prior uses that may fall into this category in Central Vermont include old town dumps, photo developing sites, mill complexes, factories, dry cleaners, auto repair shops, gas stations and even some agricultural sites.

According to the U.S. EPA, it is estimated that there may be over 450,000 brownfield sites in the United States. Yet a report undertaken by the Northeast-Midwest Institute, a non-partisan research organization, suggests that there may be nearly one million sites nationwide. Estimates vary for different reasons. Existing inventories of brownfield properties may consider commercial and industrial properties listed on the real estate market but, not account for those not for sale and/or abandoned. Estimates may include only those properties which are currently enrolled in a brownfield assessment or clean-up program. Regardless, most properties with an industrial or manufacturing history may be considered as a brownfield.

Brownfield sites often remain vacant and underutilized due to concerns over liability and unknown environmental assessment and clean-up costs; yet many sites can be rehabilitated. Redevelopment or re-use of potentially contaminated sites has many benefits:

- Eliminates eyesore properties,
- Promotes/supports historic use patterns,
- Protects human and environmental health, and
- Strengthens the local economy.

Since brownfield sites are often in already developed areas, their reuse can help to promote compact land use and in-fill development. According to the U.S. Environmental Protection Agency's website "for every acre of brownfields redeveloped, it is estimated that an average of 4.5 acres of greenfields are saved."

Stormwater Management

In a pristine environment, stormwater is managed by the landscape's natural features. Surface flow is inhibited by vegetation and most water is able to infiltrate the ground through pervious, uncompacted soils. That

which does not, settles into depressions and wetlands or finds its way into streams and rivers where excess water collects on undeveloped flood plains.

In a developed landscape, the situation is different. Precipitation is intercepted by roofs, parking lots, roads, sidewalks and other impervious surfaces which increase the quantity, velocity, and concentration of surface runoff. Water flowing over such surfaces picks up a variety of pollutants (e.g., gas, oil, animal waste, road salt, anti-freeze, etc.), as well as debris, thermal gain, and speed - all of which can have severe consequences on water quality and aquatic biota. Fast moving, channelized surface flows can erode roads and other structures, overwhelm combined stormwater systems, contribute to the occurrence and severity of downstream flooding, and cause sedimentation in rivers, lakes and streams. As urbanization continues, soils are disturbed by new construction, vegetated buffers are lost, and the pressure to develop in less suitable locations (e.g., steep slopes, higher elevations) increases.

While growth and development can affect water quality and exacerbate flood risk, potential impacts can be mitigated. Good land use planning and site design can do much to mitigate the impacts of stormwater runoff (and even help correct existing problems) by minimizing impervious surfaces, maintaining and/or providing vegetation, and employing Best Management Practices (BMP's) and structural controls during and after construction.

Noise

Any undesired sound can be considered “noise.” Noise pollution is defined as “continuous and unrelenting sounds at all levels or episodic and excessively loud sounds.” Noise necessarily accompanies certain business and transportation operations, new development should make all reasonable efforts to minimize noise impacts and shall not exceed acceptable standards in residential areas. Among the techniques available are: restricting hours of operation or construction, using vegetated buffer zones to filter sound, taking advantage of topography in designing projects to provide sound barriers, the use of structural barriers (i.e., earth berms and sound walls), and architectural design and materials. Higher noise levels may be appropriate and unavoidable within assigned industrial, commercial, and mixed-use zones.

Land Use Policy Statement

The central land use policy to help guide future land use and development is based on traditional land use patterns: concentrated nodes of residential and commercial development surrounded by open working lands and conservation lands. To achieve this, CVRPC will prioritize clustered settlement patterns and encourage higher-density residential, commercial, and industrial development in downtown and village centers. CVRPC will work with municipalities to align local regulations, capital planning, and public investment strategies with state and regional infill and redevelopment goals.

CVRPC recognizes that transportation has both enabled the development of affordable housing in rural bedroom communities as well as contributed to sprawling linear development along existing state routes and town highways that competes with agricultural uses and contributes to the fragmentation of forestland. Where transportation shortcomings exist, such as lack of mode choice or dependency on vehicles, CVRPC views these as impacts of sprawling development patterns. CVRPC supports growth in existing settlements and potential new settlements outside of the flood hazard and river corridor area, direct public funding toward Village and Downtown Centers and the placement of new housing in or adjacent to existing walkable neighborhoods.

CVRPC recognizes that human settlement in river corridors and floodplains is at risk of increasingly frequent and intense fluvial erosion and inundation. At the same time, CVRPC recognizes that much of the Region’s existing development is in river hazard areas and that it is easier to restrict new development than to remove existing development. CVRPC prioritizes conserving and restoring flood storage capacity, where feasible, while keeping new development out of harm’s way. Land use regulation is the most effective method of preventing future development in floodplains and river corridors – or at least ensuring that development is safer from hazards and does not worsen the hazard downstream.

CVRPC supports compatible land uses that are determined by state and local regulations, community support, neighborhood characteristics, and site suitability. Outside of flood hazard areas and where compatible, CVRPC supports the transformation of existing commercial areas into mixed use development.

Development should adhere to State "smart growth principles" (24 V.S.A. § 2791) to minimize impact on the viability of agricultural operations and to maintain large contiguous tracts of woodland. Identified critical wildlife corridors should be protected from fragmentation and uses that reduce their viability for movement of wildlife, particularly where they connect large contiguous tracts of land. Development of wetlands, steep slopes of 25% or more, and ridge lines should be avoided.

The Future Land Use Areas are not meant to be detailed representations of current conditions, nor are they intended to be distinct areas of segregated future land uses. The Future Land Use Areas focus on the overall pattern and form of development across the rural to urban spectrum rather than on specific densities or uses, which are more properly defined at the local level.

Future Land Use Planning Areas

State Statute directs Regional Plan to include a future land use element as set forth by 24 V.S.A. § 4348a. The Future Land Use Map identifies general Future Land Use Planning Areas (FLUAs) that will be used to guide land use and development in the Central Vermont Region.

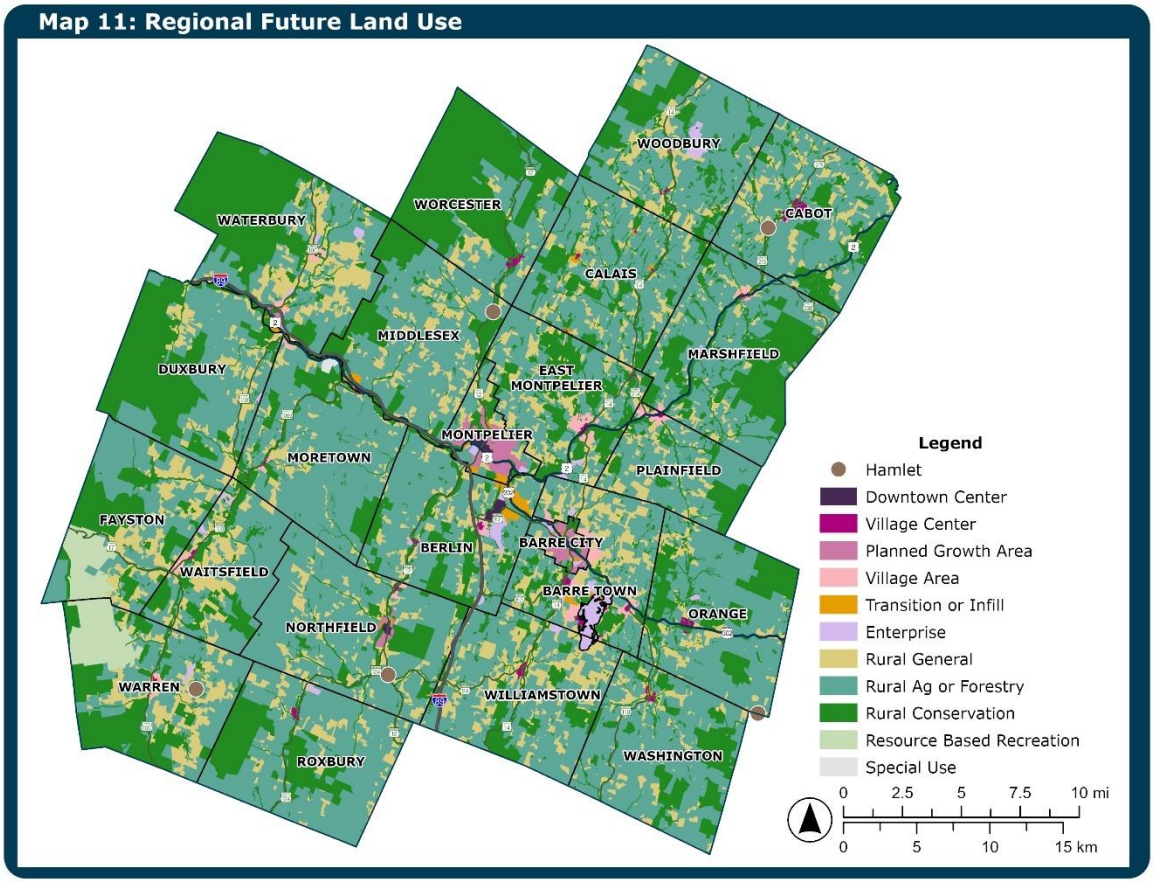
Per ACT 181, the Regional Plan Future Land Use Areas (FLUAs) will be the boundaries of state designations. FLUAs planned for growth will be mapped at a local scale, considering details necessary for ACT 250 jurisdictional thresholds and state designation status. FLUAs will also be mapped on a regional scale and work in cooperation with other regional boundaries and land uses. The FLUAs are organized into the following groupings:

1. Higher Density Growth Areas
    a. Downtown Centers
    b. Village Centers
    c. Planned Growth Areas
    d. Village Areas
2. Transition/Infill Areas
3. Enterprise Areas
4. Resource-based Recreation Areas
5. Hamlets
6. Rural Areas
    a. General
    b. Agriculture and Forestry

c. Conservation

7. Special Use

Map 11: Future Land Use



The Vermont Association of Planning and Development Agencies was charged with creating a standard methodology to "develop, maintain, and update standard methodology and process for the mapping of areas eligible for Tier 1B status under 10 V.S.A. § 6033 and designation under chapter 139 of this title." CVRPC followed the VAPDA methodology[21] in creating the Regional Future Land Use Map. Below are the statutory definitions of the FLUAs as described in 24 V.S.A. § 4348a(a)(12), along with factors and considerations used to determine FLUA boundaries and locations.

[21] Act 181 Statewide FLU Methodology v 4.0.pdf

Higher Density Growth Areas

Downtown and Village Centers

These areas are the mixed-use centers bringing together community economic activity and civic assets. They include downtowns, villages, and new town centers previously designated under chapter 76A and downtowns and village centers seeking benefits under the Community Investment Program under 24 V.S.A. § 5803. The Downtown or Village Centers are the traditional or historic central business and civic centers within Planned Growth Areas, Village Areas, or may stand alone. Municipalities may have more than one center, including planned new or emerging centers that anchor Planned Growth or Village Areas. Village Centers are not required to have public water, wastewater, zoning, or subdivision bylaws.

Factors used in determining the presence and boundaries of a Downtown/Village Center include a historical urban core, state-designated downtown or village center, local road network, availability of public water and wastewater infrastructure, dense development and smaller lot sizes, a mix of residential, commercial and civic land uses, and a distinct separation from surrounding rural areas.

Planned Growth Areas

These areas include the high-density existing settlement and future growth areas with high concentrations of population, housing, and employment in each region and town, as appropriate. They include a mix of historic and nonhistoric commercial, residential, and civic or cultural sites with active streetscapes, supported by land development regulations; public water or wastewater, or both; and multimodal transportation systems. These areas include growth centers, and neighborhood development areas previously designated under chapter 76A of this title.

The primary factor used in determining the boundaries of Planned Growth Areas is municipal input on future planned development. In including these areas as Planned Growth Areas, the RPC will consider urban context, and surrounding land uses to ensure the Planned Growth Area is complementary to existing Downtown/Village Centers. Other factors in determining the presence of a Planned Growth Area include whether the town has a duly adopted and approved town plan, the presence of municipal zoning and subdivision bylaws, walkability to a Downtown or Village Center, the location

of flood hazard areas, and conformance with Complete Streets principles.

Village Areas

These areas include the traditional settlement area or a proposed new settlement area, typically composed of a cohesive mix of residential, civic, religious, commercial, or mixed-use buildings, arranged along a main street and intersecting streets that are within walking distance for residents who live within and surrounding the Downtown Center or Village Center.

Factors in determining the presence and boundaries of a Village Area include: the proximity to a state-designated Village Center, local road network, presence of municipal zoning and subdivision regulations, whether the town has a duly adopted and approved town plan, the location of flood hazard areas and the availability of public water, wastewater or soils adequate for wastewater disposal.

Higher Density Growth Areas Policies

1. In order to maintain the existing settlement patterns, higher-density residential, commercial, and industrial development should be located in Higher Density Growth Areas.

2.Small-scale shopping centers, designed to complement the historic character and support the vibrancy of community centers, are most appropriate in Village Centers or Hamlets (see Rural Areas). Community and Regional Shopping Centers, however, are less appropriate in Village Centers or Rural Areas and should be located in Downtown Centers as a first priority.

Shopping Center Definitions (*Source: 2024 Bennington County Regional Plan*)

A shopping center may include one or multiple stores, in single or multiple ownership, functioning together as one integrated complex. For the purposes of the Regional Plan, the following definitions apply:

Small-Scale Shopping Center: A shopping center with a store or stores that sell daily living needs and convenience goods such as food, medicine, clothing, and hardware, and may also include service businesses (e.g., laundry, hair salon, bank, auto or bicycle shops). These centers range in size from 10,000 to 30,000 sq. ft. of gross floor area.

Community Shopping Center: A shopping center with a store or stores that sell a broad range of goods (such as food, clothing, furniture, appliances, sporting goods) and which also may include personal and professional service establishments. Large grocery stores, department stores, and movie theaters are often found in these centers. Gross floor area in a community shopping center may range from 30,001 to 300,000 sq. ft.

Regional Shopping Center: A shopping center (or "shopping mall") including stores that sell a wide variety of merchandise and services – similar to but larger and more extensive than a community shopping center – usually built around one or more large anchor department stores. These centers exceed 300,000 sq. ft. in gross floor area.

3.Encourage infill, redevelopment, adaptive reuse of existing buildings and reuse of "brownfield" sites in Higher Density Growth Areas. Encourage the revitalization and reuse of viable historic structures whenever possible.

Strategy 3a: Work with municipalities to align local capital planning and public investment strategies with infill and redevelopment goals.

Strategy 3b: Support implementation of infill and redevelopment activities identified in the 2015 Vermont Downtown Action Team reports (Barre City, Northfield, Waterbury, Waitsfield and Warren).

4. Municipalities should consider use of innovative tools such as "form-based" land use regulations. These types of regulations focus less on specific uses and more on the physical form of the built environment, utilize dimensional standards to shape how buildings relate to each other, to streets, and to other public spaces.

Strategy 4a: Explore opportunities to conduct a regional workshop focused on Implementing Form-based Land Use Regulations.

5. Continue to work with municipalities and VTrans to reduce conflicts between traffic needs and human-scale functions of Higher Density Growth Areas through practices like traffic-calming measures, pedestrian-safety improvements and gateway treatments. Priority for the use of public funding for the maintenance or improvement of infrastructure shall be for those that support concentrated development in Higher Density Growth Areas.

Strategy 5a: Support identification of corridors for new roads or road segments in and around Higher Density Growth Areas as part of a local planning process, and support for construction of those roads and utility infrastructure to help drive growth in a way that supports compact center development.

Figure 1: Connected Streets



Connected Streets. The diagrams above illustrate two different traffic patterns created by new development (shown in light gray). The diagram on the left highlights several smart growth principles by integrating the new roads with the existing road and providing for a mixture of uses at a density consistent with compact development (Smart Growth Vermont).

6. Priority for the use of public funding for the development of affordable housing and assisted living facilities shall be for those located within Higher Density Growth Areas in order to increase access to services.

7. The placement of municipal and other government buildings should be in established Higher Density Growth Areas in order to maintain and

enhance the vitality of these areas.

8. Encourage the development of public places and cultural events within Higher Density Growth Areas.

9. Support the creation of off-road bike and pedestrian paths that connect Higher Density Growth Areas with residential areas and neighboring centers in a hub and spoke pattern.

10. Identify key areas with flood storage capacity and encourage floodplain protection measures such as land acquisition or restrictive land use regulation in areas upstream of Higher Density Growth Areas.

Transition or Infill Areas

Include areas of existing or planned commercial, office, mixed-use development, or residential uses either adjacent to a planned growth or village area or a new stand-alone transition or infill area and served by, or planned for, public water or wastewater, or both. The intent of this land use category is to transform these areas into higher-density, mixed-use settlements, or residential neighborhoods through infill and redevelopment or new development. New commercial linear strip development is not allowed as to prevent it negatively impacting the economic vitality of commercial areas in the adjacent or nearby planned growth or village area. This area could also include adjacent greenfields safer from flooding and planned for future growth.

Strip Development

Title 10: Chapter 151, the Vermont statute dictating the Act 250 land use permitting process, defines "strip development" as follows:

"Strip development means linear commercial development along a public highway that includes three or more of the following characteristics: broad road frontage, predominance of single-story buildings, limited reliance on shared highway access, lack of connection to any existing settlement except by highway, lack of connection to surrounding land uses except by highway, lack of coordination with surrounding land uses, and limited accessibility for pedestrians. In determining whether a proposed development or subdivision constitutes strip development, the District Commission shall consider the topographic constraints in the area in which the development or subdivision is to be located."

Transition or Infill Areas Policies

1. Encourage the transformation of existing commercial areas into areas serving a mix of uses, including residential, and offering diversified transportation options, while also conforming to traditional historic development patterns.

    Strategy 1a: Work with towns to incorporate standards such as placement of buildings near the road with parking areas to the side and rear, attractive building design, application of access management principles and provision of pedestrian facilities within the center and facilities that connect to sidewalks and public transit.

2. Large scale retail constituting a substantial regional impact should be permitted only if it includes exemplary building and site design as described above in Policy 1, and is determined to have a net beneficial impact based on an independent economic and community impact study that may be requested by the host municipality and/or CVRPC.

Enterprise Areas

Include locations of high economic activity and employment that are not adjacent to Planned Growth Areas. These include industrial parks, areas of natural resource extraction, or other commercial uses that involve larger land areas. Enterprise areas typically have ready access to water supply,

sewage disposal, electricity, and freight transportation networks.

Enterprise areas are principally determined by local zoning bylaws that support concentrated commercial and industrial uses. Enterprise consists of areas where existing and future commercial and industrial activities are encouraged, including new development and redevelopment.

The specification of commercial/industrial sites allows for location of these types of businesses without creating adverse impacts on adjacent land uses. Large-scale commercial/industrial uses, which are important to the region, need to be located in areas where off-site impacts such as noise, traffic and light/glare can be mitigated.

Enterprise Areas Policies

1. Industrial uses are encouraged to locate first in existing enterprise areas and secondly in enterprise areas assigned in municipal plans which are in accordance with the goals and policies included in this plan.

2. It is acknowledged that commercial activity and small scale, individual industrial activities will take place in other parts of the region as directed by town plans, which can address the town needs with more specificity.

Resource-based Recreation Areas

Include large-scale resource-based recreational facilities, often concentrated around ski resorts, lakeshores, or concentrated trail networks, that may provide infrastructure, jobs, or housing to support recreational activities.

In Central Vermont, Resource-based Recreation Areas are determined by their proximity to a large-scale recreation area such as the ski resorts in the Mad River Valley. Downhill facilities and associated development at Lincoln Peak (Warren) and Mt. Ellen (Fayston) of Sugarbush Resort and Mad River Glen (Fayston) all provide recreational facilities, services and jobs and contribute to the Region’ s seasonal housing stock. Resource-based Recreation Areas may also be determined by the provision of water and wastewater.

Resource-Based Recreation Areas Policies:

1. The Towns of Warren and Fayston have developed specific ski area planning districts and regulations in its municipal plan and zoning bylaw to ensure that development is consistent with town goals. As the impacts of

these resorts extend beyond municipal boundaries, this Plan recognizes that the Town of Waitsfield participates with the Towns of Warren and Fayston participate in the Mad River Valley Planning District (MRVPD). Also including representation from Sugarbush Resort and the Mad River Valley Chamber of Commerce, the MRVPD carries out a program of planning for the future of the Mad River Valley and conducts studies regarding key issues, such as affordable housing, recreation and trail planning and economic development that are incorporated into local plans. Future growth at Sugarbush Resort and Mad River Glen that is compliant with local plans and bylaws is consistent with this Plan.

2. The focus of alpine ski area development in the Region should remain on the expansion of existing facilities rather than development of new ones.

Hamlets

Hamlets are small historic clusters of homes and may include a school, place of worship, store, or other public buildings not planned for significant growth; no public water supply or wastewater systems; and mostly focused along one or two roads.

Though small in area, a Hamlet is distinguished by a relatively dense development and a distinct separation from surrounding rural areas. These small settlements generally do not meet the criteria to become a Village Center.

Rural

Rural areas encompass the majority of the Region's land area and are generally rural in character. Much of the Region's residential development in recent decades has occurred in these areas in a low-density pattern along transportation routes. These areas encompass much of the Region's large forest blocks, sand/gravel/mineral deposits, and prime agricultural soils that, when in productive use, contribute to the working landscape and have significant economic value. Rural areas also include residential, small-scale commercial and industrial, and recreational uses.

New subdivisions can be planned to incorporate the positive characteristics of earlier rural settlements, such as a community identity, public open spaces, and preservation of important resources (such as agricultural soils and forest blocks). Many of these objectives can be realized by clustering

lots to create a Hamlet-type character around the homes, while setting a significant percentage of the project area aside as open space reserved for agriculture, forestry, wildlife habitat or public recreation.

Rural - General

These areas include areas that promote the preservation of Vermont's traditional working landscape and natural area features. They allow for low-density residential and some limited commercial development that is compatible with productive lands and natural areas. This may also include an area that a municipality is planning to make more rural than it is currently.

Rural - Agricultural and Forestry

These areas include blocks of forest or farmland that sustain resource industries, provide critical wildlife habitat and movement, outdoor recreation, flood storage, aquifer recharge, and scenic beauty, and contribute to economic well-being and quality of life. Development in these areas should be carefully managed to promote the working landscape and rural economy, and address regional goals, while protecting the agricultural and forest resource value.

Rural - Conservation

These are areas of significant natural resources, identified by regional planning commissions or municipalities based upon existing Agency of Natural Resources mapping that require special consideration for aquifer protection; for wetland protection; for the maintenance of forest blocks, wildlife habitat, and habitat connectors; or for other conservation purposes.

Rural Conservation areas are intended to be conserved, often with regulations or State or non-profit acquisition of property rights, limiting development, fragmentation, and conversion to maintain ecological health and scenic beauty. These lands have significant ecological value, and require special protection due to their uniqueness, fragility, or ecological importance. They may include protected lands, areas with specific features like steep slopes or endangered species, wetlands, flood hazard areas, and shoreline protection areas, and are intended to remain largely undeveloped for the benefit of future generations. Some portion of managed forest land will likely fall into this category. Included in this category are forest blocks and habitat connectors that are significant on a state, regional or local level.

Examples of Rural - Conservation area include the following:

- Protected lands
- Elevations above 2,500 ft (elevations above 1,700 ft in Waitsfield, as regulated)
- Slopes of 25% or more
- Rare, threatened or endangered species and significant natural communities
- Wetlands
- Special flood hazard areas
- Shoreline protection areas
- Critical wildlife connectors

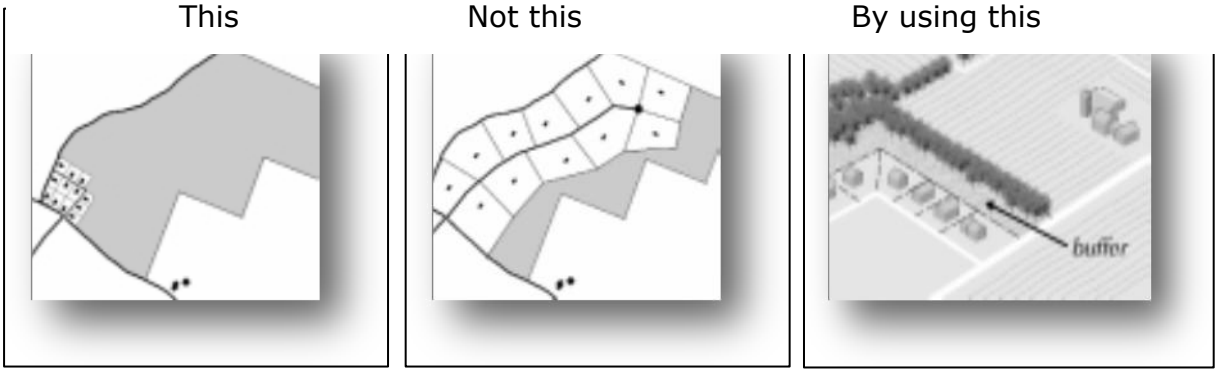
Rural and Hamlet Areas Policies:

1. Development should be designed to minimize its impact on the viability of agricultural operations or its contribution to the fragmentation of forest blocks.

> Strategy 1a: Provide guidance and training on regulatory and non-regulatory tools for open space and resource protection available to towns for use in town plans and regulations. Encourage implementation of tools such as conservation subdivisions, clustered development, transfer of development rights, building envelopes and variable lot size in all subdivision development, and especially within rural residential and productive rural lands.

2. Development is encouraged to be built outside of farms and along the edges of forests, preferably with buffers between such development and agricultural uses or environmentally sensitive areas.

Figure 2: Avoiding Fragmentation and Minimize Use Conflicts



Incorporate buffers between developed and resource lands to avoid conflicts between incompatible uses — maintain a well-defined edge between developed and open land. (Smart Growth Vermont).

3. Policies that enable owners of farm and forestland to bear the financial responsibility of resource protection should be supported.

4. Development that diminishes the rural character of the area as defined by local and regional plans is discouraged. Development is encouraged to incorporate the following principles:

- Convenience and safety of vehicular and pedestrian movement, including measures such as traffic calming, within the site, and in relation to adjacent areas or roads.
- Compact development that allows for use of shorter power lines and shorter, narrower, and interconnected roads that result in lower maintenance costs.
- When new roads are being constructed, consideration should be given to burying power and phone lines, if practicable.

5. Support existing Hamlets that may want to grow and become a Beginner Center (Step 1) in the new State Designation Program and that meet State requirements for the designation of Village Center on the regional Future Land Use Map. Encourage towns to enable this pattern of development in local land use regulations.

6. Wildlife connectivity areas should be protected from fragmentation and uses that reduce their viability for movement of wildlife, particularly where they connect forest blocks.

7. Non-residential uses, including small service businesses, small professional offices and inns are acceptable land uses for Rural Areas provided that such uses are planned as relatively small in size or scale, are not primary or dominant uses in an area, do not unduly conflict with existing or planned residential, forestry or agricultural uses, and do not unduly affect rural character. Towns should limit the number and size of such establishments to prevent a proliferation of scattered commercial development that does not serve the needs of the community.

8. Occupations that are customarily practiced in residential areas, and which do not affect the character of those areas, are another form of small-scale commercial use common in and appropriate for rural areas. Small

professional offices, antique shops, and craft studios are examples of such "customary home occupations."

9. Cross country ski centers, mountain biking facilities and other outdoor recreational areas represent an economically viable means of maintaining rural open spaces with little secondary development; both expansion and development of new facilities are consistent with this Plan.

Rural-Conservation Areas Policies

1. Conservation of the natural landscape and careful management of lands is sought for these areas. Development in these areas should be subject to extensive planning, review and conditions that ensure its protection.

2. Any development proposed within Critical Resource Areas[22], or areas that fall under known and possible siting constraints,[23] shall provide evidence as to why the development cannot be avoided and demonstrate how impacts to identified resources are being mitigated if applicable.

3. The extension of permanent roads, energy transmission facilities, and utilities into Resource Areas is discouraged.

4. Development on wetlands, steep slopes of 25% or more, and ridge lines should be avoided.

5. Avoid or limit development and investment in identified flood hazard areas, where feasible.

6. Avoid development that fragments forest blocks and habitat connectors.

Special Use

Regional planning commissions were also permitted to use any other special land use category deemed necessary in creating the Future Land Use Map. CVRPC included a Special Use class to denote the decommissioned Moretown Landfill, which did not fit neatly into one of the existing FLUAs. The Moretown Landfill was shut in 2013 because it had reached initial capacity, created a strong odor in the community, and posed water quality concerns.

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[22] Critical Resource Areas, as defined in Chapter 2, include National Natural Landmarks, State-designated Natural Areas, Sites listed on the Vermont Rare, Threatened and Endangered Species, and Significant Natural Communities, Elevations over 2,500 feet.
[23] See table of known and possible state and regional constraints, Element 3.

It is unsuitable for future development and thus was set apart.

Coordination with State Programs

Act 250 Permitting

Prior to Act 181 of 2024, Act 250 jurisdiction was determined by the size and impact of development, irrespective of location. Act 181 sought to streamline permitting in areas planned for growth, creating a location-based tier system for Act 250 exemptions. Downtown Centers, Village Centers, and Planned Growth Areas identified on the Future Land Use Map are Tier 1A eligible. Village Areas, in addition to the FLUAs already listed, are eligible for Tier 1B.

> **Tier 1A:** Exempts all subdivision, development, or change to an existing project that is located entirely within a Tier 1A area from Act 250 review. Municipalities apply directly to the Land Use Review Board (LURB) and must meet specific requirements, including planning capacity, zoning, flood hazard and river corridor bylaws, and adequate infrastructure.
>
> **Tier 1B:** Exempts housing and mixed-use projects with 50 or fewer units on 10 acres or less within a Tier 1B area from Act 250. Municipalities may opt into Tier 1B by passing a resolution through the legislative body, provided that they have zoning and subdivision regulations and adequate municipal capacity.

State Designation Program

The Designation Program, administered by the Vermont Department of Housing and Community Development, creates a framework for directing incentives and technical assistance to compact and vibrant areas to encourage development and redevelopment in alignment with smart growth principles. Act 181 created a new designation framework that simplifies the five legacy designation types into two categories, Centers and Neighborhoods. The shift in the designation process seeks to expand access to the program and better align planning and investment. The new framework follows the regional plan approval process, and designated areas are now determined through the Future Land Use Map. Downtown and Village Centers enter the program as Centers. Planned Growth Areas and Village Areas enter the program as Neighborhoods. Within the Center

designation, there are three “steps” which allow municipalities to access greater levels of incentives and support, dependent on local capacity and alignment with state goals. To advance between steps, municipalities may apply to the Vermont Community Investment Board.

General Land Use Goals, Policies and Strategies

General Land Use Goal 1

To encourage the historic settlement pattern of compact village and urban centers separated by rural countryside while promoting development in economically viable locations.

Policies

1. New development should be planned so as to respect the historic settlement pattern of compact villages, neighborhoods, and urban centers separated by rural countryside. Accordingly, CVRPC:

a) Endorses the concept of creating, relocating or expanding villages and downtowns to accommodate new growth and comply with the Flood Safety Act of 2024.
b) Endorses “smart growth” planning principles as embodied in this Plan and supports the designation of growth centers.
c) Will assist municipalities in conducting the studies required to designate new future land use map designations via Act 181 of 2024.
d) Supports the appropriate expansion of existing settlements, particularly where excess infrastructural capacity exists. (The existing settlements within Central Vermont are those areas currently served by public water and/or sewer systems or characterized by higher densities of development. Existing settlements include, but are not limited to, the downtowns and cities, the villages and the myriad concentrated residential neighborhoods.)
e) Encourages PUD, "cluster" or "open space" design for new residential and commercial developments, particularly those outside of existing settlements or planned growth areas, and discourages the development of commercial and residential sprawl.
f) Encourages "infill" development and adaptive reuse of buildings in existing settlements.

g) Supports and encourages revitalization efforts directed towards strengthening and improving villages and cities.
h) Recognizes that some environmental and development "trade-offs" will be necessary to achieve desired growth patterns. To this end, CVRPC believes that mandatory mitigation of any agricultural soils or habitat losses, even at a reduced ratio, within State designated Centers is counterproductive to enticing development and recreating traditional land use patterns.
i) Believes that land use restrictions should not unduly hinder self-employment for residents. Such opportunities may help reinforce traditional land use patterns through economic incentives.
j) Believes that land use plans should not unnecessarily infringe upon the landowner's ability to enjoy and profit from the investment and use of private property.
k) Encourages municipalities and individual landowners to identify sites which may qualify for assessment and/or cleanup under the EPA’s Brownfields Grant Program.
l) Encourages municipalities to undertake build-out modeling in order to better evaluate development capability and future growth potential under current zoning, as well as to examine the potential impact of employing alternative density strategies.

2. To seek ways to overcome the economic disincentives to development within existing built-up areas, including the high costs associated with the construction of, or hookup to, necessary infrastructure. CVRPC:

a) Recognizes Tax Increment Financing (TIF) as a valuable tool for supporting infrastructure development in planned growth areas and supports amending current State law to make it more practical for communities to implement.
b) Will, over the next eight years, continue to work with municipalities to maintain and amend, where appropriate, the regional future land use map that includes designated centers and neighborhoods and incorporates feedback from municipalities on local land use planning efforts. In conjunction with this effort, CVRPC will provide technical assistance in determining future land use designations, upon request, and in conjunction with State guidelines.
c) Will recognize areas of growth on the regional future land use map and employ them to attempt to achieve desired growth patterns through its

influence over public expenditures and development review decisions, where applicable.

d) Will provide assistance to municipalities seeking such funding for brownfield assessment and remediation, upon request.

General Land Use Goal 2

To preserve the aesthetic quality of the Region.

Policies

1. Municipalities and developers are encouraged, through design and siting of structures, to make a concerted effort to preserve access to and enjoyment of scenic views for the public.

2. Unless effectively screened, or clearly in the best interest of the general public, ridge line development or conspicuous development on locally prominent landscape features is discouraged

3. The scale and siting of new structures should be in keeping with the surrounding landscape and architecture; however, towers should utilize stealth technology, such as integration into a silo, chimney, steeple or flagpole, or simply a brown finish (fake trees or other camouflage that results in shedding plastics is not preferred).

4. Outdoor lighting should be limited to minimum levels necessary to ensure safety and security of persons and property.

5. Light sources shall be shielded and not directly visible from public roads or adjacent residences.

6. Landscaping with native species is generally preferred over the use of nonnative species, particularly in non-urban environments. The use of non-native trees and plants for landscaping can lead to unintended introductions of species which out-compete native vegetation.

7. Where possible, parking lots and storage areas should be well landscaped and/or otherwise screened from view on public roads.

8. CVRPC encourages the State and municipalities to maintain existing roadside views by means of vegetation clearing, where appropriate.

9. CVRPC will attempt to inventory and map the Region's scenic resources, with assistance from municipalities.

10. The location of telecommunication towers is a significant aesthetic issue within the Region. Policies intended to minimize negative impact are presented in the wireless telecommunication facilities policies of this Plan.

11. CVRPC will track indicators that show impacts on aesthetic quality and natural beauty in Central Vermont.

12. New development should make all reasonable attempts to minimize noise pollution and shall not exceed accepted standards in residential areas.

General Land Use Goal 3

To ensure that new development in the vicinity of the Region's interstate interchanges is appropriate to the setting and considers the impact of such development on adjacent village and urban centers.

Policies

1. CVRPC encourages interchange modeling and identification of preferred development scenarios.

2. CVRPC will encourage and assist municipalities in planning for land use in and around interchange areas.

3. CVRPC will encourage the concept of management associations (similar to transportation management associations) to promote master planning for interchange zones.

4. CVRPC will exercise its status as a statutory party in Act 250 whenever new development has the potential to impact the form and function of an interchange area or adjacent communities.

5. In support of regional land use priorities that endorse the development of downtown and village centers, CVRPC will not encourage development at interchanges where that development will result in a demonstrable negative impact on adjacent downtown and village centers. CVRPC will, however, encourage development at interchanges that complement or appropriately expand existing growth centers according to a locally developed, regionally approved plan.

6. New development should employ design guidelines that foster economic vitality in growth areas and encourage the maintenance of the rural, working landscape.

General Land Use Goal 4

To manage the quality and quantity of storm water runoff in order to avoid property damage and negative impacts on surface and groundwater.

Policies

1. New development should, through design and maintenance, attempt to minimize changes in the volume and chemical composition of runoff. Methods recommended to achieve this objective include:

a) Avoiding construction on steep or unstable slopes and in high elevations (Slopes in excess of 25% and elevations above 2,500 feet are generally thought to be prohibitive for most kinds of development.);
b) Stabilizing entrances to construction areas to eliminate tracking of sediment onto paved public roads;
c) Employing cluster/open space design techniques;
d) Minimizing development road and sidewalk widths to those which are necessary for safety and access;
e) Avoiding the use of wide radius, paved cul-de-sacs, where appropriate ("Hammerhead" turns, smaller radius turns, and landscaped cul-de-sac islands are some other options.);
f) Minimizing the removal of native vegetation to the extent practical;
g) Phasing new construction to minimize the amount of disturbed soil at any given time where practical; and
h) Providing vegetated buffers between roof lines and paved areas and between sidewalks and roads, where appropriate.

2. Structural Best Management Practices (BMP's) should be used, as appropriate, to control storm water on new development sites before, during and after construction (including plans for long term maintenance and operations). Objectives and applications include:

a) Storm water retention: wet ponds, artificial wetlands
b) Storm water detention: dry basins
c) Storm water filtering: bio-retention, sand filters, compost filters
d) Storm water velocity control: filter strips, grassed swales, rock swales
e) Erosion control: construction schedule, seeding/mulching, check dams, run-off diversions
f) Sediment control: sediment basins/traps, filter fabric/silt fences, hay

bales, inlet protection
g) Infiltration: infiltration basins, trenches, dry well, leaching catch basins, infiltration islands, pervious surfaces

3. Acceptable Management Practices (AMP's, as defined by the Vermont Agency of Natural Resources) should be employed on all agricultural, silvicultural and earth extraction operations.

4. Efforts should be made to minimize the extent of impervious surfaces and surface runoff associated with parking facilities. The following methods are recommended:

a) Constructing structured parking facilities (i.e. multi-level garages) where practical and appropriate in order to provide a higher ratio of parking spaces to impervious surface area;
b) Using pervious materials in "spillover" parking areas;
c) Integrating the use of landscaped areas as "bio-retention" filters; and
d) Providing smaller spaces for compact cars.

5. Municipalities should consider adopting policies and practices to reduce the volume and impacts of storm water runoff, including:

a) Encouraging storm water management through the use of BMP's (as outlined in policy 2) in local plans, zoning bylaws, and building permits;
b) Minimizing zoning setbacks to allow for shorter driveways, and allowing shared driveways;
c) Instituting maximum, as well as minimum, parking ratio requirements in local bylaws to prevent "overbuilt" parking lots;
d) Allowing for shared parking facilities in local bylaws;
e) Adopting "pooper scooper" ordinances to prevent the pollution of surface waters with pathogens and nutrients;
f) Protecting high elevations and steep slopes from intensive development in local bylaws;
g) Properly sizing and maintaining culverts;
h) Properly maintaining ditches on dirt roads to slow runoff and filter sediments as per the "Road Design and Maintenance Handbook" published by the Vermont Local Roads Program;
i) Separating combined storm water/sewer systems (CSO's) which can discharge raw sewage to surface waters during big storms; and
j) Making sure road salt storage areas are covered.

k) Consulting the "Erosion Control Prevention Manual" published by the Vermont Geological Survey.

4. ENERGY ELEMENT

Introduction

Energy is a vital component of modern life. When sources of power are lost or interrupted, even temporarily, the rhythms of our lives are profoundly interrupted. Business and industry halt and residents and goods dependent on electricity and other types of power are at great risk. Our electric infrastructure in Vermont is increasingly vulnerable to extreme weather conditions due to climate change. This comes at a time when we anticipate significant increases in demand for reliable and affordable electricity associated with the beneficial electrification of the thermal and transportation sectors.

Existing and potential sources of electric power in the region are adequate for current conditions, however, the region's electric infrastructure is aging and reaching performance limits. While the costs of developing new infrastructure are high upfront, potential long-term cost savings are increasing as resilience measures can reduce recovery spending. Furthermore, technology is rapidly advancing and markets are shifting to match beneficial electrification needs and the urgency of the climate crisis. It is increasingly important to consider cross-sector impacts and measures as well. For example, the electrification of the transportation and thermal sectors is demanding a statewide rethinking of electric efficiency targets and demand growth forecasts. There are novel and significant opportunities for municipalities and other stakeholders to implement community-scale solutions to offset energy use and mitigate costly infrastructure investments.

Integrating renewable energy infrastructure more comprehensively into all scales of our planning across the region is important to not only maximize associated community benefits but also to minimize negative environmental and land use impacts of energy generation, transmission, distribution, and use. CVRPC's objective is to ensure that our energy infrastructure is located, designed, and correctly sized to support the Region's community and economic needs. Thus it must be reliable, resilient, and affordable in the long term to reduce operational costs and greenhouse gas (GHG) emission contributions. For an introduction to existing energy infrastructure please see pages 196-213 in the Utilities, Facilities and Services Chapter.

This chapter and Appendix A, as well as relevant sections in the Utilities, Facilities and Services, Transportation, Natural Resources and Working Lands, Future Land Use, and Housing chapters, constitute Central Vermont's Enhanced Energy Plan developed to meet the standards outlined in Act 174 and the 2022 Comprehensive Energy Plan (see Supplement Section: Standards) in addition to meeting the statutory requirements for the regional plan energy element (24 V.S.A. § 4348a(a)(3)). The primary purpose of this chapter is to identify a path toward achieving our regional share of the State's overarching energy and climate goals in a manner consistent with our regional priorities and needs.

To meet state energy and climate goals, Vermont is shifting away from fossil fuels in the thermal and transportation sectors to electricity with a portfolio of renewable sources of energy. Across all sectors, Vermont is pursuing efficiency and increasing in-state renewable energy generation. CVRPC promotes an approach to these state policies tailored to our region which includes, notably, the integration of cordwood heat especially in combination with heat pumps; the conservation of energy and reduction of electric demand growth from thermal demand electrification via weatherization, wasteheat recovery, and community-scale decarbonization; community-centered renewable energy development; and an emphasis on long term social and physical infrastructure resilience.

Vermont Policy Framework:

This regional plan is consistent with the following state goals and requirements:

- Greenhouse gas reduction requirements under 10 V.S.A. § 578(a) (26% from 2005 levels by 2025; 40% from 1990 levels by 2030; 80% from 1990 levels by 2050)
- The 25 x 25 goal for renewable energy under 10 V.S.A. § 580 (25% in-state renewables supply for all energy uses by 2025)
- Building efficiency goals under 10 V.S.A. § 581 (e.g., reduce fossil fuel consumption across all buildings by 10% by 2025)
- State energy policy under 30 V.S.A. § 202a and the recommendations for regional and municipal planning pertaining to the efficient use of energy and the siting and development of renewable energy resources

contained in the State energy plans adopted pursuant to 30 V.S.A. §§ 202a and 202b

- The distributed renewable generation and energy transformation categories of resources to meet the requirements of the Renewable Energy Standard under 30 V.S.A. §§ 8004 and 8005 (100% annual load by 2035).

Appendix A provides further context for the underlying analyses and frameworks that this plan is built upon. This includes not only technical analyses that inform the State's Climate Action Plan and from which sector-based targets stem, but also Vermont's Environmental Justice Law (Act 154 of 2022), Climate Council principles from the just transitions subcommittee, and other state and national frameworks. As a result, regional energy issues pertaining to energy reliability and resilience, equity, and land use are highlighted throughout this plan. These framing considerations are intended to ensure implementation of this plan centers an energy transition that is both expedient and accessible for all members of our communities and is responsive to future demands and conditions while minimizing impacts to our ecosystems.

Key Issues

Energy Resilience, Reliability, and Independence

The increasing severity, frequency, and unpredictability of extreme weather in Vermont has greatly exacerbated existing rural infrastructure gaps, leaving many Vermonters, and the physical and social infrastructure they rely on, without reliable access to electricity. Washington County is tied for the second most disaster-prone county in the US in terms of federal disaster declarations due to extreme weather (Rebuild by Design). While extreme flooding is at the forefront currently, many of those events are localized winter storms characterized by high wind and heavy wet snow that cause up to 8-day outages in some of our most rural towns. Major electric utility companies have active, ongoing programs to improve system reliability and protect facilities from damage by ice, severe winds, and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes, and placing new distribution lines underground. Other major problems include closed roads and restricted

transportation. The costs of these events are worrisome, and CVRPC promotes working with DUs to harden infrastructure and build local reliability at the community level.

Outages are a significant barrier to electrification in many of our communities and generators are one of the most common unfunded requests we hear from municipalities. Despite this, our communities are dedicated to climate and resilience planning, recognize the role of distributed renewable energy and storage, and support robust energy and GHG emissions goals. In 2023, 19 out of the 20 municipalities in Washington County have received investment-grade energy audits of 2 or more municipal buildings via the State's Municipal Energy Resilience Program. As we develop and phase these key community facility projects (first building envelope/weatherization & HVAC, second on-site renewable energy & storage), we have repeatedly heard concerns about increased costs associated with electrification without on-site renewable energy. Addressing this gap will be critical for a just transition in Central Vermont.

Energy Conservation (and Reducing Future Electric Demand Growth)

Given our aging building stock and inconsistent record of compliance with the Residential and Commercial Building Energy Standards (RBES and CBES respectively), weatherization and equipment efficiency and conversion remain critical pathways towards energy conservation and steps to reduce our GHG emissions as well as energy operating costs. Energy efficient building designs provide benefits to the owners and occupants by reducing the amount of energy needed to heat, cool, and maintain the mechanical systems within the building. Establishing and promoting energy efficiency in design, construction, retrofits, and renovations will ensure new and existing buildings and building practices will be more efficient into the future. These efficiencies promote conservation of energy resulting in cost savings and increased affordability for owners and renters.

There is a disjoint, however, between our ambitious State’s goals and the building-by-building focused implementation programs. The region has an important role to play in planning for and implementing community scale conservation and efficiency projects, which while may have higher upfront costs, have significantly reduced long term costs especially for system users (Central Vermonters). Furthermore, community scale thermal networks and

district heat systems and waste heat recovery systems for example, have an important role to play in ensuring that electrification can go further, faster, in our region without severely stressing our existing electric infrastructure and triggering costly investments by reducing the amount of energy demand from the thermal sector that needs to be electrified in the first place. Such strategies, along with energy storage and load management at the household to utility scale, also importantly reduce our estimated future electric demand growth, reducing required investments in renewable energy generation and associated land use impacts.

While we will certainly have to invest in and expand our electricity infrastructure, by better integrating and prioritizing energy conservation measures at a larger scale, we can ensure our long term and user costs remain lower while reaching our goals faster.

Did you know?

Black, Indigenous, People of Color, (BIPOC), as well as low-income, and rural Vermonters have largely been left out from major economic, social, and environmental benefits associated with investments in climate resilience and renewable energy infrastructure. BIPOC Vermonters were seven times more likely to have gone without heat in the past year, over two times more likely to have difficulty affording electricity, and seven times less likely to own solar panels than white Vermonters (Act 154 Sec 1.10), while rural and low-income communities consistently carry the highest energy burden.

Siting location, project characteristics, and renewable energy generation programs can either help to address these gaps or continue to widen them. Municipalities can reinvest revenue from hosting larger-scale projects into community weatherization or fuel switching programs or to support community resilience hub operation. Municipalities can incentivize on-site generation and storage integration into multiunit and novel housing developments; invest in shared heating and cooling infrastructure; and work with utilities to highlight gaps in reliability. State and utility programs can lower barriers to participation in programs significantly by covering upfront costs instead of using reimbursement models.

Energy Justice & Accessibility

CVRPC has approached this plan, including supporting analyses, with an explicit priority on access, affordability, and participation considering those most burdened by the impacts of climate change and the costs of energy in Vermont *first* (including those with low or fixed incomes, residents of color, renters, electrically dependent residents, some of our rural communities, etc.). Implementation of this plan should maintain this approach to ensure that no community nor community members are left without access to the energy transition (for more tools see Appendix A, pages 2-5). CVRPC has adapted the guiding principles and assessment rubric[24] from the Just Transitions sub-committee of the Vermont Climate Council for use in future planning as well as project development and prioritization processes. Near-term costs can present equity challenges for programs and policies that deliver positive outcomes in the medium and long term while barriers to access and incentive structures (e.g. reimbursement, loans, tax incentives), perpetuate existing disparities. CVRPC, in partnership with THRIVE Community Health partners and our energy committees and coordinators, works with income-based and recovery adder programs (e.g. with Efficiency Vermont) and the State to develop programs like ChargeVT, that cover upfront costs, allow sliding scale match. Furthermore, municipal and regional energy project savings can be optimized to establish revolving loan funds and/or community funds to lower barriers and/or support future projects with community benefits.

At all scales, the time frame used to determine the least cost affects analytical outcomes and resulting decisions: longer-term cost horizons are critical when considering the benefits and costs of a just transition. Clean, affordable, resilient, and reliable energy is a critical component of building social as well as physical infrastructure and community resilience. To leverage federal and state funding opportunities the region must build administrative and procurement capacity, establish community benefit agreement models, and foster community expertise sharing. Transitioning away from fossil fuels, promoting energy efficiency, weatherization, and renewables, while addressing energy burden will have direct and positive impacts on all Vermonters.

[24] Vermont Climate Council's Guiding Principles for a Just Transition

Community asset inventories, needs assessments, engagement, and related efforts will be necessary to drive frontline community identification for prioritization. An iterative process at the project scale is an effective strategy for ensuring that projects align with community needs and priorities, fostering more equitable outcomes and sustainable development in the long run. This approach allows for continuous feedback and adaptation, enabling stakeholders to respond to the evolving challenges and opportunities within the community. The implementation actions identified in this section focus primarily on integrating these considerations into existing local land use, transportation, environmental, and health equity planning activities.

Economic Needs & Opportunities

While Central Vermont is home to key members of the Clean Energy Industry, not only in Vermont but nationally, workforce constraints are a significant challenge in the implementation of the region's energy goals. Supporting workforce development at a rapid rate must become a key priority for all those engaged with climate and energy planning. The Clean Energy Industry Report has tracked Vermont's employment in the clean energy sectors since 2014. As of 2020, clean energy jobs made up about 6% of total employment in Vermont. Generally, the median wage for clean energy jobs (approx. $27/hour) is much higher than the statewide median wage (approx. $19/hour). Meeting our climate commitments via investments in energy efficiency and clean energy can be a win for Vermont consumers, the Vermont economy, and Vermont workers.

Land Use and Balancing Regional Priorities

Towns and regions have experience with, and see the direct local impacts of, land use planning. This includes planning for shared and beneficial infrastructure of many kinds, such as roads and industrial and commercial developments. Energy infrastructure similarly serves a public purpose, while also creating both costs and benefits that are not distributed evenly. Energy planning is not just about siting electricity generation. Over half of Vermont's energy use is for heat and transportation, and local and regional decisions regarding buildings, roads, and other built infrastructure also have significant energy implications. For example, building a home or commercial building in a particular location will have implications for the energy required to travel to and from that building for decades. Given the pressing economic and environmental challenges associated with the use of fossil fuels, all

aspects of planning must be undertaken with energy implications in mind. Municipal and regional planning that better integrates energy and resilience as it does economics and conservation will improve Vermonters' quality of life. See sections about on Transportation and Land Use and Local Siting and Regional Policy.

Regional Energy Use Summary

Definition:

"Energy" refers to all forms people use for transportation, thermal (heating space & water primarily), and electricity.

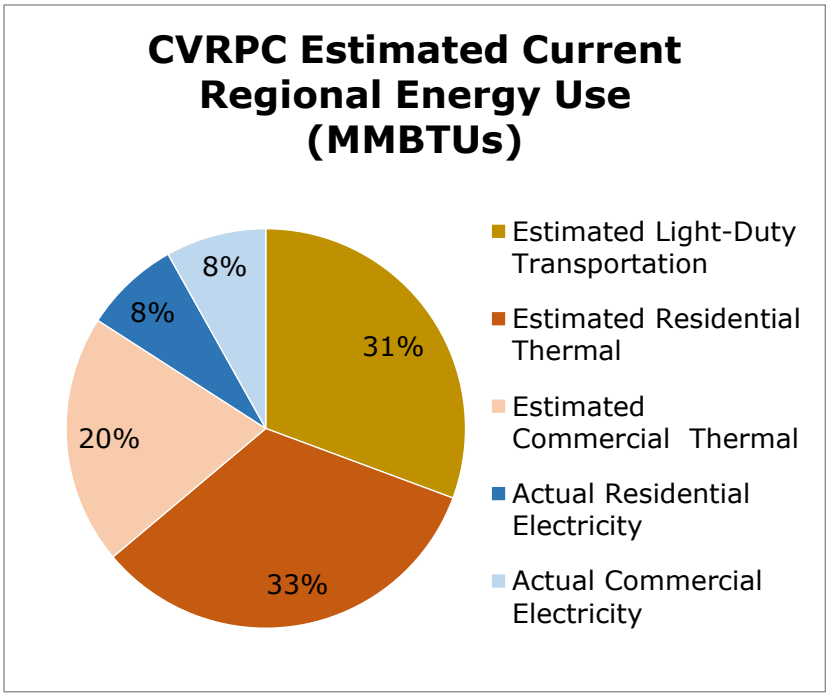
There are many different "units" of energy such as kilowatt-hours or gallons of gas, which can be converted and expressed in the common unit:

British Thermal Units (BTUs) or million BTUs (MMBTUs).

This allows us to compare across sectors but is often difficult to understand. Where possible, targets have been translated into more tangible metrics such as the number of homes to be weatherized (based on an average savings in MMBTUs per weatherized house).

Broadly, the thermal sector is still the largest energy use at 53% including both residential and commercial space and water heating. The thermal sector is declining however, with Transportation increasing proportionally to the overall regional energy use (e.g. from 2024 update to this 2026 update thermal decreased 2% and Transportation increased 2%). Transportation is the second largest energy use in the region accounting for 31% of total usage although it is important to note that the reported estimates are limited to light-duty vehicles (commercial and medium- and heavy-duty data not available at this time). The electric sector makes up approximately 16% of the region's energy use.

Figure 3: Current Regional Energy Use Estimates



Sector	Current Regional Energy Use (MMBTUs)
Transportation (LDV)	3,158,735
Residential Thermal	3,421,190
Commercial Thermal	2,083,630
Total Thermal	5,504,820
Residential Electric	799,894
Commercial & Industrial Electric	837,891
Total Electric	1,637,785

Each sector, thermal, transportation, and electric is discussed below first in terms of current use, and then in terms of regional targets and key discussions.

Thermal Sector- Residential

Heating homes in Central Vermont is our greatest energy use. Together oil and propane were reported in 74% of the region's households. Wood/biomass is used in approximately 15% of the region's homes (19% owner-occupied and only 4% renter-occupied homes). Variation across our region is high (from 4.3% in Barre City to 45.2% in Woodbury); however, in half of the towns in our region wood is used as primary fuel in over 20% of homes, and in nearly a third over 30% (see Appendix A page 28, and some discussion below). As census data only collects information on a single primary fuel type and most Vermonters use two, wood and electric are likely underreported (see Appendix A pages 27-30 for more discussion). Approximately 8% of homes report electricity as their heat source, this is a slight increase from the previous plan. The increase in electricity is likely newly adopted heat pumps while some of the baseline is residual electric resistance heat. Breakdown by town and fuel type is available in Appendix A pages 10-15.

Although electric resistance heating has very low upfront and installation costs, it is one of the most expensive heating options for Vermonters. Low-income renters are disproportionately burdened by this inefficient equipment (EAN Annual Progress Report p.28). The adoption of air sourced and ground source heat pumps may be partially obscured here and, in the future, if only primary heating sources continue to be reported and included. The predominance of fossil fuel in the residential heating sector is a cost burden to our region's residents and contributes a relatively small amount of in-state labor to our economy (in comparison to cordwood or even electricity which keep more jobs and dollars local); there is a clear opportunity and responsibility across the region to consider fuel-switching (primary heating source or entirely), weatherization and other efficiency measures which will reduce fuel use and emissions contributions (see below).

Table 1: Current Regional Residential Fuel Type

% of Fuel Use by Tenure	2024 Regional Estimate					
	Owner Occupied		Renter Occupied		Regional Total	
	Totals	%	Totals	%	Totals	%
Utility gas	321	2%	372	5%	693	2%
Bottled, tank, or LP gas	5,424	26%	2,166	31%	7,590	27%
Electricity	944	4%	1,334	19%	2,278	8%
Fuel oil, kerosene, etc.	9,863	47%	2,657	38%	12,520	45%
Coal or coke	18	0%	0	0%	18	0%
Wood	3,914	19%	262	4%	4,176	15%
Other Fuel	599	3%	201	3%	800	3%
No fuel used	15	0%	17	0%	32	0%

Source: 2024 5 Year American Community Survey B25117

Table 2: Current Regional Residential Heating Cost Estimate

Fuel Type	Standard Unit	BTUs/Unit	Cost/Unit	Total Regional Current Costs	Source (cost/unit)
Fuel Oil, kerosene, etc.	Gallon	140,000	$4.133	40,869,208.29	Vermont Average Residential-EIA (March 2024)
Bottled, tank, or LP gas (propane)	Gallon	91,000	$3.575	30,470,927.14	Vermont Average Residential-EIA (March 2024)
Coal or coke	Ton	19,590,000	$500	44,949.46	VT newspapers and quote VT&NH suppliers
Wood (seasoned)	Cord	20,000,000	$350	7,709,887.50	(275 green-450 kiln dried) VT newspapers and quoted VT suppliers
Wood Pellets	Ton	16,400,000	$405		Vermont wood/pick-up; Energy Co-op of VT
Electricity	Kilowatt hour	3,412	$0.2109	3,939,594.36	VT State Energy Profile, US Energy Information Administration
Other				4,142,353.99	
Regional Total Cost				$87,176,920.74	

Tables 1 and 2 are based on total occupied units, but there are many seasonal, recreation, and/or occasional use (second) homes across the region. In Appendix A (pages 19-20), an additional adder to take into consideration thermal use in these homes is provided: 4,137 additional homes across the region account for approximately 97,201.5 additional MMBTUs of energy use (conservatively).

Thus far, fewer low-temperature degree days in the winter have yet to result in reduced fuel consumption in the winter (without stable declining temperatures, residents may not adjust as naturally to cold temperatures). Furthermore, more frequent high-temperature degree days are associated with increased heat-related health issues (VDH Climate Dashboard) including Central Vermont where few have adopted air conditioning and the threshold for health impacts is lower (86F as compared to 90F in Burlington). The increased use of air conditioning and associated electricity will need to be assessed in future updates as we continue to experience increasingly extreme storms, loss of stable seasons, and overall warmer, wetter conditions associated with climate change.

Thermal Sector- Commercial

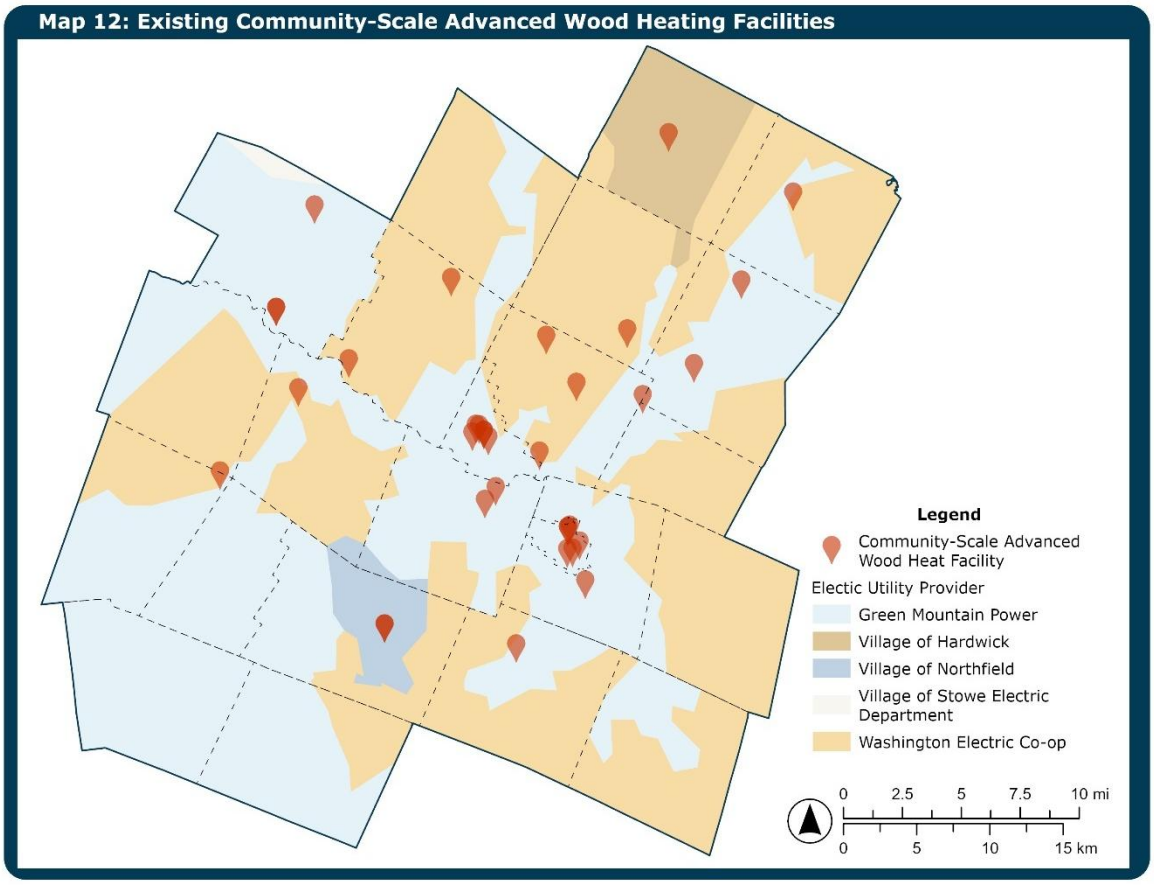
Table 3: Current Regional Commercial Thermal (Heating) Energy Use

# Commercial Establishments	Average Thermal Energy Used Per Establishment (MMBTUs)	Regional Commercial Thermal Energy Use (MMBTUs)
2231	934	2,083,630

Source: Municipal Consumption Tool, CVRPC & Department of Public Service using data from the Department of Labor

Most of the region's commercial/industrial energy usage can be attributed to space heating and process heating. There is less distinction between many of our region's business buildings and the residential sector, though in more developed towns we do have more conventional commercial premises. Many of our region's schools are on wood heat, and several of our larger businesses have championed net-zero buildings and practices. Harnessing the expertise and capacity of our region's experts to mentor and support small commercial businesses to do the same may be a key way to implement our targets.

Map 12: Existing Community-Scale Advanced Wood Heating Facilities



Transportation Sector

Transportation is the second largest use of energy in Central Vermont, accounting for a little less than a third of total usage measured in MMBTUs (see Figure 3). Fossil fuels account for approximately 94% of the energy statewide we currently use for transportation- a much higher share of fossil fuel dependence than in the other energy sectors.

Table 4 below provides an overview of light duty (passenger) vehicles and use in the region. The vast majority of residents in the state, including Central Vermont, use personal vehicles for their daily travel needs. Approximately 3.5% of the 43,506 light duty vehicles in Central Vermont are electric vehicles (including all electric and plug-in hybrid electric vehicles registered by January 2024 (Drive Electric Vermont[25])). The total number of vehicles in the region has decreased slightly, while the number of electric

[25] http://www.driveelectricvt.com/buying-guide/why-go-electric

vehicles (EVs) has increased quickly in the last few years. In 2023 alone, EVs increased by approximately 40% coinciding with the expansion of state, utility, and federal incentive programs. Light Duty Fleet Electrification and EV charger planning is covered in the Transportation Chapter of this plan (pages 175-184).

Table 4: Current Regional Transportation Energy Use

Transportation Data	Regional Data 2024 5-YR ACS & Drive Electric EV #			Regional Data 2011-2015 (ACS)
Fuel Type	Internal Combustion Engine (ICE)	Electric Powered (EV)	Total	Internal Combustion Engine (ICE)
Total # of Light Duty Vehicles	46,894	1,517	48,411	45,584
Average Annual Miles per Vehicle	12,500	9,000		287,500 (12,500/vehicle)
Total Miles Traveled	586,175,000	13,653,000	538,515,500	567,650,000
Total Use per Year	26,644,318 gallons	4,551,000 kWh		30,518,817
Transportation MMBTUs	3,143,207	15,528	3,158,735	3,396,000
Average Cost per unit	$3.37/gallon	$0.2109/kWh		$2.31
Cost per Year	$89,791,352	$959,806	$90,751,158	$70,488,465

Source: Municipal Consumption Tool (Department of Public Service) which uses Table DP04, 2024 ACS 5-Year Estimate used to estimate the count of vehicles associate with area housing units, and State DMV data averages; cost per gallon of gas was taken from EAN Annual Progress Report 2023. EV data was provided by Drive Electric based off DMV registrations as of January 2024. Comparable public transportation and medium and heavy-duty vehicle data is not available, additional information is provided in the Transportation Chapter and Appendix A.

Table 5: EV Registrations

	EV Registration Jan. 2023			EV Registration Jan. 2024			Increase 2023-2024	
	AEV	PHEV	Total EVs	AEV	PHEV	Total EVs	Count	%
Regional Total	588	497	1085	921	596	1517	432	40%

According to the 2024 Energy Action Network Annual Progress Report on Emissions, Energy, Equity, and the Economy, nearly 70% of Vermont's transportation climate pollution comes from the use of motor gasoline for on-road use of light-duty passenger vehicles. Thus, reducing our reliance on fossil fuels used for personal vehicles presents a key opportunity to reduce GHG emissions from fossil fuel use overall. However, land use choices are inextricably linked with our transportation system, the transportation sector cannot be effectively nor sustainably addressed at the individual scale alone. Instead, it is important to recognize that Vermont's dispersed pattern of development is a key reason why our transportation energy demand (and burden) is so high. Vermont's historically dispersed settlement pattern still holds much appeal for many moving to and within the state. However, communities have been working hard to designate and develop small villages and downtowns, promote infill housing development, and improve walk/roll-ability to shift residential development to intentional growth areas and focus infrastructure investment. The Land Use and Transportation chapters in this regional plan detail these priorities.

Electric Sector-Current Use

The Central Vermont Region currently uses approximately 480,007,289[26] kilowatt hours (kWh) of electricity on an annual basis across the residential, commercial, and industrial sectors as reported by Efficiency Vermont for 2025 (see Table below for use by sector and Appendix A pages 7-8 for use by town and by sector).

[26] incomplete demand data is known at least for Woodbury from Efficiency Vermont's annual regional data report; strengthening relationships with our Distribution Utilities directly will ensure more accurate and comprehensive data will underlie future planning efforts. This total is thus an underestimate of total demand (use).

Table 6: Current Regional Electricity Consumption (Annual)

CVRPC Electricity Consumption	2016 CVRPC Regional Plan	kWh Usage by Year (Efficiency VT)		
Sector	2016 Plan	2023	2024	2025
Commercial & Industrial	353,117,000	243,986,495	236,541,932	245,571,762
Residential	241,268,000	222,292,256	225,772,530	234,435,527
Total	594,385,000	466,278,751	462,314,462	480,007,289
Average Annual Residential Use		6,876	6,966	7,206

Data Source: Efficiency Vermont CVRPC Regional Summary Report, May 2026 (corrected)

As a comparison to Central Vermont's 7,206kWh per year, the US average residential electricity usage was 10,791kWh in 2022, an average of about 899kWh per month (EIA). Electricity consumption is expected to increase as electrification continues to be a central approach of the State to meeting Global Warming Solutions Act (GWSA) targets and transitioning away from fossil fuels given that Vermont is rapidly decarbonizing its electric sector resources. Fuel switching in the thermal sector and switching to alternative fuels and electric vehicles in the transportation sector are both discussed in the following sections.

As electric consumption is projected to rise, the most useful targets include those around energy efficiency and conservation, critical to ensuring electrification has the intended outcome from the ground up to the State's legally binding GWSA goals. It is of note, however, that since the 2018 Enhanced Energy Plan, reported electricity consumption in central Vermont has declined by approximately 20% overall (approximately 11% decrease in the residential sector and 28% in the commercial and industrial sectors). It is difficult to know if this is associated with changes in usage over the pandemic, a lack of consistent reporting from the DUs to Efficiency Vermont, or evidence of the successful implementation of efficiency and conservation measures (see below). Most likely, it is a mixture of all three.

Existing electricity infrastructure is detailed in the Utilities, Facilities and Services Chapter. Efficiency and conservation measures are integrated into the other two sectors and also treated explicitly below.

Sector Targets

As part of Vermont's Comprehensive Energy Plan (CEP) and Climate Action Plan (CAP), developed to meet our legally-binding greenhouse gas emissions reductions goals (per the GWSA), state wide targets for energy use have been established. These targets provide a sense of scale overall by sector and for key types of actions that will get us to our goals- they are not binding requirements and regions and towns are encouraged to customize them to better suite their circumstances. While a summary of results is included below and referenced throughout this chapter, a walkthrough of the methods, data sources, and steps are included in Appendix A and accompanying tools and supporting resources hosted by the Department of Public Service. Furthermore, full details of the LEAP Model methods, data sources and assumptions may be found as Appendix D to the 2022 Comprehensive Energy Plan.[27] Municipal analyses and targets will be made available on the CVRPC website and in summary in Appendix A (pages 20-22; 31). Priority targets discussed below are accompanied with data, as available, of recent progress in each measure. Priority targets include weatherization, heat pumps, heat pump hot-water heaters and advanced cord wood heat will increase use of renewable fuels in the thermal sector while reducing the amount of energy used to achieve space and water heating over the target years. Further co-benefits include increasing access to air conditioning, reducing wasteheat, and, if well implemented, reducing energy costs for both individual consumers as well as communities and the state.

Weatherization

A portion of Central Vermont's housing stock is older and was constructed at a time when no specific codes existed for energy efficiency. Residential Building Energy Standards (RBES) and the Commercial Building Energy Standards (CBES) for new construction set minimum thresholds for energy efficiency. This will encourage new construction to address energy efficiency, however a lack of enforcement may hinder implementation.

Weatherization of our buildings across sectors is one of the most important

[27] https://publicservice.vermont.gov/content/2022-cep-analysis-greenhouse-gas-emission-reduction-pathways-vermont

pathways for our region; it is not only a key conservation of electricity and emissions reduction strategy but also has significant health and financial benefits. Energy-burdened Vermonters spend disproportionately more of their income on energy. Heating (and cooling) can escape through leaky windows, cracks in the doors, and poorly insulated building envelopes. Recent research on energy burden and the need for integrated low-income housing and energy policy shows multiple, interrelated health risks are linked to, and intensified by, energy burden.[28] For example, high and/or overdue energy bills can contribute to stress and mental health concerns, which can exacerbate adverse decision-making about heating/cooling, which can then further exacerbate health issues such as asthma, heart disease, and malnutrition, as well as physical inactivity.

Most weatherization assistance funds in Vermont are available to homeowners, and some to commercial properties as well. Renters have been identified as a group underserved by the health, comfort, and financial savings associated with weatherization (see Energy Action Network Working

> *"The largest barrier to low-income home weatherization continues to be the presence of vermiculite insulation, a material known for containing asbestos. Unfortunately, there are also many other structural issues present in Vermont's older housing stock which can prohibit Weatherization such as leaky roofs, wet basements, knob and tube wiring, and other structural issues. Historically, these issues would "defer" weatherization of a home indefinitely. Vermont's Weatherization Program has adopted a "zero deferral" policy in recognition that addressing non-energy related issues that otherwise prevent weatherization is a critical equity policy. However, there are significant limits to this policy including requiring deferral for vermiculite at properties that are rented (but not owner-occupied) according to the 2020 Technical Policies & Procedures Manual published by OEO and still in use. OEO secured $125,000 of Vermont Low Income Trust for Electricity (VLITE) funds for vermiculite remediation and continues to leverage Zonolite Trust Funds. Additional funding to address deferral issues comes from the Vermont Community Foundation, as well as ARPA State Fiscal Recovery (SFR) funds."* Performance Indicators for the Weatherization Assistance Program Report to the Vermont Legislature 2022

[28] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4819257/

Group on Renter Weatherization led by Rights & Democracy for more[29]). Rental housing represents about 30% of Vermont's housing stock- including approximately 25% of occupied units in Central Vermont- and almost 75% of people who rent their homes have incomes under Vermont's median household income of approximately $63,500. Tenants often cannot weatherize their homes because it is cost-prohibitive, but also because major structural changes to a building must include a willing landlord to participate. Both "weatherization-ready" and rental programs have been identified by the current Climate Action Plan update as priorities. CVRPC works closely with Capstone Community Action, Efficiency Vermont, THRIVE partners, state programs and partners, and with municipal committees to develop, implement, and provide resources, support, and programs to address these needs.

Table 7: Residential Weatherization Targets

Regional Residential New Retrofits (Number of Housing Units)			
CAP Mitigation Scenario	2025	2035	2050
Housing Units to Weatherize	7,758	16,767	27,125
% of Homes Weatherized*	28%	56%	85%

Table 7 identifies the number of existing residential structures in Central Vermont that would need to be weatherized by each of the target years to meet the State's energy goals (CAP Mitigation is our target and Baseline Scenario indicates business as usual). Targets are cumulative.

In Central Vermont, there are two main entities involved with weatherization: Capstone Community Action provides weatherization for lowest-income residents (see table below for number of homes weatherized per year in recent years), while Efficiency Vermont provides weatherization services and income-based incentives for other residents and businesses. (see Appendix A pages 22-26 for savings and breakdown).

Capstone Community Action administers Vermont's Weatherization Assistance Program in Central VT which aims to help low-income Vermonters save fuel and money by improving the energy efficiency, health, and safety of their home while reducing carbon emissions. On average, the program

[29] https://eanvt.org/network-action-teams/tenant-wx/; https://eanvt.org/network-action-teams/weatherization-at-scale-action-team/

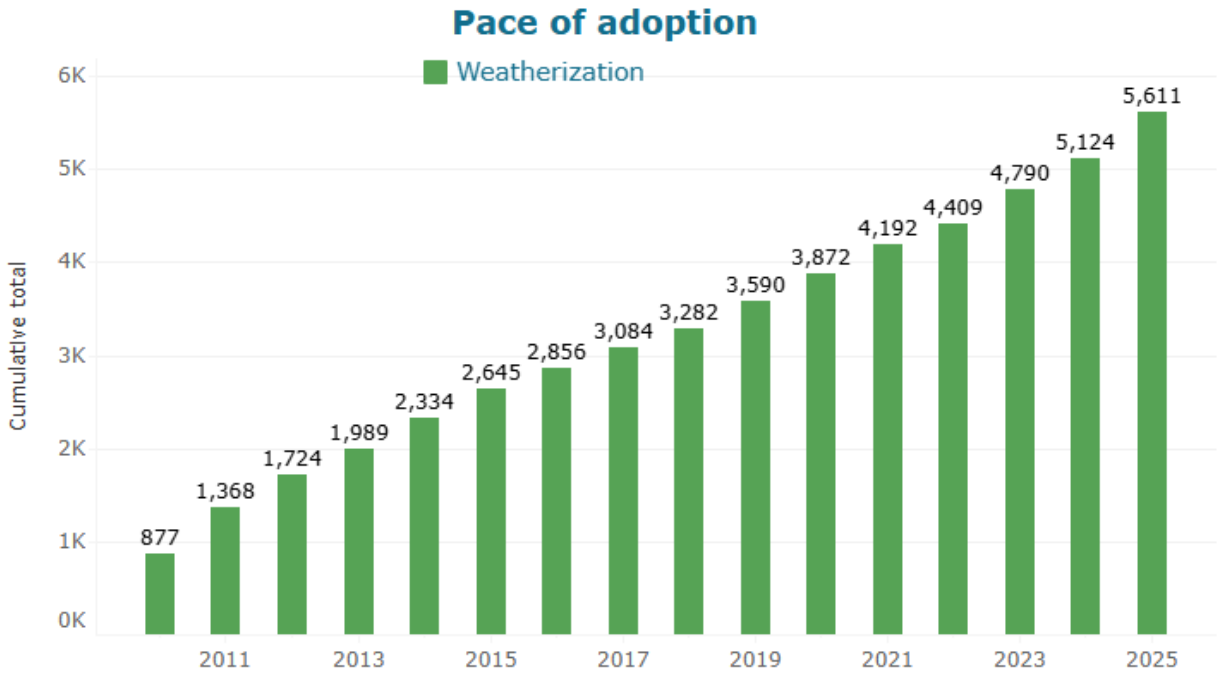
makes about $10,000 worth of improvements per home, installs about 1,500 square feet of insulation, and reduces drafts by about 40%[30] (see table below for project counts).

The data below indicates the number of weatherization and energy efficiency projects completed per year across Central Vermont via these two key partners. While this is not comprehensive, it provides some indication of progress. At the current rate, weatherizing between 300-700 homes a year the region is on pace to meet the baseline scenario provided in Figure 4 but falls short of our regional CAP target.

There are several likely contributing factors to the near doubling of projects this past year including severe residential damage in the July 2023 flood event that prompted additional state incentives/rebates for affected properties, as well as the launch of major federal incentives provided via the Inflation Reduction Act. For example, the Home Energy Performance-Based Whole-House Rebates (HOMES) Program will provide eligible households with rebates of $2,000 to $8,000 for whole-home energy-saving retrofits and weatherization such as improving insulation and methodically sealing air leaks. The region has a key opportunity through 2031 to support weatherization and draw down investments which will substantially improve the condition of our housing stock, improve health and wellbeing, and reduce energy burden on top of reducing fossil fuel use and GHG emissions. Additionally, affordable and expanded housing is a key priority for our region and municipalities, building these to energy code (and better yet, to stretch code or higher energy standards) will contribute to the region's weatherization targets.

[30] https://legislature.vermont.gov/Documents/2022/WorkGroups/House%20Appropriations/Reports%20and%20Resources/W~Department%20for%20Children%20and%20Families~Performance%20Indicators%20for%20the%20Vermont%20Weatherization%20Assistance%20Program~1-28-2022.pdf

Figure 4: Regional Pace of Adoption: Weatherization



Data Source: Energy Action Network Dashboard (above), data directly from Efficiency Vermont by town will be available on the CVRPC website. *Efficiency Vermont projects include Home Performance with Energy Star, other weatherization projects, and residential new construction projects; their total savings include all measures).Comprehensive weatherization is defined as those weatherization projects which, overall, achieve a minimum of 25% energy savings, as established in 10 V.S.A. § 581 and interpreted by the Public Service Department.*

Weatherization of commercial and other buildings will also play a role in meeting our energy goals; focusing on municipal buildings and facilities, schools, and other key community buildings will also support community resilience and health. CVRPC is in the process of developing custom targets for the region based on municipal participation in the Municipal Energy Resilience Program and similar programs.

System Conversions (Fuel Switching)

Many of our regions buildings have outdated and inefficient mechanical systems that can be replaced and updated in tandem with weatherization (or after). These often include oil-based heating systems, propane, or inefficient wood-fired units. With advances in technology, cold weather heat pumps, high-efficiency wood stoves, and other mechanical systems can provide significant efficiency improvements for existing buildings that reduce fuel use and thus cost and significantly improve the health of occupants. System

conversion, and the building modifications sometimes required to do so, can however be a challenge for residents with low and fixed incomes.

Vermonters face on average a thermal energy burden of roughly 4%, while some communities face even higher upwards of 6-7%, with individual Vermonters greater still. Research by Efficiency Vermont shows that towns identified as most severely burdened by thermal costs tend to show low overall thermal spending but have household income well below the statewide median. Furthermore, Efficiency Vermont reports that household fuel use is correlated with income and whether a home is owner or renter occupied. Lower-income households disproportionately use fuel oil and inefficient resistance heating systems while owner-occupied homes are much more likely to heat with wood and less likely to heat with inefficient aged electric resistance than rental properties (VT Comprehensive Energy Plan, p.163). Spending is relatively inelastic- consumers do not have a lot of control over the amount of energy they use on an ongoing basis (see Appendix A for breakdown by town for CVRPC region and comparison with state values).

As discussed above, there are a considerable number of income-based incentives, rebates, and programs for residents and business owners alike (Efficiency Vermont, Capstone Community Action, and previously substantial federal programs). Distribution utilities offer programs for income-eligible Vermonters to help lower the cost of energy and take part in the energy transition, this includes incentives for heat pumps, efficient wood stoves, and more for homes, businesses, schools, and municipalities.

CVRPC continues to provide information and support to municipalities to promote these programs and opportunities while working with administrating bodies to remove barriers for lowest-income Vermonters and renters. As noted previously, new construction will generally include these high-efficiency systems which will help address energy conservation. Additional Efficiency Vermont Efficiency Measures include appliances, lighting, motor controls, etc., which contribute to our targets as outlined below and towards reducing total residential demand as included in the Appendix A (pages 32-34; 37).[31]

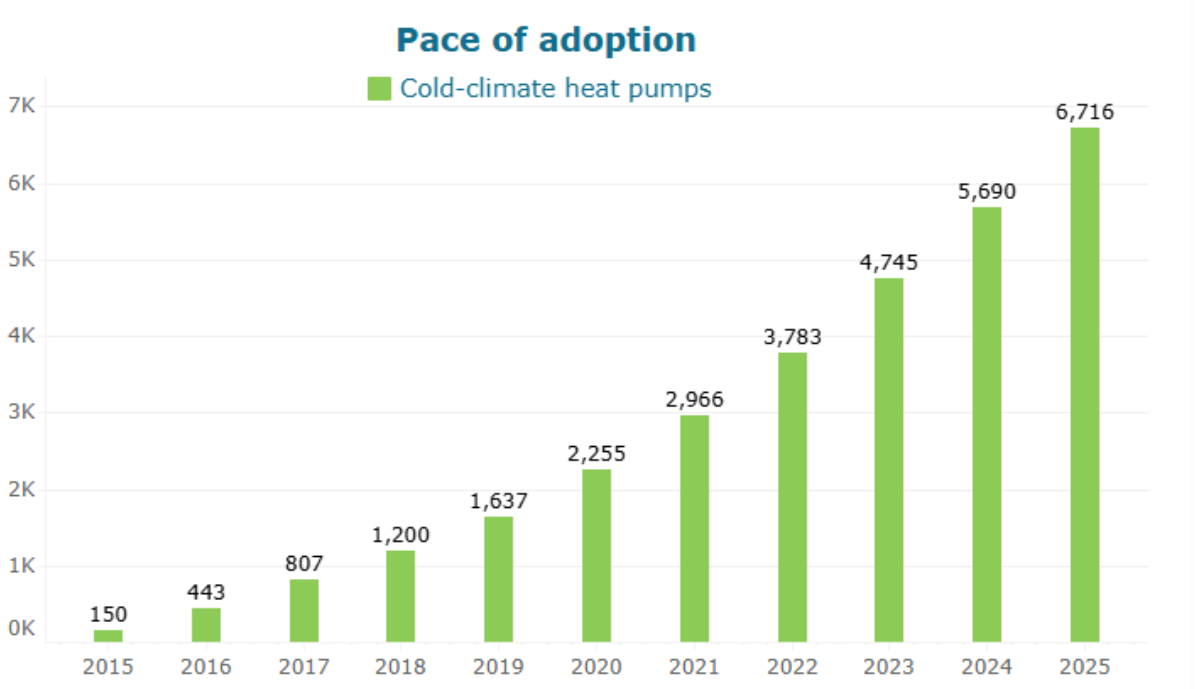
[31] The High-Efficiency Electric Home Rebate Program will be another additional residential energy program run by the Department of Public Service through 2031 (IRA) to support existing incentives and technical assistance. This program will provide point-of-sale rebates to low- and moderate-income households for a variety of electric technologies, including heat

Table 8: Efficiency Vermont Regional Summary Selected Measures

	2020	2021	2022	2023	2024
Heat Pump Water Heat Installations	260	321	307	303	394
Cold Climate Heat Pump Installations	618	711	817	962	945
Wood Heating Installations	178	240	82	112	173

Heat Pumps

Figure 5: Regional pace of Adoption: Cold-Climate Heat Pumps



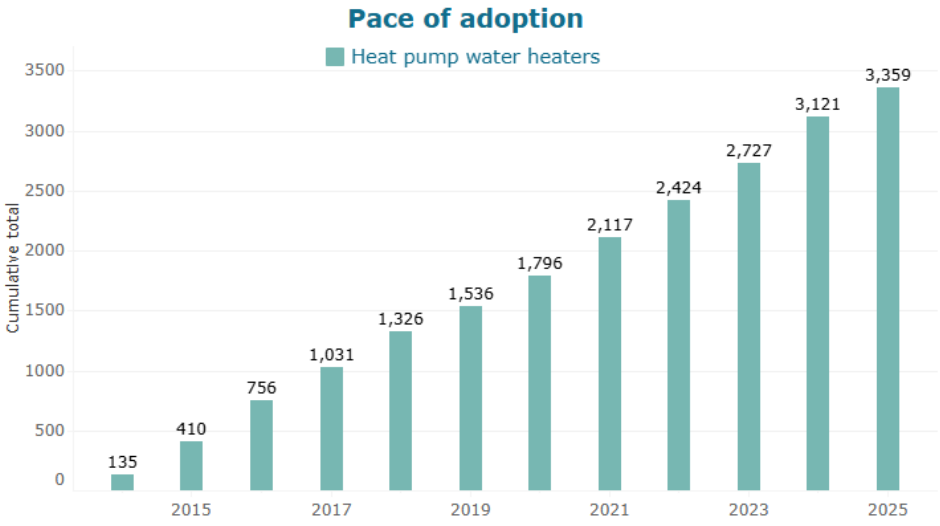
Data Source: Energy Action Network Dashboard (above), data directly from Efficiency Vermont by town will be updated on the CVRPC website.

Based on Table 8 above and if the current pace of projects is maintained, CVPRC is likely on track to meet the heat pump target (approximately 1270 a year needed per year over the next 25 years to make the target). But, CVRPC is only at around one third of the adoption rate needed to meet the

pumps for space heating and cooling, heat pump water heaters, electric stoves and ovens, and electric service upgrades. Eligible households will be able to receive up to $14,000 for installing energy-efficient electric equipment, including up to $8,000 for heat pumps, $1,750 for heat pump water heaters, and $840 for electric stoves. Complementary programs including Energy Efficiency Contractor Training Grants to support workforce development, tax credits, and direct pay options for homeowners, municipalities, and other eligible participants for energy efficiency home improvements, on-site renewable generation, and storage, up to 30% are also available through 2032.

heat pump water heater target. While on target for heat pumps, rising electric rates and particularly the ability of existing infrastructure and systems to integrate a large electric demand increase from the thermal sector are major concerns (see below for grid and infrastructure conditions and limitations). Ground Source Heat Pumps are more efficient and can help reduce the thermal load while we electrify it; they are a critical component of heat pump targets. Furthermore, CVRPC supports the combined use of high-efficiency cord wood and heat pumps, especially in homes (see Wood Heat below).

Figure 6: Regional Pace of Adoption: Heat Pump Water Heaters



Data Source: Energy Action Network Dashboard (above), data directly from Efficiency Vermont by town will be updated on the CVRPC website.

Tables 9-10 provide thermal targets for new residential and commercial heat pumps and heat pump hot water heaters; the regional LEAP targets provided by the Public Service Department showing the Baseline trajectory and the Climate Action Plan Mitigation State approach (CAP) are available in full in Appendix A pages 35-43 and municipal target breakouts on CVRPC's website.

Table 9: Thermal Targets for New Residential Heat Pumps

Regional Residential New Cold Climate Heat Pump Target (number of new heat pumps- cumulative)						
Technology	2020	2025	2030	2035	2040	2050
Air Source Heat Pump- 2 Head	423	2,549	4,686	6,836	8,995	10,093
Air Source Heat Pump- Central	658	3,964	7,311	10,705	14,155	15,727
Air Source Heat Pump- Hybrid	622	3,743	6,882	10,039	13,210	14,821
Ground Source Heat Pump Hybrid	77	463	851	1,241	1,633	1,832
Total	1,780	10,720	19,730	28,820	37,993	42,473

Table 10: Thermal Targets for New Residential Heat Pump Water Heaters

Regional Residential New Heat Pump Water Heater Target (Number of Units)						
New Heat Pump Water Heaters	2020	2025	2030	2035	2040	2050
	483	7,046	15,213	23,465	31,809	32,196

Table 11: Thermal Targets for New Commercial Heat Pumps

CAP Mitigation Regional Commercial New Cold Climate Heat Pumps						
New Cold Climate Heat Pumps	2020	2025	2030	2035	2040	2050
	316	5,682	11,298	17,184	21,120	21,977

Wood Heat- Regional Custom Target

Original targets overemphasized the electrification of the thermal sector for the region and undervalued the role of efficient wood stoves. CVRPC supports the transition from fossil fuel heating fuels using not only heat pumps (air and ground sourced), but also strongly supports the conversion of inefficient wood stoves to advanced wood heat stoves to reduce air pollution emissions, reduce heating costs, amount of wood fuel used, and provide an accessible option for many Vermonters- our targets for the thermal sector reflect this commitment. These targets were adjusted for the region (methodology and discussion on wood heat in Appendix A 27-30).

Table 12: Targets for Residential High Efficiency Wood Heat Conversions

	2025	2030	2035	2040	2050
Existing Wood (homes)	4000	3200	2400	1600	800
New High Efficiency Cord Wood Heat (homes)	0	800	1600	2400	3200
% converted	0%	20%	40%	60%	80%
Total Cords Used	22730	19725	16691	13656	10621
Thousands MMBTUs	454.608	394.507	333.813	273.120	212.427

Transportation & Land Use; Community Scale Decarbonization

Weatherization and fuel switching are two core components of CVRPC's multi-pronged approach to meeting thermal and electric sector goals but there is a key gap between statewide policy and building specific targets: municipal and community scale infrastructure. Building Energy Standards, Wasteheat Recovery and Thermal Energy Networks (shared heating and cooling), and future land use focusing growth intentionally in density centers are integral to meeting targets in all three sectors as well as reducing energy burden and infrastructure costs.

CVRPC's multi-pronged approach to the transportation sector includes smart growth, and walk, bike, roll initiatives in addition to fleet electrification/EV adoption (see Land Use, Transportation, and Health Communities Chapters for more detailed discussion of smart growth and walk, bike, roll). The Transportation Chapter (pages 175-184) includes the Transportation Sector Targets, of which light-duty vehicle EV registrations is the priority target to transition to renewable fuels over the target years.

The following land use and mobility principles encourage not only reduced transportation energy consumption, but also offer important health equity benefits:

- Encourage the location of new development in or near traditional village and downtown centers to reduce both sprawl and the number of vehicle miles driven.
- Support transit-oriented development that fosters the expansion of public transportation, micro-mobility (e.g., bikes, e-bikes/scooters), and rail use.
- Encourage the construction of Park and Ride facilities to support carpool and rideshare efforts.
- Encourage the expansion of bicycle and pedestrian facilities such as safe sidewalks and bike lanes, as well as secure parking options for micro-mobility.
- Promote the development of EV charging stations (also known as electric vehicle supply equipment, or EVSE) in Central village centers and downtowns. Especially where resilience benefits can fill backup power gaps.

Additionally, improved telecommunications infrastructure in this region has the potential to reduce annual vehicle miles traveled (VMTs) by allowing more workers to telecommute.

One key factor that impacts energy usage is land use. Land use directly impacts and influences our choices, especially as they relate to transportation. When land use patterns focus on density, compact and mixed-use development, the result can be an area that is walkable, bicycle friendly, and more easily serviced by public transit.

Land use planning and management can have a direct impact on how much energy is used and consumed in regard to transportation. As development density decreases (creating fewer lots or uses per acre), the impacts associated with that decrease in density will rise. This includes both costs and consumption of resources including energy to move people from place to

place. As land uses are spread further from one another, more resources are required to link those uses together. This includes infrastructure such as roads or utilities; needs for emergency services such as police, fire, and ambulance, and increases in municipal service needs such as road maintenance.

In order to reduce the costs and needs for energy related to transportation and land uses, changes in land development will need to occur. One significant way that this can be addressed is through amendments to land development regulations such as zoning or subdivision bylaws. Changes to land development regulations that require pedestrian facilities such as sidewalks or multi-use paths to connect uses or activity centers is one technique that can be used to help create alternative transportation options in a community. Additionally, smaller changes could be implemented that can have larger impacts. Examples of this include reducing lot sizes, reducing parking requirements, adjusting setbacks, implementing traffic calming measures, or increasing building heights are all ways to maximize development potential within the framework of existing land development regulations.

If a municipality does not have land development regulations, there are still avenues that can be explored from the non-regulatory side that would impact land development practices. For example, developing a capital plan for public utilities and services that is consistent with a municipal plan can identify and prioritize where public funds should be spent. This could include sidewalk connections, park & ride facilities, or water and wastewater services. Expansions to emergency services or road maintenance equipment can also be a way to signal intended growth. Through FLU areas, specifically Downtown and Village Centers, Planned Growth Areas and Village Areas, it can provide the basis for growth management and the tools necessary to regulate development. Finally, having clear goals, policies, and action items identified in municipal plans will impact how a community grows.

Currently, 19 of the 23 municipalities in the Central Vermont Region have some form of development regulation. Six of the 19 only have zoning regulations in place while the other 13 have zoning and subdivision regulations.

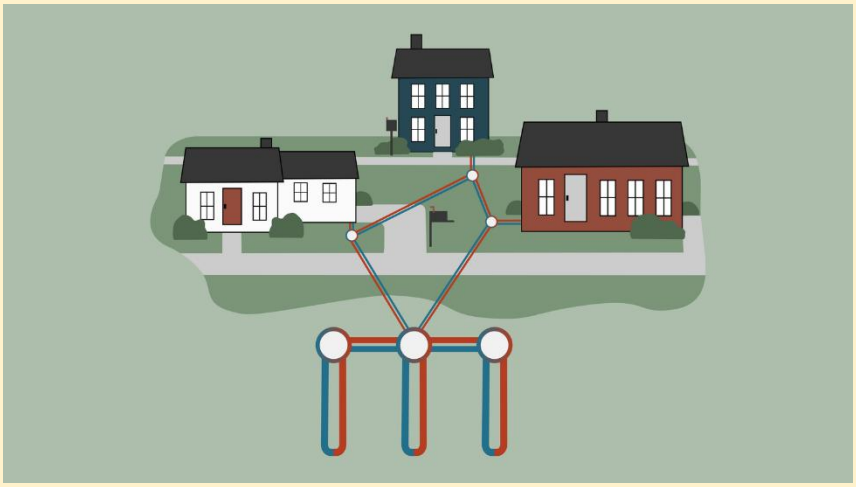
While the techniques noted herein can help provide avenues for changes to support development density and create compact development patterns, a

primary factor that will influence development density is adequate infrastructure to accommodate water and wastewater. Water and wastewater infrastructure is critical to provide a development pattern that includes density, mixed uses, and alternative transportation options. This is done by moving the supply and treatment of water and wastewater off-site therefore, reducing the need for land to accommodate these facilities on-site. All of these are positive steps to reduce the need for infrastructure to accommodate single-occupancy vehicles such as parking areas, but also begin to support the critical mass that is necessary to support public transit.

As noted previously, regulatory and non-regulatory approaches can have an impact on energy use due to the future development patterns in a community. While there isn't a single approach that will address all of the Region's energy needs, municipalities are encouraged to identify what programs or actions will work best to implement their community's future transportation and land use planning. Specific actions from the Region that can assist with municipal transportation and land use priorities can be found in the Energy Goals and Strategies. Ultimately, positioning the municipalities to take control of their energy futures while working collectively as a region could be a successful outcome for all.

Ultimately, to achieve our comprehensive energy goals, transportation energy use must be reduced by embracing smart growth that directs development into existing centers, providing cost savings for households and municipalities, reducing the extent of development pressure on the environment, and building physical and social infrastructures to support thriving communities.

Maximize Infrastructure Investments: Wasteheat Recovery



Many Vermont communities have taken advantage of state and federal funding to install, expand, and/or upgrade local water and wastewater systems. Integrating wasteheat recovery into wastewater systems is a terrific way to maximize the benefits of such an investment by recovering heat from wastewater to make potable hot water and to heat buildings (wastewater can also be used as a heat sink to cool buildings). Wastewater is a continuous and existing source of thermal energy; the average residential wastewater temperature is 70°F while commercial and industrial wastewater can be up to 140°F or higher. Heat recovery systems are simple, low maintenance, offer lower, predictable customer heating and cooling bills, and are scalable from one building/facility to much larger community or district thermal energy networks.

For more on how Thermal Energy Networks can be key opportunities to meet local infrastructure needs while reducing energy burden, GHG emissions, and thermal sector energy demand visit Vermont Community Thermal Networks for toolkits and more information.)

Electric Efficiency Targets

Electricity efficiencies were embedded into the 20-year load forecast used in the updated LEAP model and, thus are not an output of their own in the 2022 Comprehensive Energy Plan Update (and why the Public Service Department removed the Electric Sector tab of the Analysis & Targets Tool with the 2022 update). The Public Service Department provided regional estimates of electric energy savings associated with the implementation of efficiency programs based on the 2022 Energy Efficiency Market Potential

Study for 2025-2050 (these targets are cumulative). Table 13 below shows possible electric energy efficiency savings (MWh); Tables A17 and A18 in Appendix A (page 34) include measures that can be used to achieve those savings including efficient appliances, hot water, HVAC equipment, HVAC shell, lighting, miscellaneous loads, motors, and whole buildings in the residential sector, as well as compressed air, plug loads, heating and cooling, ventilation and circulation, lighting, refrigeration, water heat and motors in non-residential sectors. Tables A15 and A16 in Appendix A (page 33) show the co-benefits of these efficiency measures on reducing peak demand pressure (including seasonal impacts). Electricity use is expected to increase dramatically by 2050 so demand-side management and upgrades, such as those measures listed in Tables A17 and A18 Appendix A (page 34), are critical to maintaining our energy conservation policies, meeting our energy use and renewable fuels transition targets, as well as minimizing potential impacts and costs of beneficial electrification to the grid and communities alike.

Table 13: Program Achievable Electric Energy Efficiency Savings (MWh)

		2025	2030	2035	2040	2050
Residential	Incremental Annual	2,459	2,583	2,801	2,707	3,010
Residential	Cumulative Annual	4,861	16,566	27,893	35,147	51,456
Non-Residential	Incremental Annual	4,361	3,961	3,966	3,909	4,546
Non-Residential	Cumulative Annual	8,740	28,611	43,894	42,904	39,581
Total	Incremental Annual	6,820	6,544	6,767	6,616	7,556
Total	Cumulative Annual	13,601	45,177	71,787	78,052	91,037

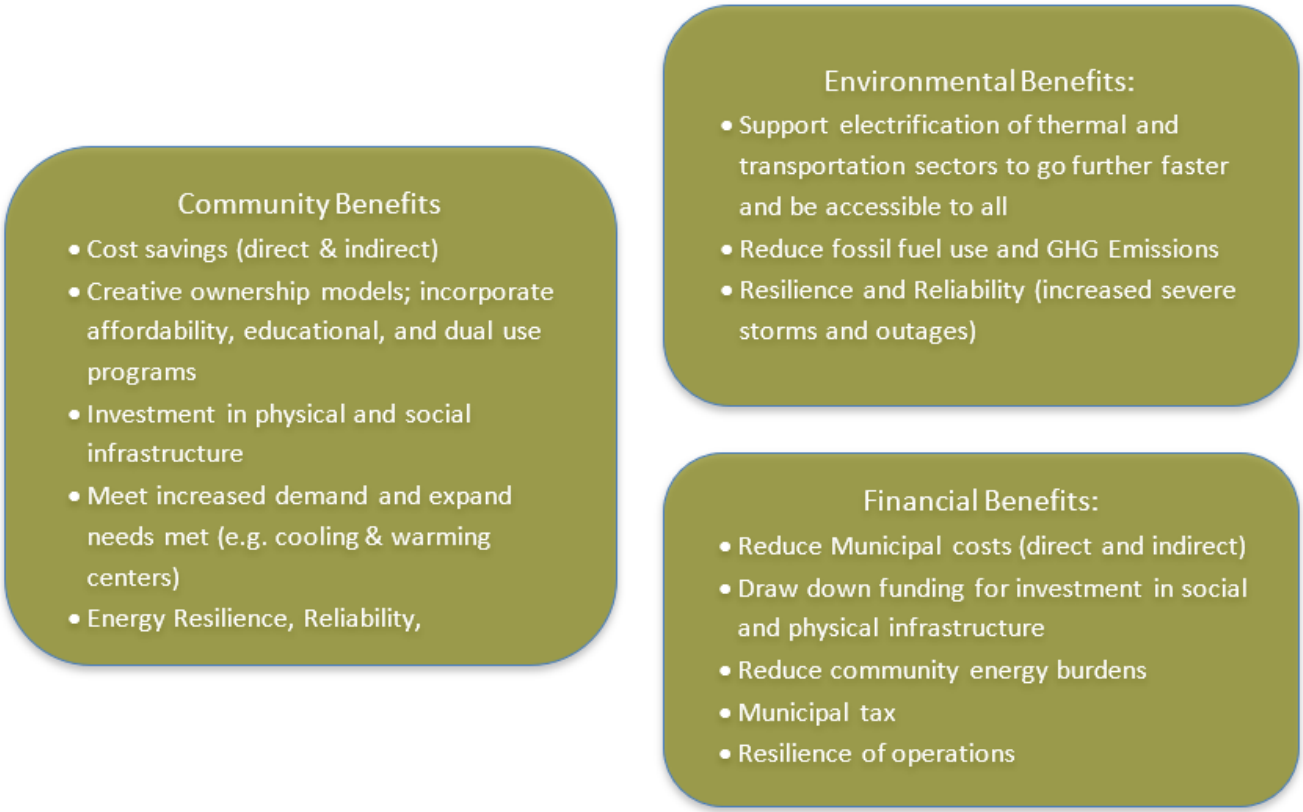
Renewable Energy Resources and Siting Energy Infrastructure

This section and underlying analyses consider land and resource availability for different types of renewable energy generation and thus their suitability based on size, type, and proximity to demand in addition to location-based environmental and social considerations. The section combines resource information with specific known and possible constraints to support the development of renewable energy generation at the state, regional, and local levels (including guiding the region's participation in the Section 248

process). The mapping section also provides the opportunity to identify preferred locations for renewable energy development and areas that are unsuitable for development of any kind. In addition, the maps identify existing infrastructure to support renewable energy development. Preferred sites (types), preferred project characteristics, land use policy, renewable energy generation targets, key issues, and community priorities will be discussed below after a review of known and possible constraints. While this chapter largely refers to renewable energy generation throughout this section, often in combination with storage, these discussions also extend to transmission and distribution infrastructure more broadly.

Several over-arching goals frame this section and supporting analyses. CVRPC acknowledges it has a role to play in providing its share of renewable energy generation to meet State goals of meeting 25% of demand with renewable energy generated in the state. CVRPC integrated an assumption of 25% energy demand in-state generation into its analyses underpinning this section of the plan.

This plan is intended to be a starting point, and not the only basis for siting, and project development. CVRPC intends for these mapping products and targets to catalyze collaboration, the interconnection of renewable generation projects on preferred sites, and the identification of vulnerable or ill-suited infrastructure. CVRPC encourages municipalities and communities to take an active role in project development to support their needs and demonstrate the types of projects that work well for them within their existing and future visioning for their community. Furthermore, CVRPC encourages developers and distribution utilities to reach out early and often when considering developing a project within the region and to work with communities and their priorities which may favor resilience and reliability concerns (integration with storage, ability to function as a micro-grid), alternative site choices, community benefit agreements to support municipal and/or residential energy programs, educational opportunities, dual-use opportunities, etc. There are significant local benefits if distributed energy projects are developed with intentionality and community collaboration:



The siting and generation of renewable resources is a critical part of how successful the region will be in meeting our share of the state's renewable energy goals by 2050. The analyses underpinning this section of the plan describe where energy generation resources are available throughout the region to work towards optimizing our regional resources but also to ensure no one municipality is unduly burdened. Finally, this information will better position the region and its municipalities to evaluate the renewable energy generation options that are available to meet these goals while reducing costly grid infrastructure investment and maximizing co-benefits for our communities to ensure access to affordable and reliable local energy.

New Renewable Energy Generation

CVRPC's objective is to ensure that energy generation, distribution, and transmission facilities are located, designed, and correctly sized to support the Region's community and economic needs, which increasingly means it must be reliable, resilient, and affordable as well as sustainable to reduce operational costs and Green House Gas emission contributions (further reducing long-term costs). At the State level, supporting policies and programs are being revisited to consider key issues including adequate

electricity, affordability of rates, cost-effective and efficient use of resources, economic vitality, environmental justice and energy equity, reliability, security, sustainability, and limiting negative environmental impacts. Many, if not all of these, apply to the regional and municipal, as well as the state level. However, priorities may differ, given the unique characteristics of each region.

Long-term energy resilience (adaptability, affordability, and, crucially, reliability) is critical to supporting thriving communities in Central Vermont. CVRPC advocates for the regional and municipal scales to be considered in the planning of local generation and energy transformation policies, especially as local communities increasingly experience:

- Increasing duration and frequency of outages (especially in our rural communities),
- Increasingly disparate electric rates and opportunities to invest in on-site renewable generation and storage alternatives based on distribution utility territory and proximity to energy infrastructure,
- Increased reliance on municipal and community hubs to provide critical care and resources.

Investing in infrastructure choices that maximize co-benefits and energy efficiency in complementary infrastructure such as capturing waste heat and/or creating thermal energy networks will reduce demand on existing electric infrastructure and further support cost and emissions reductions.

Potential Municipal Roles

- Participation in Section 248
- Enhanced Energy Plan
- Policy: update zoning and plans to incentive preferred projects and integrate priorities
- Community Outreach: support local partnerships and share information; develop committee/coordinator role; project working groups, etc.
- Investment: participate/host project
- Ownership/Project Development

CVRPC and ACRPC Energy Planners led a three-part workshop series in 2023 on Municipal Solar- see for more information and resources: https://centralvtplanning.org/programs/energy/webinars-and-workshops/

Siting: Known & Possible Constraints, Preferred Site Types & Project Characteristics

Act 174 outlined a set of land characteristics that would make a site:

- likely unsuitable for development including renewable energy development (known constraints),
- potentially suitable for the development of renewable energy resources but only after additional analysis (possible constraints),
- preferred for renewable energy development (preferred sites).

In addition to the State's known and possible constraints, and preferred site types; CVRPC identified additional regional possible constraints, preferred site types, and preferred project characteristics consistent with the region's land use policies and orderly development. The tables below provide basic definitions of known and possible constraints, preferred site types and project characteristics; Appendix A provides additional definitions, discussions, and mapping methods to complement these (pages 44-66).

State and regional constraints are integrated into resource potential area maps which identify where basic technical suitability conditions are met for the development of renewable energy resources. These map products are intended as a starting point in early project development and foremost to assess the region's ability to meet renewable energy targets and integrate energy planning into broader land use planning (see below). In coordination with the RPCs, the Department of Public Service, Vermont Center for Geographic Information, and the Agency of Natural Resources have created statewide layers that represent the best available known and possible constraints detailed in the Act 174 Energy Planning Mapping Standards for Regional and Municipal Plans (available in the Act174 tab of DHCD's Vermont Planning Atlas). State and regional constraints, as well as preferred sites, also provide a core framework for evaluating 248 projects more generally and their consistency with regional and municipal plans. Furthermore, preferred site types, preferred site parcels, and preferred project characteristics serve to explicitly provide regional and local input up front to project developers and stakeholders.

Table 14: Summary of State Known and Possible Constraints

State	
Known Constraints	Possible Constraints
• Vernal Pools (confirmed) • DEC River Corridors • FEMA (Federal Emergency Management Agency) Floodways • State-Significant Natural Communities and Rare, Threatened and Endangered Species • National Wilderness Areas • Class 1 and Class 2 Wetlands • Regionally or Locally Identified Critical Resources	• Vernal Pools (potential and probable) • (Prime) Agricultural Soils • FEMA Special Flood Hazard Areas • Protected Lands (State fee lands and private conservation lands) • Act 250 Agricultural Soil Mitigation areas • Deer Wintering Areas (DWA) • Highest Priority Interior Forest Blocks, Connectivity Blocks, Physical Landscape Blocks, Surface and Riparian Areas (ANR) • Hydric Soils • Regionally or Locally Identified Resources

See Appendix A pages 45-50 for Descriptions of State Known and Possible Constraints; Act 174 Planning Atlas for layer sources.

Table 15: Summary of Regional Possible Constraints

Regional Possible Constraints
• Elevations Above 2500 ft: excludes rooftop and associated with existing development • Slopes Greater than 25%: excludes rooftop and associated with existing development (unless presents new concerns for landslides) • 250ft Lake Shore Protection Buffers, excludes rooftop and hydroelectric facilities

See Appendix A pages 50-51 and page 42 in the Natural Resources and Working Lands Element above.

While the regional constraints are considered possible constraints; they were integrated unilaterally into all map products and layers as they did not unduly constrain the resource potential layers (see Table 16 and Table 19 which summarizes more than sufficient resource potential areas and acres needed to meet regional targets). CVRPC intends to conduct further analyses in collaboration with municipalities to refine these regional constraints and clarify local constraints for comprehensive integration as known constraints and unsuitable locations in our mapping products.

Map 13: State & Regional Energy Development Constraints

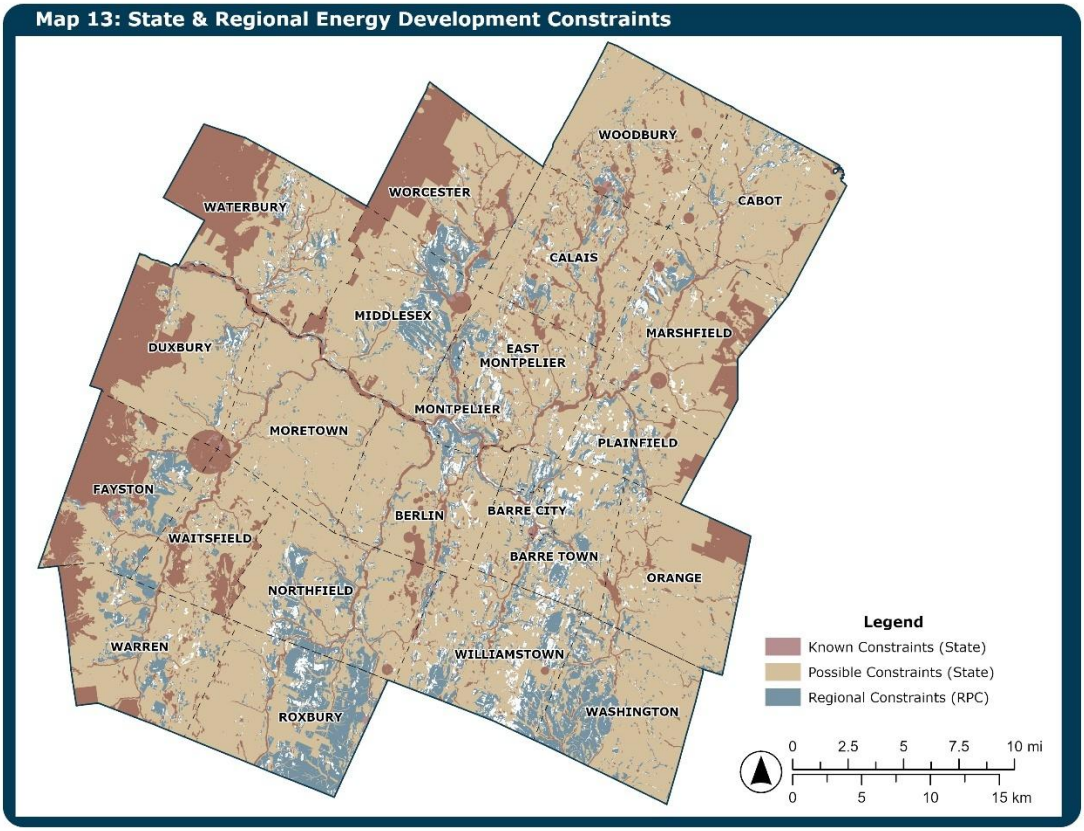


Table 16: Summary of State and Regional Constraints (Acres)

	Acres	% Region	Notes
Regional Total	520,605	100%	
State Known Constraints	86,682	Approx. **17%**	
State Possible Constraints	435,807	Approx. 84% **67%** do not overlap with existing state known constraints	Of which 84,935 acres (nearly 20%) overlap with state known constraints and 350,848 do not
Regional Constraints	372,532	Approx. 72% **12%** do not overlap with existing state constraints (known and/or possible)	Of which- 63,989 acres overlap with state known constraints (17%), 246,371 acres overlap with state possible constraints (66%), and 62,189 do not overlap with either state known or possible constraints

			(nearly 17%)(Regional constraints in map above)

Thus far regional and municipal plans have not generally identified sites to the parcel level as preferred for renewable energy generation, instead defining site types.[32] With the first round of the municipal enhanced energy plans entering their first update phase and several towns developing new plans, CVRPC is working with municipalities to best maximize the opportunity to define and map additional preferred sites to shape the form and benefits of implementation in our region. We anticipate that the additional specificity of these planning efforts to connect stakeholders will have lasting impacts on investment in and across our region and thus the reliability, resilience, affordability, and independence of our energy infrastructure. CVRPC offers technical assistance and support to all 23 municipalities in their town planning and enhanced energy planning efforts. As municipalities and communities designate preferred sites to the parcel level in municipal plans they will be integrated into the regional plan (and will not be designated at the regional level until specific in municipal plans or by a municipal legislative body e.g. in the 248 process).

Did you know?

Proposed projects between 150kW-500kW must be a preferred site to participate in net-metering.

CVRPC strongly encourages all projects, especially those above 150kW, to incorporate preferred site types and project characteristics into their planning and design.

Most Regional and Town Plans use the State Preferred Site list as their "base". The Region adopts the state's preferred site list and provides additional preferred site types and project characteristics below. These are in line with the Region's broader land use approach to reducing GHG emissions and conserving energy while investing in shared community infrastructure. Specifically, this includes encouraging smart and intentional growth; reducing dispersed development that would disrupt forest blocks, wildlife corridors, working lands and further exacerbate rural infrastructure gaps.

[32] Although several draft plans, including Worcester's, identify municipal parcels and projects.

Regional preferred sites and project characteristics also prioritize projects that would be collaborative with local communities and meet existing needs especially regarding resilience and reliability. This includes encouraging projects sited at or near critical social and physical infrastructure, paired with storage, and structured to either directly engage with a local off taker or have explicit community benefit agreements.[33] Limiting vegetation impact and encouraging projects to employ construction techniques to reduce the embodied carbon of projects are further in line with regional and state energy and conservation goals.

[33] Dual land use opportunities (agrivoltaics), educational opportunities, community solar, low income programs, component of lease payment to community revolving loan fund to support upfront costs of residential weatherization, integration of meter adaptors to add micro-grid operation options.

Table 17: State and Regional Preferred Site (Types) and Project Characteristics

State Preferred Sites	Additional Regional Preferences
• Rooftops and Impervious Surfaces (e.g. Parking Lots) • Gravel Pit, Quarry, or Similar Mineral Resource Extraction Site (Lawful and Reclaimed) • Brownfield Sites • Sanitary landfills • National Priorities List (e.g. Superfund Sites) • On same parcel or directly adjacent to customer allocated more than 50% of the net-metering system's electrical output • A site identified in municipal plan or joint letter of support from municipality and RPC (Regional Planning Commission)	• Proximity to use: density centers including designated downtowns, village centers, new town centers , growth centers, and neighborhood development areas (as previously designated under 24 V.S.A. Chapter 76A); commercial and industrial areas; adjacent to large farms • Schools, libraries, municipal building facilities, and critical community spaces, • Solar carports • Location served by existing roads and energy infrastructure (e.g. 3 phase) OR addresses existing gap • Designated a preferred site in Town Plan or by Town leadership (as consistent with broader planning)
Preferred Regional Project Characteristics	
• Minimize vegetation impact especially forest clearing and fragmentation; plant screen trees & pollinator habitats • Combined with storage; micro-grid potential or functions • Creates dual land use opportunities (e.g. agrivoltaics) • Includes design/build techniques that reduce embedded carbon of program (e.g. alternatives to concrete pylons) • Engage community in development process (early) • Local off-taker and/or community benefit agreement	

Local Siting and Regional Policy

Local (municipal) constraints, preferred sites (types and parcels), and preferred project characteristics have been established as towns have drafted and approved enhanced energy plans (or move towards doing so). While state resources have yet to capture these in their mapping products; CVRPC is working to integrate them directly into the regional plan and associated breakout municipal draft maps, analyses, and targets.

As of the writing of this plan Barre Town, Middlesex, Northfield, Plainfield, Waitsfield, and Waterbury all have had Enhanced Energy Plans approved;

East Montpelier and Moretown have plans pending regional approval; Worcester, Berlin, Calais, Marshfield, Williamstown, Orange, and Barre City have plans in progress or most components already integrated into their approved plans; while Montpelier has a distinct Net-Zero by 2030 plan.

More nuanced work is needed to balance conflicting priorities regarding cost (and to whom), land use impacts, historic and aesthetic considerations, technical conditions, and the constraints presented by our existing infrastructure gaps. Ongoing energy planning at the municipal level will help us develop a clearer sense of where preferences and potential resource areas align, as well as the potential land use impacts of different scenarios. CVRPC is committed to integrating mapping tools into both town planning processes, as well as project review (248) and the project development to support evaluations of existing and potential constraints, the identification of preferred sites (types and parcels), mapping existing preferred site types and project characteristics, etc.

A summary is provided below of local constraints, identified unsuitable locations, preferred sites, preferred project characteristics, and siting policies, across current town plans to reflect how local considerations inform and elaborate on regional siting policy. A detailed town-by-town document with live links to municipal plans will be added to the CVRPC website and updated as municipalities continue to update their plans and pursue determinations of energy compliance. With almost a quarter of the region pursing enhanced energy plans this planning cycle for the first time, and others updating their current enhanced energy plans, an updatable resource will properly amplify local plan policies that can be then included in the upcoming 2027/8 Regional Plan update. CVRPC is working with these municipalities to review their local policies to ensure there are authoritative and clear resources to support project review (local and 248) and collaborative project development. This is linked closely with updating municipal energy maps to reflect local specifications which can then be better integrated not regional and state mapping products (see page 140 down below on Municipal Energy Maps and Appendix A page 51 *Next Steps in Mapping: Preferred Site and Local Identified Resources).*

Local Constraints and Unsuitable Locations include:

- High elevations e.g. Barre City high elevation protection zones, some municipalities have lower elevation maxima than the region's 2,500ft

due to varying topography of the region e.g. 1800ft in Northfield, and 1700ft in Waitsfield; while others simply note highest elevation with limited development (e.g. Fayston).

- prohibit development in specific conservation, forest reserve, and historic districts (Fayston, Northfield, Waitsfield), active farmland (East Montpelier, Northfield, Waitsfield), bear habitat (Barre Town), and flood hazard areas and river corridors (East Montpelier, Barre City)
- prohibit development in Town Forests, parks, and recreation areas (Northfield, Worcester)

Additional local considerations, preferences, and policies:

- Repeated commitment to regional and state energy goals with an emphasis on off-setting municipal, resident, and local business needs and demand (Barre City, Worcester)
- Variation across municipalities in approach to technology types and scale (balancing potential impacts and costs of many, smaller projects, with one or two industrial-scale projects; e.g. Barre City and Montpelier take a project-by-project approach including consideration of industrial scale across all technology types, while others prohibit solar arrays above 500kW (Barre Town), or support only residential-scale use, while still others take a stepped approach with few policies for residential scale up to 25kW, some for commercial and community scale projects up to 150kW, and more stringent policies for projects above 150kW or 500kW (e.g. East Montpelier, Worcester).
    - Some municipalities have explicitly less stringent or specifically set no limitations on residential scale projects to encourage access for all residents (Worcester, Berlin), while others have more narrow conditions based either on location or project scale(e.g. Calais includes wind towns less than 50ft in height, with blades less than 20ft in diameter and not on a ridgeline, and rooftop solar or ground mount less than 10ft tall for residential use).
- Distinction between agricultural soils and co-location with farms is not always made within a given plan but agricultural soils come up as a local constraint (prime Barre City, Calais, East Montpelier, Northfield, and Waitsfield) while co-location with large farms building is a preferred site (East Montpelier) and agrivoltaics (dual-land use) can be a preferred site characteristic (Worcester).

- Earlier plans emphasized screening and reducing visual impact, more recent plans tend to emphasize mitigating vegetation, forest, and wetland impacts and co-locating with other forms of development (e.g. housing).
- Consistent support for projects proximate to, and often serving, key community spaces like schools, municipal buildings (e.g. Calais, Middlesex, Worcester).
- Clear balancing act between preference for projects to be proximate to existing infrastructure and demand and co-located with intentional growth areas (designated areas), while not taking up important "developable" footprint space served by existing or planned infrastructure (unless co-developed) and in some cases, concern regarding aesthetic impact in historical villages.

Implications for Regional Siting Policy[34]:

- **Forest Blocks and Habitat Connectors:** CVRPC recognizes the importance of protecting forested lands as a key element of the regional environment. Forests play a crucial role in sequestering carbon from the atmosphere, and the state's 2025 Climate Action Plan accordingly places significant emphasis on protecting forest blocks and habitat connectors to achieve statewide goals of greenhouse gas emissions reductions and carbon sequestration. Avoid development that fragments forest blocks and habitat connectors.
- **Development on wetlands, steep slopes of 25% or more, and ridge lines should be avoided**. Avoid or limit development and investment in identified flood hazard areas where feasible. Upgrades or repair to existing infrastructure in these locations should consider relocation or minimizing continued impact to these areas; CVRPC would support accelerated regulatory proceedings for projects which address vulnerable critical infrastructure to increase resilience and reduce ecosystem impact (e.g. moving lines from wetlands or out of special flood hazard areas and river corridors).

[34] Note these are consistent with the specific conservation and general land use policies in the previous element and throughout this plan.

- Energy infrastructure should be planned to optimize co-development opportunities (e.g. housing, sidewalks, and road work), contribute to community needs and benefits, and follow dig-once principles.
- Dual Land Use (e.g. agrivoltaics), meeting local demand and/or addressing local infrastructure gaps, and community benefits are strongly encouraged, especially for grid-tied utility-scale projects.
- Increasingly more interest in intentional islanding/microgrid capabilities, back-up power as part of host agreement (depending on location and outage frequency), and interest in on-site generation and storage integrated at the community scale in housing and housing-ready infrastructure projects (heat recovery, thermal storage, etc.).

Changes to regional priorities, as well as municipal and state priorities, are likely to impact constraints (and preferred sitting) in the future as we comprehensively reassess how to maximize meeting our goals associated with housing needs, forest and land conservation, and flood and climate resilience in addition to renewable energy development. If, through the development of a local energy plan consistent with Act 174, a municipality identifies a community supported resource and/or project, the CVRPC may revise or amend this plan to consider the location(s) that has been identified. Prior to any amendments, the CVRPC will consider and balance regional planning goals, mitigation of any identified constraints, and compatibility with the plans of adjacent municipalities in aggregate.

Table 18: CVRPC Siting Considerations and Distribution of Incremental Target by Technology Type

Technology Type	Considerations
Solar	While there is a strong preference to minimize land use impacts especially on undeveloped land, rooftop and small-scale projects do increase costs overall and hasten costly grid infrastructure investment. General building (and roof) condition and age in region also present a major barrier to the buildout of rooftop solar. Thus the distribution of the region's incremental renewable energy target has been set as 25% rooftop and 50% ground mount. This distribution also limits the number of towns who experience distribution and transmission constraints to meet their municipal share of the regional target. As the dominant source of renewable energy in our region, solar projects must be right-sized for our communities; wherever

	possible co-located (onsite generation and storage) with housing and mixed-use development to maximize community benefits and infrastructure.
Hydroelectric	While hydroelectric generation makes up a significant portion of the region's current generation (approximately 1/3), the feasibility of establishing new projects (dams, pumped, in-line, etc.) is low. There is a lack of state programming support, high up-front costs, the capital gap to maintain our existing aging infrastructure, and the administrative gap to navigate the FERC certification process. Optimization of existing generation facilities, while balancing flooding mitigation priorities and ecosystem impacts, remains a regional priority. Thus the regional target is set at only 5% of our incremental renewable energy target. Energy generation must be balanced with flood mitigation priority, minimize or remediating negative ecological impacts of infrastructure, and consider recreation.
Wind	There are a limited number of small-scale wind turbines in Central Vermont and no projects established in recent years. While some municipalities and communities have expressed interest in wind to increase the resilience and reliability of their renewable energy portfolio (wind is stronger at night and during the winter and thus a complement to solar which is plentiful in the day and summer), there are also significant concerns regarding the ecosystem and aesthetic impacts of wind projects throughout the region as well as some strong opposition. A state-wide sound ordinance limits the siting of wind projects. Furthermore, analyses of locations with the proper conditions for wind generation in Vermont do not highlight Central Vermont as an attractive potential resource area for industrial wind. The 2018 CVRPC Enhanced Energy Plan determined, and this plan maintains, that industrial-scale wind development is not compatible with the future land use patterns of Central Vermont (defined as any wind turbine with a hub height greater than 125ft excluding blades[35]).

[35] This height restriction is maintained from the 2018 CVRPC Enhanced Energy Plan and was intended to reduce the visual impact of wind generation facilities while still permitting commercial and residential land uses to incorporate wind generation as appropriate. Additionally, it was intended, in combination with the regional constraints regarding steep slopes and lands above 2,500 feet in elevation which are identified as a regional resource, to help maintain the sensitive natural resources throughout the region where industrial-scale wind resources might be identified.

	Further conversation around smaller-scale wind is warranted with those communities where significant prime and base resource potential exists, especially along the eastern portion of our region. Further, new types of wind generation (such as roofline) or additional options at the household and community-scale may prompt the region to reconsider the general preference of other technology types in the coming years. The potential to have a more diversified and reliable energy portfolio in our region is the main reason the recommended target is maintained at 20%.
Biomass	Currently no new biomass fueled energy production is proposed. We do not currently have this type of electric generation in our region; given the closure of the only plant in this category, it is assumed this is not a likely reliable source of future generation. Combustion based renewables include methane gas, anaerobic digesters, biodiesel, combined heat and power, compost heat, and woody biomass. While wood heat is a significant renewable for thermal heating (mostly residential), combustion based renewable facilities are not for electricity generation. Although, Washington Electric Cooperative receives a majority of its energy generation from the Coventry Landfill outside of our region which does serve our region. While biomass has a high level of annual output per installed megawatt, the source is important. Locally sourced biomass will have the greatest benefit to the community. To limit secondary impacts associated processing and transportation costs and energy, as well as ecological impacts of invasive species that impact woody biomass need to be considered. While CVRPC supports the use of local cord wood for space heating (especially residential), the use of biomass otherwise, especially for electricity generation is not consistent at this time with current nor future land use. If a project were to be proposed and supported by the host municipality, the board would consider a future amendment to this plan. Thus, the recommended target for generation is set at 0%.

Other	There is no natural gas infrastructure in the Central Vermont region. The establishment of new infrastructure would not be in line with current nor future orderly development within the CVRPC region. CVRPC does not consider nuclear as a renewable resource this is currently supported by the State definition of renewable energy as *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(21)A) this includes solar, wind, and hydro-power, as well as biomass, and excludes nuclear power. The establishment of new infrastructure would not be in line with current nor future orderly development within the CVRPC region.

Technology Type and Scale

CVRPC acknowledges there is a tendency for preferred sites at all scales to favor small and medium projects, while this is in line with many municipal and community preferences and many regional priorities, it requires new models for how projects may be aggregated to take advantage of economies of scale, for local and state investment, as well as increased capacity at DUs for interconnections and load demand management (which may be viewed as both an opportunity and burden). It is also important to remember that preferred site designation is required for projects 150kW-500kW to participate in net metering. While there are comparatively few projects at this scale in the Central VT region (see below, approximately 23) they do provide approximately 10% of our region’s existing generation. Not having a preferred site status does not prevent the project from being implemented, it just excludes it from the financial incentives provided via the net-metering program.

The best way for projects of this scale (and all projects but especially this scale and larger) to attain preferred site status is to reach out early and often to the town and community including local energy committees and coordinators. Furthermore, CVRPC does encourage municipalities to work with local landowners and the broader community to consider potential and parcel-specific opportunities for large projects- only 23 projects out of the region's 2,463 and counting renewable energy generation projects are 500kW and more, yet they contribute approximately 1/3 of our region's total

nameplate generation. As the state continues to electrify and move towards 25% of demand produced by in-state renewable energy generation, it is important to consider and direct where these large-scale projects may be located and how they fit into local and regional visioning of our communities. To this end, CVRPC has begun to analyze potential resource areas to identify contiguous areas that may meet basic technical requirements and facilitate community conversations around the development and use of renewable energy generation.

So where are projects being located?

Many of the projects in terms of numbers are small residential scale (many rooftop but not all)- important to consider that siting guidelines are best developed with clear references to different scales.

Total from State Energy Programs	MW	# Projects	
Generation <25kW Category I	14.69856	2233	Many are rooftop as residential scale
Generation 25kW to <150kW (Category II)	6.56739	184	Generally includes Municipal/Community Scale (not limited to)
Generation 150kW to <500kW (Category III)	6.18665	23	Currently have to be preferred sites to participate in net metering
Generation 500kW+	22.944	23	Most Standard Offer projects are 1-2.2MW
Total (not regional total):	50.3966	2463	

Noted trends in current project development:

- projects that have been co-developed by municipalities/schools are often preferred site types and are typically smaller from residential to community scale,
- projects that are developer/DU led typically are larger, many do develop at least some green field space, some are on landfills/gravel pits

CVRPC thus identifies a critical need to connect stakeholders and their planning processes:

- work with Distribution Utilities to establish annual data updates for local and regional planning processes, understand short, medium, and long term infrastructure improvement plans, and provide regional summaries for integration into integrated resource planning efforts
- encourage towns to highlight opportunities and mechanisms for project development in town plans and websites; encourage DUs and developers to consult towns and town plans early on in project development
- offer educational and workshop opportunities for municipal project development and implementation

New Regional Renewable Energy Generation Potential & Targets

Table 19 provides an overview of the potential renewable energy generation for Central Vermont based on the prime and base resource potential areas that have been identified (see mapping section in Appendix A 52-66). These resource potential areas take into account both basic technical considerations for each technology type as well as state and regional constraints and unsuitable areas (see Appendix A). Resource potential is mapped for solar and wind, as they are locationally constrained. Potential hydroelectric sites identified in prior state programs have also been included. Other renewable energy generation such as woody biomass, biogas, and other renewable technologies do not require specific conditions for the location of the generation facility, however, they do require resources such as wood or other organics to provide the needed fuel- there are no existing such plants for renewable electricity generation nor plans for them. Note that wood for electricity generation is significantly different than that for space heating; as noted in the thermal section above, wood does play an important role in, especially residential, space heating across our region.

Municipal maps will be made available on the CVRPC website- as CVRPC continues to work with municipalities to integrate local constraints, unsuitable and preferred locations into regional and municipal enhanced energy plans, approved municipal enhanced energy plans and updated local maps on the CVRPC website should be consulted in addition to this plan as they may include more up-to-date information, data, and much higher resolution at the local scale. Municipal breakouts of these resource potential maps included in this plan integrate additional layers for planning purposes that are difficult to view at this regional scale- for example, intentional growth areas, municipal parcels, road networks (although these mirror distribution networks in much of the region), etc.. CVRPC continues to advocate for the integration of regional and local mapping layers to be integrating regularly into state-wide resources, such as the Act 174 tab of the Planning Atlas online viewer, hosted by the Department of Public Service, Vermont Center for Geographic Information, and Agency of Commerce and Community Development to ensure equitable access to authoritative, and high resolution, tools for project and community planning, development, and review.

Prime resource potential areas, rooftop solar and hydroelectric potential, as well as existing generation, population, and infrastructure capacity are integrated into the Generation Scenarios Tool provided by the Department of Public Service to establish incremental regional and municipal renewable energy generation targets (see Appendix A for assumptions, methodology, and discussion including regarding Municipal Customization, pages 58-66).

The constraints outlined above have been evaluated to ensure sufficient resource area exist to meet the region's share of the state's renewable energy targets. The distribution of new generation across technology types was set based on precedent for the type in the area, technical difficulty and cost, as well as community preference (See Table 17 above). CVRPC has found community members and municipalities to be open to a diverse range of technology types, with especially scale but also project location and community benefits to be key determinants of support (see in-depth discussion Fall 2023 CVRPC SAY WATT: The Future of Vermont Electricity Report).

Table 19: Incremental Regional Targets for New Renewable Electric Energy Generation (MWh and MW)

Target Year	2025	2035	2050
New Renewable Electric Energy Generation (25% In-State) (MWh)	26, 957	97,196	163,094
New Renewable Energy Generation Target (25% In-State) (MW)	18.6	67.1	112.6

Source: Central Vermont Regional Planning Commission & Department of Public Service (via Generation Scenarios Tool, see methodology starting on page 58 of Appendix A). Municipal breakouts available in Appendix A,pages 60-64 and updated in context of municipal enhanced energy planning online.

Table 20: New Regional Renewable Energy Generation Potential & Targets- Land Use Context

	Multiplier (distribution across technology	Incremental Regional Capacity Target (MW) 25% In- State	**Acres needed to meet 2050 Target**	Possible Resource Available* (MW)	Land (Acres) Identified with Resource Potential

	type) see Table 17	2025	2035	2050			
Ground Mount Solar	50%	10.3	37	62.4	**437 4% of prime solar; 0.08% of total region**	1500	10,503 (Prime) 49,744 (Base)
Rooftop Solar	25%	5.3	19.1	31.9	**48 Approx. 20% of available resource**	163	244
Wind	20%	2.7	9.9	16.4	**656** ** **2% of prime wind; 0.13% of total region**	867	34,705 (Prime) 116,893 (Base)
Hydroelectric	5%	0.3	1.1	1.9	**N/A**	1.9	N/A
Biomass (Wood, methane, farm biogas)	0%	0	0	0	**0**	0	0
Total	100%	**18.6**	**67.1**	**112.6**	**1,141 Acres 0.22% total region**	2532.7 MW	45,452 Acres (Prime)

**Resource available is based on prime resource areas from mapping analyses, rooftop solar is also based on mapping analyses, hydroelectric is sourced from previous statewide analyses of undeveloped hydroelectric sites (see Appendix A for more).*

***Acres needed for wind target assumes constant for wind (not large wind) so uses 40 acres/MW instead of 10 acres/MW based on regional and municipal project scale preferences.*

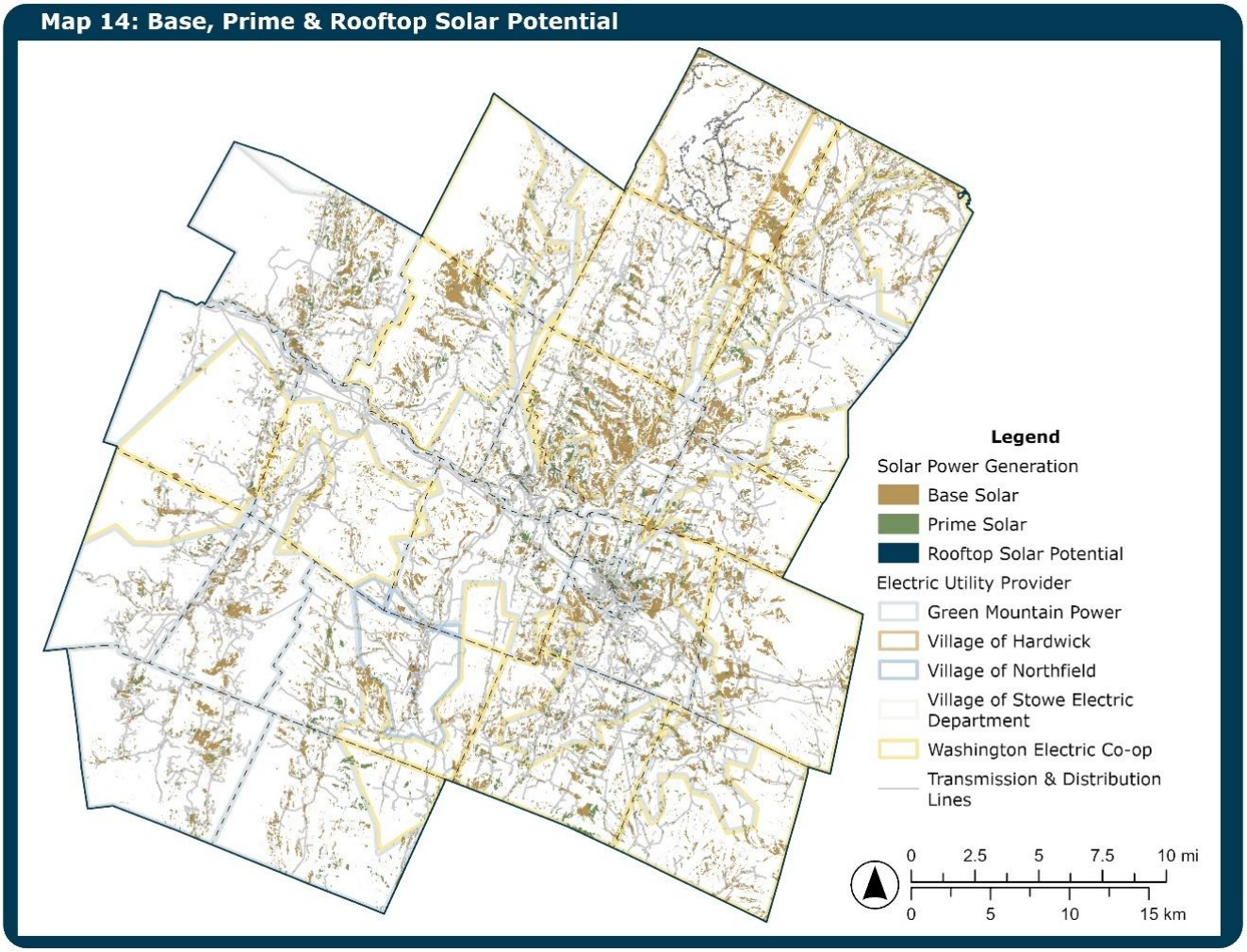
Central Vermont has more than sufficient potential renewable energy resources available, even with a conservative estimation, to meet 25% of the demand met by in-state renewable generation. This includes sufficient resources available for each technology type for most municipalities. For town-specific distribution and transmission capacity limitations see Table X in Appendix A page 61-63.

Potential Resource Areas: (see also Appendix A pages 52-58)

Map 14 shows solar potential resources areas: base solar includes no state

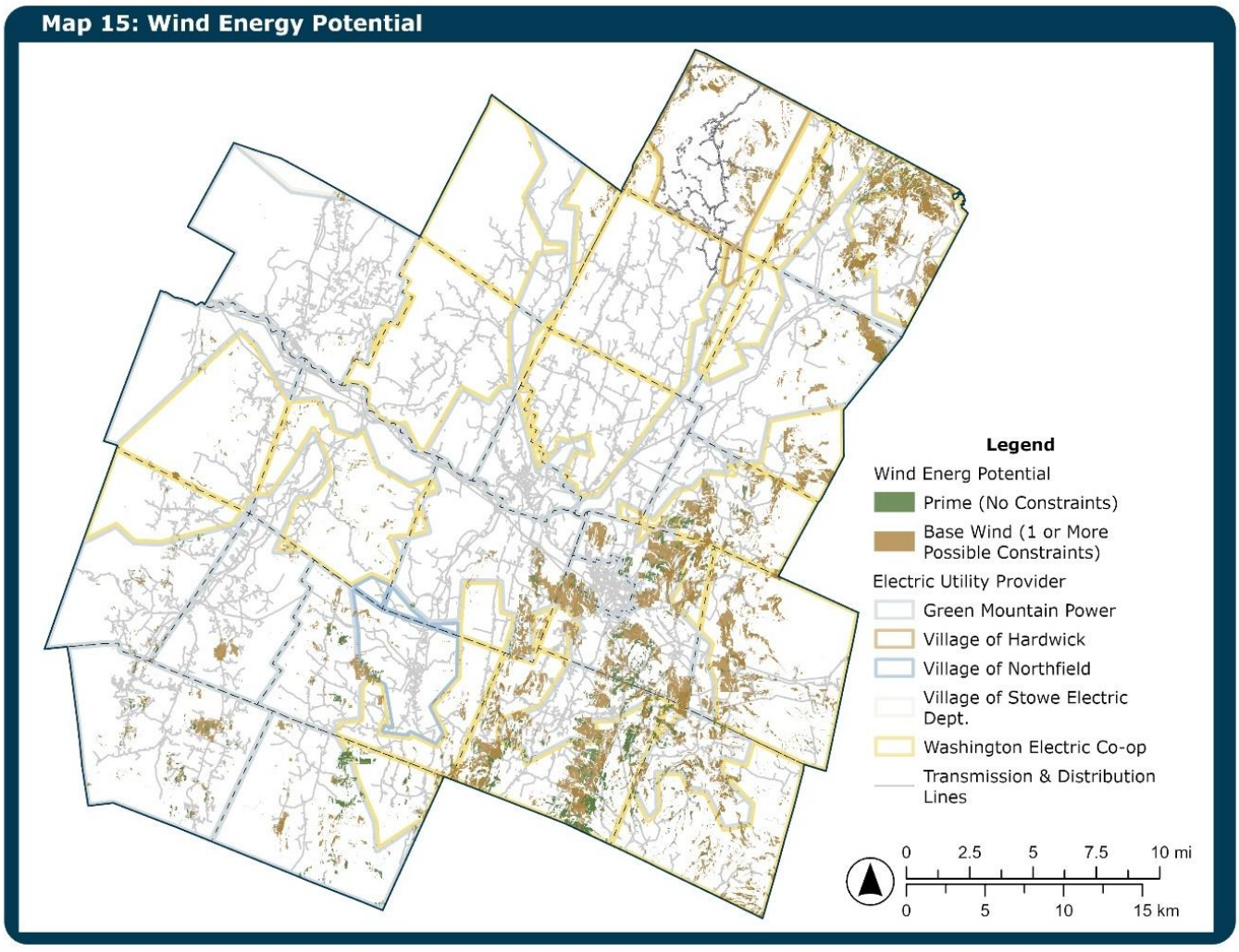
known constraints nor regional constraints but has one or more state possible constraints; prime solar includes no state known or possible constraints and no regional constraints. Rooftop potential can be viewed in the Act 174 tab of the Department of Housing and Community Development Planning Atlas and a webinar walking through recommended ways to use this public mapping resource for energy planning and solar project development is available on the Webinar and Workshops page on the CVRPC website. When looking at the regional scale the rooftop potential is not visible in this static map but are present; CVRPC highlights rooftop potential further when working with municipalities on enhanced energy plans and supporting project development by including insets of intentional growth areas and municipal parcels to support discussions of potential municipal project development and/or partnership with proximate assets.

Map 14: Base, Prime & Rooftop Solar Potential



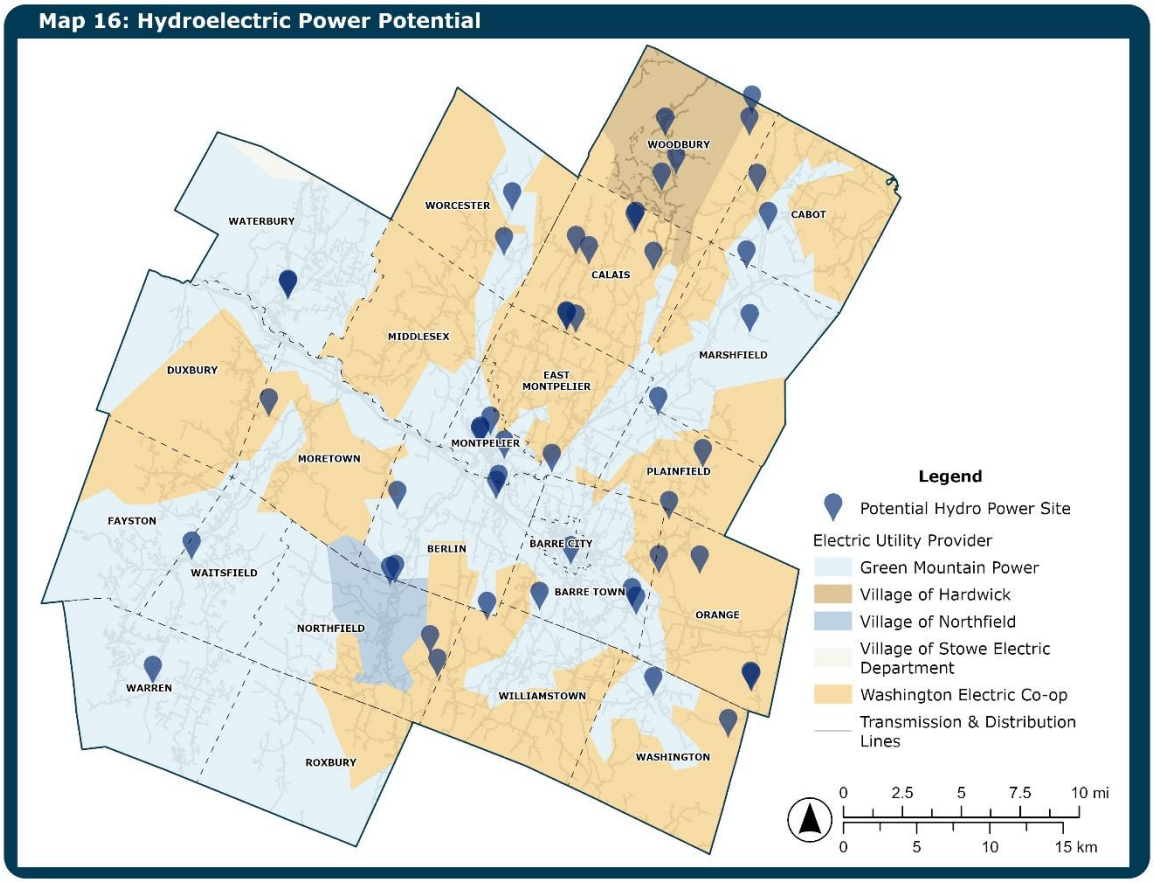
Map 15 identifies wind resource potential areas. Again, these resource potential areas are based on state wide technical analyses associated with the 2022 Comprehensive Energy Plan for each technology type, from which constraints where then removed. Base Wind excludes state known constraints and regional constraints but has one or more state possible constraints, while prime wind excludes all state known and possible constraints and regional constraints. As noted above in Table 17 *CVRPC Siting Considerations and Distribution of Incremental Target by Technology Type*, and evident in the regional map below, there are not significant prime wind resource potential areas in Central Vermon and base wind potential resource areas are predominantly along the eastern portion of the region. See siting policy discussion above, and appendix A for summary of municipal plan policies.

Map 15: Wind Energy Potential



Map 16 identifies potential hydroelectric generation sites based on statewide analyses on undeveloped hydroelectric potential from[36].

Map 16: Hydroelectric Power Potential



[36] https://publicservice.vermont.gov/renewables/resources https://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/Resources/Hydro/DPS-Undeveloped-Hydro-Potential-FINAL-VERSION.pdf

Grid Capacity and Infrastructure Needs

The following section summarizes some of the primary known issues our electricity infrastructure presents in terms of existing and new renewable generation (and electrification).

Some Central Vermont communities have extremely limited or no three-phase power but do have prime resource areas to support renewable energy development. While, as previously noted, smaller generation projects (including residential and some municipal and small businesses) can typically be accommodated by single transmission even when not located close to load, medium and larger scale projects rely on three-phase power.

Staff are working with the Public Service Department to update the Generations Scenario Tool to ensure the 2024 and upcoming 2027 Long Range Transmission Plan (LRTP) updates are integrated into these analyses. It is important to note that based on the 2024 LRTP, Central Vermont is constrained in meeting our incremental renewable energy target by transmission capacity, or *headroom*, according to the solar-optimization scenarios previously run. In future updates, this is anticipated to improve. In the most constrained scenario of the 2021 LRTP, as captured in the Generations Scenario Tool, Central Vermont's transmission capacity was limited to approximately 41.5 MW with transmission grid upgrade costs estimated at $40.1 million (see Appendix A). The 2024 update increased this

Resilience and Reliability

The State's "Electrify Everything" approach does raise specific concerns for some of our municipalities and communities given these interconnection limitations, rural infrastructure gaps, and annual longer-term outages.

CVRPC continues to advocate for wider scale policies and programs to address reliability and local resilience (the most recent Renewable Energy Standard Update included a series of technical analyses, none of the scenarios modeled yielded significant reliability benefits). CVRPC also supports municipalities, affordable housing partners, community groups, and businesses to consider integrating on-site energy generation, storage, and back-up power into their capital

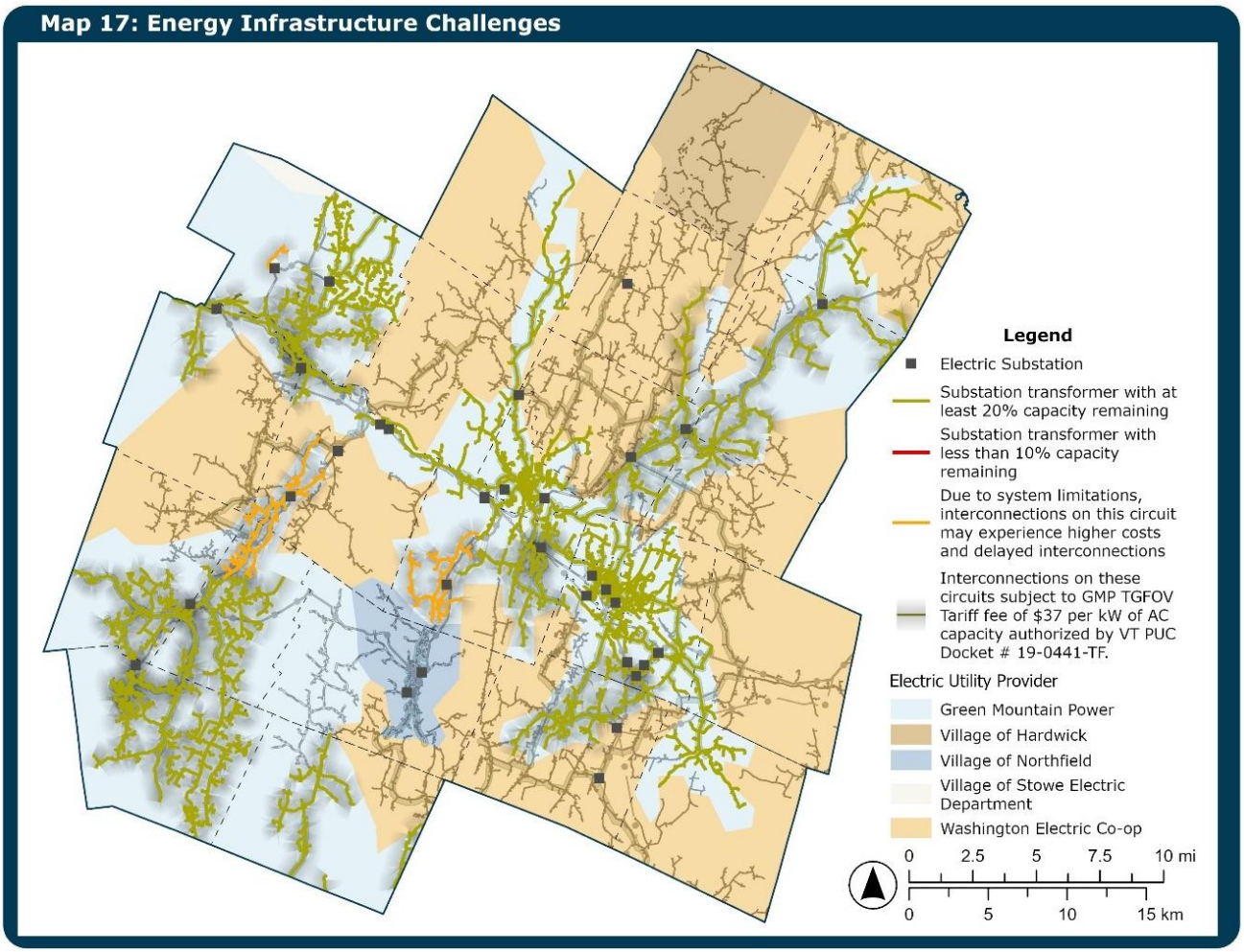
to over 65MW and in the 2027 update in progress initial analysis improves this scenario further. Again, there are significant and rapidly evolving opportunities to mitigate some, but certainly not all, of these upgrades and costs. While CVRPC conducts further analyses to help municipalities understand how these limitations may impact their energy planning, the region also recognizes that significant investment in our energy infrastructure is required to support thriving communities in our region and these costs should not be borne by those who are already most burdened by infrastructure challenges which furthermore limit their access to draw down federal and state funds to participate in a just transition. CVRPC again emphasizes the importance of integrating energy into land use planning and working with energy stakeholders to ensure that energy planning not only is consistent with local regulations and visioning but also accounts for targeted growth and likely demand. Further engagement with VELCO's Long Range Transmission planning process, our Distribution Utilities' integrated resource planning processes, and the State's energy planning will strengthen these efforts at all scales. The Department of Public Service highlights this, including the role of RPCs, in the 2022 Vermont Comprehensive Energy Plan (page 87).

While regionally, Central Vermont has more than double the distribution headroom (267.5MW) required to meet our 2050 incremental renewable energy generation target, this is not evenly accessible throughout our region (see Tables XX in Appendix A, pages 61-63). Notably, Cabot, Calais, Orange, Plainfield, Washington, and Williamstown may be unable to meet their share of the 2050 targets, requiring infrastructure investment, offset by other towns, and/or increased emphasis on reducing future electricity demand growth. The Generation Scenario Tool estimates another $3million of Distribution upgrade costs to address these shortfalls although this is likely an underestimate as distribution headroom data is not provided for Northfield, Roxbury, nor Woodbury. Both the transmission and distribution upgrade cost estimates to meet the demands of a network of dispersed energy generation are coarse. This number will be updated with the new LRTP and IRPs, but it provides a magnitude of the level of investment needed that need to be kept in mind when we talk about the mix of technologies used to meet our renewable energy production goals.

It should be noted that these analyses do not take into account storage, flexible load management programs, and offsetting electric

demand from the thermal sector via cordwood, waste heat recovery, and geothermal which are all key pieces of Central Vermont's approach to the energy transition. These would reduce the incremental energy targets required and total new renewable energy generation capacity needed (and associated costs) which further emphasizes CVRPC's confidence that as a region we can not only achieve but comfortably exceed our goals.

Map 17: Energy Infrastructure Challenges



Note this data is only available for Green Mountain Power at this time.

Several substations presently pose significant barriers to expanding renewable generation in our region (summary below). For the substations in GMP territory, substation transformer capacity can be viewed on their Solar

Interconnection Map[37] which highlights circuits based on having at least 20%, less than 20%, less than 10%, or severe limitations (higher costs and delayed interconnections) (although two GMP feeders that serve Roxbury, Northfield, and Woodbury are blank due to lack of data from municipal utilities). For other distribution utilities, it is harder to plan in real time based on potential technical limitations due to the lack of publicly available data. Our region has approximately 267.5MW of Distribution Headroom according to data supplied by the Department of Public Service in the Generations Scenario Tool which is well above our Capacity Target for 25% in state generation. While this headroom is ample at a regional glance, there are issues at the municipal scale including, as noted above, that Calais, Orange, Plainfield, Washington, and Williamstown have capacity targets that exceed their distribution headroom. These town's capacity targets exceed provided distribution headroom by less than 1MW in 3 cases (Calais, Orange, and Plainfield), by 1MW in Washington, and by 4.2MW in Williamstown which hosts 2 of the region's largest solar arrays (utility-owned). Depending on the size of the proposed projects, these may or may not present significant interconnection barriers but are representative of the longer-term challenges we face in implementing our energy goals. Distribution headroom is not provided for Northfield, Roxbury, and Woodbury. CVRPC continues to work with DUs on data gaps and to integrate their Integrated Resource Planning into regional and municipal planning and project development and to advocate that regional and municipal energy planning and goals in turn are considered in their Integrated Resource Planning Processes. Key issues included:

- Many substations across our region, regardless of utility territory, must be upgraded to address transmission ground-fault overvoltage (TGFOV) concerns (see figure below), these are subject to an additional Tariff fee of $47 per kW of AC capacity authorized by VT PUC Docket #19-0441-TF.
- Two such systems in WEC (Washington Electric Coop) territory have issues that are so severe that they are currently objecting to any further interconnection and the risk that it could adversely affect system stability and reliability. This severely impacts the portions of Barre Town, Berlin, Northfield, Orange, Roxbury, Washington, and

[37] https://www.arcgis.com/apps/webappviewer/index.html?id=4eaec2b58c4c4820b24c408a95ee8956

Williamstown that are in WEC territory. Existing substation voltage regulators and transformers have to be upsized which in turn requires support structure adjustments. At the time of writing, an RFP had just been posted for projects to upgrade these substations.

- Summer loading in the Woodbury Lakes area creates a sizeable circuit imbalance and an imbalance on the Hardwick Substation transformer for several months of the year, converting from a V-phase to a full three-phase feeder along with additional reliability improvements is included in Hardwick Electrics 2021 Integrated Resource Plan.

In the short term, costs of additional renewable energy infrastructure will be lowest in areas that do not have TGFOV tariff fees and with substation transformers that have at least 20% capacity remaining (although the tariff fees are a key mechanism for paying for necessary updates to DU infrastructure). In the long term, some of these infrastructure upgrades are necessary and inevitable; again, better coordination among planning efforts can help our region transition and make sure no one is unduly burdened by cost or left out.

Changes in Technology

Storage is a key and rapidly changing area for future planning.[38] At the grid scale, most storage is generally currently 3-6hours of very big amounts of energy, while critical to keep continue power supply at the transmission and distribution scales, these don't address many of the reliability and resilience, not to mention seasonal, challenges we face in Central Vermont. Diversified and complimentary generation sources- for example, solar with daytime and summer peaks paired with wind with night and winter peaks- are one component of planning for seasonality and reliability and important to keep in mind when thinking about the types of infrastructure to plan for. Distributed storage, smaller scale typically chemical storage (battery) tied to renewable generation is currently the dominant approach in our region. DUs are integrating grid-tied storage systems at the customer scale; ensuring that this approach allows for the provision of backup power in outage events

[38] The Vermont Public Utility Commission had an excellent series of Energy Storage Systems Workshops in late Fall 2023, for an excellent introduction to energy storage technologies, the role of energy storage in transforming the grid, storage policy at the state and federal level, interconnection, and more access them at https://energy.sandia.gov/programs/energy-storage/policy-and-outreach/regulatory-webinars/vermont-public-utility-commission-energy-storage-systems-workshops/.

for those with on-site generation is a keyway that Central Vermont can enhance resilience in our region and ensure every community can meet critical needs and operations.

As noted previously, the state's comprehensive energy plan and subsequently the Central Vermont Regional Energy Plan are both written with electricity as the primary power source. As technologies change and advancements are made in both efficiency and sources of renewable energy generation, the region's municipalities will need to be flexible and adaptable to these changes.

With this in mind, the Central Vermont Regional Energy Plan acknowledges and recommends consideration for changes in technology that do not limit renewable energy development to known sources. This concept will need to be continually revisited to ensure current technologies are considered and outdated technologies are not recommended. Examples of CVRPC's commitment to working on solutions that fit well for different communities in our region include our emphasis on exploring the role waste heat recovery and geothermal can play in energy conservation and reducing thermal electric demand, continued emphasis on cordwood and efficient wood stoves over pellet and wood chips as key accessible and affordable sources of residential heat, and a fierce determination to emphasize the need for local reliability and resilience considerations at the broader scale of state and NE regional energy planning.

CVRPC is committed to helping municipalities explore fossil fuel-free alternatives for back-up power which can leverage funding to meet a common municipal demand that lacks existing funding. Technologies including bi-directional EV chargers, power storage, mobile solar generators, and Meter-Socket Adapters can be integrated into existing and new energy systems across our region at all scales to transform our region into one dotted with micro-grid capabilities. This is key as we face increasingly extreme weather and storm events, resulting in many of our communities experiencing outages of longer duration (up to 8 days) annually (See Climate Chapter for the role of on-site generation and storage in municipal buildings and facilities and Community Resilience Hubs).

Lastly, CVRPC's next plan update will include a discussion of large-load interconnection and the potential impacts to the region- a fast evolving space with significant infrastructure and land use implications.

Energy Goals and Strategies

Conservation and Efficiency

Goal 1: Increase conservation of energy by individuals, organizations, and municipalities. Reducing the amount of energy needed to support existing and future systems is critical to reducing GHG emissions, operations costs, and energy burdens, while optimizing the use of renewable generation and storage.

Strategies

a) Connect municipalities, including residents, businesses, and other interested parties, with organizations, state programs (including Weatherization Assistance Program), incentives/rebates (Energy Efficiency Utility and Distribution Utilities), and best practices in weatherization, HVAC, efficient design, appliances, lighting, decarbonization, etc.

- Programs and opportunities included in CVRPC weekly newsletters, and quarterly digests.
- Updated materials in town buildings.
- Collaborates with partners to increase regional participation and facilitates training and information sessions for municipalities and local energy champions.
- Support drawdown of IRA and other federal monies
- Maximize participation in income-based programs

(Partners Efficiency Vermont, Distribution Utilities, Capstone Community Action, VEEP (Vermont Energy Education Program), BGS (Buildings and General Services) (Buildings and General Services), PSD (Public Service Department), VLCT, VCLN, VCRD (Vermont Council on Rural Development))

b) Coordinate and support municipal residential weatherization campaigns, including WindowDressers Community Builds, Button Up!, and the establishment of revolving loan funds to cover up-front costs for residents, etc.

- streamline outreach and recruitment
- connect municipalities and communities to existing resources and partners
- maximize incentive and rebate use; federal funding drawdown
- establish town: town leadership development for program expansion
- connect to stable funding sources

(Partners include WindowDressers, Efficiency Vermont, Capstone Community Action, ReSOURCE)

c) Support existing, and the development of, municipal energy committees and coordinators to establish and implement municipal energy goals.

d) Provide technical assistance to municipalities and encourage municipal bylaws that promote energy conservation and the development of renewable energy resources

e) Support State, utility, and other energy and conservation program development to facilitate weatherization, fuel, switching, and increased energy savings and comfort within Central Vermont housing and other buildings stock

- Advocate for models that are most accessible for underserved residents especially low-income households, those on fixed incomes, and renters- that cover up front costs, minimal eligibility requirements and administration, and can meet acute needs (at point of failure)
- Promote program commitments for allocating program funds and benefits based on energy equity metrics

f) Develop a summary of needs and measures across municipal buildings and facilities via the Municipal Energy Resilience Grant Program assessment reports:

- Establish municipal energy use baselines
- Model project development and developing funding stacks
- Support implementation

Goal 2: Promote climate-ready, resiliency, and energy efficiency in the design, construction, renovation, operation, and retrofitting of systems for buildings and structures.

Strategies

Energy efficient building designs provide benefits to the owners and occupants by reducing the amount of energy needed to heat, cool, and maintain the mechanical systems within the building. Establishing and promoting energy efficiency in design, construction, retrofits, and renovations will ensure new buildings and building practices will be more efficient into the future. These efficiencies can also lead to conservation

of energy which can promote cost savings and affordability for owners and renters.

a) Promote Vermont's Residential and Commercial Energy Building Standers (RBES/CBES) for new construction and existing building additions, alternations, renovations, repairs, and retrofits.

- provide education and support to interested municipalities to adopt stretch code, hire code officials, and/or host educational training
- support regular state code updates and update necessary materials/trainings/best practices to newest adopted standards
- Host and facilitate building science/standards training and education opportunities for local officials, zoning administrators, and relevant workforce development groups to promote the distribution of code information to permit applications and ensure code compliance.
- Promote benchmarking for commercial buildings.

b) Work with municipalities to develop local energy codes, education programs, and/or promoting energy efficient site design, "net-zero ready" best practices (e.g., solar/EVSE ready), and renewable energy generation and energy storage use in new construction projects that require an Act 250 permit (or writ large).

- Review local zoning bylaws and offer technical assistance to development review boards when evaluating the energy, climate, and health implications of site plans for proposed developments.
- Work with housing and energy efficiency organizations to promote and improve the regional supply of affordable, high efficiency manufactured housing, such as Zero Energy Modular homes.
- promote the use of landscaping for energy efficiency
- promote the use of incentives (e.g., density bonuses) to developments located in identified growth areas that exceed stretch code

c) Support municipal building and facilities to establish energy use baseline and tracking, identify energy efficiency, fuel switching, EVSE, renewable energy & storage, and resiliency measures, and support implementation

d) Support the identification of waste heat recovery opportunities, thermal resources, and the siting of infill development in proximity to maximize capture and use to reduce electricity load from electrification of heating

sector. Encourage and provide technical assistance to community-shared energy infrastructure such as Thermal Energy Networks.

- Wastewater systems
- Grocery Stores, Ice Rinks, IT centers, food, and drink production/processing, etc.

e) Work with community organizations or existing businesses to identify available information regarding the use of landscaping for energy efficiency including the importance of tree canopies, pervious surfaces, and similar design practices.

Goal 3: Identify ways to decrease the use of fossil fuels for heating.

Strategies

a) Decrease fossil fuel heating and increase affordable electrification by working with Energy Committees and other Central Vermont Energy Network partners to raise awareness among homeowners, renters, landlords, developers, etc. on the benefits of fossil-fuel-free technology such as cold-climate heat pumps, advanced wood heating and geothermal systems. Examples include thermal-led combined heat and power (CHP), biomass district heating and biogas generation (capturing the methane produced by landfills or farms and using it instead of fossil fuels).

b) Support upgrade and trade-out programs and incentives for retiring outdated, higher-emission, polluting wood burning stoves and boilers.

c) Identify potential locations throughout the region that could benefit from district heating projects based on building density, proximity to resources such as biomass, or status as a use by right where applicable.

d) Work with interested municipalities to evaluate and amend, as necessary, local regulations to ensure district heating or similar centralized renewable generation facilities such as biogas or bio-digesters are permitted in appropriate locations.

e) Identify sources of renewable materials such as biomass, farm waste, or food waste (such as schools, restaurants, or food processors) to determine supply of alternative fuels that may be available for district heating or other heating alternatives for homes or businesses.

f) Work with state agencies to identify and inventory known sources and supplies of woody biomass that do not contribute to the spread of Federal or state identified invasive species, nor conflict with conservation and climate resilience goals, and make this information available to the public as appropriate.

g) Identify opportunities to integrate energy storage technologies such as batteries into capital planning projects to support micro-grid systems and diversify emergency back-up power resources.

Provide opportunities for community education and engagement around the role of renewable energy generation and storage in emergency management (recovery & response) as well as the costs, benefits, and challenges associated with these technologies.

h) Due to the rural nature of Central Vermont, identify and map large farm operations that may provide a sustained source of materials that could be used for bio-digesters.

i) Develop regional GHG emissions inventory.

Reducing Transportation Energy Demand and GHG Emissions

Goal 4: Promote the shift away from single-occupancy vehicle trips to reduce congestion, impacts to local facilities, and support alternative options for transportation needs.

Strategies

a) Promote Transportation Demand Management (TDM) and Ridesharing Programs:

- Promote and support the Go!Vermont program that links travelers to a variety of transportation resources and mobility options
- Develop recommended criteria for supporting public and ridesharing infrastructure integrating health equity recommendations such as curb cuts, cross walks, raised and sheltered bus stops/benches, accessible transit stop sitting, etc.
- Identify key gaps in accessibility of existing public transit infrastructure
- Work with regional partners such as VTrans to ensure inventories of park & ride locations and conditions are up-to-date and are consistent with the State Park & Ride Plan. This may include occupancy studies or

user surveys to assess specific needs
- Identify Park & Ride facilities that are near or over capacity to ensure future planning will accommodate expansions, upgrades, modifications, or alternative locations are identified as appropriate
- Support employer programs to encourage telecommuting, carpooling, vanpooling, walking, and biking for employee commute trips (including flexible work hours, remote work options, discounted transit fair, health bonuses, etc.)

Work with utility companies and municipalities to inventory and map infrastructure to identify gaps that may prohibit information accessibility or telecommuting options

b) Follow the 2023 Vermont Transportation Equity Framework to help decision makers plan for and prioritize projects, ensure accurate representation in decision making, and enhance the equitable delivery of services.

c) Support regional infrastructure projects that provide commute alternatives including rail, multi-town greenways/paths, etc. Ensure continued support for inter-municipal and inter-regional public transit.

Work with municipalities to evaluate and determine the feasibility of intermodal transit facilities in appropriate regional locations that can be supported by infrastructure, population, and resources.

d) Work with VTrans and Green Mountain Transit to identify future growth areas or development centers to ensure public transit will be accommodated in these locations including access to park & ride locations when appropriate.

e) Work with public transit providers and other partners to identify underserved communities including unhoused community members, rural areas, low-income neighborhoods, night shift work sites, etc. to identify transit opportunities in these locations (and connected to critical services).

f) Assist municipalities, regional partners, state agencies, and development community to identify incentives that encourage the inclusion of public transit in land development plans such as reduction in parking requirements, reduced local permit fees, or the like.

g) Develop clear policy to require large scale developments to consult transit providers regarding the need to include transit, multi-modal, and EVSE infrastructure within development proposals.

h) Work with regional partners and municipalities to establish a comprehensive transportation plan that incorporates policies and implementation regarding the expansion of public transit that considers locations of park & ride facilities; public facilities such as schools, libraries, health services, wrap around services (shelters, food banks/pantries, addiction recovery services) and government buildings; or other activity centers and uses throughout the Region and identifies possible funding sources to support implementation and the Region's future land use planning efforts.

i) Provide technical assistance to transit providers as appropriate regarding and use, infrastructure, and future planning considerations to help plan for service needs.

Goal 5: Promote the shift away from gas/diesel vehicles to electric or non-fossil fuel transportation options to reduce dependency on non-renewable fuel sources for transportation.

Strategies

a) Work with municipalities to ensure land use regulations do not prohibit the installation of electric vehicle supply equipment (EVSE, aka charging stations) or similar alternative fuel technologies (such as biodiesel) and identify model language that can be considered by municipalities to support these uses.

b) Promote EVSE ready building practices and retrofits (electrical panel needs); promote the use of EV Meter Socket Adapters to mitigate common obstacles to adoption and enable bidirectional EVSE for charging, vehicle to grid configurations, connection to solar and stationary storage, etc.

c) Consult with Vermont Energy Investment Corporation's Drive Electric program and other regional/state partners including VTrans, Vermont Clean Cities Coalition, and EmPower to coordinate multi-scale funding, program development, and implementation and stay up to date on current technology trends and opportunities to provide guidance to municipalities.

- Disseminate Drive Electric fleet electrification resources, funding, and technical assistance opportunities; participate in quarterly stakeholder meetings
- Conduct outreach and provide technical assistance to municipalities to participate in State EVSE and fleet electrification programs (via

support to ACCD and DHCD (Department of Housing & Community Development), VTrans, and Drive Electric)
- Promote EPA (Environmental Protection Agency) Clean School Bus Program with schools and municipal champions; provide technical assistance around bi-directional options which can be integrated into back-up and emergency power plans

Support and expand the use of electric powered buses and vans among the public and private transportation providers serving the region

d) Identify businesses and municipalities in the region that operate large fleets of vehicles to provide assistance evaluating the possibility of integrating electric, low-emissions, and/or alternative fuel vehicles into their fleet

e) Provide training to local zoning and development review boards to consider infrastructure for alternative transportation in their review of site plans.

f) Support and encourage municipalities and businesses to install EV charging stations at convenient and desirable locations, such as in front of restaurants, stores, tourist and recreational destinations, and community sites like Town Halls and libraries, where users would want to park for several hours. Explore and pursue incentives to defray the cost of installation and administration so that users pay only for electricity.

- promote the integration of EVSE with solar generation including but not limited to solar carports

g) Support municipal transportation asset sharing and procurement:

- develop equipment and culvert inventories
- develop study and plan for regional sand/gravel resources to reduce costs and vehicle miles traveled especially in high demand conditions (mud season, disaster recovery, etc.)

h) Support DriveElectric and VTrans to maintain inventory of existing EVSE, condition, and recruit potential site hosts; identify infrastructure gaps and facilitate region-wide access for EV operators

- develop template criteria for EVSE location prioritization to improve access and equity

i) Support and expand access to fluid biofuels for use in commercial vehicles and heavy equipment in addition to electrification

j) Consider regulations that would EVSE to be included in large scale developments as appropriate

Goal 6: Facilitate the development of walking, biking, and rolling infrastructure to provide alternative and multi-modal transportation options for communities and to promote interconnection within the region's transit systems.

Walking, biking, and rolling provide critical alternatives to motorized vehicle travel. Ensuring a safe, efficient, and convenient infrastructure exists to promote walking/biking/rolling is essential to the future growth and sustainability of the Region's municipalities. Furthermore, in addition to decreases in fossil fuel use and GHG emissions, there are substantial co-benefits to this infrastructure related to public health, accessibility, and emergency management.

Strategies

a) Provide technical and grant writing assistance to municipalities who plan for multi-modal transportation and better connectivity with alternative transportation modes. Prioritize implementing the strategies and priorities identified in the Vermont Health Equity Planning Toolkit that are relevant to the region.

- develop project prioritization criteria that integrate health equity considerations

b) Working with municipalities to update municipal road standards (for maintenance and new construction) to reflect Complete Streets principles.

- evaluate local regulations and recommend changes as needed to come in line complete streets legislation (19 V.S.A §309d) (done?)
- provide regular updates and training to municipalities
- review state transportation projects to ensure Complete Streets are implemented

c) Develop model regulations to be evaluated by municipalities that require walk/bike/roll infrastructure in downtowns, village centers, growth areas, or locations that propose high density development patterns

- Ensure that site plans include adequate bike and pedestrian infrastructure and safety measures, through participation in the Act

250 hearing process.

d) Work with municipalities and regional partners to developing a walk/bike/roll master plan:

- conduct gap analyses and high priority projects that connect residents with diverse needs to food assets, schools, public transit, libraries, etc.
- identifies implementation strategies and matching funding stacks
- coordinate with and integrate existing community-supporting organizations and non-profits; center underserved communities in decision making, prioritization, and planning

(Key partners include Capstone, Central Vermont Mobility Committee; Center for Independent Living, PrideRidesVT, FreeRide, LocalMotion, GMT, etc.)

e) Evaluate land use patterns to ensure walk/bike/roll connection feasibility between key land uses such as schools, parks/greenways, commercial areas, and neighborhoods.

f) Work with cycling advocacy groups such as Local Motion, FreeRide, and PrideRidesVT, by hosting safe on-road cycling workshops and raising awareness about the viability of micro-mobility (such as electric bikes and scooters).

Development and Siting of Renewable Energy Resources

Goal 7: Evaluate generation from existing renewable energy generation by municipality including the identification of constraints, resource areas, and existing infrastructure by energy type.

Identifying and mapping existing renewable energy generation facilities throughout the region will provide a baseline to determine the generation that currently exists. This information can provide a better understanding for where developments are currently being established and can help prioritize assistance that may be needed at the municipal level. Additionally, mapping existing constraints will provide municipalities with a better understanding of resources that are available within their community.

Strategies

a) Provide regular updates to municipalities regarding existing generation

facilities to maintain an up-to-date inventory of locations.

b) Provide regular mapping updates to municipalities regarding known and possible constraints to ensure consistency with state guidelines on renewable energy siting.

c) Update regional maps to reflect changes at the municipal level regarding preferred or unsuitable locations for renewable energy generation.

d) Work with state agencies to map locations of woody biomass to evaluate cord wood acquisition for residential heating and ensure it is in line with conservation and forest corridor priorities

Goal 8: Evaluate generation from potential renewable energy generation by municipality including the identification of preferred sites, constraints, resource areas, and existing infrastructure by energy type.

Identifying and mapping potential renewable energy generation throughout the region will provide municipalities with information regarding available land area where renewable energy generation could be located. This information can be used to help municipalities prioritize and evaluate where future renewable generation could or should occur based on municipal land use policies and constraints to meet their own, regional, and state needs and goals (as well as where it would conflict with their town planning).

Strategies

a) Evaluate known, possible, and regionally identified constraints to ensure up-to-date information is available for future planning purposes.

b) Update information on utility infrastructure including existing and proposed distribution and transmission facilities to ensure accurate data exists.

c) Evaluate and update preferred and unsuitable locations for future renewable energy generation siting as needed based on state, regional, and municipal policies and plans.

d) Update generation potential based on future land developments, changes to land uses, or updates to priority areas as identified by state, regional, or municipal actions.

e) Work with municipalities, as requested, to evaluate and prioritize future

renewable energy generation technologies and locations to best suit municipal needs and policies. This includes providing support to municipalities in the section 248 process such as project review, process education and assistance, and developing Enhanced Energy Plans and siting policies.

5. TRANSPORTATION ELEMENT

The Central Vermont transportation system provides access to jobs, homes, recreation, commerce, and entertainment, with links to regional, statewide, national, and international networks and destinations. There is little in the daily lives of Central Vermonters that is not reliant on some form of transportation. The collection of highways, streets, trails, sidewalks, and bus routes that make up the regional transportation system structures enables the rhythms of daily life. Additionally, our region is globally connected via Knapp State Airport (MPV) locally, Burlington International (BTV) in neighboring Chittenden County, two Amtrak stations, and an active freight rail line with a spur serving Barre.

The Central Vermont transportation system largely functions as intended, though with room for improvement in multiple areas, as detailed below. For example, the Region generally experiences low traffic congestion, but commuters tend to drive long distances in single-occupancy vehicles and many residents do not feel safe using active modes of transportation on existing roads. The low density, high dispersion development pattern that predominates in the region also leads to limited transit service with low ridership and automobile dependency with its attendant impacts on climate, air, water, land, and wildlife. This plan discusses existing and proposed initiatives to improve on these shortcomings, along with considerations of funding and implementation.

Maintaining the parts of the transportation system that function well has always been expensive and complex, and climate change is projected to worsen those challenges. Much of the Region’s critical transportation infrastructure is already vulnerable to flooding and will become more so as flood frequency and severity increase. Increased road repairs, interruptions to commuting and freight, and isolation of rural communities are some ways that climate change’s effects on transportation will impact Central Vermonters – especially the Region’s frontline communities. Where possible, federal, state, and local agencies should invest upfront in transportation resilience to save money later and help ensure the continued function of the transportation system that we all rely on.

Discussion: Trends

Driving alone to work is the dominant mode choice for Central Vermont workers and will likely continue to dominate as households disperse and employment concentrates within a few areas of the Region. Ride-share also plays a significant role in the journey to work and will remain a viable option as households continue to disperse and workers are imported from outside of the Region. Driving alone and ride-share account for 76.8% of the work trips in the Central Vermont Region.[39] According to Vermont Public Service, road transportation accounts for 95% of transportation energy use. Walking has a significant mode share in Montpelier and Northfield and is also an important mode for non-work trips in those communities. Similar to national trends, the largest growing age cohort will be people over the age of 65, potentially requiring special transportation needs.

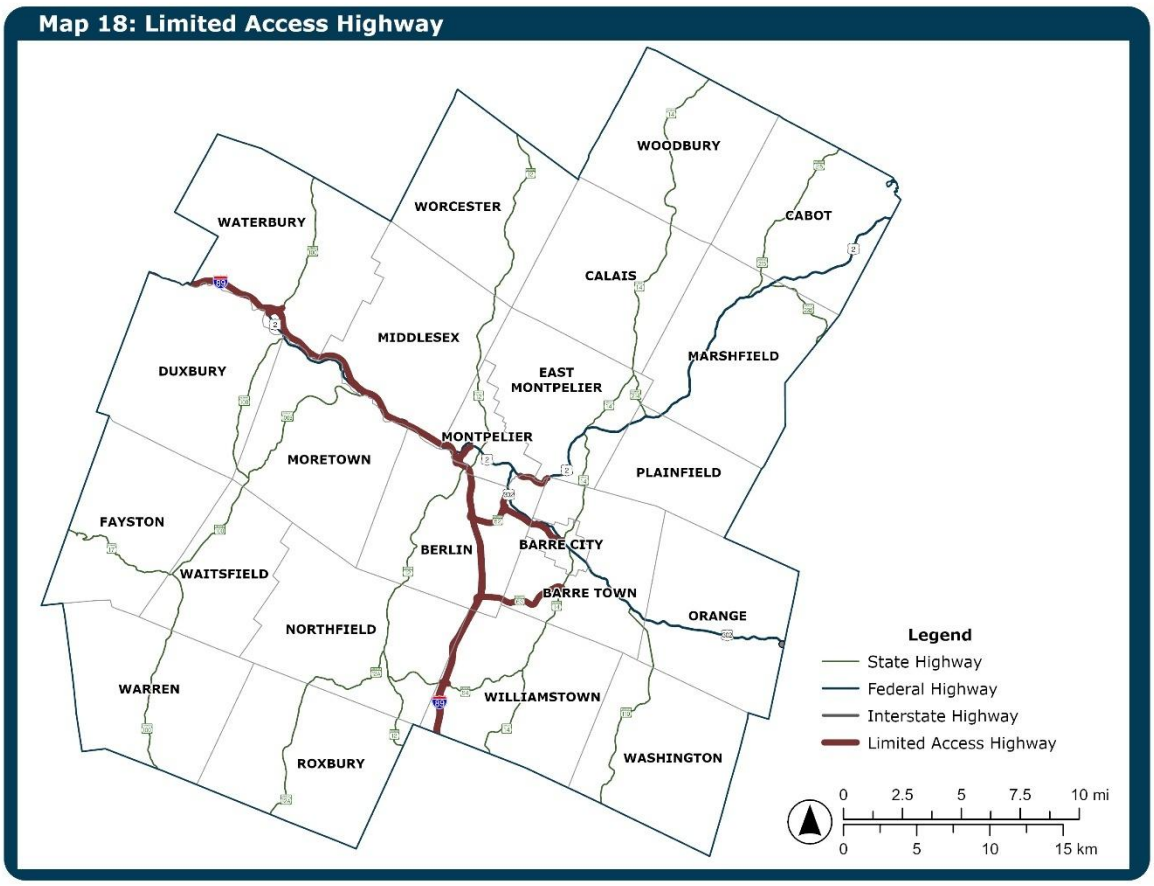
Transportation System

Roadway Classification – Function and Jurisdiction

Roads in the region are classified either by function (long-distance mobility versus access to adjacent land) or by jurisdiction (which government entity owns the facilities and is responsible for their operations and maintenance). The two classification systems are related – larger roads tend to be under the jurisdiction of larger government entities – and both ways of classifying roads are important considerations in transportation planning.

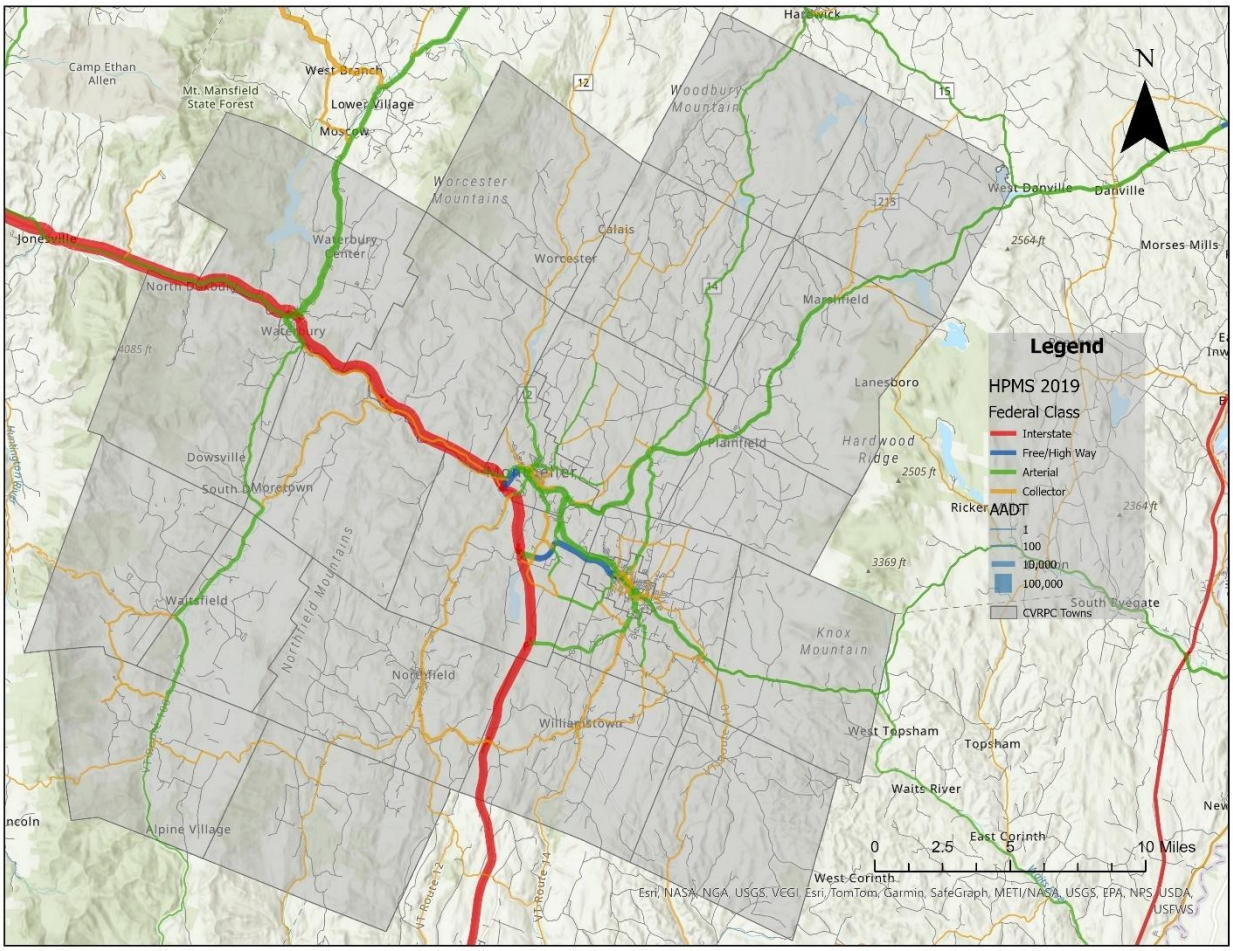
[39] US Census Bureau DP03 - Census Bureau Tables

Map 18: Limited Access Highway



In Vermont, roads are owned and maintained either by the State of Vermont or the municipality in which they are located. Local roads make up most of the road network in terms of road miles, while State roads are generally larger facilities that carry the most traffic. The Federal-Aid Highway Program provides funds for State roads but not for local roads. Maintaining the condition of roads and bridges in the future will require sustained levels of funding for system preservation projects. Figure 7 shows the region's roadways classified according to the federal system.

Figure 7: Federal Roads Class by AADT



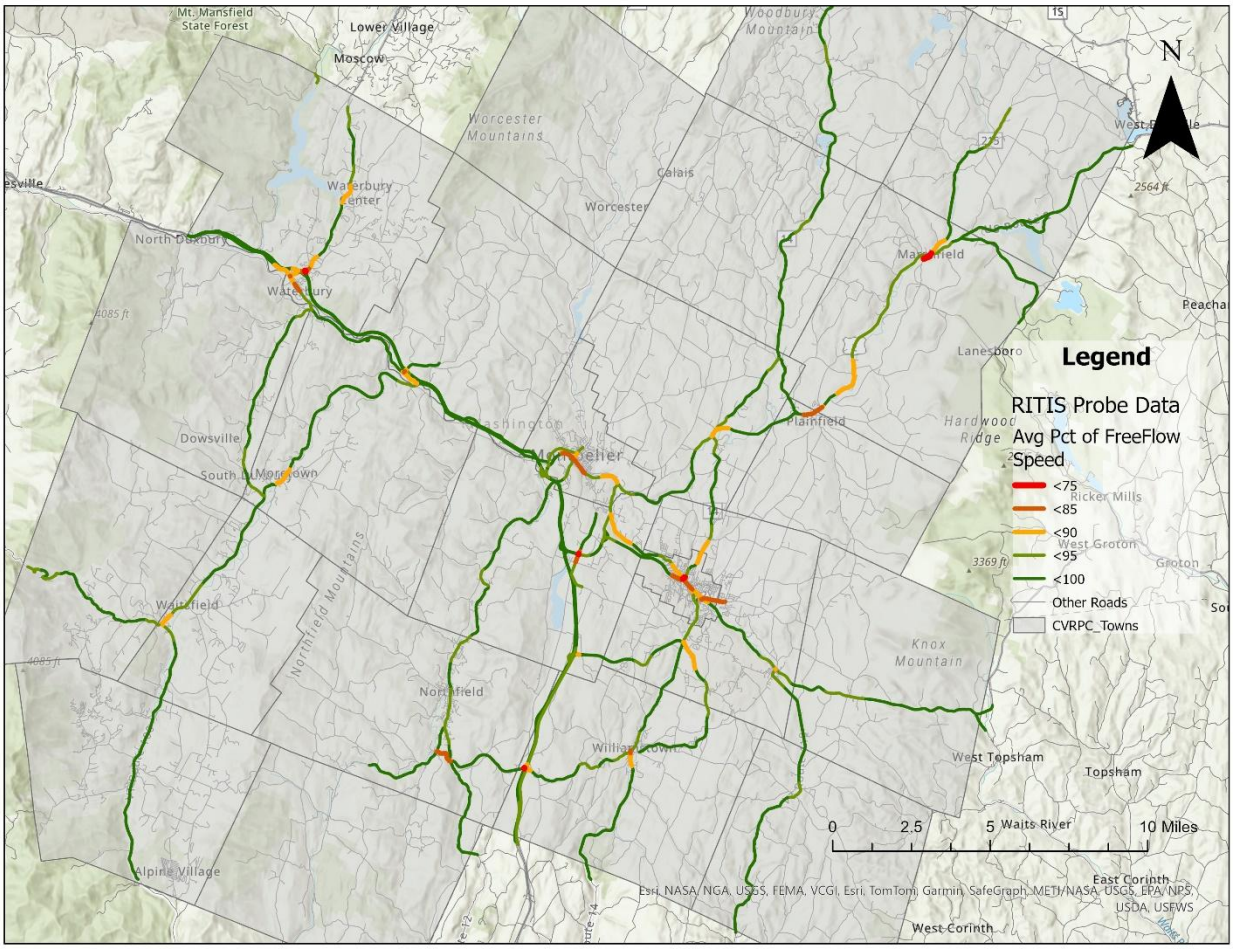
Source: HPMS 2019

Congestion

Central Vermont experiences very limited travel delay from congestion. To the extent that congestion occurs, it is generally in activity centers (downtowns and villages) during business hours. This is the outcome we expect when looking at dense, high-activity areas where access is maximized and there are many conflicting movements occurring. As a general pattern, what delay does exist tells a story of successful communities rather than failing roads. Where extreme congestion and queueing, be it recurrent or episodic, that present safety concerns (e.g. seasonal peak volumes at Exit 10 in Waterbury) efforts should be made to reduce, manage, and mitigate delay and danger.

As the Region continues develop, transportation impacts of new development will need to be considered both in the siting of new development and the prioritization of highway projects to handle increased volumes. Locating residential development near commercial and employment centers will limit new congestion by limiting new demand for driving.

Figure 8: Average Percent of Free Flow Speed by Segment for Average Weekday 2023



Source: RITIS Probe Data

Safety

Intersections are the most dangerous components of the Region's highway system. The figures below show crashes, with injury or fatality resulting, by town for arterial and collector roads respectively. From the data it is clear that the higher speed and volumes on arterials are associated with a higher

occurrence of injuries and fatalities. As well, towns with higher activity levels (i.e. – more trips due to concentrations of population and/or employment) have higher incidence of these crash types.

Of crashes where a fatality occurred, roughly 65% involved some form of driver impairment from drugs and/or alcohol. This points to the need for enforcement to be a component of future Vision Zero efforts in the Region. The Region will continue to conduct planning studies and participate in State programs to address high crash locations.

Figure 9: Fatality and Injury Crashes on Arterials

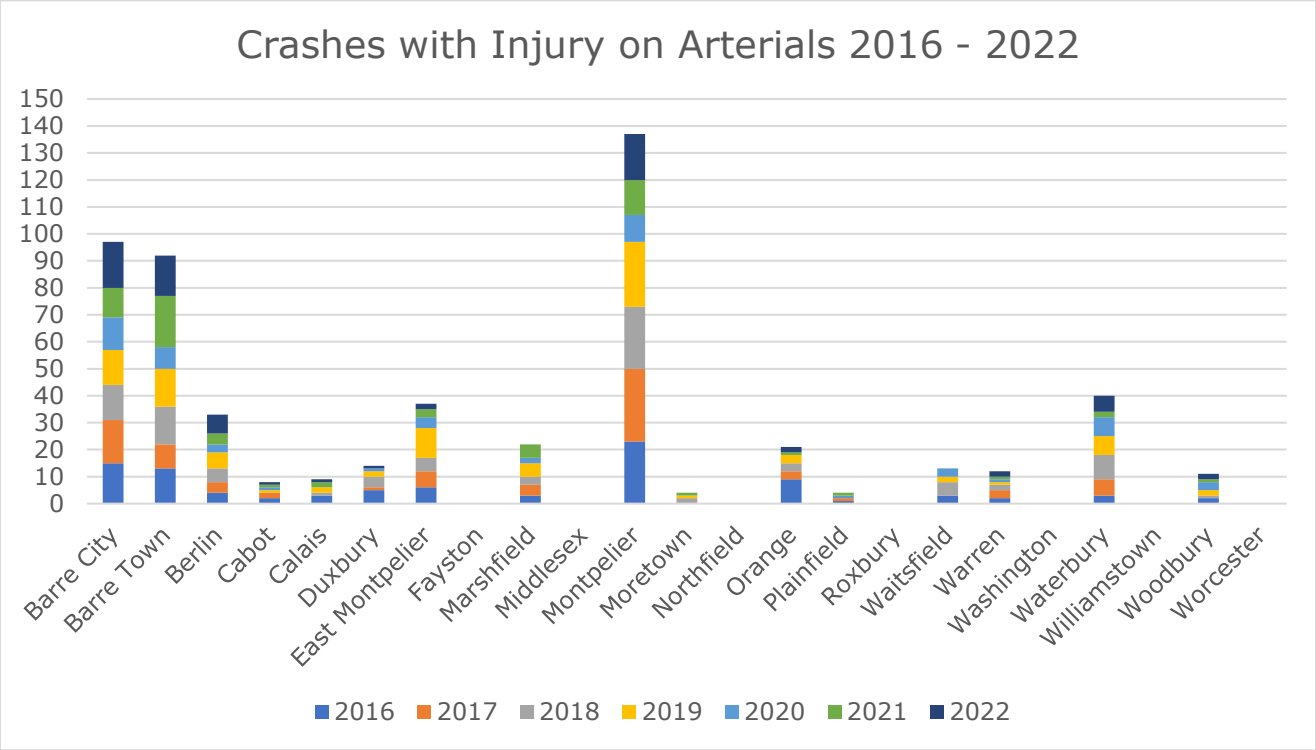
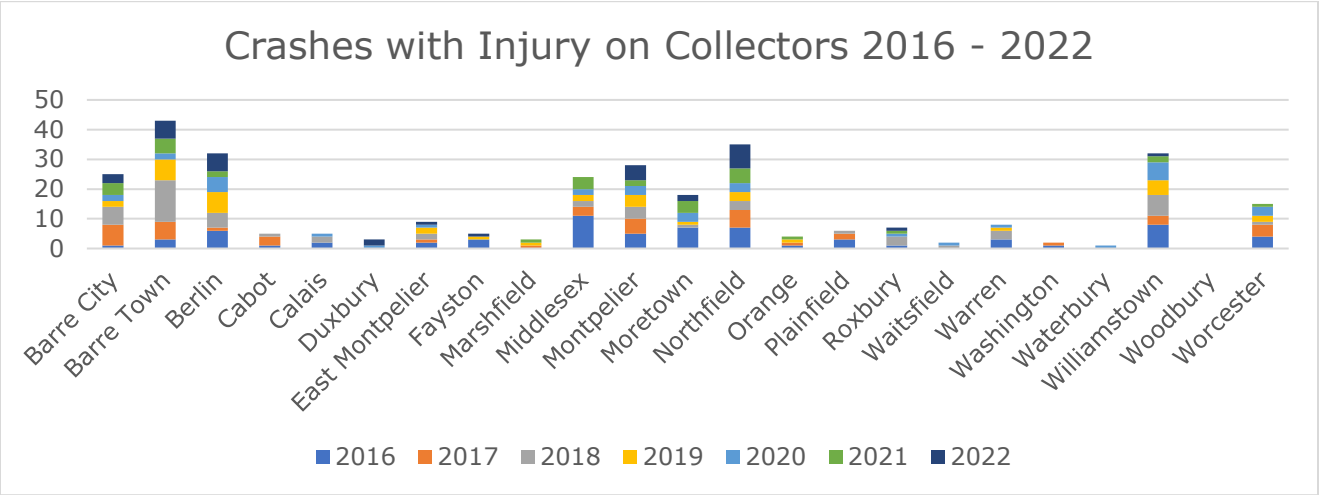


Figure 10: Fatality and Injury Crashes on Collectors



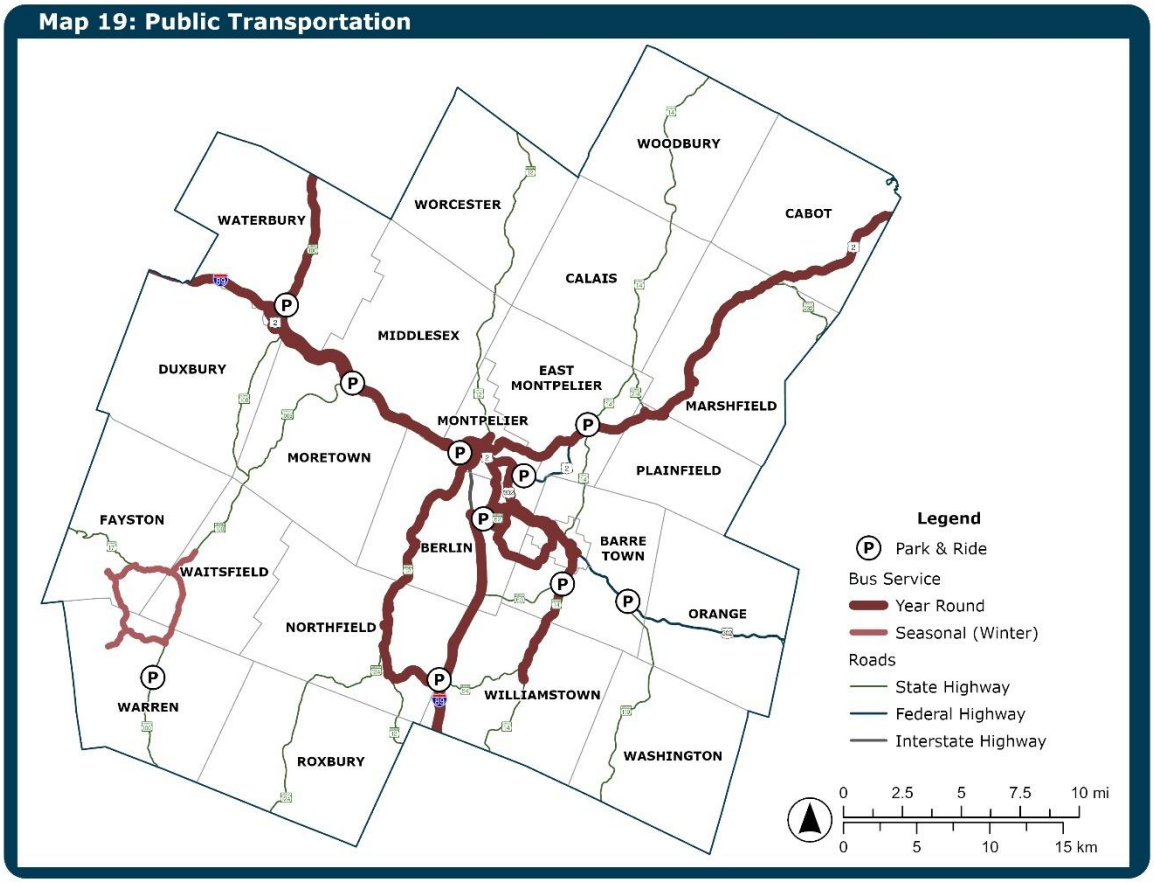
Transit

Public transit is an important modal choice in the Central Vermont transportation system. It facilitates the pooling of trips between important origins and destinations and provides basic mobility to any user regardless of access to private vehicles. Public transit provides access to jobs, medical and social services, education, childcare, shopping, recreation, and other essential services.

By pooling trips in vans and buses and moving individuals out of single occupancy vehicles, transit helps reduce congestion, air pollution, parking needs, and the need for expensive highway improvements. A wide variety of public transit services are available within the Central Vermont planning area, including local, regional, and inter-regional services.

Tri-Valley Transit (TVT) is the primary public transit provider for the Central Vermont planning area. TVT is a full-service public transportation provider offering fixed route, deviated fixed route, demand response, commuter route, shopping shuttle, Medicaid transportation and transportation services for the elderly and disabled. TVT operates 10 fixed services throughout the Region and a seasonal route in the Mad River Valley providing access to Sugarbush Ski Resort. Microtransit is offered in Montpelier through the MyRide program. The Montpelier Link Express, connecting Montpelier to Burlington, is still run by Green Mountain Transit. Rural Community Transportation runs the Route 100 Commuter bus, from Morrisville to Waterbury, and the US 2 Commuter between St. Johnsbury and Montpelier.

Map 19: Public Transportation



Freight Movement

The important products transported from the Region are specialty and dairy food products, granite, and wood. Most of these commodities are shipped by truck, with rail transporting a much smaller but significant share (7% statewide). Truck travel in the Region is constrained by highway geometry deficiencies and the hilly terrain. Arterials that carry truck traffic also pass through village centers creating safety and quality of life issues for residents. Rail plays an important role in the Region's trade with Canada. Preventive maintenance is needed to preserve the existing New England Central rail line that serves that international trade connection.

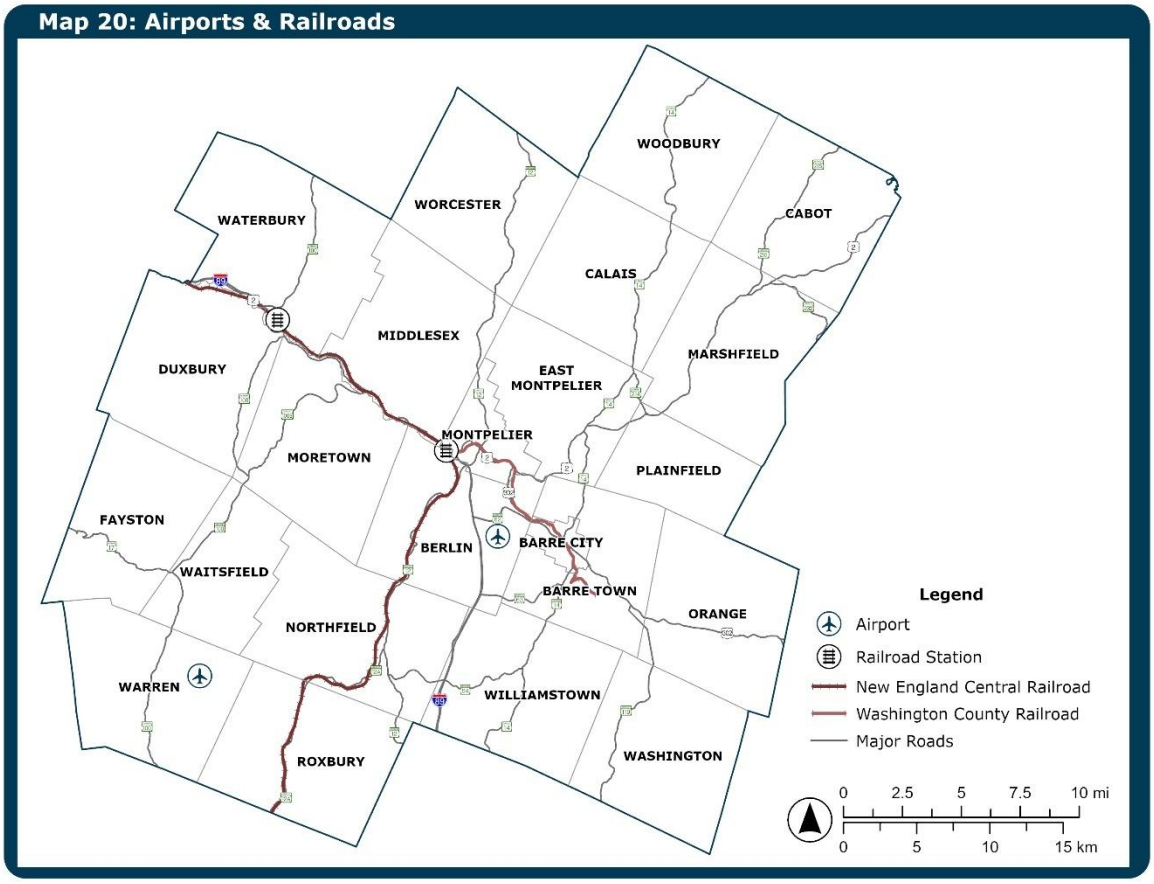
Air Transportation



Edward F. Knapp State Airport, Berlin, Vermont.

There are two airports located in the Central Vermont Region; the Edward F. Knapp State Airport in Berlin, and the privately owned Warren-Sugarbush Airport. The Region's public-use airports provide opportunities for public access to the National Airspace System, airfreight, emergency medical services, search and rescue operations, business aviation, recreational flying, and flight training. Knapp Airport is equipped for night operations and precision instrument landings. Since 1996, improvements at Knapp Airport have included runway rehabilitation, installation of navigational aids, and construction of jet fuel farm, hangars, and a taxiway. Future improvements have been identified that will preserve and enhance how the Airport functions. Any development proximate to Knapp or Sugarbush airports will need to abide Federal and State standards regarding flight path and approach clearances.

Map 20: Airports & Railroads



Bicycle and Pedestrian

There are a variety of bicycle and pedestrian facilities in the Central Vermont Region including sidewalks and cross walks in most cities and villages, paved shoulders in rural areas, and separated bike paths in various locations. Existing deficiencies include discontinuity of adequate shoulder widths in rural areas, constant need for maintenance of existing urban/village sidewalk networks, and a lack of sidewalks in the growing suburban commercial areas. There has been significant progress in planning and implementing bicycle and pedestrian facilities at the local and Regional level (See Map 29: Recreation Trails and Scenic Byways). This incremental progress, if continued over the next twenty years, will help the Region develop an interconnected network of bike and pedestrian facilities.

The design of community infrastructure, including roads, sidewalks, and public spaces, influences the physical activity levels of residents. Walkable neighborhoods with well-designed infrastructure encourage physical exercise, reduce reliance on motorized transportation, and contribute to lower rates of obesity and related health issues. Conversely, poorly planned infrastructure can hinder active lifestyles and compromise community health.

Complete Streets are designed for all roadway users and are accessible whether driving, riding, walking, bicycling or rolling (using a wheelchair or pushing a stroller). Not every street is expected to be a "complete street", but Complete Streets policies are those that consider the needs of all users and, when appropriate, meet these needs.

Housing density complements walkability and bikeability, access to green spaces, access to amenities, including food access and access to social infrastructure. Mixed-use developments are encouraged in Higher Density Growth Areas to allow commercial, business, low-intensity industrial, and residential uses. Mixed-use allows for goods and services to be accessible to all and encourages walkability, bikeability and community health.

Transportation Demand Management

Transportation Demand Management (TDM) seeks to reduce the number of single occupant vehicle trips by encouraging people to share rides, shift travel to off-peak hours, tele-commute or use other modes such as walking, biking, or transit. Most of the ride-sharing in the Central Vermont Region occurs on an informal basis. The Park & Ride lots in the Region facilitate informal ride-sharing and the location, capacity, and average usage of these lots are noted in the table below. In the future, transportation demand management associations could help facilitate further use of TDM programs.

Table 21: Park and Ride Utilization by Season

State Lots		Winter		Summer		Autumn	
Location	Total Spaces	# of vehicles	% full	# of vehicles	% full	# of vehicles	% full
Montpelier DOL	170	81.5	48%	39	23%	44.3	26%
Montpelier MJSH	55	29	53%	24	44%	37.7	68%
Waterbury	69	53	77%	50.5	73%	52.3	76%
Middlesex	28	12.5	45%	12.5	45%	13.7	49%
Berlin	81	42	51%	58.5	72%	49.0	60%
East Barre	10	2	15%	3	30%	3.0	30%
Barre Town	34	14	40%	10	29%	9.3	27%
Williamstown	25	12	46%	15.5	62%	17.3	69%
Roxbury	8	1.5	19%	0.5	6%	0.3	4%
Plainfield	22	4	18%	2.5	11%	4.0	18%
Marshfield	6	2.5	42%	0.5	8%	1.0	17%
Orange	26	4	15%	0	0%	3.0	12%
Warren	12	2	17%	5.5	46%	2.7	22%
East Warren	15	3	17%	1	7%	0.7	4%
Cabot*	19	1	5%	15.5	82%	9.7	51%
East Montpelier	6	4	58%	1.5	25%	1.7	28%

** Cabot Park and Ride values reflect regular use associated with foodbank/historical building*

Climate Impacts and Vehicle Emissions

The Region's critical transportation infrastructure is already vulnerable to flooding and will require significant investments in maintenance and/or upgrades as flooding increases due to climate change. If repeated replacement or repair of a facility or settlement is determined to be unsustainable, consideration will need to be given to retiring and relocating the right of way (ROW). CVRPC recognizes that the costs of ROW acquisition and road building coupled with the potential for eminent domain issues to arise in pursuit of relocating

The Vermont Agency of Transportation developed the Vermont Transportation Resilience Planning Tool (TRPT), a free and easy-to-use tool for planners "that identifies bridges, culverts, and road embankments that are vulnerable to damage from floods, estimates risk based on the vulnerability, and criticality of roadway segments, and identifies potential mitigation measures based on the factors driving the vulnerability." A brief introduction is at https://vtrans.vermont.gov/climate/trpt and the tool is at https://roadfloodresilience.vermont.gov/#/map

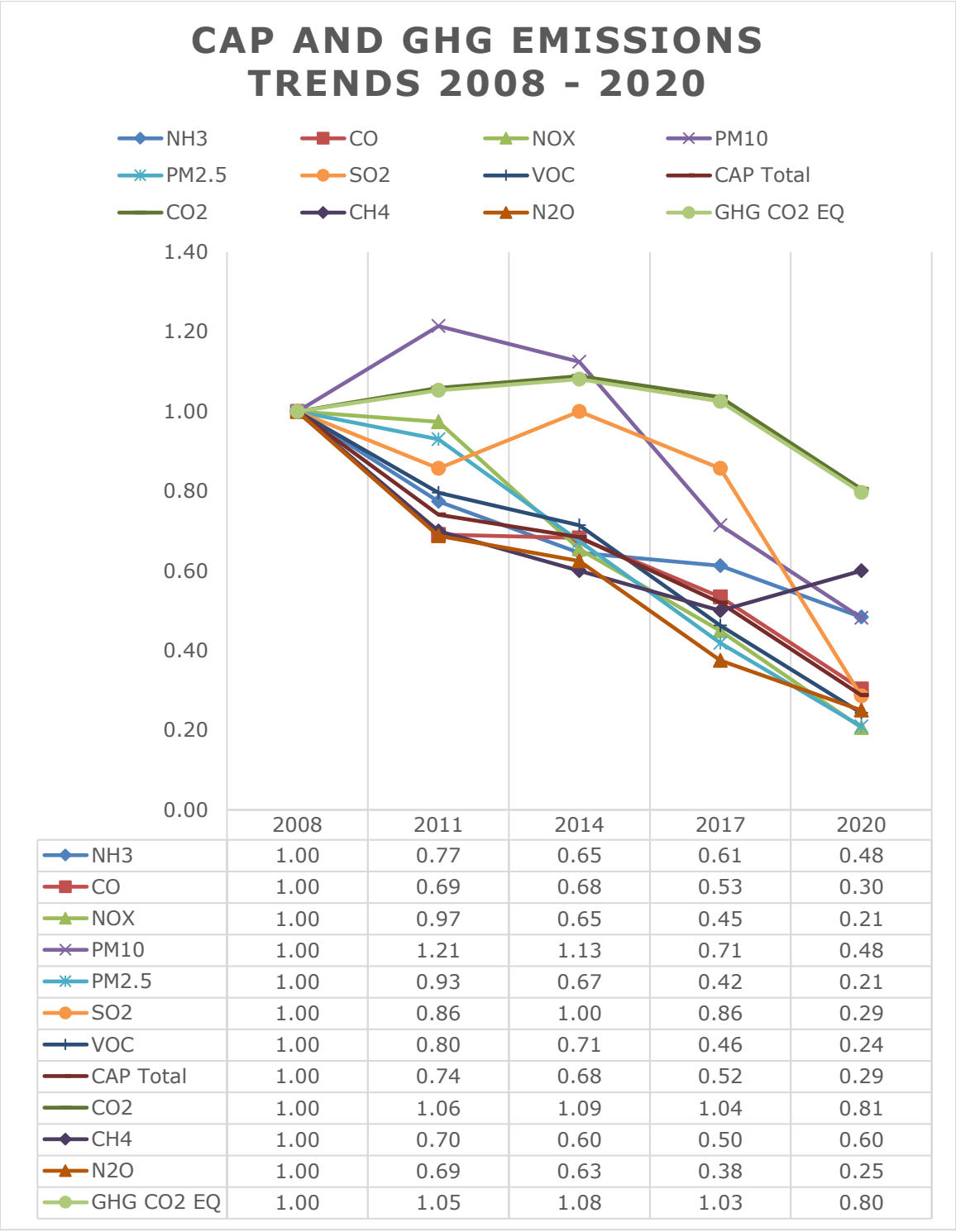
roads is likely to preclude the possibility of such action short of a crisis that forecloses all other options.

Figure 11 shows changes in emissions for Criteria Air Pollutants (CAP) and Greenhouse Gases (GHG) from 2008 through 2020, indexed to 2008. GHG emissions saw a pandemic-driven decline of about 14% from 2019 to 2020 from a roughly flat trend for the prior 12 years, however a partial rebound was already apparent in 2021, increasing 7% relative to 2020 levels limits.[40] Over the same period, 2008-2020, CAP volumes have declined drastically due to improved emissions after-treatments.[41] Reliable numbers for more recent years are not currently available, though it is known that there has a been a rebound in trip-making and overall travel from the pandemic-driven decline in 2020.

[40] The Energy Action Network's 2024 Annual Report for Vermont on Emissions, Energy, Equity, and the Economy provides a more detailed high level summary of the statewide transportation sector- check out summary graphics and high level conclusions at https://eanvt.org/2024-annual-report/.

[41] (Winkler, 2018)

Figure 11: Change in Emissions Over Time



	2008	2011	2014	2017	2020
NH3	1.00	0.77	0.65	0.61	0.48
CO	1.00	0.69	0.68	0.53	0.30
NOX	1.00	0.97	0.65	0.45	0.21
PM10	1.00	1.21	1.13	0.71	0.48
PM2.5	1.00	0.93	0.67	0.42	0.21
SO2	1.00	0.86	1.00	0.86	0.29
VOC	1.00	0.80	0.71	0.46	0.24
CAP Total	1.00	0.74	0.68	0.52	0.29
CO2	1.00	1.06	1.09	1.04	0.81
CH4	1.00	0.70	0.60	0.50	0.60
N2O	1.00	0.69	0.63	0.38	0.25
GHG CO2 EQ	1.00	1.05	1.08	1.03	0.80

Source: NEI Data

Electric Vehicles

Alongside reducing vehicle miles traveled, light-duty and fleet electrification is a key part of the State's plan to reduce GHG emissions from the transportation sector (see Energy Chapter for an overview of State Goals and Policies and full sector targets). The tables below represent Central Vermont's share of the State targets of EV adoption (replacement of fossil fuel vehicles), required to meet our broader State energy and emissions goals (according to the current LEAP pathway model). While Central Vermont surpassed its 2025 goal, targets increase rapidly thereafter. CVRPC continues to support municipalities and other fleet operators, especially schools, and town energy committees to promote education and participation in State, Utility, and Federal incentive programs. See pages 41-43 in Appendix A for additional transportation targets, including medium- and heavy-duty vehicles and non-road energy demand and for the baseline (aka business as usual) comparison. CVRPC is working to pull together municipal fleet inventories to better adjust these targets and provide municipalities municipal fleet recommendations.

Table 22: EV Ownership by Type Targets

CAP Mitigation Regional **Passenger Car & Light Duty Truck EV and PHEV Stock** (Number of Vehicles)						
Vehicle Type	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Battery Electric	3	1,163	6,926	16,289	24,669	33,219
Plug In Hybrid	33	122	169	161	107	40
Total	**36**	**1,285**	**7,095**	**16,450**	**24,776**	**33,259**

Want to do a fleet analysis? You don't need a lot to get started:

- Vehicle Inventory (make & model, year)
- Annual data per vehicle: Vehicle Miles Traveled (VMT), Gallons of fuel used, MPG
- Replacement Schedule

To learn more about technical assistance and funding support for fleet electrification and EVSE CVRPC, Drive Electric, VTrans, and Vermont Clean Cities Coalition are all at the ready. Municipalities can develop fleet electrification and EVSE plans, host EV community events, and support local partners as well.

The table below provides an overview of light duty (passenger) vehicles and use in the region. The vast majority of residents in the state, including Central Vermont, use personal vehicles for their daily travel needs. Approximately 3.5% of the 43,506 light duty vehicles in Central Vermont are electric vehicles (including all electric and plug-in hybrid electric vehicles registered by January 2024 (Drive Electric Vermont[42])). The total number of vehicles in the region has decreased slightly, while the number of EVs (Electric Vehicles) has increased quickly in the last few years, increasing by approximately 40% in 2023 alone coincident with the expansion of state, utility, and federal incentive programs.

[42] http://www.driveelectricvt.com/buying-guide/why-go-electric

Table 23: Current Regional Transportation Energy Use

Transportation Data	Regional Data 2024 5-YR ACS			Regional Data 2011-2015 (ACS)
Fuel Type	Internal Combustion Engine (ICE)	Electric Powered (EV)	Total	Internal Combustion Engine (ICE)
Total # of Light Duty Vehicles	46,894	1,517	48,411	45,584
Average Miles per Vehicle	12,500	9,000		287,500 (12,500/vehicle)
Total Miles Traveled	586,175,000	13,653,000	538,515,500	599,828,000
Total Use per Year	26,644,318 gallons	4,551,000 kWh		30,518,817
Transportation MMBTUs	3,143,207	15,528	3,158,735	3,396,000
Average Cost per unit	$3.37/gallon	$0.2109/kWh		$2.31
Cost per Year	$89,791,352	$959,806	$90,751,158	$70,488,465

Source: Municipal Consumption Tool (Department of Public Service) which uses Table DP04, 2024 ACS 5-Year Estimate used to estimate the count of vehicles associate with area housing units, and State DMV data averages; cost per gallon of gas was taken from EAN Annual Progress Report 2023. EV data was provided by Drive Electric based off DMV registrations as of January 2024. Comparable public transportation and medium and heavy-duty vehicle data is not available.

EV adoption rates will continue to be driven by the real and perceived viability of EVs performance in Central Vermont, local electric infrastructure and capacity, and the availability of charging infrastructure. As of spring 2024, there are nearly 400 public EV charging stations across the state[43], though not widely distributed throughout Central Vermont. In Central Vermont public chargers can be found in Cabot, Plainfield, Middlesex, Berlin, Northfield, and Roxbury located at schools, municipal buildings, and food coops; with higher density of chargers located in the Mad River Valley (many at ski resorts), Waterbury, and Montpelier. Figure 12 shows the locations, numbers, and types of charge points in CVRPC and adjacent regions. While many EV drivers across the state charge at home (typically overnight),

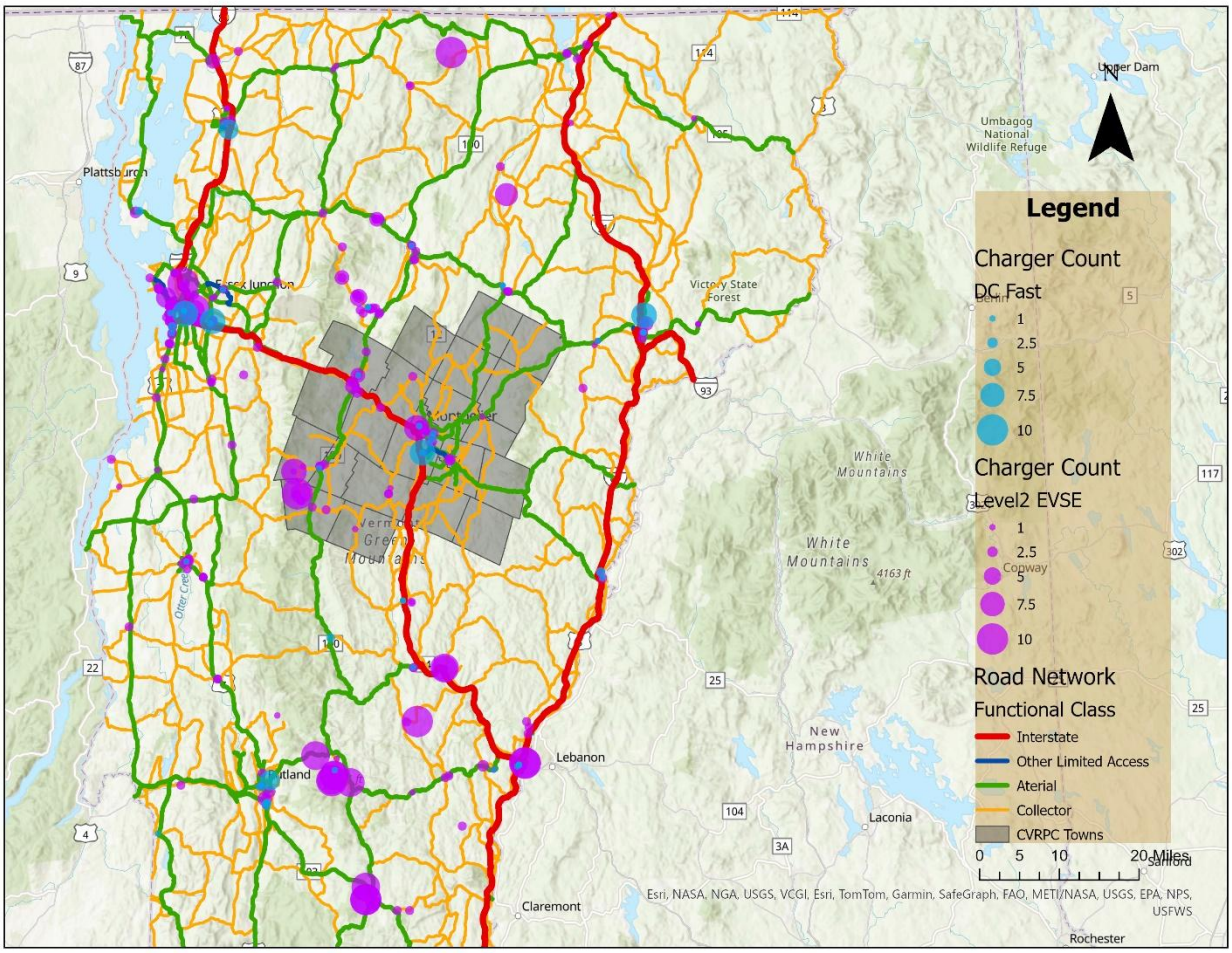
[43] https://www.driveelectricvt.com/about-evs/charging-map?gad_source=1&gclid=CjwKCAjwtqmwBhBVEiwAL-WAYU8qVxhVDK55M5TSzltPA6SYiVI69Np0Ns-JkkqeFql6e-6UIHCP8xoCsgEQAvD_BwE

increasing workplace and public charging infrastructure has been identified as key to supporting longer trips/commutes, visitors, or those without charging access at home. CVRPC continues to encourage municipalities and local businesses to install EV charging stations at convenient and desirable locations including workplaces, schools, community centers, recreation sites, libraries, multi-unit buildings, etc., where users could park for several hours in our regional downtowns, village centers, and other designated growth area (e.g. VT Community Charging program[44]; become a host or solicit community hosts[45]).

The electrification of the transportation sector will require upgrades throughout our energy system. At the residential and commercial scale, panel upgrades are already being integrated into EV and EVSE state and utility programs. Furthermore, meter socket adapters have been developed and now deployed to enable both solar and EV interconnection without a panel upgrade. To minimize costly energy infrastructure upgrades at the distribution and utility scale, demand-management and enhanced coordination via integrated resource planning and long range transmission planning, are critical. Lastly, measures that reduce future electric demand growth, especially in the thermal sector, will reduce the cost and infrastructure concerns in Central Vermont from EVs (see Energy Chapter and Appendix A).

[44] https://www.chargevermont.com/
[45] https://survey123.arcgis.com/share/8c15711e4e404a7ca9ed3979640b0121

Figure 12: EV Charger Location



Continued increasing flexibility in existing programs to address interconnection barriers, and new opportunities to include off-grid chargers and charging to Vermonters with high outage frequencies and duration will be necessary to meet our regional targets. Furthermore, as medium and heavy-duty options come on the market, regional or state cohort procurement programs would significantly reduce the difficulty in navigating ever-changing funding programs and allow for the development of best practices suited to local concerns and needs. Increased weight of electric vehicles will also need to be considered in planning and budgeting for roadway maintenance, especially unpaved roads where higher axle weights will increasingly impede traversability during storms and thaws.

Equity considerations must be thoughtfully integrated throughout EVSE planning process to ensure benefits and costs are fairly distributed. Historically, clean energy and transportation innovations have not been

deployed evenly across communities -- resulting in higher energy burden, rural, and lower-income communities being left behind. EVSE equity concerns include a project's affordability, accessibility, reliability, location, safety, and related employment and economic opportunities. Drive Electric's Charging Installation Guide provides thorough guidance and workflow for Vermonters and Vermont communities. CVRPC recommends that when integrating EVSE into new builds and parking lot upgrades alike, proximity to electrical panel, zoning setbacks, and other technical considerations are addressed in addition to including EVSE supported handicap spots.

The VTrans NEVI (National Electric Vehicle Infrastructure) program and the U.S. Department of Transportation's Toolkit for Planning and Funding Rural Electric Mobility Infrastructure offers helpful equity planning considerations and strategies relevant to Central Vermont. When assessing where EV charging stations should be located, engagement with rural, underserved, and high energy burden communities is essential to prevent delayed and diminished access to clean energy and transportation infrastructure vital to a healthy economy. Furthermore EVSE-Ready requirements for new buildings can be explored at the municipal level (see Climate Change and Land Use).

According to the U.S. Department of Energy (DOE), over the long term, EV ownership is typically less expensive than ownership of fossil-fuel vehicles. Additionally, low operation costs make some EVs less expensive on a monthly basis compared to equivalent fossil-fuel vehicles (when the vehicle purchase is financed). Therefore, increased EV adoption in Central Vermont could contribute to community-wide reductions in transportation energy cost burdens. As stated by Drive Electric Vermont, "It costs less to own an EV. Plugging in is like paying $1.50 a gallon, and EVs need less maintenance than gasoline cars." Like fossil fuel vehicles, how cars handle Vermont's winter and mud seasons varies from make to model. Opportunities for medium and heavy-duty vehicles are expanding; CVRPC strongly encourages municipalities and other fleet operators in the region to consider low-diesel and alternative fuel options when replacing these in their fleet to take advantage of State and federal incentive programs.[46]

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[46] Drive Electric provides the most comprehensive and up to date snap shot of State, Distribution Utility, and Federal incentives, rebates, and inclusions: https://www.driveelectricvt.com/?gad_source=1&gclid=CjwKCAjwtqmwBhBVEiwAL-WAYbmxAzFQ9-5GP2WHd7oP5AzQhS3OPMRCUhERxSZwW2b9d0Fv9rEvyhoCuDIQAvD_BwE

The lowest-carbon modes will always be active modes, including electric-assist bikes (electrocycles or e-bikes). Given the long lead time for full turnover of the residential fleet, it is recommended that a regional trail network paralleling the arterial network be developed to provide safe, conflict-free routes for travelers using active and electric micro-mobility modes. This low-stress arterial network should be paired with local complete streets retrofits in villages and downtowns. At the same time, towns should be leading on the issue by preferentially buying electric when purchasing vehicles for their municipal fleets.

Hidden Resilience Co-Benefits of EVs and EV Charging Infrastructure

Much of the discussion of EVs and EVSE focuses on GHG emissions & fossil fuel use reductions, as well as long term financial benefits to individual households and to the local economy. Perhaps the most appealing co-benefit, however, is that some EVs can provide backup power to communities through vehicle to building (V2B) charging as a microgrid or provide power to grid through vehicle to grid (V2G) charging. Both V2B and V2G can complement other distributed energy resources (DERs), or supplement diesel generators as backup power and a mobile source at that! This is a particularly important aspect of EVs and EVSE for municipal operations (especially town garages), schools, libraries, and other locations that provide critical social and physical infrastructure on a daily, emergency, and recovery basis.

Historic and Natural Transportation Assets

Historic Site Markers

Unveiled in 1947 by the Vermont Legislature, the Roadside Historic Site Marker program has proven an effective way to commemorate Vermont's many people, events, and places of regional, statewide, or national

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, State Diesel Emissions Reduction Assistance Program https://dec.vermont.gov/air-quality/mobile-sources/diesel-emissions/vt-diesel-grant#:~:text=The%20Vermont%20Diesel%20Emissions%20Reduction,diesel%2Dpowered%20engines%20and%20the ; Vermont Clean Cities Coalition provides direct support to municipalities https://cleancities.energy.gov/coalitions/vermont#:~:text=The%20Vermont%20Clean%20Cities%20works,advanced%20vehicle%20technologies%20in%20transportation

significance. Nearly 310 cast-aluminum green markers, crested with the distinctive gold state seal, are placed throughout Vermont to provide a fascinating glimpse into the past and insights into the present. Vermont's easily identifiable roadside historic site markers commemorate diverse topics. (See Map 31: Historic Resources).

Table 24: Historic Markers by Town

Town Name	Specific Location
Duxbury	- Views from Route 100, especially those north to Mount Hunger, south the Northfield range, and the views of Camels Hump in South Duxbury - Views of Camel Hump, especially those from Ward Hill and Scrabble Hill and Mountain View - Views from River Road and Duxbury Corner across the Winooski River valley to the Bolton ridgeline
Moretown	- Valley land along the Mad River and Route 100B at the Waitsfield town line - Route 100B is recognized as a Scenic Byway
Warren	- Forest Reserve district - Meadowland Overlay district - Route 100 corridor near Sugarbush
Williamstown	- Waterfall area of Falls Bridge Road
Woodbury	- Nichols Ledge - Ridgeline of Woodbury Range - Surface waters that distinguish Woodbury as the "Land of Lakes and Ponds"
Worcester	- North Branch Cascades Trail - Route 12, especially north of the village through the Worcester Woods - Worcester Mountain Range

Scenic Byways

A “Vermont Byway” is a road that has been formally recognized by the Vermont Transportation Board as having special scenic, historic, recreational, cultural, archeological and/or natural qualities. For a road to receive a “byway” designation, it must be nominated – a process usually initiated at the municipality level – and subsequently evaluated and certified. Byway designation can be used as a marketing tool, a framework to develop management strategies for natural and cultural resources, and a means of accessing federal transportation dollars. Map 29: Recreation Trails and Scenic Byways on page 250 depicts scenic byways in the region. Full background and process for The VT Byways Program can be found in the program manual.

Regional Transportation Recommendations

Specific program and policy recommendations are presented on the Regional and corridor levels. The recommendations also address the need for Regional planning and cooperation on transportation issues, transportation funding, and mitigation of development impacts to the transportation system, and the project development process.

CVRPC, through its Transportation Advisory Committee, helps to identify priority projects as a part of the Vermont Project Selection and Prioritization (VPSP2) program. Through this prioritization and collaboration with the State, projects in the Region can more efficiently move through the VTrans development pipeline, taking into consideration available funding and construction constraints.

Table 25: Priority Projects – VTrans Capital Program

Roadway, Safety and Traffic	Bridges and Structures
• VT 100: sign replacement in Warren; ROCHESTER - WARREN STPG SIGN(78) • Sugarbush Access Path: design and construction of multi-use path; WARREN STP BP23(16) • VT 62 pedestrian facilities Paine Turnpike to Fisher Rd; CDS CD26(1) • VT 14/ Quarry St intersection reconstruction; BARRE CITY-BARRE TOWN MEGC M 6000(11) • US 2/Main St. intersection redesign, Plainfield; NH 028-3(41)	• Bridge 1: VT 100B over Dowsville Brook, Moretown; MORETOWN ER P24-3(603) • Bridge 67: VT 12 over Dog River, Berlin; BF 0241(60) • Bridge 27: TH 61 Lovers Lane over Dog River, Berlin; BO TRUS(4) • Bridge B2-1: US-2 State St. over North Branch rehabilitation, Montpelier; BF 6400(46) • Bridge 42: Fletcher Rd. over Mad River, Moretown; BO TRUS(8) • Bridge 60: VT 12 over Dog River, Northfield; BF 0241(58)

Table 26: Priority Projects – Not in the VTrans Capital Program

Roadway, Safety and Traffic	Bridges and Structures
• VT 100/17 intersection-intersection redesign for safety and pedestrian access, Waitsfield • VT 14/Marshfield Rd- Safety improvements • I-89 Waterbury exit-permanent variable message board notifying of congestion • US 2/VT 100 intersection-upgrades • US 2 Middlesex safety improvements at Camp Meade	• Bridge 7: VT 215 over Winooski, Cabot • Bridge B27: Moscow Woods Rd over Kingsbury Branch, Calais • Bridge 24: Meadow Rd over Mad River, Waitsfield • Bridge 6: North Fayston Rd over Shepard Brook, Fayston • Bridge 5: US 302 over Gunners Brook, Barre City • Bridge 44: US-2 over Little River, Waterbury • Bridge 37: Camels Hump Rd over Ridley Brook, Duxbury • Bridge 21: VT 12A over Flint Brook, Roxbury • Bridge 56, VT 14 over Stevens Branch, Williamstown

Funding for Town Transportation Projects

Table 27 shows funding programs available to municipalities for planning and implementation purposes. As the costs of transportation construction rise, the need for creative and diversified funding sources increases. CVRPC is happy to assist in finding funding from state and federal programs and agencies.

Table 27: Transportation Funding Programs

Program	Funding available	Municipal Costs
Bridges		
VTrans- Town Highway Structures Program for short bridges < 20'	State funds - $175,000	80/20 match, may be reduced to 10% with requirements (highway study and standards requirement)
Vermont State Infrastructure Bank	1% fixed loans up to 30 yrs., 10-20% borrower equity contribution	Fees for loan, can take up to 5 yrs to begin repayment but still must complete in 30 yrs.
FEMA- Hazard Mitigation Grant Program (HMGP)	15% of Public Assistance within ~12 months of a disaster. Must have a benefit cost analysis. Usually 3-5 yr time line.	75/25 cost, reimbursement grant
FEMA- Building Resilient Infrastructure and Communities (BRIC)	State allocated 2 million/yr beyond that nationally competitive.	75/25 cost, reimbursement grant
Town Highway Bridge Program	Varies- coordinate with RPC	Varies- minimum 10% match
Culverts		
VTrans- Better Roads Category B Road drainage, Category C streambank, shore and slope stabilization	Up to $60,000 for either one large or multiple small culverts	80/20 cost- local match can be covered using labor, equipment and materials
VTrans Grants in Aid- road drainage	To be determined by program manager and budget for year	80/20 cost- local match can be covered using labor, equipment and materials

Federal- through VTrans Municipal Highway & Stormwater Mitigation Program	To be determined by program manager and budget for year	80/20 cost- reimbursement program, usually takes 3-5 years
Vtrans- Town Highway Structures Program for culverts greater than 36"	State funds - $175,000	80/20 match, may be reduced to 10% with requirements (highway study and standards requirement)
VTrans- Town Highway Structures Program for class 2 roads culverts under 36"	State funds - $175,000	70/30 match, may be reduced to 20% with requirements (highway study and standards requirement)
FEMA- Hazard Mitigation Grant Program (HMGP)	15% of Public Assistance within ~12 months of a disaster. Must have a benefit cost analysis. Usually 3-5 yr time line.	75/25 cost, reimbursement grant
FEMA- Building Resilient Infrastructure and Communities (BRIC)	State allocated 2 million/yr beyond that nationally competitive.	75/25 cost, reimbursement grant
Fish and Wildlife Fish Passage- USFW Grant	Contact Regional Fish Passage Coordinator	Match varies from 0-50%
General Transportation		
Municipal Highway and Stormwater Mitigation Program	$1.5 million federal funding annually	80% federal, 20% local
Better Roads Program	Varies by purpose	Varies by purpose
VTrans Municipal Grants in Aid Program	To be determined by program manager and budget for year	80/20 reimbursement program
VTrans Capital Program (VPSP2)	Very high cap	80% federal with 20% state and/or local match
Better Connections	$260,000 statewide	90% state- 10% local match for multimodal projects
Bicycle and Pedestrian Grant Program	Varies by purpose	Varies by purpose

Vision and Mission for Transportation in the Region

To emphasize the scope and scale of the Regional transportation issues facing Central Vermont and its communities, CVRPC established a vision and mission statement to guide the development of transportation goals, policies, and action items.

Vision - “To maintain and develop a transportation system that facilitates travel while preserving the Region’s character.”

Mission - "Preserve, enhance, and develop an integrated, multi modal Regional transportation system to accommodate the need for movement of people and commerce in a safe, cost-effective, environmentally responsible, and equitable manner, that conforms with other elements of the Regional Plan."

The vision and mission statements provide an overall direction that CVRPC believes should be followed. To guide these steps, CVRPC established a series of nine goals that further define this direction. These goals are described below, as well as the policies written to provide guidance of how the goals can be achieved.

Transportation Goals and Policies

Transportation Goal 1

To achieve a Regional transportation planning process that is comprehensive, multi-modal, and public, and is integrated with Regional and local land use planning as outlined in the Central Vermont Regional Plan.

Policies:

1. Encourage municipalities' analysis of transportation needs at the local level, including the relationships between development patterns and transportation needs, and which considers various modes of travel.

2. Encourage coordination and cooperation in comprehensive transportation planning among the various municipalities in the Region and at the Regional, State, and private levels.

3. Undertake a comprehensive Regional analysis of existing and anticipated travel behavior and multi-modal approaches to accommodating anticipated

travel demand.

4. Balance Regional and local decision-making, and flexibility in transportation planning, when conflicts develop between local and State plans.

6. Promote open and inclusive public participation in the multi-modal planning and development of transportation projects.

7. Support the planning and design of the Region's transportation system to encourage development and redevelopment in existing downtown centers, village centers, planned growth areas, and villager areas.

8. Encourage the full integration of transportation and land use planning at the Regional and local level.

Transportation Goal 2

To preserve and maintain the existing transportation system.

Policies:

1. Support the necessary steps for evaluating, prioritizing, and implementing preventive maintenance programs for all elements of the transportation system.

2. Promote a funding strategy that realizes maximum use of all available resources to ensure adequate maintenance of the existing transportation system.

3. Encourage development patterns that reflect the planned capacity of the transportation system. Level of Service C will be taken as the preferred condition. Level of Service D should be accepted within the more urban, built-up sectors of the Region (for example: Montpelier, Barre City, Northeast Berlin, South Barre, Waterbury Village, Northfield Village, Waitsfield Village, and Irasville).

Transportation Goal 3

Enable the transportation system to operate at it's highest efficiency by managing travel demand and encouraging shifts to under-utilized and more efficient travel modes.

Policies:

1. Develop a strategy that encourages maximum use of all available transportation resources and allocates those resources to the optimum functioning of the transportation system.

2. Support the education of the Region's employers in the development of Travel Demand Management Programs (e.g. tele-commuting, flextime, compressed work weeks, ride-share matching, preferential parking, commuter fringe benefit, etc.). Facilitate the establishment of Transportation Management Associations to organize and administer TDM programs.

3. Educate the public on modal choices available.

4. Encourage preservation of existing rights-of-way for future transportation purposes. In particular, work to retain abandoned railroad rights-of-way for transportation uses such as trails and bike paths.

5. Consider new or expanded public transit services that serve intra-Regional and intercity travel needs.

6. Encourage full accessibility to the Region's transportation services for the Region's residents in need.

7. Establish aggressive, but realistic, targets for modal shares along Regional transportation arteries.

8. Support updating and optimization of traffic signal timings on a regular schedule and coordinate where appropriate.

9. Market public transit to new users.

Transportation Goal 4

To integrate modes of travel in order to allow for their most effective use and ultimately reduce dependence on single occupant vehicles.

Policies:

1. Encourage the development of park and ride lots for car and van pools, and encourage employers to provide incentives to car and van pool users.

2. Promote physical and operational connections between various modes of transportation.

3. Ensure adequate mobility for all segments of the population, including residents who cannot or do not use private automobiles.

4. Foster a sense of mutual respect among users of the various modes of transportation.

5. Encourage the availability of multiple options for the movement of people and goods.

Transportation Goal 5

To establish a transportation system that minimizes the consumption of resources and maximizes the protection of the environment.

Policies:

1. Support efforts to minimize negative environmental impacts associated with the transportation system (including air quality, noise levels, surface water, vegetation, agricultural land, fragile areas, and historical/archaeological sites).

2. Encourage the preservation and enhancement of scenic views and corridors.

3. Support efforts to minimize energy consumption, especially nonrenewable energy resources, and explore expanded use of alternative fuels.

4. Factor direct and indirect costs and benefits into decision-making. Impacts that are not easily expressed in dollar values should also be considered.

5. Promote public awareness of the environmental impacts resulting from use of the Region's transportation system.

6. Promote a transportation system that encourages concentrated development, allows greater access to residences, employment, and services, and facilitates carpooling, bus and rail service, and non-motorized travel.

Transportation Goal 6

To make necessary improvements to achieve a transportation system appropriately structured and designed to safely, effectively, and economically move goods and people.

Policies:

1. Encourage the appropriate scale and design of streets, highways, and other transportation infrastructure to serve local traffic, destination traffic, and through traffic.

2. Foster a neighborhood street system characterized by a network of interconnected streets that minimizes through traffic in residential neighborhoods.

3. Promote safety-targeted measures at High or Potential Accident Locations, and promote traffic safety Region-wide.

4. Promote projects that limit the conflicts between the motor vehicle traffic stream, pedestrians, and the rail system.

5. Encourage access management policies that reduce traffic congestion and maintain capital investment.

6. Consider new facilities when demand warrants (e.g. when alternatives to reduce congestion and improve safety have been attempted) and/or when other strategic state, Regional, or local goals apply.

7. Foster a sense of safety and comfort for riders of public transit.

Transportation Goal 7

Promote a transportation system design that strives for aesthetic and functional characteristics that improve the quality of life.

Policies:

1. Support the design of visually attractive and durable infrastructure such as roadways, pathways, and bridges.

2. Support high architectural standards for terminal buildings, stations, shelters, garages, and other facilities.

3. Respect and enhance the built environment by restoration of period transportation structures where possible, and maintain the natural environment through architectural, landscaped, and engineered features.

4. Encourage traffic calming efforts to minimize conflicts between traffic and surrounding neighborhoods.

5. When feasible, encourage restoration or preservation of historic bridges.

6. Foster improvements that are contextually appropriate.

Transportation Goal 8

To promote a Regional transportation system that preserves and enhances residential and economic development potential in growth areas.

Policies:

1. Provide transportation system improvements at locations where they will or can serve growth areas.

2. Foster transportation and commerce links that contribute to the economic health of the Region.

3. Encourage transportation system improvements that renew and improve downtowns, growth areas, and neighborhoods.

Transportation Goal 9

To promote a Regional public transportation system.

Policies:

1. Provide for basic mobility for transit-dependent persons.

2. Support public transit that provides access to employment.

3. Encourage congestion mitigation to preserve air quality and the sustainability of the highway network. Support public transit that advances economic development with emphasis directed toward tourist areas.

6. UTILITIES, FACILITIES AND SERVICES ELEMENT

Public and private utilities, facilities, and services play a critical role in providing for the health, safety, and welfare of Central Vermont's citizens. All of us depend, in one way or another, upon water distribution systems, solid waste and sewage disposal, police and fire protection, health services, schools, parks, electric power and information technology.

The location, condition, and availability of services and facilities can have a profound influence on growth and development in a region. Homes, businesses, and industry tend to concentrate where utilities and facilities are readily available, while areas remote from infrastructure and services are more costly and difficult to develop (they often contain important natural resources as well). Hence, communities and regions, through the thoughtful placement of infrastructure, may direct growth to the most suitable location, or away from areas where change may have undesirable impacts.

The condition and scale of utilities also need to be considered. Where facilities are oversized and under-utilized, they may encourage unplanned growth or operate inefficiently and at unnecessary financial expense to residents. For systems that are at capacity and/or outdated, further development may cause environmental damage. Failure to upgrade urban systems may stall new growth or push it away from growth-designated areas. Communities and regions can avoid the above scenarios through the appropriate timing and sizing of infrastructure improvements.

Energy Infrastructure: Electricity

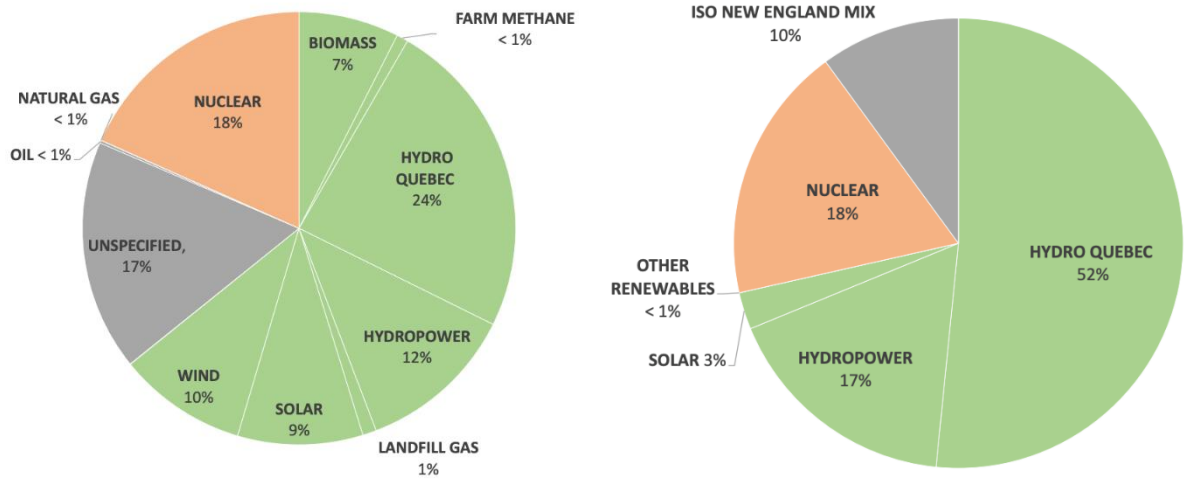
This section details existing infrastructure including generation, key trends, and challenges (including outages). Energy analyses and targets for the electricity, thermal, and transportation sectors, renewable energy generation siting, and recommendations can be found in the Energy Chapter.

Electric Distribution Utilities (DUs)

In 2021, Vermont distribution utilities purchased over 5.8 million MWh of

electricity to meet the demand of their customers, of this 64% came from renewable resources and 18% came from carbon free resources. Also in 2021, Vermont distribution utilities retired just over 4 million renewable energy certificates[47] (i.e. equivalent to just over 4 million MWh of electricity) to meet their obligations under Vermont's Renewable Energy Standards, of this 72% of the electricity Vermont accounted for was renewable; including nuclear, 90% of it was low-carbon.[48]

Figure 13: 2021 Vermont Electricity Characteristics



Source: Department of Public Service Webinar: Where Does VT Electricity Come From? https://publicservice.vermont.gov/sites/dps/files/documents/Webinar%201%20-%20Where%20does%20VT%20electricity%20come%20from.pdf

The left shows the electricity Vermont utilities generated and bought to meet demand, the right shows how renewable Vermont's electricity is considered based on renewable energy certificates

Central Vermont is served by four different distribution utility companies including Green Mountain Power, Washington Electric Cooperative, the

[47] Renewable energy credits (RECs) are the accounting system used to track all renewable electricity generation in or sold into ISO New England's regional electric system (ISO= Independent System Operator). These certificates ensure no two entities claim credit for that electricity, and provides a mechanism to buy and retire (aka take credit) for renewable energy generation regardless of their own production and use (or rather to compensate for it).

[48] See 3 one-page resources for more info: *Where does Vermont's electricity come from*, *Current policies & programs*, *and Tradeoffs between different sources of electricity*- these were made as part of the Say WATT? Regional Event Series in the fall of 2023 during which the Department of Public Service partnered with the RPCs to offer a series of engagement opportunities for Vermonters to weigh in on renewable electricity policies and programs: https://publicservice.vermont.gov/renewables

Northfield Electric Department, and the Hardwick Electric Department (see Table 28, below, for customer counts and types by town; and Map 21 for DU territory). Green Mountain Power (GMP) and Washington Electric Cooperative Inc. (WEC) are the region's primary distribution utilities, geographically covering most of the region. Central Vermont is unique in that most municipalities are served by at least two distribution utilities (exceptions are Warren, Waterbury, and Barre City served only by GMP; Northfield, Moretown, Berlin, and Calais are each served by 3 DUs). GMP territory is located primarily in the more populous valley areas such as Barre City, Montpelier, and many of the villages along the major transportation routes (Map 21 below); WEC territory fills in the more rural, and primarily residential, areas. Northfield Electric serves part of Northfield, as well as small parts of Moretown and Berlin; The Hardwick Electric Department serves much of Woodbury and a small sliver of Calais. Three phase power is limited in the region to where GMP provides it (see Map 21 below), this is important for siting distributed generation projects but not absolutely required for most residential and even some smaller municipal/commercial plants.

Map 21: Electric Infrastructure

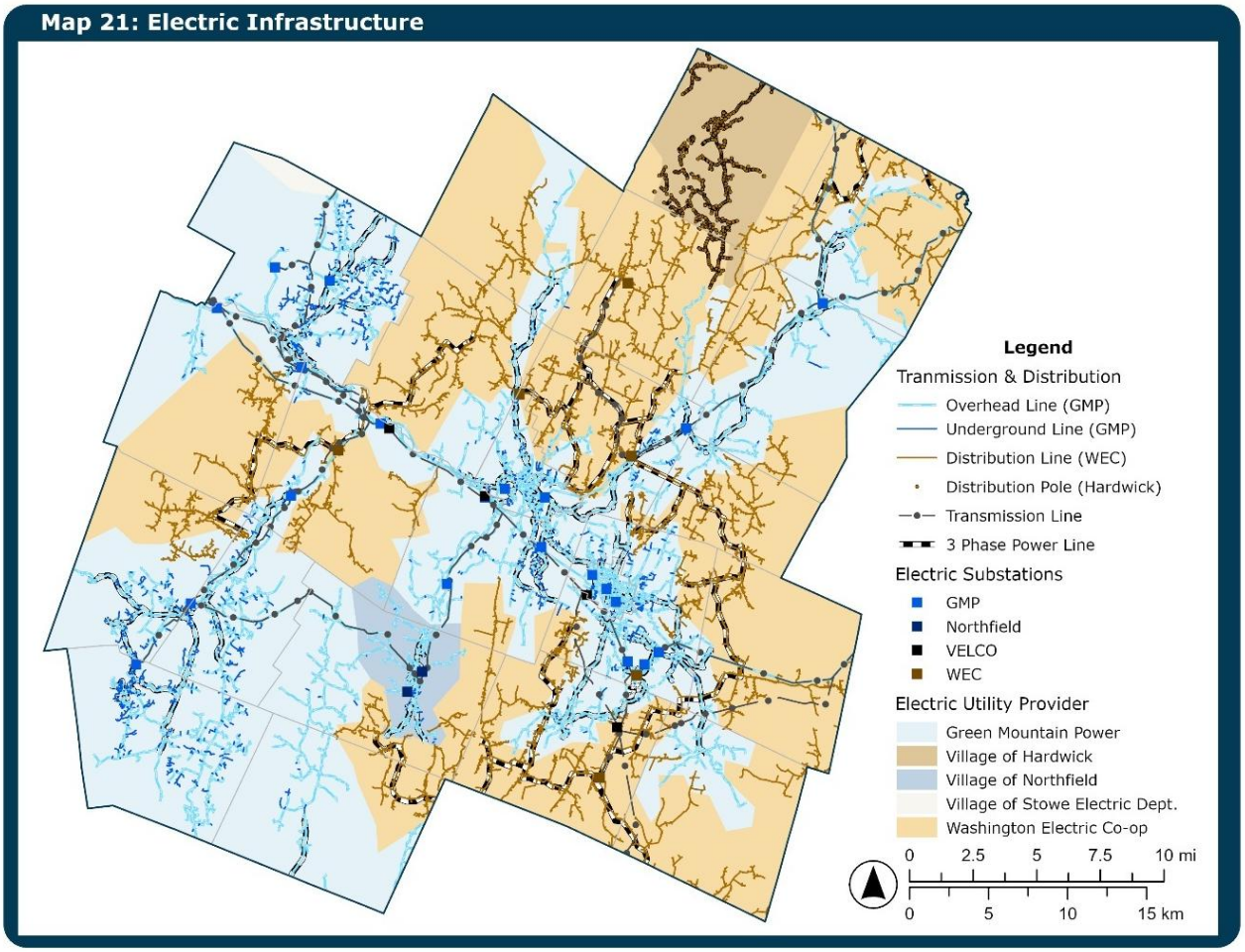


Table 28: Customer/Member by Town and Distribution Utility

	GMP	WEC	Northfield	Hardwick
Regional Total	27,246	7,167	2,200	738[49]
Barre City	4,525			
Barre Town	3,745	412		
Berlin	1,398	83	*	
Cabot	297	508		
Calais	121	733		*
Duxbury	208	471		
East Montpelier	599	753		
Fayston	710	346		
Marshfield	547	202		
Middlesex	306	578		
Montpelier	4,794	18		
Moretown	585	325	*	
Northfield	271	289	2124[50]	
Orange	55	494		
Plainfield	406	355		
Roxbury	269	111		
Waitsfield	1,376	50		
Warren	2,494			
Washington	334	223		
Waterbury	3,072			
Williamstown	901	892		
Woodbury		78		
Worcester	233	246		

Table 29: Customer/Member by Type and Distribution Utility

DU	Dairy Farm	Residential	Commercial	Large Power	Total
GMP		22,337	4,909		27,246
WEC	33	6,725	398	11	7,167
Northfield					2,200
Hardwick					738

[49] Northfield Electric and Hardwick Electric did not provide updated customer counts by towns, these numbers come from their Integrated Resource Plans and the number from Hardwick Electric

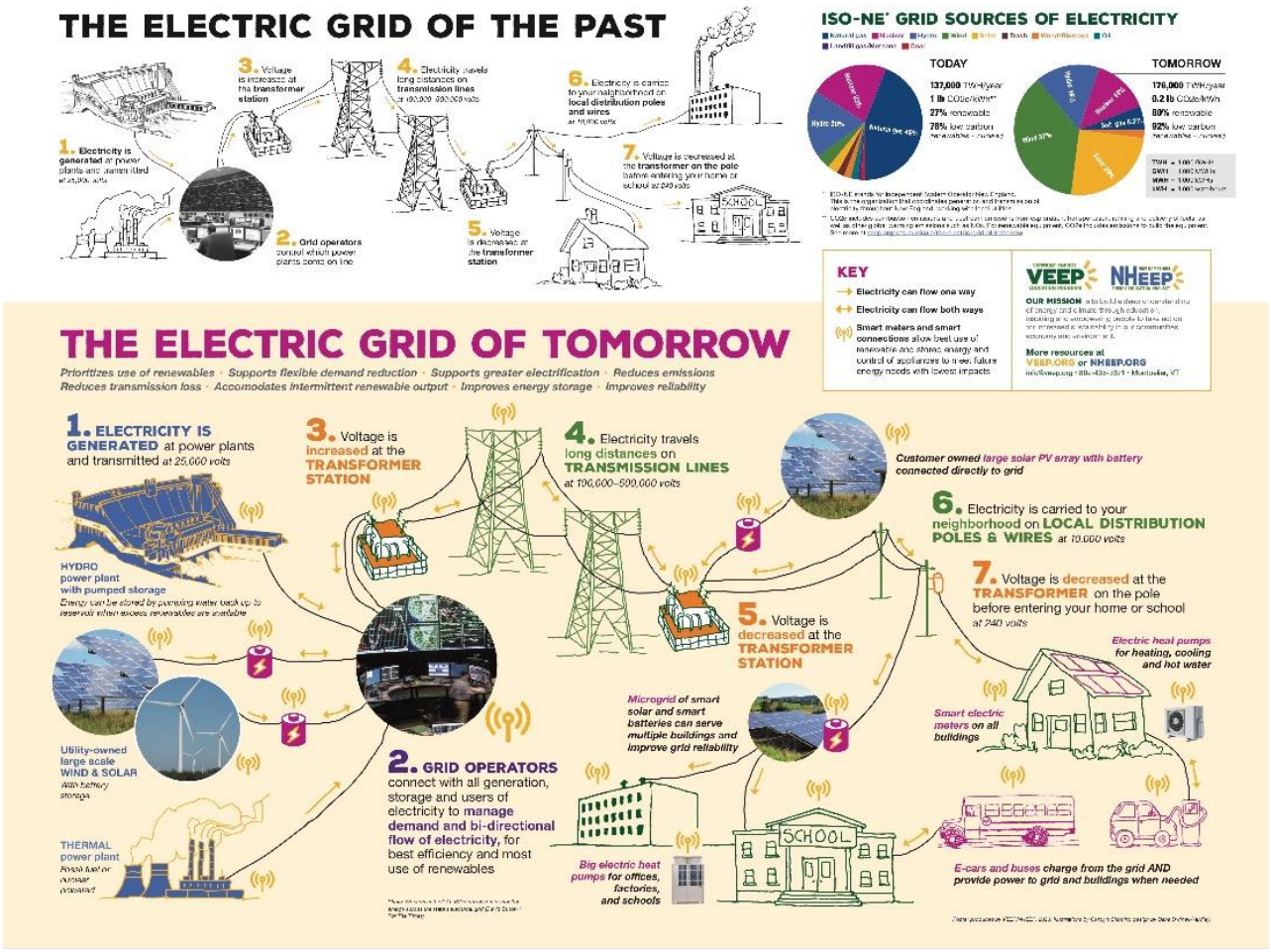
The Washington Electric Cooperative Inc. (WEC), a member-owner utility run by a 9-person member elected board, provides electricity to the more rural areas throughout Central Vermont. Its service territory covers a larger area geographically in Central Vermont than any other utility, serving approximately 7,167 customers. Due to the rural nature of WEC's service area, residential users account for an unusually high proportion of total demand; furthermore, the rural infrastructure is not co-located as often with roads nor hardened (buried), making it both more susceptible to Vermont's increasingly frequent extreme weather and more difficult to maintain and repair.

Central Vermont has 32 substations in 14 of our towns; most towns are at least partially served by additional substations outside the region. Distribution substation location, condition, and headroom capacity are important to consider when proposing distributed generation (DG) projects (see Enhanced Energy Element for a description of barriers and costs). Ultimately, the different distribution utilities in our region have unique challenges and benefits, most towns can utilize coverage by 2 or more DUs to maximize opportunities and minimize limitations, however at the individual scale this is rarely possible. The municipality can thus play a critical role in supporting residents and businesses to access key energy opportunities including renewable generation and storage, EVSE, energy efficiency measures, and more (see Enhanced Energy Element).

specifically reflects the number of customers on the Woodbury Circuit which may or may not reflect the true total customers in the region (a map of their circuits is not available online). Data requests were sent over the course of Fall 2023 and Winter 2024.

[50] Northfield has not provided specific customer counts by town; 2200 customers are served according to the Integrated Resource Plan; Efficiency VT data reported 2,124 residential premises served in Northfield, subtracting those reported by GMP and WEC gives this number although it should be noted that Efficiency Vermont data is simply given as residential premises not customers.

Figure 14: Electrical Grid Systems Primer, Poster from Vermont Energy Education Program



Electric Transmission

The Vermont Electric Power Company, Inc. (VELCO) manages the safe, reliable, cost-effective transmission of electric power throughout Vermont and as part of the integrated New England regional network. VELCO updates its Long Range Transmission Plan every 3 years. The 2021 and 2024 Long Range Transmission Plans[51] highlights that peak demand is forecast to grow due to accelerating electrification of the heating and transportation sectors. While the transmission system had sufficient capacity to serve expected future demand for the first 10-years of the 20-year planning horizon in the

[51] https://www.velco.com/assets/documents/2021%20VLRTP%20to%20PUC_FINAL.pdf
101252_Velco_CC24_singles.pdf

2021 plan, in one of the two forecast scenarios in the 2024 plan load growth was projected to create grid reliability concerns within the 10-year horizon:

- The 2024 LRTP offers a call to action for greater collaboration and focus on generation siting including storage, and on flexible load management to improve system resiliency, lower costs, and increase overall sustainability. Load management is necessary to serve high electrification loads consistent with Vermont's total energy and emissions goals in the 10- and 20-year planning horizons;
- A change between the 2021 and 2024 plans includes the transition from DG projects reviewed on a project-by-project basis without regard to transmission system impact to a cluster-based interconnection process[52] to prevent further stressing transmission and distribution systems, careful coordinated statewide planning is required to successfully integrate future distributed generation and storage without significant grid reinforcement especially as interconnection studies for small-scale DG do not include transmission system studies. Tables 8 & 9 in the 2024 LRTP suggests that there are potential transmission thermal impacts of high solar pv scenario within our region including on lines Berlin VT-Barre, Barre-Granite, Middlesex-Berlin; and transformers (Barre and Berlin). At the sub-transmission level this includes Berlin-Middlesex, Little River-Duxbury, Danville-Marshfield, North End-Barre, Websterville-South Barre, Montpelier-Berlin, North End-Berlin, Montpelier-Mountain View, Montpelier-East Montpelier, South End-Barre, and Middlesex-Moretown. These upgrades could be avoided in part with storage, load management, grid-optimized locations, and generation curtailment. It is likely a combination of transmission upgrades and non-transmission upgrades will be required. (Note storage is most impactful closest to constraints and the 2024 LRTP suggests a state-wide scheme including 15MW in the Montpelier area to mitigate these high solar scenario issues). It should be noted that CVRPC's own regional targets for generation

[52] The Vermont Systems Planning Committee, which plays a key role in the planning process for Vermont's electric transmission system including the preparation of the LRTP, regularly includes Transitional Cluster Study updates at their quarterly meetings from ISO-NE, VELCO, DUs, and developers e.g. July 2026 quarterly meeting.

have been adjusted since our 2024 plan and are misrepresented in the 2024 LRTP as nearly 3 times our actual goal- please see Tables A30 in Appendix A (page 61-63) which shows significantly fewer concerns as related to transmission and sub-transmission capacity for our region specifically. Future LRTP are unlikely to continue to run this higher solar pv scenario and thus CVRPC is working with the VSPC to identify more appropriate planning touch points in the future.

- There are sub-transmission scale reliability issues (categorized as causing high or low voltage, or a thermal overload in which equipment exceeds its rate temperature) including Montpelier-W. Berlin-Northfield, Moretown-Irasville-Northfield- West Berlin, Moretown-Bolton Falls, Barre Area, Websterville-South Barre, South End-Barre, Marshfield-Danville, and East Montpelier (pages 50-51, 2024 LRTP).
- The transmission system will experience reliability deficiencies due to peak demand growth in both summer and winter (more severe in winter) near the ten-year time frame, and load control may become less effective as loads continue to increase during the 20-year planning horizon. Within our region Barre transformer was noted as part of the "Northern Area" bulk system regional groupings (Table 2, 2024 LRTP).
- Granite substation (Williamstown) flagged for evaluation and likely mitigation (repair); out of several lines identified for extensive repair and structure replacements both the lines extending from the Granite substation to the Barre substation and from the Granite substation to the National Grid Comerford substation were include (project timing approx. through 2029).

As DUs take on more and more interconnection of distributed energy projects, coordination between VELCO, DUs, the Region[53], and municipalities will be increasingly important to ensure not only Vermont and its stakeholders can meet their respective goals, but that we do so in a manner that minimizes negative impacts to our landscapes and natural resources

[53] noted also by the Department of Public Service in the 2022 Vermont Comprehensive Energy Plan (e.g. pages 68, 87)
https://publicservice.vermont.gov/sites/dps/files/documents/2022VermontComprehensiveEnergyPlan_0.pdf

and maximizes benefits to all Vermonters foremost those who have been disproportionately burdened by energy costs and reliability issues to build resilience for all. CVRPC continues to work with DUs to integrate their Integrated Resource Planning into regional and municipal planning and project development and to advocate that regional and municipal energy planning and goals in turn are considered in their Integrated Resource Planning Processes.

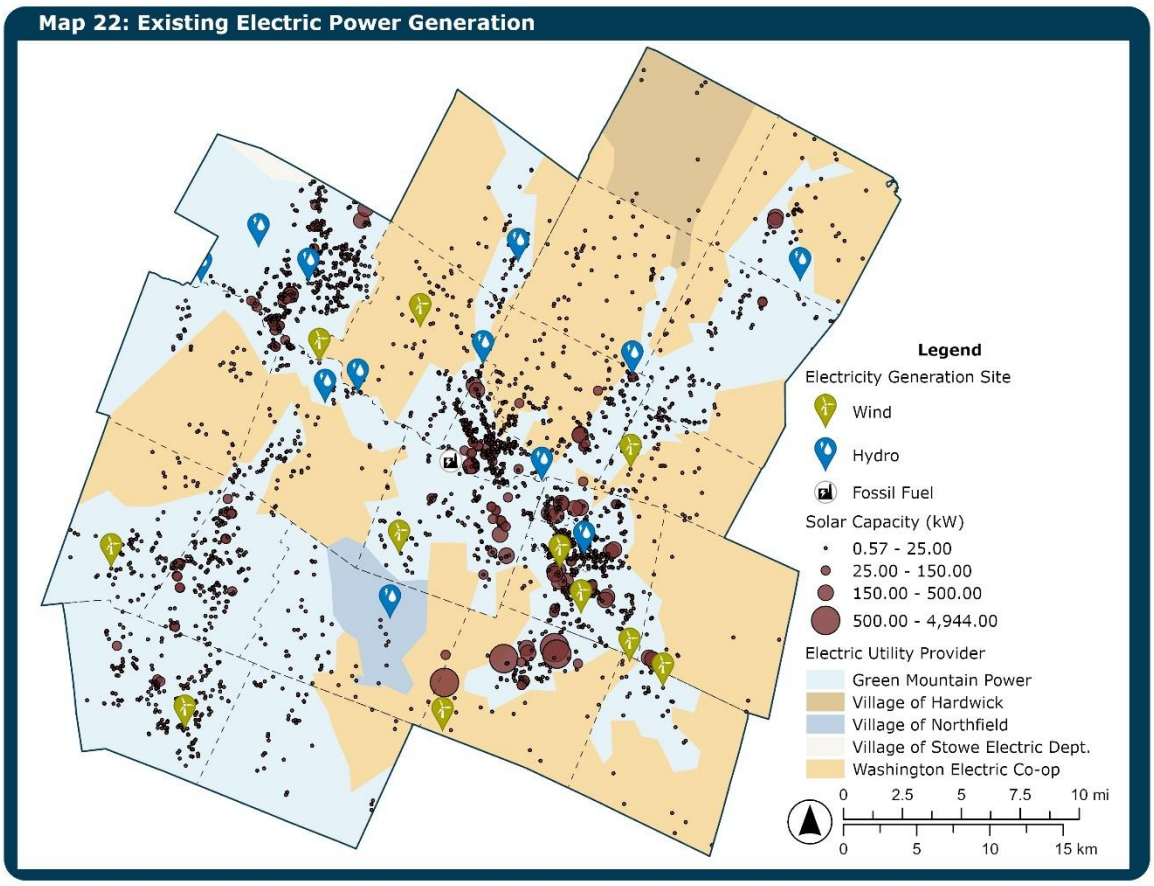
Efficiency Utility

Efficiency Vermont is the statewide energy efficiency utility; it provides technical advice and financial incentives to residents, businesses, non-profits, and municipalities alike to reduce their energy use and costs with efficiency buildings, equipment, and lighting. CVRPC works closely with Efficiency Vermont to connect municipalities with opportunities and to provide support to energy committees and coordinators with resources for their communities. CVRPC also works with Efficiency Vermont to provide data on consumption and efficiency measures implemented, as well as to adapt incentives programs and support in recovery situations (e.g. July 2023 floods). More information about energy efficiency and conservation, as well as supporting partners can be found in the Enhanced Energy Element of this plan. Additional key partners include Capstone Community Action who provide income-based fuel support, weatherization, and more to community members with the lowest incomes and highest needs.

Existing Generation & Storage Facilities

For an in-depth discussion of future renewable generation in the context of demand and energy planning see the Enhanced Energy Element, this section summarizes existing energy infrastructure including non-combustion-based renewables (solar, wind, and hydroelectric), combustion-based renewables (biomass specifically for electricity generation- for discussion on biomass and the thermal sector see the Energy chapter), nuclear energy, and fossil fuels (as categorized by the 2022 State Comprehensive Energy Plan). Appendix A pages 44-46 provide detail on existing generation data challenges and data sources used for summaries and mapping. Updated summaries will be available on the CVRPC website.

Map 22: Existing Electric Power Generation



There is one remaining fossil fuel peaking power plant in Central Vermont in Berlin run by Green Mountain Power:

Table 30: Regional Fossil Fuel Electricity Generation

Resource Type	MW	Town	Name	Details
Fossil Fuels	46.5MW	Berlin	Berlin 1	Gas Turbine, 46yo. Largest peaking plant in VT consisting of a gas turbine generator and 2 engines run on low-sulfur kerosene fuels. Full winter output is 50MW; 40MW in summer. Improvements were

				made in 2008, 2012, 2013, 2019, and 2020[54].

Existing Renewable Energy Generation has noticeably increased since the last plan (see Appendix A for further updates and discussion regarding Existing Generation Data, pages 44-46).

Table 31: Existing Renewable Electricity Generation

Existing Generation	2024		2016	
Resource Type	MW	MWh	MW	MWh
Solar	41.7	53876.4	24	29,919
Wind	0.24	473.04	0.14	486
Hydroelectric	26	134,861.4 *	25	88,467
Biomass (wood, methane, farm biogas)	0	0	3	13,091
Total Existing Regional Renewable Electricity Generation	68	189,211	52.14	131,963
Total Storage	7.95MW**			

Sources: Distributed Generation Survey (Distribution Utilities, Public Utilities Commission, Department of Public Service), Distribution Utilities Integrated Resource Plans, Federal Energy Regulatory Commission, Low Impact Hydropower Institute (Hydroelectric), Town Plans, State Comprehensive Energy Plan.

**calculated using constants provided on pages 57-58 in Appendix A (consistent with those used by the Public Service Department and the Generations Scenarios Tool), except for hydroelectric which was taken directly from DUs IRPs, FERC, and LIHI.*

The closure of the Moretown Landfill is a significant change for Central Vermont; while there are thus no longer biomass electricity generation

[54] page 192 of Green Mountain Power's 2021 Integrated Resource Plan https://greenmountainpower.com/wp-content/uploads/2021/12/2021-Integrated-Resource-Plan.pdf

facilities in the region, WEC acquired a significant portion of their power to serve their territories including Central Vermont from the Coventry Landfill facility among others biomass facilities just outside the region. CVRPC does not anticipate biomass becoming an electricity generation source in the region, although it plays a critical role in the thermal sector for both space and water heating and will continue to be a key resource for residential heating in particular (see Energy Element).

The region's hydroelectric facilities, though few in number, make up over a third of the region's renewable generation, balancing ecological considerations, flood management, and energy generation potential at these and potential future sites is a high priority topic for future planning efforts (see Map 22 above of existing hydroelectric sites and Map 16 on page 145 in the Energy Element). These are not new resources, despite the contrast in the table above, they were not reported in the previous plans assessment which likely was sourced specifically from the distributed generation inventory (DG Survey, see below) based off the Public Utilities Commission which focuses, generally, on smaller projects most participating in the State's net-metering program.

By and large the most change has been solar generation; in terms of numbers most are small residential scale plants (many, but certainly not all, are rooftop- we do not have data specifying the type). Below, in the table of renewable distributed generation in our region (<5MW), there is a clear preference, or at least ability to access and implement, smaller scale projects.

Table 32: Distributed Generation Projects <5MW

Total from DG Survey (not regional total)	MW	# Projects	
Generation <15kW Category I	14.69856	2233	Residential scale- most solar.
Generation 15kW to <150kW (Category II)	6.56739	184	Generally includes Municipal/Community Scale (not limited to)
Generation 150kW to <500kW (Category III)	6.18665	23	Currently have to be preferred sites to participate in net metering
Generation 500kW+	22.944	23	
DG Total:	50.3966	2463	

Source: Public Service Department 2/1/24, Current DG Survey (<5MW), see Methodology for aggregation below

This is very much in line with the results of community engagement efforts CVRPC conducted in the fall of 2023 in partnership with the Department of Public Service and the other RPCs. CVRPC found that in addition to consistent support for a diversity of renewable resources, that support was bounded by scale- as in support decreased with the scale of the project increasing (see full report[55]). CVRPC has found both in these engagement opportunities and while working with municipalities more broadly, technology type is not generally the key factor except for strongest opposition. Instead scale, location, and perceived community benefits/burdens are important to the region. An emphasis on local, community-scale, generation and storage is paired with other measures including efficiency/weatherization, waste heat recovery opportunities, dual land use, energy independence, and more. These represent a more holistic view of energy systems that stemmed from a wider variety of perspectives than are often considered. See the Energy Element for considerations and discussion of future renewable energy generation and more.

[55] CVRPC Report on Renewable Energy Standards Update Regional Engagement Events https://publicservice.vermont.gov/sites/dps/files/documents/CVRPC%20RES%20Event%20Summary.pdf

Table 33: Existing Renewable Energy Generation and Storage by Town

TOTAL EXISTING GENERATION			PROPOSED		EXISTING SOLAR			EXISITNG HYDROELECTRIC			EXISTING WIND		
Town	Total MW	% Regional	Projects	MW	Projects	MW	% Regional	Projects	MW	% Regional	Projects	MW	% Regional
Barre City	1.03	1.50%			138	0.93	2.20%		0	0.00%	1	0.1	42.39%
Barre Town	7.92	11.70%			273	7.79	18.70%	1	0.014	0.10%	3	0.12	51.28%
Berlin	1.32	1.90%	2 solar projects	4.4	79	1.32	3.20%						
Cabot	5.84	8.60%			53	0.84	2.00%	1	5	19.20%			
Calais	0.43	0.60%			54	0.43	1.00%						
Duxbury	9.25	13.60%			51	0.45	1.10%	1	8.8	33.80%			
East Montpelier	3.45	5.10%			148	2.28	5.50%	3	1.16	4.50%			
Fayston	0.48	0.70%			65	0.48	1.20%						
Marshfield	0.61	0.90%			68	0.61	1.50%						
Middlesex	0.75	1.10%			104	0.75	1.80%						
Montpelier	4.71	6.90%			307	3.78	9.10%	2	0.93	3.60%			
Moretown	5.21	7.70%			112	0.81	1.90%	2	4.4	16.90%			
Northfield	0.39	0.60%	16 solar projects, 2 hydroelectric projects	1.26	52	0.39	0.90%				1	0.003	1.04%
Orange	1.19	1.80%			23	1.19	2.90%						
Plainfield	0.53	0.80%			81	0.53	1.30%						
Roxbury	0.26	0.40%			32	0.26	0.60%						
Waitsfield	2.6	3.80%			132	2.6	6.20%						
Warren	1.34	2.00%			140	1.34	3.20%				1	0.003	1.06%
Washington	0.24	0.40%			29	0.23	0.60%				1	0.01	4.24%
Waterbury	9.97	14.70%			338	4.45	10.70%	1	5.53	21.20%			
Williamstown	9.97	14.70%			100	9.97	23.90%						
Woodbury	0.02	0.02%			2	0.02	0.04%						
Worcester	0.42	0.60%			39	0.24	0.60%	1	0.18	0.70%			
TOTAL EXISTING	**67.95**		**5.66**		**2420**	**41.7**		**12**	**26.02**		**7**	**0.24**	

Table 33b: Existing Renewable Energy Generation and Storage by Town

Town	STORAGE Total MW	Number of Projects	% Regional
Barre City	0.1367	17	1.72%
Barre Town	5.209	26	65.52%
Berlin	0.09	10	1.13%
Cabot	0.029	3	0.36%
Calais	0.01	1	0.13%
Duxbury	0.039	5	0.49%
East Montpelier	0.069	7	0.87%
Fayston	0.105	12	1.32%
Marshfield	0.08	9	1.01%
Middlesex	0.079	8	0.99%
Montpelier	0.3595	41	4.52%
Moretown	0.097	11	1.22%
Northfield	0.035	5	0.44%
Orange	0	0	0.00%
Plainfield	0.02	2	0.25%
Roxbury	0.075	9	0.94%
Waitsfield	0.3695	41	4.65%
Warren	0.543	60	6.83%
Washington	0.025	3	0.31%
Waterbury	0.539	62	6.78%
Williamstown	0.01	1	0.13%
Woodbury	0	0	0.00%
Worcester	0.03	3	0.38%
TOTAL EXISTING	7.9497	336	100.00%

Key Challenge

Vermont Distribution Utilities, to varying degrees, are implementing programs to smooth energy demand peaks and valleys through flexible load management, incentives, and battery storage. These initiatives are intended to increase system reliability, help address the climate crisis, and lower customer costs. The 2021 Vermont Long-Range Transmission Plan continues to emphasize the importance of thoughtful siting of generation with respect to interconnection and grid capacity, grid automation, deployment of battery

storage and flexible load management programs, grid reinforcements, as well as the communications infrastructure necessary to synchronize energy demands with supply across DUs. These ensure Vermont's transmission grid reliably serves expected load growth. The implications for our regional infrastructure, to the municipal and household scales, include the importance of the "get ready" approach to retrofitting/switching over individual systems and components to be in line with, and thus benefitting from these broader investments which includes at times, higher upfront costs and/or more intentional and longer-term phased planning (the Enhanced Energy Element will touch on many specific measures further). CVRPC thus anticipates, the key challenge facing our region is the capacity and coordination to draw down unprecedented funding and invest in not only transforming the energy sectors to meet legally binding GWSA goals to mitigate future climate change, but to support all our communities down to the local scale so that none are left behind or without options.

The vulnerability of our critical infrastructure, including our energy systems to high wind, wet heavy snow, and flooding, has become increasingly apparent. In the last five years or so, CVRPC has noticed the increased consideration of climate impacts in DU planning, for example GMP has conducted topographical surveys of their substations to assess their location in relation to FEMA-designated floodplains.[56] While the Middlesex transmission station and hydro generation are both located on ground higher than the 100-year and 500-year floodplain, the Waterbury distribution substation was rebuilt outside the 100-year flood plain (moved from 48 Winooski Street, Waterbury to Cloverdale Lane), and the Barre South End distribution substation was raised three feet at its current location (121 South Main Street Barre City) so that it is above the 100-year floodplain (Riverton in Berlin remains in the 500-year floodplain). Again, due to structure, dominant customer type and distribution, not to mention historical development, our region's DUs are not equipped equally to handle large infrastructure projects nor the increasingly demanding recovery efforts in response to extreme weather (see outages table). CVRPC will continue to work with regional and state stakeholders, including the DUs themselves, to identify opportunities for funding and technical assistance, build

[56] 2021 GMP IRP Appendix I: Substations https://greenmountainpower.com/wp-content/uploads/2022/01/Appendix-I-Substations.pdf;

transparency in planning processes, and promote public data sharing to support municipal and community efforts including Local Hazard Mitigation and Local Emergency Management Planning, as well as the development of projects and programs that promote on-site back-up power and/or the establishment of community micro-grids.

Wastewater Systems

The proper treatment of wastewater is essential to a safe, healthy environment. Today, we are doing a better job treating waste than ever before. Treatment plants built in the 60's and 70's reduced the impacts of effluent reaching our streams and rivers, including biological oxygen demand and microbe levels. In general, our surface waters are cleaner now than they were 40 years ago. Improved on-site septic system technology, regulation, and monitoring has had a beneficial impact on our environment as well.

There is still, however, much room for improvement. The volume of waste treatment byproducts (effluent and sludge) grows with the population. Disposal of these substances poses its own unique set of problems and issues. Though improvements have been made, combined sewer and storm water systems are still releasing raw sewage to receiving waters during heavy rains. In addition, there remain, in spite of new laws, many unregulated or "Clean Slate" on-site systems polluting our environment.

It is important then that we provide for the safe and efficient treatment of sewage for current and future residents. As communities in Central Vermont plan for the future, wastewater treatment and disposal will continue to be a critical factor, particularly when considering encouraging higher residential densities or in permitting commercial or industrial uses.

Public Systems

There are eight municipal wastewater treatment facilities in the Central Vermont region that serve over 10,000 households and scores of businesses and industries (see Map 23: Water Supply and Wastewater Infrastructure). They range in size from the Montpelier Wastewater Treatment Facility with a design of 4 million gallons per day (mgd), to a .045 mgd capacity facility in Marshfield. All provide secondary treatment of effluent. All discharge treated effluent is released into class C receiving waters of the Winooski River or its

tributaries. Combined, they retain over five mgd of reserve capacity. A more detailed analysis of each of the region's sewage treatment plants and their implications for future growth and development is shown in Table 35, followed by a brief summary of the individual systems.

Table 34: Wastewater Treatment Facilities

Facility Name	Permit ID	Permitted Design Flow (MGD)	2022 Monthly Average Flow (MGD)	Unused Flow
Barre City	3-1272	4	2.0838	1.9162
Cabot	3-1440	0.05	0.0175	0.0325
Marshfield	3-1195	0.045	0.0152	0.0298
Montpelier	3-1207	3.97	1.6136	2.3564
Northfield	3-1158	1	0.4469	0.5531
Plainfield	3-0381	0.125	0.0493	0.0757
Waterbury	3-1160	0.510	0.3324	0.1776
Williamstown	3-1176	0.150	0.0901	0.0599
		9.85	4.6488	5.2012

Most municipal systems in the region are operating under hydraulic capacity. It should not be inferred, however, that operating at less than hydraulic capacity represents available capacity. Other factors, such as capacity already allocated and/or being held in reserve, the amount of phosphorous in the treated effluent, and local decisions regarding how close to the theoretical limit the plant should operate, all affect the potential to use any remaining capacity. Generally when a facility is operating at 80 percent capacity regularly, the plant may be required to upgrade.

The needs to address aging wastewater treatment systems are significant. Nearly all municipalities with aging wastewater treatment systems need assistance in managing their assets. Many systems must implement improvements to either maintain or attain compliance with state clean water standards to protect public health and the environment. Upgrades to address Total Maximum Daily Load of phosphorus have increased the level of complexity and automation in some of the Region’s facilities, creating considerations for staff capacity to manage these systems.

Warren Community Septic System. The historic settlement pattern of Warren Village, with houses concentrated at high densities along the Mad River and Freeman Brook, had led to serious problems for continued on-site water and wastewater disposal. The town underwent detailed studies to identify a cost-effective combination of onsite individual and offsite cluster systems tailored to the localized need and conditions which resulted in permits for the first municipal alternative system in the state. The decentralized wastewater management program in Warren included upgrading individual, onsite systems; building an innovative system at the elementary school; and building a small cluster system and large cluster system to which residences can connect.

Lack of wastewater infrastructure has been cited as obstacles to promoting denser development and redevelopment in some of the Region's more rural villages. While new, centralized systems are a cost-prohibitive option, flexible or alternative waste-water solutions such as decentralized treatment systems may be a viable option for rural communities. Decentralized systems can include conventional or advanced on-site septic tank systems with dispersal trenches that serve individual homes and businesses, larger septic systems that serve a cluster of buildings on one or more properties or a sewer system that connects to a neighborhood or community treatment unit.

The decentralized option can be used in a more targeted way so that communities are able to envision their land use and environmental protection goals first and then develop wastewater management solutions to best serve those goals. As decision-making related to wastewater solutions can be very complex, forming an advisory body or local wastewater committee can be an important first step for a community in understanding the problem to be addressed and planning for local action. Recent legislation has also enabled municipalities to invest in essential public infrastructure through tax increment financing, with the explicit purpose of supporting the development of new housing.

Active public involvement in the needs assessment planning process led to the collection of better information regarding onsite systems, site conditions, and potential effects on drinking water supplies and surface waters. In the long run, this involvement led to public support for proposed solutions in Warren, including passing a local bond vote.

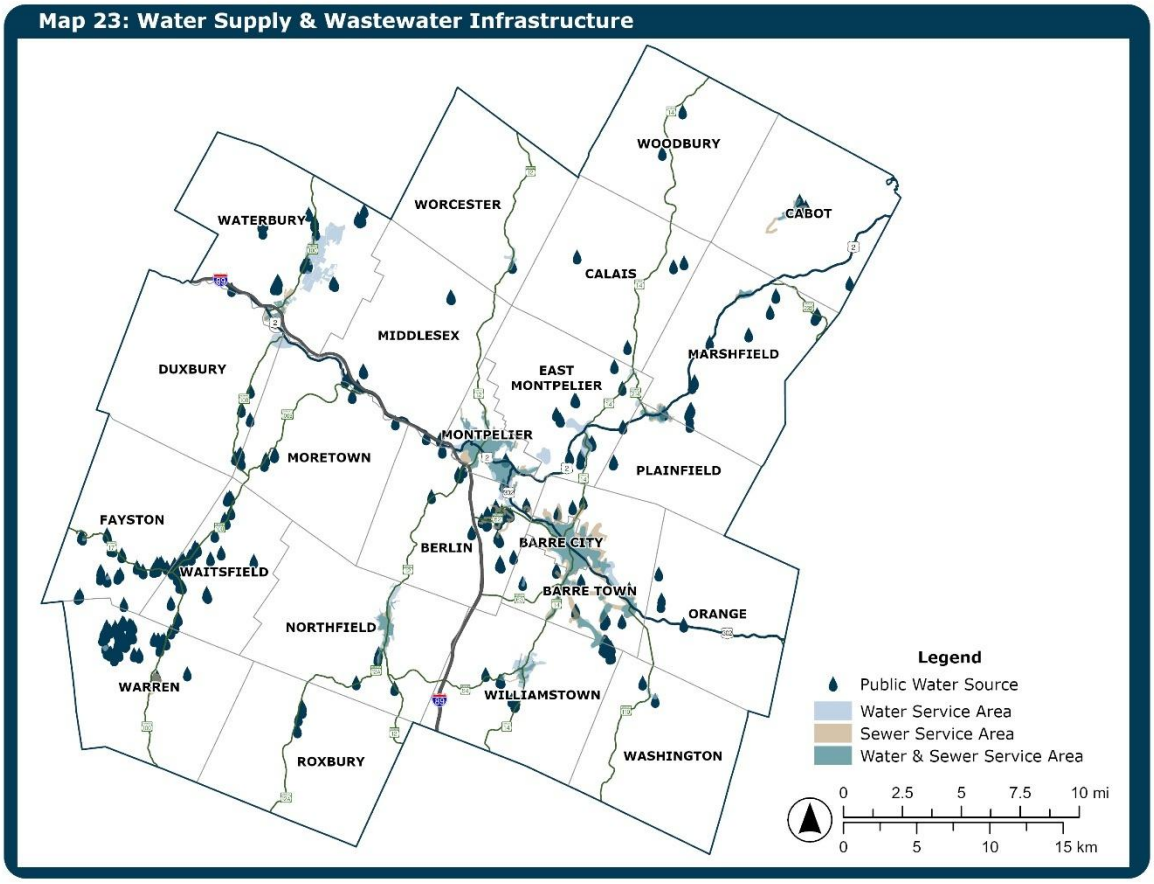
Sub-surface Disposal and Private Systems

Central Vermont is highly dependent upon on-site, underground septic disposal, as about half of our population lives in rural areas outside of the service territories of the above-described systems. Vermont's Indirect Discharge Permit Program regulates land-based systems with design capacities equal to or exceeding 6,500 gallons per day. Larger sub-surface discharge systems are predominantly located in the Mad River Valley towns and are otherwise serving resort-related condominiums or facilities.

Most on-site septic systems require specific soils and site characteristics to enable the effective treatment of wastes. Where soils are impermeable, too permeable, shallow, wet, or steep slopes, make conventional septic systems problematic and potentially hazardous. Accordingly, non-sewered areas displaying such site limitations have generally not been recommended for development.

Restricting such areas, however, intensifies development pressure on those soils that can accommodate septic systems. Unfortunately, prime agricultural land contains such soils. Clustered subdivisions with community septic systems may help overcome site limitations and simultaneously protect resource lands. Historically, many communities in Central Vermont enacted health or zoning bylaws to regulate the installment and engineering of new septic systems.

Map 23: Water Supply & Wastewater Infrastructure



Water Supply Systems

Water is among the most basic of human needs. A clean and plentiful supply of water is essential to our very survival. We need water in our homes to cook, clean, drink and flush waste. Water is critical to our ability to fight fires. Our farms, businesses and industries depend on a plentiful water supply for their operations, as well.

Public Water Systems

Many of Central Vermont's residences and businesses receive their water from public supply systems. Defined by the Department of Health as those systems that have ten or more connections and/or serve twenty or more people, public water supply systems are regulated by that same agency to ensure their compliance with state drinking water standards. Within the

region there are 138 permitted public water systems. The 17 municipally-owned community water systems in the Region are displayed below in the table. These systems serve populations ranging from approximately 62 hookups (East Calais) to 14,000 (Barre City). Twelve systems are permitted to allow expansion.[57]

Table 35: Municipally Owned Community Water Systems

Name	Community Served	Hookups	System Average Flow (theoretical gal/day)	Permitted to Expand
Barre City Water System	Barre City	14,000	1,600,000	YES
Barre Town Water System	Barre Town	1,638	102,000	YES
Berlin Municipal Water System	Berlin	300		YES
Cabot Town Water System	Cabot	250	24,650	YES
East Calais Fire District 1	Calais	62	8,050	NO
Edward Farrar Utility District	Waterbury	6,003	218,868	YES
Graniteville Fire District 4	Barre Town	700	108,914	YES
Marshfield Water System	Marshfield	350	26,000	YES
Montpelier Water System	Montpelier	8,912	900,000	YES
Northfield Water Dept	Northfield	5,145	327,000	YES
Plainfield Water System	Plainfield	985	41,107	NO
Waitsfield Water Supply	Waitsfield	450	33,000	YES
Washington Fire District	Washington	170	13,645	NO
Websterville Water System	Barre Town	367	30,464	NO

[57] This table is based on information received from the Department of Environmental Conservation in 2023, and as such, may not reflect the current status of permitting for systems to expand, or the ability to meet the demands of increased capacity.

Name	Community Served	Hookups	System Average Flow (theoretical gal/day)	Permitted to Expand
Williamstown Water Dept	Williamstown	985	89,100	YES
Worcester Fire District 1	Worcester	350	8,400	NO

The newest system to come online is the Berlin Municipal Water System, a $5.5 million community water system which supplies drinking water and fire protection to the Fire Department, Elementary School and commercial and residential areas in Berlin Corners. The system draws from wells drilled into bedrock and consist of 32,000 ft of distribution mains, 40 fire hydrants, a 400,000 gallon water storage tank and a well pumping station. The system makes municipal water connection available in previously undeveloped areas on the rural urban fringe and it will be important to orient local planning and policies for desired growth.

Currently, four of the municipally-owned water systems are structured as fire districts. Fire districts in Vermont are independent, quasi-municipal bodies with limited jurisdiction, established by acts of their respective Towns or Cities under the authority of State law. Historically, fire districts have arisen and been established to meet public needs in a part of a town that the town itself declined to assume. In the past, the need for fire-fighting services often prompted the establishment of a fire district, but more recently the needs for public drinking water or wastewater treatment have been the catalyst.

Reasons for a community to form a fire district or to take over private systems as such include eligibility for various state and federal funding programs and municipal financing rates and terms that are not available to privately owned systems. Disadvantages include the extensive time commitment required from members and the high level of technical, managerial and financial skills required by volunteers to operate a water system.

Many water and wastewater systems operate under direction of the legislative body and a few communities in the Region operate their water

and wastewater utilities under the authority of a separate water and wastewater commission. These include Waterbury, Plainfield and Northfield, where powers to determine operational budgets and user fees have been delegated by the Selectboard or the voters to the commission.

In the past, conflicts have arisen between municipalities regarding the shared use of a supply owned and operated by one municipality. The City of Montpelier has advocated for tax-sharing agreements where its system is providing water (and waste-water) service to adjacent communities. Inter-municipal conflicts have also surfaced where one municipality's source of water is located in or near an adjacent municipality, and thus is potentially affected by activities beyond the control of its users.

The physical components of the municipally-owned water systems range in age from newly installed to approximately 95 years. The most common problem facing communities that have or seek to have public community water systems is obtaining funding to acquire or upgrade water supply facilities. One of the largest needs for water systems is for distribution and transmission infrastructure. This critical portion of infrastructure is often overlooked as it is mainly below ground, however this component accounts for most of a typical system’s capital value. Managing hundreds, sometimes thousands, of assets with the staff capacity of most local utilities is a challenge in Vermont and the Region.

A strategy the State is employing to help address ongoing issues of system depreciation is an Asset Management approach geared towards changing the way water and wastewater utilities in Vermont think about their financial management and to aid in making decisions for how to most efficiently use limited resources.

This program provides technical assistance to help local operators inventory and develop a prioritized list of water infrastructure improvement projects.

What is Asset Management? The Environmental Protection Agency (EPA) defines asset management as “a process for maintaining a desired level of customer service at the best appropriate cost”. It is designed to aid water and wastewater systems in making decisions on how to most efficiently use their limited resources. An asset management program is developed to minimize the total cost of asset ownership by helping to determine when to repair, rehabilitate or replace the asset.

The average life of the asset, along with its replacement costs are taken into account when making these choices. Managing hundreds, sometimes thousands, of assets is a daunting task. Many systems will simply wait for an asset to fail before it is replaced. This is not always the best method. Unexpected failures can lead to large debts for a small system.

The development of an asset management program will inform the system when certain repairs or maintenance are needed and assist in developing a long-term funding strategy for larger assets. Issues related to aging systems combined with a loss of knowledge from personnel retirements, and public resistance to rate increases, results in a growing need to make every dollar count.

The July 2023 and 2024 floods brought location and hardening of infrastructure into focus for many municipalities, both within our region and in surrounding municipalities. Both water and wastewater facilities and their pipelines were damaged due to erosional forces. Exposing pipes to the floodwaters and inundating necessary infrastructure. This created loss of service and boil water notices throughout the region

Another issue some water systems in the Region struggle with are source yield and the need to identify additional reliable sources. Some systems that provide fire protection are under strain as they weren't necessarily designed with adequate distribution systems/pipes for use in fire protection.

In addition to the municipal systems, there are many other systems in the Region that meet the State's definition of a public water supply system serving facilities like campgrounds, recreation areas, mobile home parks, commercial areas, general stores and private schools. While almost every town in the Region has at least one of these systems, the highest numbers of them are found in the towns with ski-resort related development and in the Town of Berlin which contains a large commercial and industrial center and has attracted considerable development during the past 40 years. Outside of the service territories of public and private systems, water is generally obtained from on-site wells or springs.

Drinking Water Source Protection

Each public water system has an accompanying source protection area. The Vermont Water Supply Rule defines a Source Protection Area as: *… a surface and sub-surface area from or through which contaminants are*

reasonably likely to reach a Public water system source.

All public community and non-transient, non-community water systems must have approved Source Protection Plans. These Plans address the actions the public water system will perform to minimize the contaminant risks to their drinking water supply source. Threats to groundwater and wells in the region include agricultural run-off, nearby salt storage areas, road salting, underground or above-ground storage tanks, contaminated runoff from paved areas, flood events, and failing septic systems. Specifically identified threats in local operating permits for municipally-owned systems primarily include roadways and impervious surfaces within 200 feet of the water source. Two communities respectively identify a nearby sewage treatment line and an adjacent excavating operation as potential threats to drinking water sources.

In Vermont, Per-and Polyfluoroalkyl substances (PFAS) have been found in groundwater sources, contaminating drinking water and posing health risks. PFAS are a group of manufactured chemicals which have been used in industry and consumer products for decades. Such chemicals can persist in the environment for significant periods of time, bioaccumulating in individuals and the environment. While exposure to PFAS is not as widespread in Central Vermont compared to other regions, PFAS monitoring and mitigation remains important. The VT DEC, in collaboration with the VT Department of Health, is working to identify potential sources of PFAS exposure and to reduce or eliminate their use in commercial and industrial uses.

Within source protection areas, the DEC reviews Act 250 and wastewater facility applications. VT DEC also requires that towns develop a plan for protecting source areas. Towns are not required to regulate land uses within source protection areas, but some communities in the Region choose to do so.

Solid Waste

Vermonters generate an average of about five pounds of waste each day[58]. The proper management and disposal of solid waste is a critical challenge

[58] 2024 Disposal and Diversion Report

facing the region, with one remaining open landfill in the state that is projected to exceed capacity in about 20 years. The Region's growing population is projected to generate increasing quantities of household and business waste, and increasingly occurring events generate enormous amounts of waste that further reduce the in-state capacity for waste disposal. In 2012, Vermont passed Act 148, the Universal Recycling Law, which banned several types of materials from the landfill and requires waste infrastructure to provide accessible diversion options for those banned materials. Banned items include clean wood; leaf and yard debris, grass clippings, branches, etc.; food scraps, recyclable packaging, large appliances; scrap metal; used oil filters; automotive fluids; tires; explosives; fireworks and propane cylinders. Keeping these items out of the municipal solid waste stream protects solid waste workers and environmental health, preserves landfill space, and enables the recapture of valuable or hazardous components for appropriate disposal.

Solid Waste Districts/Entities

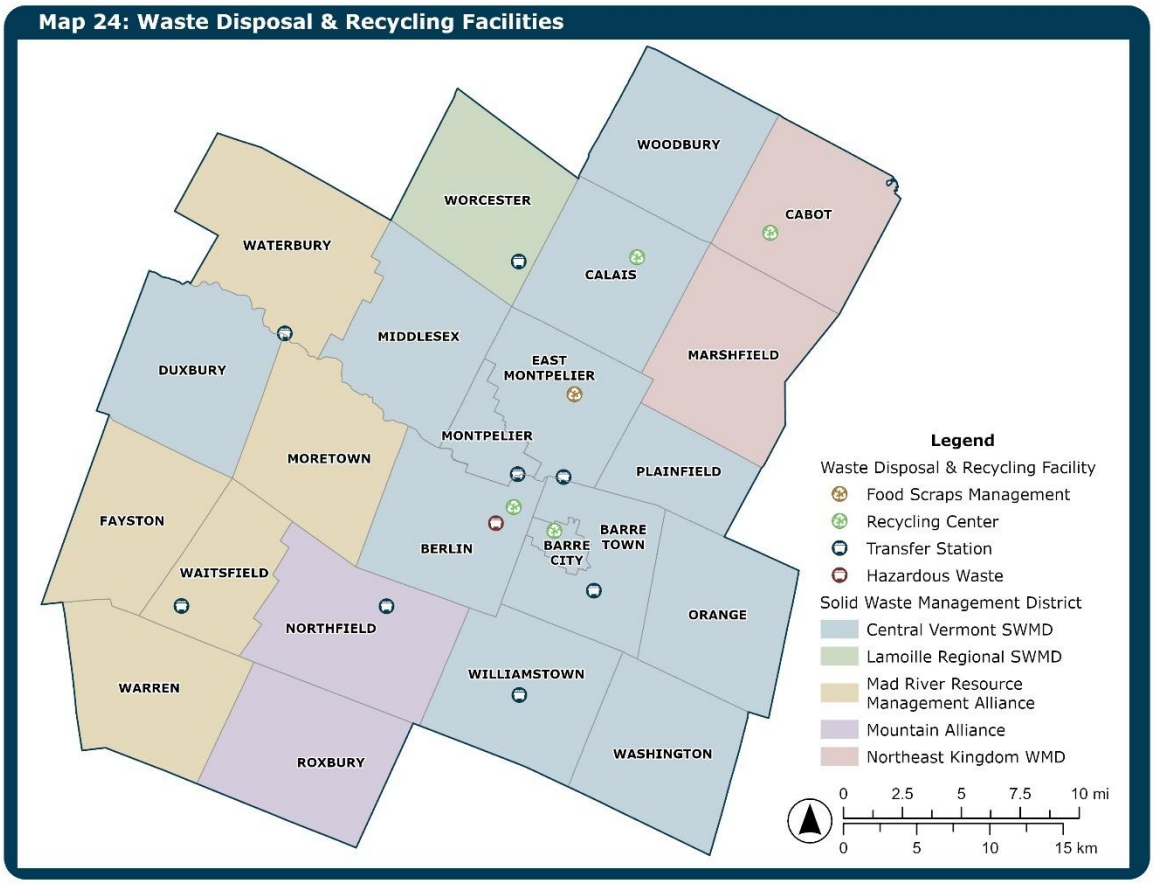
Five Solid Waste Districts and one Alliance operate within our Region. The Central Vermont Solid Waste Management District (CVSWMD) contains the majority of our towns: Barre City, Barre Town, Berlin, Calais, Duxbury, East Montpelier, Middlesex, Montpelier, Orange, Plainfield, Washington, Williamstown, and Woodbury. Marshfield and Cabot are served by the Northeast Kingdom Waste Management District. Northfield and Roxbury are a part of the Mountain Alliance Waste Management District. The Mad River Resource Management Alliance (MRMMA) serves Fayston, Moretown, Waitsfield, Warren, and Waterbury. The Town of Worcester is part of the Lamoille Solid Waste Management District. Each of the solid waste Districts/Entities is responsible for implementing the waste management goals the state sets in the five-year Materials Management Plan in their local jurisdiction. This includes providing outreach and education, maintaining information for residents on proper local disposal outlets, and providing hazardous waste collection services.

CVSWMD and other waste districts maintain information on their websites about waste management in Central Vermont, including:

- A list of transfer stations, drop-offs, food waste collection facilities, and other waste facilities serving the region;

- A list of licensed waste, recycling and food scrap collection businesses and licensed waste haulers;
- A list of reuse and repair businesses;
- Information on the reasons for and paths to reducing the use of hazardous chemicals and safe disposal methods to protect human health and our natural resources;
- Resources and technical support to schools and businesses in their district to assist their diverting food waste from landfills to composting;
- No-cost programming to help regional schools with safe waste management and diversion efforts; and
- Other topics related to waste management, reduction, and hazards.

Map 24: Waste Disposal & Recycling Facilities



Trash and Recycling

In Central Vermont, most of the trash generated is sent to the landfill in Coventry, the only current operating disposal facility in Vermont, with a projected capacity limit date of 2046.

There are several local disposal options for residents and businesses, including one-day bag-drops, municipal transfer stations, private waste facilities, and full-time commercial Transfer Stations. Curbside collection of trash and recycling is available to most of the households in the region through licensed private waste haulers.

Waste facilities all perform the same basic functions: waste is aggregated, sorted, and processed for delivery to either the landfill or a downstream processor for desired materials (recyclables) that are separated from trash. Act 148 requires all waste facilities to accept food scraps and recycling. Separating recyclable or hazardous components of the waste stream reduces the burdens on disposal facilities and protects public health and safety. Source separation of waste materials produces cleaner and more valuable products but is more challenging to educate customers on. Recycling is primarily sent to the Williston Materials Recover Facility owned by Chittenden Solid Waste District and operated by Casella.

Composting

Composting is the process of decomposing organic materials (for solid waste purposes, primarily food scraps) along with carbon containing "brown" additives like wood shavings to create a value-added soil amendment product. Composting the organic components of the solid waste stream saves landfill space and prevents greenhouse gas generation caused by anaerobic decomposition of those organic materials had they been landfilled. Source-separated organics can be managed locally to produce a composted product that benefits local gardeners, farmers, and landscapers. Several businesses offer compost services, including commercial scale or small-scale drop-off (e.g. Vermont Compost in Montpelier and Dog River Farm in Berlin).

Re-use & Repair

Re-use and repair are key methods of waste reduction and resource conservation. By repairing or re-homing products that would otherwise be thrown out, we save landfill space and reduce the need to extract additional

resources to produce and ship new goods. The Central Vermont region is home to several dozen operations that repair or resell clothing, household goods, electronics and furniture.

Business and Household Hazardous Waste Collection Facilities

Some waste generated by households and businesses poses a threat to human and environmental health: collectively called Hazardous Waste. Examples include automotive fluids, fuels, pesticides, aerosol cans, fertilizers, paints, solvents, disinfectants, pool cleaners, and other commercially available chemicals. The release of even small quantities of these materials into the environment can pollute air, soil and water, poisoning humans and animals and causing birth defects and other lasting ailments.

Hazardous waste is regulated under two categories; household hazardous waste (HHW) and business hazardous waste. Despite the fact that the chemicals may be identical, businesses are subject to more regulations and are required to manage their waste materials in accordance with federal, state, and local rules.

Hazardous waste is banned from the landfill because it vaporizes into the air or drains as a liquid leachate, contaminating ground and surface waters. Even if leachate is captured, it is difficult to neutralize or remove at wastewater facilities, like Montpelier's Water Resource Recovery Facility that treats Coventry landfill's leachate.

CVSWMD operates a year-round hazardous waste and collection facility in Berlin, while the Northeast Kingdom Waste Management District operates a hazardous waste collection facility from May through September in Lyndonville. The Mad River Resource Management Alliance, the Northeast Kingdom Waste Management District and the Lamoille Regional Solid Waste Management District host seasonal one-day events for household hazardous waste collection. In 2024, 682 tons[51] of hazardous waste was managed through waste district programming. Some facilities and events also accept special recycling materials such as batteries and fluorescent bulbs.

Product Stewardship/Extended Producer Responsibility (EPR)

Product Stewardship, also known as Extended Producer Responsibility (EPR), is a system in which producers are required to help pay for responsible

disposal options for their products. Vermont’s EPR programs require producers to create product stewardship organizations that establish collection systems for those items that have been identified as problematic for landfilling or recycling due to hazards, or because they contain valuable recyclable components, often both.

Vermont’s current EPR programs include batteries; architectural paint, stain, finish and sealer; fluorescent bulbs; mercury thermostats; and TV’s, computers, and computer peripherals. The state is working to expand the list to include specific household hazardous products through Act 158.

Communications

Our era is often referred to as "the age of communication." Innovations in the way we process and transmit information have made the world a smaller place. Communication networks are rapidly linking the Region's residents, businesses, and governments with the rest of the world. While Central Vermont's existing communication facilities seem adequate to meet current needs, the maintenance and continued development of communications systems can help keep Central Vermont informed and competitive. Many businesses and individuals seek out areas where high speed internet connections and cellular service are available to locate their businesses and buy a house. Ultimately though, such systems may make our current working and living patterns obsolete, as they change the elements of our lifestyle, such as the distinctions between home, the work place, and the marketplace.

Radio

Twelve radio stations host transmitters within the region of these two are AM, with 10 being FM. These stations have seen an overall loss in listenership due to streaming services but still do play an important role in public messaging and reporting. The Region is also served by Vermont Public radio and several commercial stations broadcasting from locations outside Central Vermont but whose transmitters are located here.

Newspaper

The Barre-Montpelier Times Argus and the Burlington Free Press are the primary daily newspapers serving the Region and its residents. These

publications cover international, national, regional and local news. Weekly papers, covering local and/or sub regional events include; The Valley Reporter (Waitsfield, Warren, Moretown, Fayston and Duxbury), The Hardwick Gazette (Woodbury, Cabot, Calais and Marshfield), The Cabot Chronicle, the Northfield News and Transcript (Northfield and vicinity), and the Washington World (all of Central Vermont). In addition, several community papers exist in the region.

Television

Most residents of Central Vermont are within receiving distance of signals from affiliates of the major commercial networks. Only two have licenses within the region, WNNE, a CW affiliate, and WVER, a PBS affiliate. Cable television is now available to over three-quarters of the Region's population. Under Public Service Board rules, cable television companies offer local access for community programs.

Voice Communication

The majority of Central Vermont is served by Consolidated Communications of Vermont Company (CCVT), LLC, which conducts business as Fidium. Areas outside of CCVT's service territory include: The Mad River Valley, where Waitsfield Telecom operates, Northfield & Roxbury are served by TDS Telecom and finally part of Washington and Orange are served by Topsham Telephone.

Many residences are still served by a landline connection even though use of such services has seen a significant decline as cellular and internet options have abounded often for lower costs than landline service. As of 2020 only 12% of Vermonters live in a landline only household.

Wireless Telecommunication Facilities

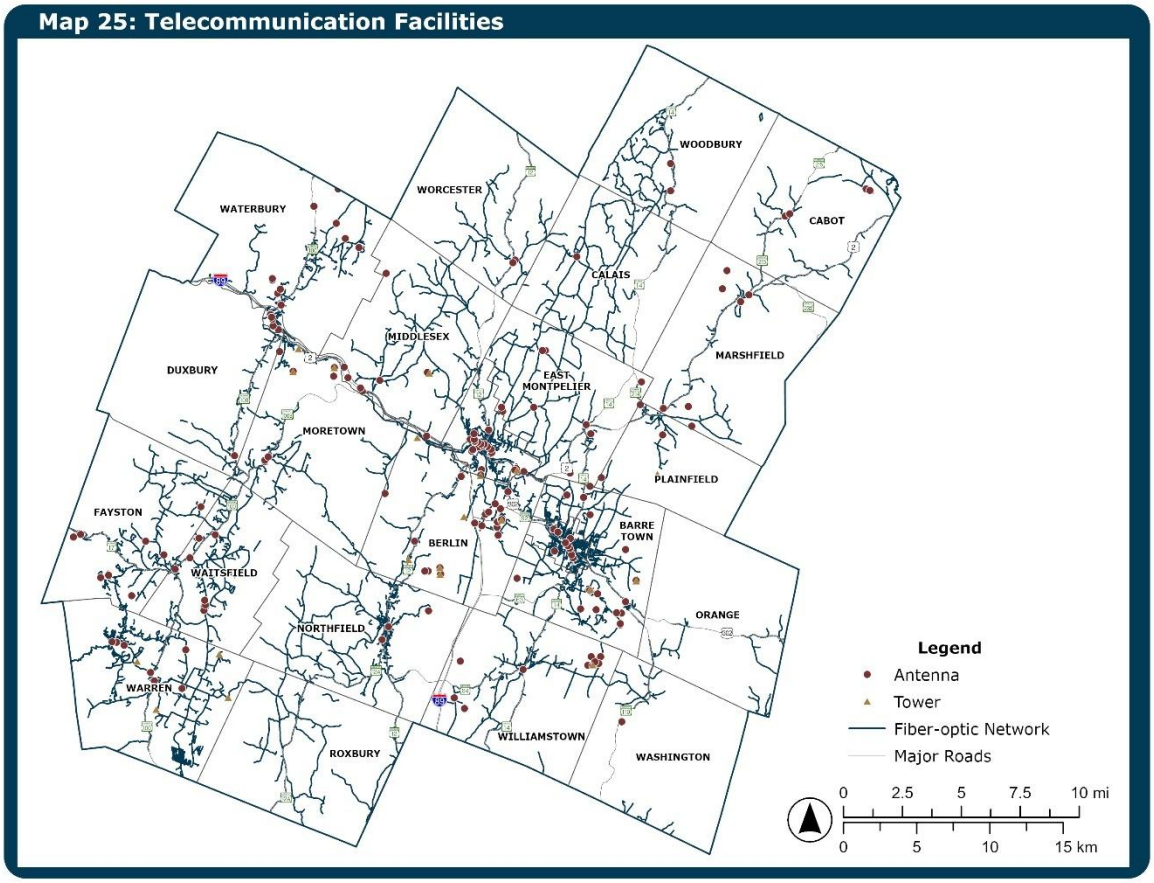
Wireless communication through broadband technologies has become a part of everyday life and a service relied upon by business, emergency services, and the public. Clearly, the ability to communicate to almost anyone, from almost any-where, at almost anytime brings added convenience and security to our lives.

Throughout Central Vermont, we are seeing continuing applications for the installation of wireless telecommunication facilities. This is partly because the demand for wireless services is growing and partly because

of changes in technology.

While Central Vermonters want and expect good cellular service, they also expect the placement and design of new facilities to be guided by a respect for the integrity of the Region's landscape and compliance with microwave emissions standards. As such, it is important to balance aesthetics, signal quality, business and personal needs when deciding whether and where to build new towers and other facilities.

Map 25: Telecommunication Facilities



The Federal Telecommunications Act of 1996 does not allow local governments to prohibit the construction of wireless facilities on a town-wide (or city-wide) basis, or to make regulatory barriers so onerous as to effectively block service. However, municipalities did retain the right to place reasonable requirements and restrictions upon such facilities in order to protect community character and the environment, encourage the efficient

use of resources, and seek coverage for local service gaps. In 2007, the Vermont Legislature created 30 V.S.A. § 248a. Section 248a provided telecommunications carriers seeking to construct telecommunications facilities the option of obtaining a CPG as an alternative to local zoning and Act 250 environmental review. Applicants using the Section 248a process are not obligated to adhere to zoning ordinances of the host town.

During the 2014 legislative session, the General Assembly crafted new provisions relating to town participation in 248a proceedings. Criteria is applied in the review of projects requiring the Public Service Board to give *substantial deference* to the land conservation measures in the plans of affected municipalities and the recommendations of the municipal legislative bodies and the municipal and regional planning commission regarding the municipal and regional plans, respectively, unless there is *good cause* to find otherwise.

Communities planning for the appropriate sitting of wireless facilities have to ask themselves many questions as they proceed. Would they rather have several small scale, less visible, facilities closer to the population or a few large, highly visible sites in less populated spots? Are there certain locations that are so environmentally or visually sensitive that they should be "off-limits", consistent with other forms of development (see siting of electric infrastructure on pages 125-137)? What areas are providers most interested in serving? Where are local service gaps and who do they impact? Through careful planning and clear language in the duly adopted municipal plan, cities and towns can ensure good service without compromising their character or the welfare of their residents.

Broadband and Internet Services

Internet services have become an integral part of everyday life relied upon by business, emergency services, and the public. Clearly, the ability to communicate to almost anyone, from almost anywhere, at almost any time brings added convenience and security to our lives. Broadband is an oft-referenced essential telecommunication technology that refers to high speed internet access. Central Vermont has several internet providers, and high speed connections are now available to most residents in highly populated areas. Although service has improved beyond dial-up for many Central Vermont residents and businesses, the nature of "adequate" service is an evolving concept that will continue to present challenges for the region. As

the broadband networks supporting the global and national economies are improved to meet demands for greater speed, residents and businesses in Central Vermont will need service that is adequate for them to participate. Broadband was originally defined as data communications at speeds faster than a dial-up connection, which is typically 56kbps or less.

All towns in the region have broadband, cable, or fiber optic within their communities. Many of the more rural areas are greatly limited in the build out of this infrastructure. CV fiber is attempting to address this within the region by building out a network in the more rural and underserved communities to allow high speed internet access to more remote areas. The towns of Orange and Roxbury currently have the smallest areas served by any of these services within the region. These services can replace standard telephone services with Voice over internet protocol which allows telephone calls to be transmitted over internet connections. The installation of these services increases the economic opportunities of individuals with access to high-speed internet services.

Cable Internet Access

All cable providers in Vermont offer broadband service. All cable providers offer speeds of at least 4/1 Mbps and in most cases much faster speeds. Prices for broadband service are generally competitive with DSL, but cable offers higher speeds. In Central Vermont cable is available primarily in or in the vicinity to the Region’s downtowns and larger villages.

Wireless Internet Service Providers (WISPs, or Fixed wireless)

Vermont consumers are served by several Wireless Internet Service Providers. These companies offer fixed wireless broadband service to residents within range of their facilities. Expansions to the system included the development of the Cloud Alliance broadband network which, in partnership with the VTA and Central Vermont Economic Development Corporation, provided for new service to homes and businesses in Woodbury and Cabot and improved the speed of broadband service in Plainfield, Marshfield, East Montpelier and Calais.

Mobile Wireless Data Service

Vermonters are served by all of the major wireless network providers, but AT&T Mobility and Verizon Wireless have the deepest facilities-based

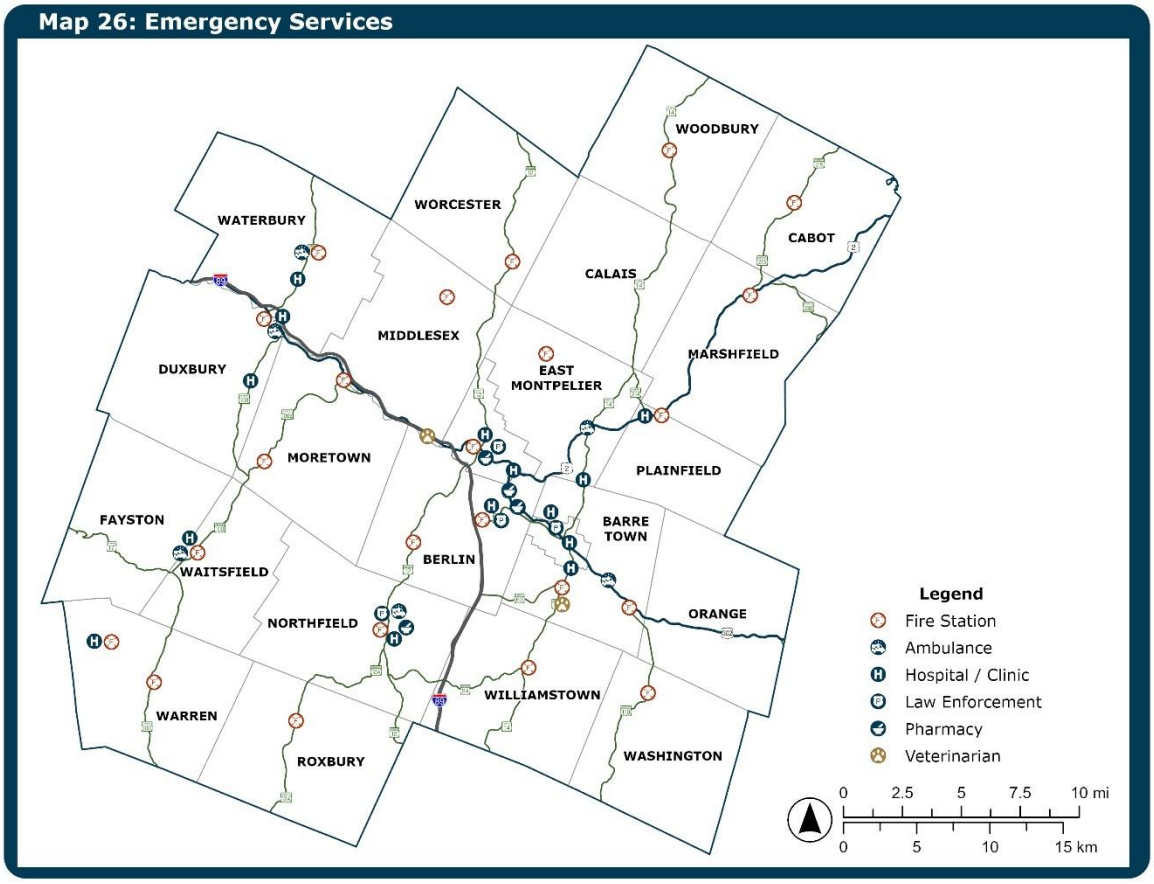
penetration in Vermont. VTel recently launched a wireless service, which is anticipated to be operational statewide. Vermonters may also choose service from a variety of pre-paid service providers and resellers of national service. As discussed more fully in the Voice portion of this chapter, mobile carriers are continuously expanding coverage and upgrading facilities to bring 4G/LTE service to existing coverage areas.

Vermont needs its wireline networks at this time. For rural residents and small businesses, wireline service is a necessity. Residents in rural areas may not have adequate cell coverage. DSL is also the best available broadband option in Vermont's most rural areas. Concerns over E-911 and the reliability of wireless service in a power outage are valid and should be carefully considered before the state accepts wireless services as a substitute for wireline services.

Emergency/Health Services

The availability of emergency services and health care facilities helps to ensure the personal safety and physical well being of Central Vermonters. As the Region grows, changes, and ages, new and increasing pressures will be brought to bear on service providers and existing facilities. While the cost of providing such services soars, public funding supplies are not keeping pace. Obviously, it will take innovative thinking and action to address the Region's long-term emergency and health care needs.

Map 26: Emergency Services



Fire Protection

Central Vermont is protected by over 19 local fire departments. Most of these are based in village or urban areas and staffed by volunteer crews. Due to the volunteer nature of most of the region's fire departments, many have been struggling with membership. This can be due to the increased strain of work/home life and the need for significant training to qualify as a firefighter. In some instances, the demands on local fire departments are beginning to outstrip their capabilities. Sprawling development patterns make response more difficult and time consuming. The fact that most individuals are employed outside of their home community increases the difficulties of quick response times during normal business hours.

All the Region's fire companies are members of the Capital Fire Mutual Aid (CFMA) system. These associations provide for back-up assistance from

neighboring member companies, when needed, and coordination of radio and training needs. The current dispatch framework that Capital Fire Mutual Aid utilizes is at the end of its lifespan. It was built in 1989 and desperately needs to be upgraded and replaced. CFMA has completed a design study for its update and is coordinating with the State to be the pilot of the State's public safety communications system. Within the region, continued identification of opportunities for shared-service models, regional staffing strategies and mutual aid agreements will strengthen the efficiency of emergency services.

Many of the fire stations in the Region need upgrades due to the age of the structures and the need for more room to accommodate new technology size. During the July 2023 flooding event, multiple fire stations were damaged from flooding and erosional damage, heightening the need to increase the resiliency of emergency services and move facilities to protected areas. Expanding regional capacity for emergency response to meet evolving risks, including climate-related hazards, is vital. CVRPC provides technical assistance to municipalities to plan for emergency services and assess operational capacity.

Police Protection

Although not immune to crime, Central Vermont has historically enjoyed low crime rates. Our ability to maintain lower crime rates will depend on maintaining adequate police services at the local and regional level.

Barre City, Barre Town, Berlin, Montpelier, and Northfield maintain municipal police squads. The Washington and Orange County Sheriff's Departments, located in Montpelier and Chelsea respectively, provide contractual law enforcement services to some of Central Vermont's smaller communities. The Vermont State Police (with headquarters in Waterbury and barracks in Berlin) provides primary police service to those towns without municipal squads or contracts with County departments, and backup assistance to all others. In addition, the State Police patrols Interstate 89.

Ambulance/Emergency Medical Services

Both full time and volunteer ambulance and emergency medical squads operate in and around Central Vermont, providing first aid and medical transport to injured persons. Most of these operate with volunteer crews and are funded at least in part by donations and user/member fees. The region is

served by volunteers such as the Barre Town EMS, Mad River ambulance, Waterbury ambulance, and Cabot Ambulance. Many municipally owned squads, such as Montpelier and Barre Town, contract with neighboring towns to expand coverage. The Vermont Medical Reserve Corps are community-focused volunteers who supplement local public health and emergency response resources. Lack of volunteers and members is cited by several squads as major concerns for the future. Coordination between municipalities, hospitals, EMS providers and regional agencies, as well as partnerships that improve the efficiency and reach of public health systems are supported in this Plan.

Table 36: Emergency Resources by Municipality in Central Vermont

Town	Police Force	Fire Protection	EMT
Barre City	Full Time	Full Time	Full Time
Barre Town	Full Time	Hourly	Full Time
Berlin	Full Time	Volunteer	Contracted from Barre Town
Cabot	State and Sheriff Contract	Volunteer	Volunteer
Calais	State and Sheriff Contract	Contracted from Woodbury and East Montpelier	Contracted from Woodbury and East Montpelier
Duxbury	State and Sheriff Contract	Contracted from Moretown and Waterbury	Contracted from Waterbury
East Montpelier	State and Sheriff Contract	Full Time with Volunteers	Full Time with Volunteers
Fayston	State and Sheriff Contract	Volunteer	Volunteer (MRV Ambulance Service)
Marshfield	State and Sheriff Contract	Volunteer	Contracted from East Montpelier
Middlesex	State Contract	Volunteer	Contracted from Montpelier
Montpelier	Full Time	Full Time	Full Time
Moretown	State and Sheriff Contract	Volunteer	Contracted from Montpelier, Waterbury and MRV Ambulance
Northfield	Full Time	Volunteer	Full Time and Volunteer
Orange	State Contract	Contracted from Barre Town, Washington and Tri-Village Fire Dept	Contracted from Barre Town
Plainfield	State Contract	Volunteer	Volunteer
Roxbury	State Contract	Volunteer	Volunteer
Waitsfield	State and Sheriff Contract	Volunteer	Volunteer (MRV Ambulance Service)
Warren	State Contract	Volunteer	Volunteer (MRV Ambulance Service)
Washington	Sherriff Contract	Volunteer	Contracted from Barre Town
Waterbury	State Contract	Volunteer	Volunteer
Williamstown	State and Sheriff Contract	Volunteer	Contracted from Barre Town
Woodbury	State and Sheriff Contract	Volunteer	Contracted from Hardwick Emergency Rescue Squad
Worcester	State Contract	Volunteer	Volunteer

Medical Facilities

The Central Vermont Medical Center (CVMC), located at Berlin Corners, is the Region's most significant medical complex. With 122 beds and a service area which includes all of Washington County and portions of

neighboring counties, CVMC is truly a regional facility. A wide range of medical specialties and procedures including; emergency care, x-rays, rehabilitation, pre-natal and maternity care, pediatrics, physical therapy, mental health care, and cardiology, are available at CVMC. Some unusual and complex problems, however, may require more sophisticated treatment and/or equipment at tertiary care hospitals.

In addition, the Washington and Orange County Mental Health Agencies provide mental health counseling, adult day programs, and substances abuse services to those in need.

The Region's elderly population is expected to grow for at least the next several decades. Accordingly, elder care facilities and services will become increasingly important. The region is host to 19 nursing, assisted living, and residential care home facilities.

Finally, Central Vermont is home to several health care clinics including Planned Parenthood of Northern New England (Barre), private facilities, and complexes of physicians.

Health care costs continue to rise at a rate faster than the rate of inflation. Consequently, access to adequate health care services has become an impossibility for many people. It is the position of CVRPC that health care should be everyone's right.

Emergency Planning

Emergency planning is an important aspect of planning that is critical to every municipality in Central Vermont and the Region as a whole. The goal of emergency planning is to work toward the development of disaster-resistant communities; through land use planning that reduces the impacts of disasters on persons and property. Municipalities can utilize tools, such as town plans and zoning regulations, to implement sound land use practices that consider the consequences of disasters, whether they be naturally occurring or man-made. In order for a municipality or the Region to understand the types and extent of potential disasters, an assessment of all known risks from potential natural and man-made disasters needs to be completed. These identified risks can then be used to develop land use practices that will protect a community from disaster, based on mitigation, preparedness, response, and recovery.

Naturally occurring disasters, which are the most common form of disaster in Central Vermont, are those events that result from environmental conditions. These disasters vary in frequency and magnitude, but always pose a threat to the Region. In Central Vermont, the most common types of natural disasters include: floods, winter storms, hurricanes, landslides, wildfires, earthquakes, and even tornadoes. Although some of these disasters may seem unlikely in Central Vermont, it is critical to plan for them, so that the impacts from their occurrence can be mitigated if they do indeed hit the Region. However, those disaster events that occur more frequently in Central Vermont, mainly floods and storms, should be given priority in the planning process.

Several major flooding events have affected the state in recent years, resulting in multiple Presidential Disaster Declarations. From 2003 to 2019, Washington County experienced roughly $88.82 million in municipal property damage due to flood events. It is estimated that the July 10th, 2023 flood created $352.7 million in County damages. Based on this data, it is evident that Central Vermont is vulnerable to major storms and the damage resulting from them.

Man-made disasters are those events that are caused by humans, usually involving accidents with hazardous materials. Man-made disasters can occur either on-site, such as factory malfunction, or in transit, such as an accident involving a truck carrying hazardous materials. Although these types of events occur less frequently in Central Vermont than natural disasters, they can be extremely dangerous and a threat to public health. Title III of the Superfund Amendment Reauthorization Act (SARA), Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C.11001 et seq. (1986) gives a municipality the legal right to know what chemicals are being used, stored, made, or transported through the community. This information regarding the presence of chemicals can be gathered from businesses and is distributed back to a municipality’s fire departments or first responders.

Mitigation is any action that reduces or eliminates long-term risk to people and property from disasters and their impacts. It involves an ongoing effort at the individual, local, State, and Federal level and is aimed at reducing the impact of disasters on families, homes, communities, and economies. Mitigation includes compliance with the National Flood Insurance Program (NFIP). Municipalities must be in compliance with this program in order for

property owners to receive flood insurance to offset some of the costs of major flood events. All 23 municipalities in Central Vermont are in compliance, however, FEMA is currently updating Flood Hazard Maps and regulatory standards – actions that will require amending local bylaws in many cases, if eligibility is to be maintained. CVRPC has been assisting communities in responding to these new mandates.

Municipalities in Central Vermont have a variety of tools and programs to assist them with mitigation activities. The Federal Emergency Management Agency (FEMA), through Vermont Emergency Management (VEM), administers the Hazard Mitigation Grant Program (HMGP).

This program allocates funding to municipalities, following a Presidential-declared disaster, to implement mitigation projects. In addition, the Vermont Local Roads Program assists municipalities in setting the proper standards for planning roads, culverts, bridges, and access to local roads.

The Regional Emergency Management Committee (REMC) is comprised of one emergency coordinator from each municipality and one representative from the emergency services community. The REMC is responsible for developing a disaster response plan for the Region, including training and exercises.

Response is a time sensitive reaction to an emergency event designed to save lives, save property, and stabilize the situation. Response to an event includes warning, evacuating, rescuing, sheltering, informing, and providing medical care to the public. Recovery is the effort to restore the infrastructure and the social and economic aspects of communities after a disaster occurs. In the case of severe events in which the President of the United States declares a disaster; Federal funds will become available to assist impacted communities with recovery efforts.

Emergency Management

Emergency management in Central Vermont is handled at the local level. It is led by a municipality's emergency managers and emergency personnel who are either professional or volunteer-based depending on the community. Emergency management deals with emergency events that occur on a regular and irregular basis, such as fire, injury, accidents, and crime. It is very important to the social and economic stability of Central Vermont and should be a high priority in the Region. Due to limited

emergency resources and the geographic extent of certain towns, emergency management is sometimes coordinated among municipalities. This is especially true with ambulance and rescue services in Central Vermont.

Local planning for disaster response is primarily done in Vermont by Local Emergency Management Plans, an integral part of each community's response. This is stated in 20 V.S.A. § 6 and the State Emergency Management Plan. That all municipal jurisdictions are expected to update and review their Local Emergency Management Plan yearly and to formally readopt them following town meeting day and before June 1st. These plans address the framework of how a town will respond during a significant event or disaster. The plan stipulates who the emergency management director is, where the town Emergency operations center and shelters are located, and any spending authority the emergency management director may have during a disaster. The plan is also used by the state during a disaster for who to contact in each town and reporting to the State Emergency Operations Center. This is also required to receive federal preparedness funding and is a component in the state Emergency Relief and Assistance Fund that combined with the other requirements increases a municipality's state reimbursement rate during a declared disaster.

Crime And Safety

At first glance, crime may not seem like an issue that bears much relation to land use planning. However, these issues do share many of the same peripheral concerns. Population growth tends to increase the opportunity for both interpersonal and land use conflicts. In addition, crime prevention experts and land use planners are both interested in many of the same "quality of life" issues, including: livable wage, the availability of meaningful jobs, access to education and training, access to transportation, community stability and vitality, recreational opportunities and even the aesthetic quality of the places where people live. It is widely accepted that vibrant, pleasant, well-planned communities can avoid many of the socio-economic conditions that lead to conflict. Conversely, low crime rates are essential to the creation and maintenance of these kinds of places. To the extent that this relationship exists, it can be said that this

Plan deals with the issue of crime prevention by default in the policies and programs espoused in its required elements. However, CVRPC believes the connection between land use planning and community conflict is important enough to merit direct attention.

Crime prevention is only one piece of the puzzle, however. The others may be found in the answer to the question "What happens after a crime has been committed?" The components of the answer involve the exploration of such concepts as justice, punishment, rehabilitation, restoration, and re-integration.

The traditional justice model is founded on the concept of retribution. The offender is generally punished for his or her offense by jail time, fines, or probation. The sentence is intended to be both the punishment and the rehabilitation with the prospect of returning to jail serving as the incentive to reform behavior. The offender has little or no contact with the victim of the crime and no requirements (or opportunity) to make amends directly. Some crime experts argue that this traditional justice model is responsible for over-crowded prisons, high recidivism rates, and an unsatisfactory outcome for crime victims.

Corrections agencies around the country, however, (including Vermont's Department of Corrections, DOC) also operate under a paradigm that stresses "restorative" over "retributive" solutions for non-violent crimes. This model (called the "Restorative Justice Program" and authorized in Vermont Statute Title 3 Section 163) is intended to make offenders answer directly to those they have wronged and begin to make amends to their victims and the community. Often this approach can maximize public resources by having offenders perform community services instead of serving costly prison sentences. In addition, it can reduce court loads and the associated expense to the taxpayers. However, there is the danger of the cost of delivering justice in this format being shifted from the State to the municipality.

Under the "restorative" model, justice for non-violent crimes may be prescribed by those closest to the offender and the victim through the establishment and operation of community reparative boards and/or restorative justice centers. Such an approach could work hand in hand with other local initiatives, such as neighborhood watch programs and "reintegration panels." While community-based justice would be in keeping

with CVRPC's commitment to "bottom up" public processes, valid concerns exist over impartiality, over-zealousness, and personal vendettas whenever small town dramas play out. Consequently, the community restorative justice model demands protection against abuse. In addition, financial incentives to municipalities are an integral part of the success of the community restorative justice model. The costs usually borne by the State should not be passed on to the municipalities.

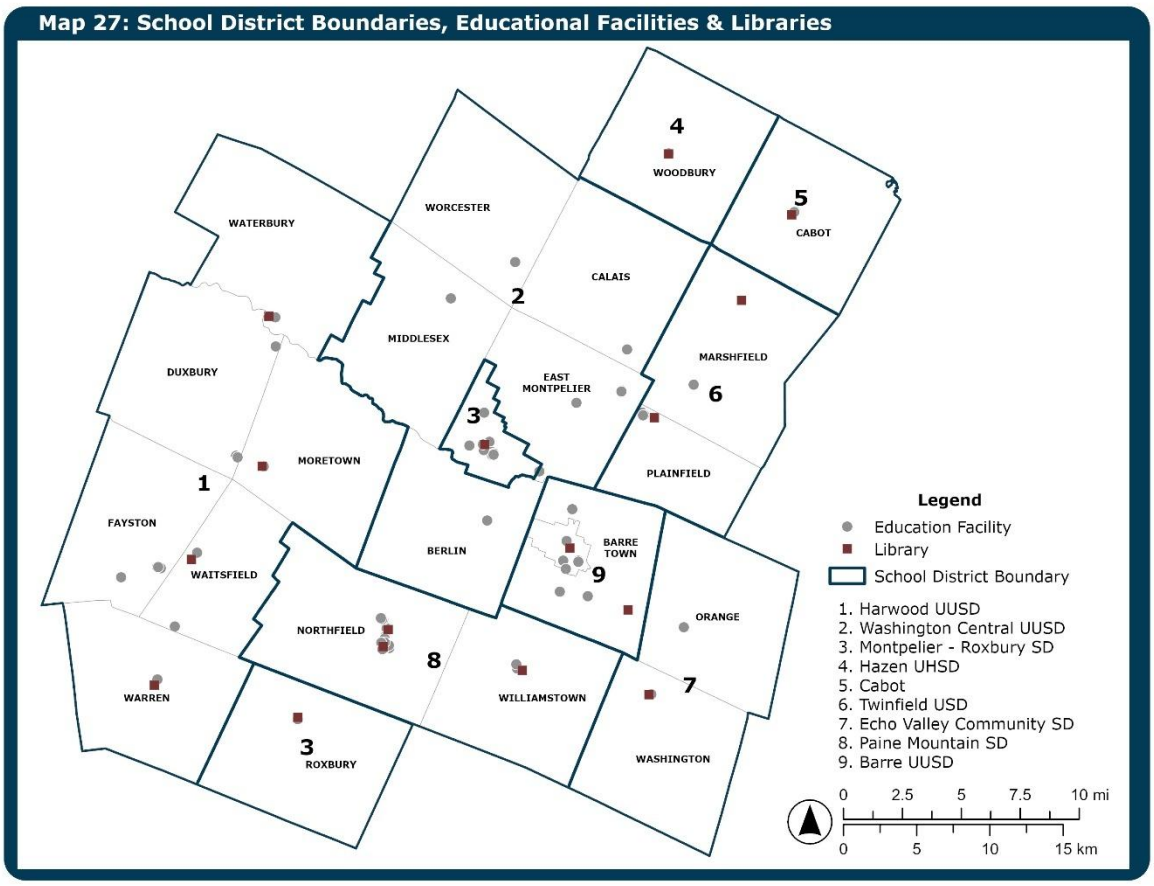
Obviously, this model is not applicable to violent or serious crime. In such instances the need to protect the public from further harm requires that offenders be incarcerated even as it is becoming increasingly difficult to house the prison population.

Educational Facilities and Services

A commitment to education is the hallmark of an enlightened society. A well-educated citizenry contributes to the societal, economic, and cultural well being of a place. Education expands the horizon of individuals, families, communities, and nations. It is the laboratory in which new ideas develop, ideas that may one day mold the future, or correct the mistakes of the past. Further, education should be a life-long process, not a luxury of youth.

While the link between education and regional planning is not particularly obvious, there are in fact connections. Planning decisions regarding the location and amount of future growth may influence the location and size of future schools or the stability of existing ones. Planning can help schools project future needs and assist municipalities in financing capital improvements. CVRPC hopes this Plan can be used to broaden access to educational and vocational training opportunities, so as to help ensure the full realization of the abilities of Central Vermonters.

Map 27: School District Boundaries, Educational Facilities & Libraries



Central Vermont is home to 18 public elementary/middle schools, eight middle and /or high schools, and two schools (Cabot and Twinfield) which host students K-12. There are a couple of higher education programs in Central Vermont, including Norwich University in Northfield which offers four-year degree programs, in a variety of disciplines. Associates Degree programs and about 100 different courses are offered through the Community College of Vermont (CCV). CCV maintains central administrative offices in Waterbury and conducts classes in Montpelier.

Vocational training opportunities are available to Central Vermonter's primarily through the Barre Regional Vo-Tech Center which offers programs in: accounting/bookkeepers, typing/general office skills, general marketing, allied health, food service, vocational home economics, brick/stone masonry, automotive mechanics, and drafting. Some area high schools offer courses in vocational skills as well.

Table 37: Public School Enrollment

Org Id	School Name	2015	2025	% CHANGE
PS381	Barre City Elem/Middle School	771	617	-19.97
PS020	Barre Town Elementary School	755	719	-4.77
PS033	Berlin Elementary School	168	150	-10.71
PS390	Brookside Primary School	716	300	-58.10
PS055	Cabot School	169	130	-23.08
PS056	Calais Elementary School	117	77	-34.19
PS391	Crossett Brook Middle School US #45	263	260	-1.14
PS357	Doty Memorial School	63	63	0.00
PS091	East Montpelier Elementary School	175	172	-1.71
PS107	Fayston Elementary School	90	98	8.89
PS138	Harwood Union Middle/HS #19	649	550	-15.25
PS173	Main Street Middle School	184	348	89.13
PS191	Montpelier High School	280	383	36.79
PS193	Moretown Elementary School	98	119	21.43
PS210	Northfield Elementary School	242	211	-12.81
PS211	Northfield Middle/High School	296	256	-13.51
PS215	Orange Center School	102	80	-21.57
PS250	Roxbury Village School	37	Closed	N/A
PS181	Rumney Memorial School (Middlesex)	156	88	-43.59
PS276	Spaulding UHS #41	717	611	-14.78
PS304	Twinfield Us #33	372	282	-24.19
PS305	U32 UHS #32	773	646	-16.43
PS308	Union Elementary School	469	366	-21.96
PS315	Waitsfield Elementary School	127	126	-0.79
PS320	Warren Elementary School	145	106	-26.90
PS322	Washington Village School	79	105	32.91
PS343	Williamstown Elementary School	196	192	-2.04
PS344	Williamstown Middle/High School	318	263	-17.30
PS353	Woodbury Elementary School	43	48	11.63
		8570	7366	-14.05

Source: Vermont Agency of Education (2025)

In addition to declining enrollment, some public schools face major

expansion, renovation, or construction costs due to State public facility standards, as well as other factors. Recent focus on the removal or remediation of PFAS has added additional pressure to the expense and maintenance of school buildings within the region as the state continues to test these facilities for the extent of the exposure to PFAS.

Child Care

Overview: The availability of safe and affordable childcare services is critical to the Central Vermont Region. Quality childcare benefits families by preparing children for schooling and social interaction while enabling parents to work and provide income. It benefits businesses by expanding the workforce and creating more reliable, productive employees. Furthermore, childcare facilities are businesses themselves and their existence expands local and regional economies directly through the hiring of workers and purchase of goods and services. Research has shown that investment in early child development programs brings a real (adjusted for inflation) public return of 12% and a real total return, public and private, of 16%.

Availability: Despite the economic and social good created by childcare services, Vermont appears to have a shortage of such facilities. In fact, the Child Development Division of the Vermont Agency of Human Services estimates that the capacity in regulated facilities meets only 50-60% of the State-wide need. Consider the following statistics:

- 72% of infants, 50% of toddlers, 53% of preschoolers are likely to need care and don’t have access to any regulated programs in Washington County.
- There are 28,997 children under the age of 5 in the State. An estimated 22,249 of those require childcare.
- Cost of childcare has increased with average costs across the state being $13,915/year for infant care at a Childcare Center (CCC) and $9,428/year at Family Childcare (FCC) this being between 10%-14% of median income of a two-earner family to 32-48% the median income of a single-parent household. Vermont-Front (childcareaware.org) Costs decrease slightly as a child grows but costs for a 4-year-old are still $12,835/year (CCC) and $8,885/year (FCC).

- Only 35% of licensed centers serve infants and toddlers in the State of Vermont.
- Only 25% of the demand for infant care is being met.
- An estimated half of all Vermont businesses have employees with a child or children in childcare.
- From the Lets Grow Kids Stalled at the Start, Vermont's Child Care Challenge report 2024 Washington County's estimated need was 545 infant, 211 toddler, and 447 preschool slots. Orange County needs an estimated 298 infant, 94 toddler, and 245 preschooler slots.

Table 38:Licensed Child Care Providers in Central Vermont

Town	Licensed Child Care Programs	% Regional Total
Barre City	15	14.2%
Barre Town	15	14.2%
Berlin	5	4.7%
Cabot	4	3.8%
Calais	4	3.8%
Duxbury	3	2.8%
East Montpelier	7	6.6%
Fayston	1	0.9%
Marshfield	0	0.0%
Middlesex	2	1.9%
Montpelier	12	11.3%
Moretown	3	2.8%
Northfield	4	3.8%
Orange	1	0.9%
Plainfield	4	3.8%
Roxbury	0	0.0%
Waitsfield	6	5.7%
Washington	2	1.9%
Waterbury	7	6.6%
Warren	3	2.8%
Williamstown	7	6.6%
Woodbury	0	0.0%
Worcester	1	0.9%
Total	106	

Source: Vermont Agency of Human Services

In Central Vermont, there are 105 licensed care providers with a total licensed capacity for 2,396 children as of February 2026 (see Table 39 for breakdown). However, there are only 35 "quality" providers (licensed with 4 or 5 STARs in the Vermont Step Ahead Recognition System and/or with national accreditation). Current data suggests that we have a crisis that is affecting the social and economic well-being of Central Vermonters.

It is probable that the high cost of child care keeps some residents of the Region out of the workforce. Simply put, for some families the cost and inconvenience of putting children in daycare outweighs any potential income gain. Even moderate income families that do opt for a daycare solution, often pay a large portion of their total income for these services and consequently struggle to get ahead.

Resources: While childcare "slots" are scarce, resources for parents, providers and would-be providers are abundant. Among the many sources of information and assistance are:

- The Family Center of Washington County/Child Support Services – Offers referral services, operates care programs. https://fcwcvt.org/
- Bright Futures Child Care Information System – Web based resource providing comprehensive information on childcare in Vermont, as well as municipal level data on regulated care providers. www.brightfuturesinfo.org
- Vermont Association of Child Care Resource and Referral Agencies – Works with parents, care providers, businesses and community organizations to provide quality child care services throughout the State. https://www.childcareresource.org/
- Vermont Child Care Consumer Line – Provides access to records of violations, counseling regarding childcare concerns. Child Care Consumer Line | Department for Children and Families

Libraries

Libraries are critical physical and social infrastructure in the region. There are 14 libraries found throughout our region (11 municipal, 3 incorporated). In addition to library and educational services, our libraries provide community members with internet, computer, and printer access (including 24-hour Wi-Fi in most cases), reliable food distribution and meals, provide

bike repair/rentals, art and school supplies in addition to educational programming, resources on mental and physical health, support navigating state and federal resources, free tax services, social meeting rooms and clubs, and more. Furthermore, libraries offer cooling and warming during business hours, and increasingly, adopting policies for extended use during extreme weather conditions. Libraries are an essential resource for all community members especially those with acute needs in day-to-day, emergency, and recovery conditions. Our region's libraries are thus considered important community stakeholders with significant insight into local needs as well as ideal locations for community infrastructure investment including but not limited to flood mitigation, sidewalk/recreation projects, on-site energy generation and storage projects, and more. CVRPC will provide outreach and technical assistance for funding opportunities for libraries to access funding for implementation of projects.

Table 39:Public Libraries in Central Vermont

Library	Town	Square Feet	Year Built	Renovation or Addition	Refresh	Public Computer Sessions	WiFi Sessions	Website Visits	Total Programs	Total Program Attend.
Aldrich Public	Barre	20,000	1908	2001	2018					
Brown Public	Northfield	11,790	1906	1999	2020	728	200	0	134	675
Cabot Public	Cabot	1,300	1920	N/A	N/A	1,404	5,951	2,735	125	1,236
Calef Memorial	Washington	966	1919	2016	2022	220	0	1,134	27	418
Cutler Memorial	Plainfield	1,125	1937	1937	N/A	1,300	2,653	4,500	50	319
Jaquith Public	Marshfield	1,700	1920	1990		624	5,916	7,750	106	1,973
Joslin Memorial	Waitsfield	3,082	1913	2018	2018	416	60	2,979	43	702
Kellogg Hubbard	Montpelier	18,449	1895	2000	2022	6,642	65,026	75,026	299	5,295
Moretown Memorial	Moretown	1,700	1835	2005	2012	18		1,705	62	1,261
Roxbury Free	Roxbury	690	N/A	2008	2018	52	2,833	3,000	10	231
Warren Public	Warren	1,450	1872	2009	2021	94	250	4,904	112	2,003
Waterbury Public	Waterbury	7,656	2016		2023	702		21,408	221	2,406
Woodbury Community	Woodbury	1,500	1991	1991	1991		1	947	21	221
Total		**71,408**				**12,200**	**82,890**	**126,088**	**1,210**	**16,740**
Average (Mean)		**5,493**	**1919**	**1998**	**2017**	**1,109**	**8,289**	**10,507**	**101**	**1,395**
Median		**1,700**	**1916**	**2001**	**2019**	**624**	**1,452**	**2,990**	**84**	**969**

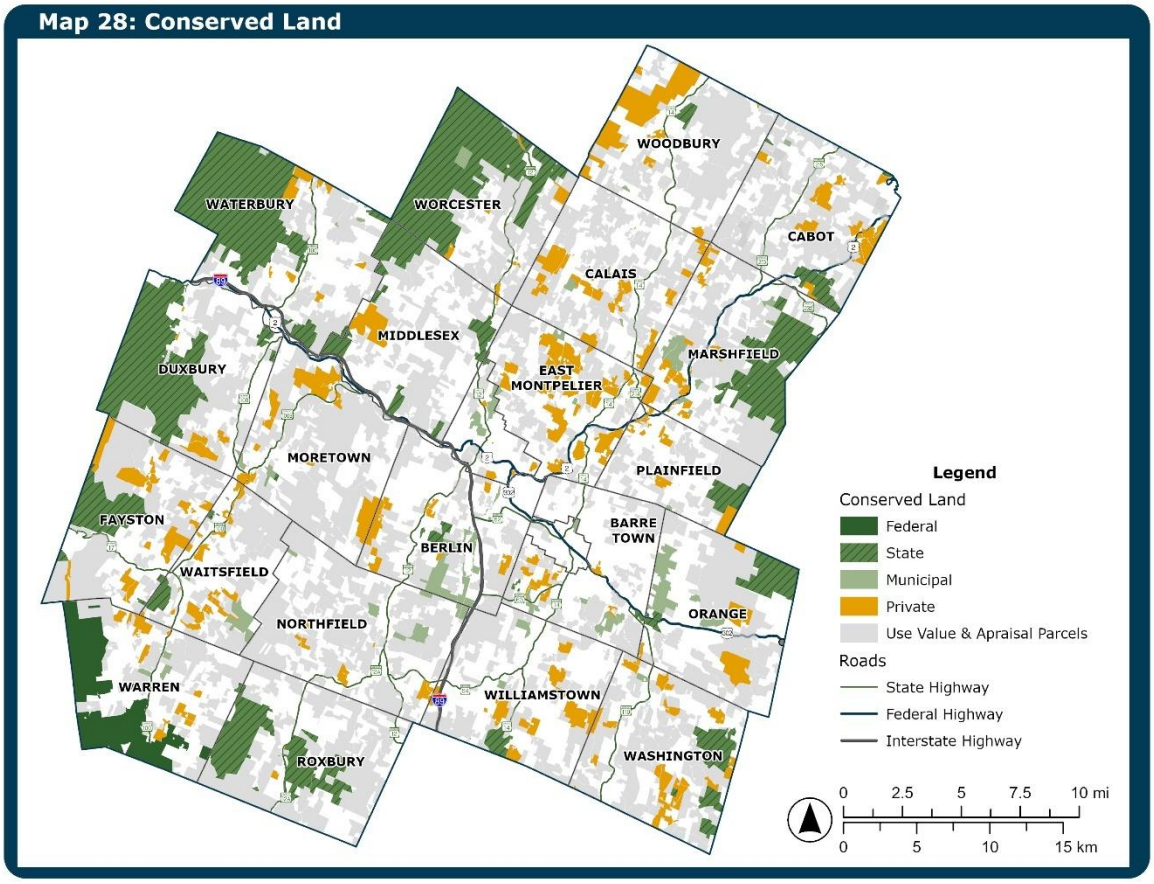
Outdoor Recreation

Recreation is a basic psychological need; not a frivolous luxury. To recreate (literally, to “make new”) is to refresh minds, bodies, and spirits. The ability to recreate enhances the quality of our lives immeasurably. Where the opportunity for recreation is denied, history and science have shown the spirit withers.

Recreation contributes not only to our individual well being, but to the health of our society as well. Throughout Vermont, recreation breeds tourism, which in turn provides an influx of imported wealth. Recreation also improves the health and productivity of our work force, thereby saving untold dollars for health care. In addition, a region that boasts recreational amenities has a competitive advantage in attracting new entrepreneurs.

One of Central Vermont's greatest recreational "facilities" is its landscape. Besides being home of Vermont's last undeveloped mountain range (the Worcester Range), a bounty of mountains, rivers, lakes, forest and fields, provide a virtual playground for residents, neighboring regions, and out-of-state visitors alike. The Region boasts some 59,194 acres of public outdoor recreation lands. These include a National Forest, eight state forests, three state parks, four wildlife management areas, and about a dozen municipal forests. In addition, there are public parks and playgrounds, as well as State surface water access points. While these lands contain some of Central Vermont's finest scenery, natural resources, and recreational opportunities, such values are abundantly represented in many of the region's private holdings, as well. Accordingly, unposted private lands are an important fabric in Central Vermont's recreational tapestry.

Map 28: Conserved Land

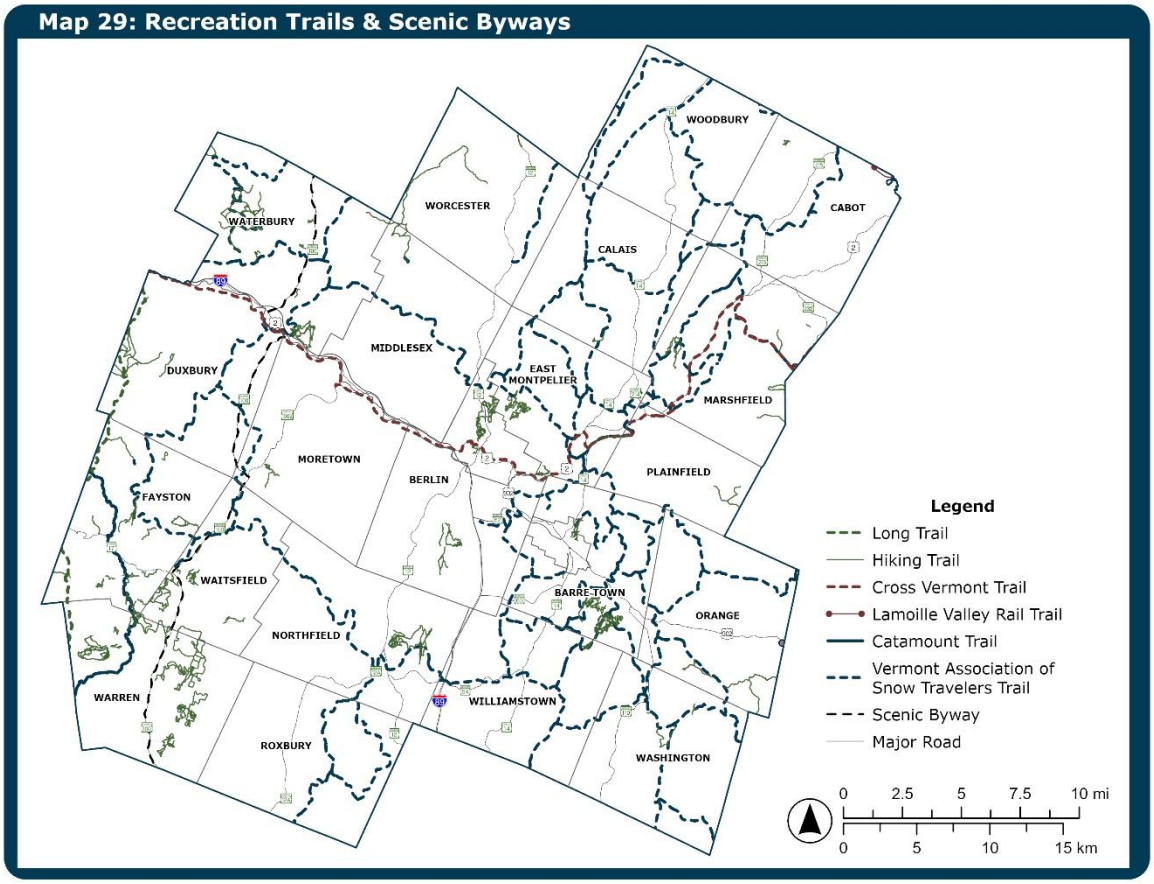


In addition, an impressive network of trails traverses the region (see Map 29 below). Statewide trail networks include the Long Trail, the Cross VT Trail, the Lamoille Valley Rail Trail, the developing Velomont mountain biking trail and the Mad River Path. Locally, recreation areas like the North Branch River Park, Perry Hill Mountain Bike Trails, Millstone Trails, and Paine Mountain Trail Network offer important opportunities for exploration and outdoor activities. In the winter, the Catamount Trail and Vermont Association of Snow Travelers provide access to backcountry ski and snowmobile routes. From day outings to multi-week adventures these trails offer some of Vermont's boldest adventures and most scenic ridgeline views.

Two of Vermont's three recreation districts exist in the Central Vermont Region; the Mad River Valley Recreation District and the Wrightsville Beach Recreation District. The recreation district model unites recreation providers, balances multiple uses, creates equity in access, and provides long-term

stability.[59]

Map 29: Recreation Trails & Scenic Byways

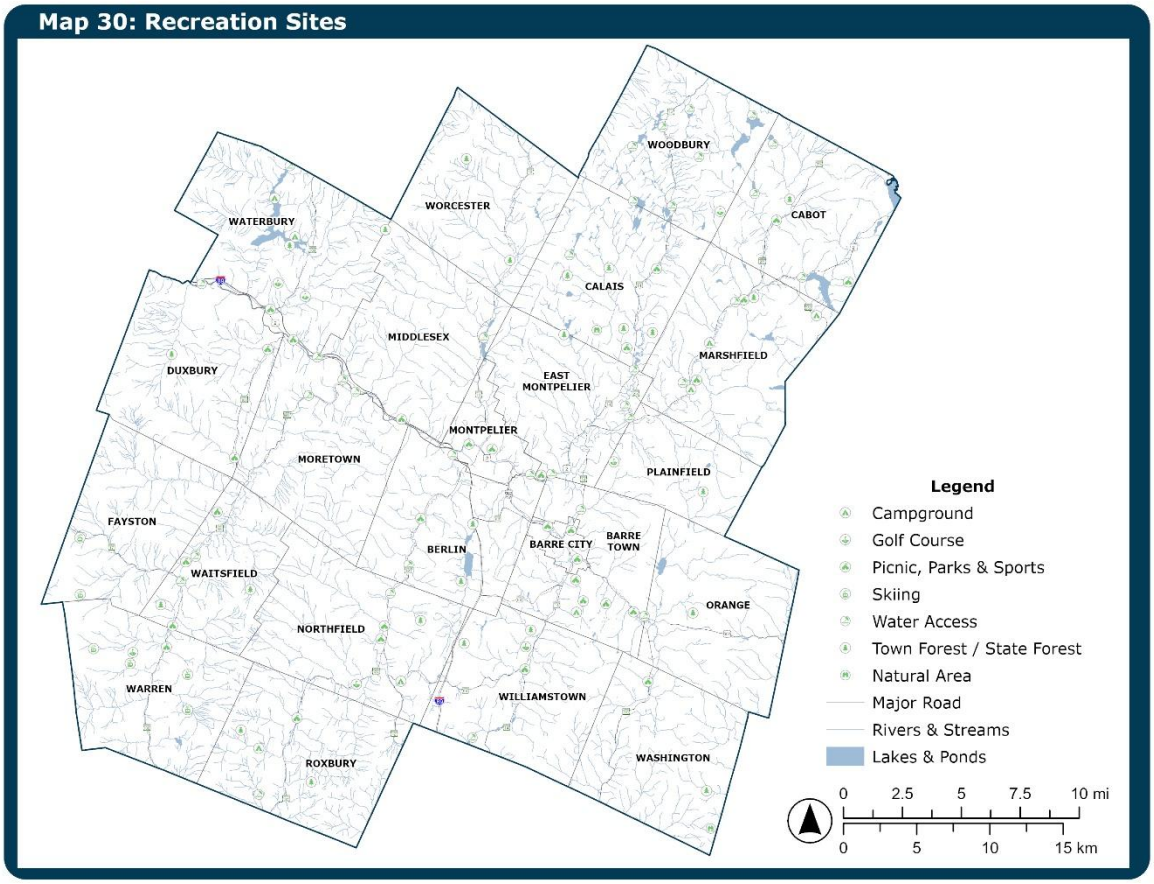


The Mad River Valley is also home to Central Vermont's two ski resorts, Sugarbush Resort and Mad River Glen Cooperative. With the introduction of ski resorts to the Region in the 1970s came a rapid rise in development, a shift in land use patterns, and a jump in economic activity. The Mad River Valley Planning District, encompassing the towns of Fayston, Waitsfield, and Warren, emerged to help plan for the growing pressures on the towns and to encourage collaboration between the municipalities and Sugarbush Resort. Ski resorts have contributed significantly to the tourism economy in the Region. However, as ski seasons become shorter and more unpredictable due to climate change, building resilience within the industry

[59] Mad River Valley Recreation District Strategic Plan 2018

and year-round recreation opportunities are crucial.

Map 30: Recreation Sites



Move Forward Together Vermont, Vermont's Statewide Comprehensive Outdoor Recreation Plan (SCORP)[60], highlights a number of Statewide trends with implications for recreation within the Region. As part of this study, recreation providers were surveyed. These providers include municipal representatives, private businesses, nonprofit organizations, land trusts, regional planning commissions, and state and federal agencies. The majority of providers reported increased funding for capacity building within recreation provider organizations and for supporting ecological and conservation goals. Providers who responded stated that resources to fund

[60] Move Forward Together Vermont: Vermont's Statewide Comprehensive Outdoor Recreation Plan

organizational budgets and budget stability year to year were the biggest limitations.

CVRPC has hosted Regional Trail Manager Meet-Ups to support trail managers who design, build, and steward public trails across the region. Similar to the priorities noted in the SCORP, the regional development challenges that emerged included recruiting and retaining volunteers, limited funding, and a gap in professional skills and knowledge. Municipal technical assistance is an important step in building local capacity, which can include trail counters, mapping, and grant writing and administration. Through the continued improvement of recreational assets in the region, communities can continue to strengthen the recreation economy and attract new economic growth for the region.

In tandem with supporting recreation providers and stewards, increasing access to the Region’s outdoor recreational opportunities is a goal shared across local, regional, and state plans. Providing a diverse range of recreational experiences and improving accessibility for all abilities can strengthen the Region’s connection to the landscape and increase positive indirect impacts for local economies. The goals of this Plan align with those of the Vermont Trails and Greenways Council and their efforts to create trails for those with mobility challenges through a Vermont Accessibility Hub.

The Department of Forest, Parks, and Recreation, in collaboration with the Trust for Public Land and the support of community leaders, recreation organizations, and community organizations, like CVRPC, is creating a statewide Outdoor Recreation Access Gap Analysis. The new statewide mapping tool will help to highlight where current inequities exist for Vermonter’s access to parks, trails, open space, and recreation opportunities. Given that EJFPs in Central Vermont have less access to green space compared to the region as a whole (see Appendix D), this tool will help to inform future recreation and conservation projects that can mitigate that burden.

Given the Region's natural endowments, it is not surprising that recreational pursuits dependent upon or enhanced by natural resources and scenery flourish here. Skiing, snowmobiling, hiking, jogging, hunting, fishing, golf, cycling, boating, swimming, camping, picnicking, and auto-touring are examples of some of our popular outdoor activities. So popular are they that

occasionally their practitioners find themselves in conflict with each other over scarce resources. CVRPC faces the challenge of promoting and capitalizing on those trends which bode well for the region, countering those which may have negative impacts, and adapting to those which are neutral and unavoidable.

Cultural Resources

The word "culture" refers to the development, improvement or refinement of the mind, emotions or interests, through ideas, customs, skills and arts. The opportunity for cultural experiences like recreation, theater, the arts, craft making, and public discussion is critical to our well being, happiness, and fulfillment. Culture, while universal among humans, is manifested differently, and with varying intensity, in different places. While the more urbane among us may perceive rural areas as existing in a cultural void, this is never true. Such an assumption about Central Vermont would be particularly erroneous. We are, in fact, in possession of cultural resources of unusual richness, quality and diversity for an area of our size and population.

This wealth of culture is partly responsible for Central Vermont's popularity as a tourist destination. At the same time, tourism bolsters our cultural resources. The link between culture and the economy is becoming ever clearer.

Central Vermont is home to a talented array of artists, musicians and crafts people, including many who have migrated here seeking a fertile ground and supportive environment for their endeavors. A multitude of festivals, galleries, playhouses, concert halls, and patron organizations exist in support of these talents.

The Region's public libraries (of which there are more than one dozen) conduct and sponsor readings, discussions, lectures and other literary activities. In addition, a few local literary publications provide a forum for amateur writers.

Central Vermont has several facilities capable of housing large cultural events and programs, including the Barre Opera House (seating capacity 645 and recently renovated to be handicap accessible), Montpelier's City Hall Auditorium (seating capacity 600-650), Barre City Auditorium, and

Barre City Recreational facility (the BOR). The Region's colleges, and primary and secondary schools also provide space for cultural happenings.

Museums are archives of our culture. Central Vermont's cultural treasures are well protected in a diversity of small museums. Montpelier is home to the T.W. Wood Art Gallery, the Statehouse Museum, the Children's Museum of Central Vermont, and the Vermont Historical Society Museum. The former Kent Tavern Museum in Calais remembers 18th and 19th century agrarian life. In Northfield, the Norwich University Museum displays a variety of military artifacts. Several local historical societies maintain small displays as well.

Historic and Archeological Resources

Preserving an accurate and tangible record of historic and prehistoric endeavors of the people of Central Vermont helps us to develop a better understanding of the past and an awareness and appreciation of our cultural lineage.

Significant properties and historic resources edify and provide important benefits to individuals, municipalities, and the Region in the forms of aesthetics enhancement, economic revitalization, tourism, job creation and investment tax credits. Across all 23 towns, there are over 1,600 sites listed on the State Register of Historic Places and 40 historic districts. Downtown Montpelier is the largest National Register of Historic Places District in Vermont, encompassing roughly 450 buildings. Several grants, such as the Historic Preservation Grant Program, are available to historic properties to assist with repairs and maintenance of structures.

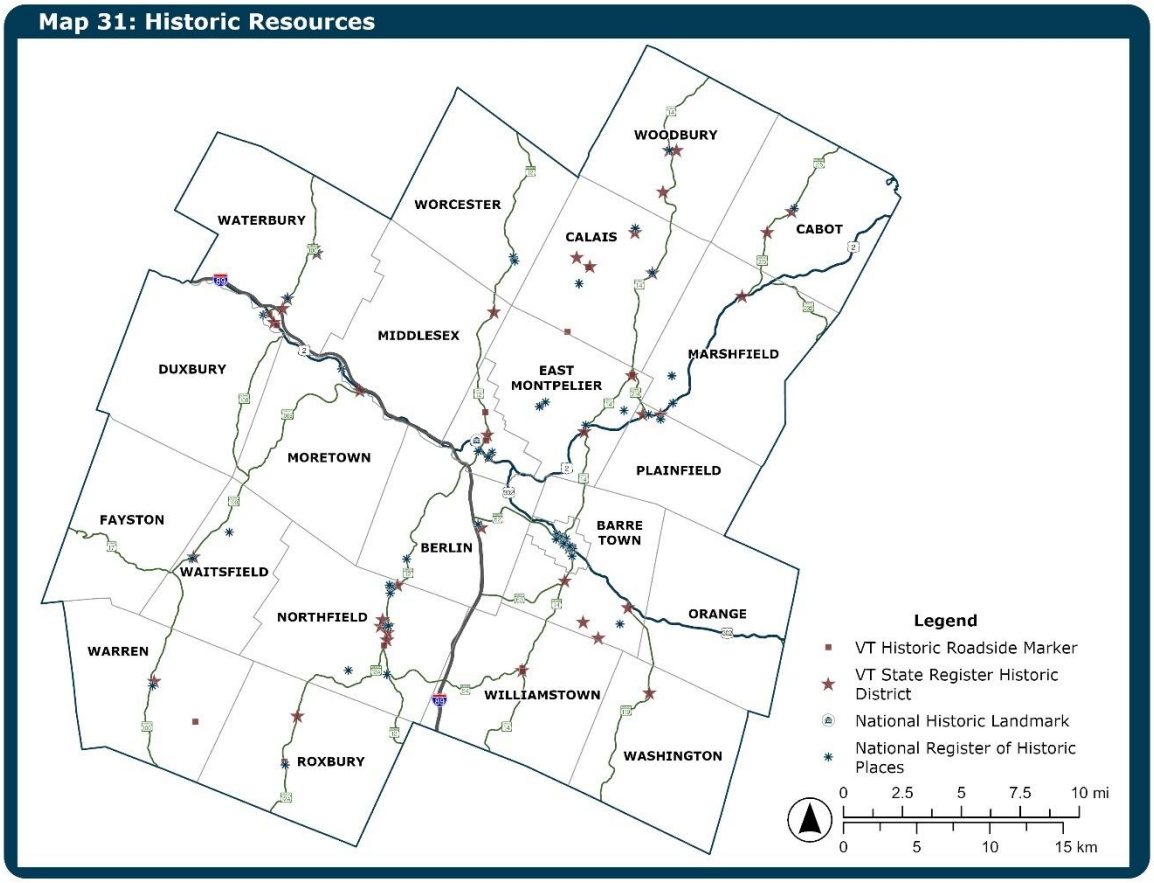
There is one State-Owned Historic Site in Central Vermont, Kents Corner, a 19th -century historic tavern/hotel, located in Calais. The site is open to the public for special engagements, including Art at the Kent, an annual art exhibit. Covered bridges also serve as important historical and cultural landmarks. There are 12 historic covered bridges in the Region.[61] The Vermont Archaeology Heritage Center (VAHC), home to artifacts and archives of Vermont's history dating back almost 13,000 years, is another asset to the Region. Located in Barre City, the VAHC has exhibits, workshops

[61] Vermont Covered Bridge Society, Covered Bridges, Covered Bridge News

and lectures open to the public.

Archaeological sites serve as important glimpses into Vermont's history, documenting precontact, contact and historic-era artifacts. The Vermont Division for Historical Preservation (VDHP) maintains the Vermont Archaeological Inventory. Given the importance of these sites, the Vermont Historic Preservation Act mandates that the locations and other information about the cultural resources be restricted.

Map 31: Historic Resources



Aesthetic, historic and archaeological resources fall under Criterion 8 in Act 250 proceedings, allowing the VDHP to evaluate whether projects might impact historic buildings and structures, historic districts, historic landscapes and settings, and known or potential archaeological resources. While many buildings and structures may be considered historic or have importance to a community, the definition of a historic site within statute

(10 V.S.A. § 6001(9)) is more limited. A historic site is defined as any site, structure, district, or archeological landmark that has been officially included in the National Register of Historic Places or the State Register of Historic Places, or both, or that is established by testimony of the Vermont Advisory Council on Historic Preservation as being historically significant. Thus, it is important for towns to identify historic sites and structures and work towards formally nominating them to the state and national databases.

Central Vermont harbors a rich historic record, in its buildings, in its soil, and in the very fabric of its landscape. It is a goal of this Region to preserve, protect, and perpetuate this record as an important part of Vermont's heritage.

Healthy Communities

Community Infrastructure

The availability and quality of infrastructure, including transportation, communication, and public services, shape the day-to-day lives of community members. Insufficient infrastructure in economically challenged communities can hinder economic development, limit opportunities for social interaction, and impede overall community well-being. Isolation and social ostracization are major risk factors for mental health issues and substance use.

Social Cohesion and Inclusion

The social fabric of a community is crucial for its health. Social factors, including inclusivity, diversity, and community engagement, shape the sense of belonging and well-being among residents. Communities with strong social cohesion tend to experience lower rates of crime, improved mental health, and a higher overall quality of life.

Although it’s hard to measure social isolation and loneliness precisely, there is strong evidence that many adults aged 50 and older are socially isolated or lonely in ways that put their health at risk. Older adults are at increased risk for loneliness and social isolation because they are more likely to face factors such as living alone, the loss of family or friends, chronic illness, and hearing loss. Recent studies found that:

- Social isolation significantly increased a person's risk of premature death from all causes, a risk that may rival those of smoking, obesity, and physical inactivity.
- Social isolation was associated with about a 50% increased risk of dementia.
- Poor social relationships (characterized by social isolation or loneliness) were associated with a 29% increased risk of heart disease and a 32% increased risk of stroke.
- Loneliness was associated with higher rates of depression, anxiety, and suicide.
- Loneliness among heart failure patients was associated with a nearly 4 times increased risk of death, 68% increased risk of hospitalization, and 57% increased risk of emergency department visits.

New Americans who are linguistically and/or culturally isolated may also face adverse health outcomes due to social isolation.

Employment and Economic Stability

Economic factors, including employment opportunities and income levels, are fundamental to community health. High rates of unemployment, underemployment, or low wages can contribute to financial stress, affecting the health of individuals and families. Economic instability within a community can result in increased rates of poverty, diminished access to healthcare, and a general decline in overall well-being.

Housing and Neighborhood Conditions

The quality of housing and neighborhood conditions significantly influences community health. Socioeconomically disadvantaged communities may face challenges such as inadequate housing, lack of access to essential services, and environmental hazards. These factors contribute to higher rates of health issues and reduced quality of life for residents.

Environmental Factors

The environmental conditions in which a community exists can impact the health of its residents. Socioeconomically disadvantaged communities may be disproportionately affected by environmental pollution, lack of green spaces, and inadequate infrastructure. These factors contribute to higher rates of respiratory issues, chronic diseases, and overall reduced well-being.

Noise and Environmental Stressors

Noise pollution and other environmental stressors can impact the mental health of community members. Constant exposure to high levels of noise, industrial activities, or environmental stressors can lead to increased stress, sleep disturbances, and mental health challenges. Mitigating these factors is crucial for fostering a healthier and more resilient community.

Built Environment and Safety

The design and safety of the built environment significantly influence community health. Safe and well-maintained buildings and neighborhoods contribute to a sense of security, reducing the risk of accidents and injuries. Conversely, poorly designed or unsafe environments can lead to higher rates of accidents, injuries, and overall community distress.

Climate Change and Resilience

The impacts of climate change, including extreme weather events, rising temperatures, and natural disasters, can have severe consequences for community health. Vulnerable communities may face increased risks of heat-related illnesses, vector-borne diseases, and displacement. Building resilience and implementing sustainable practices are essential for mitigating the health impacts of climate change on communities.

Physical Environment

The physical environment in which communities exist plays a vital role in shaping the overall health and well-being of their residents. From air and water quality to green spaces and infrastructure, various factors in the physical environment contribute to the health dynamics of a community. This includes land use planning and town bylaws and the influence they have on how a community plans for local transportation, recreational opportunities, environmental protection, and energy use, and where a community locates medical care and emergency response facilities, food access, safe and affordable housing, employment centers, and parks and playgrounds.

Access to Green Spaces

The availability of green spaces within a community has a profound impact on the physical and mental well-being of its residents. Communities with

ample parks, recreational areas, and green infrastructure tend to experience lower rates of stress, improved physical fitness, and enhanced community cohesion. Green spaces also contribute to a higher quality of life and support overall community health. Green spaces offer health benefits such as space to play and exercise, access to quality air, increase in sense of belonging, and places to gather. They also offer widespread benefits to a community such as stormwater runoff management, flood resiliency, air filtration and phytoremediation of chemicals. Access to green spaces is not always equitable in our communities. Barriers such as cost, transportation, inaccessibility, feeling unwelcome or not sure if one belongs, unsafe access (busy roads) and distance from where one lives and not having enough pre-visit information are all conditions that can limit or deny access to green spaces. Disparities in access to green spaces are higher for those of certain identities, backgrounds or intersections of identities and backgrounds. Many studies have found that green spaces in urban areas are larger and more accessible to wealthier and predominantly white neighborhoods and are less accessible to neighborhoods with a higher percentage of residents of racial minorities and those of lower socioeconomic status.

Air and Water Quality

The quality of air and water directly influences the health of community members. Poor air quality, often associated with industrial emissions and traffic pollutants, can contribute to respiratory diseases and other health issues. Similarly, contaminated water sources pose significant risks to public health, leading to waterborne illnesses and long-term health consequences.

Historically, the Region's local air quality concerns have been limited mainly to emissions from traffic, heating systems and some agricultural practices; the cumulative effect of these sources will likely increase with additional growth and have greater impact on local air quality. Air quality is also a growing concern due to the increased frequency and duration of wildfires. Currently, there are no air quality monitoring stations located in the Region. Various stationary sources of emissions within the Region are regulated by the Environmental Protection Agency (EPA), state, and local air pollution agencies. The Agency of Natural Resources maintains statewide Real-Time Air Quality Data and offers a subscription to EPA air quality alerts. Many communities have chosen to include performance standards in their zoning regulations that address sources of air pollution. Discussions about land use,

transportation, energy production, and other issues must consider the effect upon the production of greenhouse gases and air quality. Impacts on air quality also pose a serious threat to fragile, high elevation ecosystems. Our forested landscapes play a key role in maintaining good air quality through the sequestration of CO2 and airborne pollutants.

Access to Healthy Food

The availability of nutritious and affordable food options is a critical factor in community health. Food deserts, where residents have limited access to fresh and healthy food, contribute to higher rates of diet-related diseases such as obesity, some cancers and diabetes. Ensuring equitable access to healthy food options is essential for promoting overall community health. There are a number of organizations and programs in the region providing food assistance, including roughly 26 food donation sites (food shelves) in the region.[62] The Vermont State Agency of Agriculture Food and Markets provides additional information for residents seeking emergency food services and whom Central Vermonters can contact when in need of help, including information on the Supplementation Nutrition Assistance Program (SNAP) and the locations of food banks or other assistance programs.

Food deserts are geographic areas where residents have few to no convenient options for securing affordable and healthy foods, especially fresh fruits and vegetables. Among other adverse health outcomes, lack of access to healthy food options leads to a greater chance of diabetes and obesity. The USDA definition of a food desert uses two qualifiers, low-income and low access, to determine food desert status. There are 39 census tracts, or neighborhoods, designated food deserts in Vermont, and many of these are in the Central Vermont region.

[62] Universal Recycling Materials Management Map

Utilities, Facilities and Services Goals, Policies and Strategies

Electric Power Goal

Improvement, and expansion of electric power generation methods and infrastructure so as to provide adequate service, conserve energy, maximize benefits of public investment, minimize impacts on aesthetic, ecological and recreational resources, and protect public health.

Policies:

1. CVRPC supports the concepts of "demand side management" and "least cost integrated planning" as mechanisms to reduce electrical power consumption, and its attendant costs (both financial and environmental) through conservation and energy efficiency.

2. CVRPC encourages the development and use of renewable energy sources to meet the region's electrical power needs, while minimizing impacts on aesthetic, ecological and recreational resources (see *Energy* element of this Plan).

3. CVRPC encourages diversity in the region's future renewable power supply so as to establish flexibility and avoid reliance on any single source.

4. CVRPC encourages utilities and the Public Service Board to give greater consideration to making service territories more flexible by allowing for inter-utility connections and deregulation where there will be beneficial impact to the consumer and the environment. Such flexibility will help promote the Region's goals regarding settlement patterns, and save money as well.

5. Proposals to introduce extra high voltage and ultra high voltage transmission lines (capacity greater than 345 KV, AC or DC) to Central Vermont should be carefully scrutinized pending satisfactory resolution to the health and safety issues concerning their operation.

6. The Commission encourages adherence to environmentally and ecologically sound utility line maintenance practices.

A. Plans and designs for utility infrastructure and corridors should incorporate climate projections and be reviewed for long-term reliability, safety and economic, social and aesthetic impacts.

7. The corridor concept is generally supported by this Plan. As such, the location of new transmission lines should share existing power line routes as illustrated on Map 21: Electric Infrastructure. However, it is recognized that existing routes may not always be optimal for additional or expanded transmission lines. It is also recognized that the construction of distribution lines within, or adjacent to, public highway rights-of-way may, in some instances, have more negative aesthetic impacts than would a parallel route away from the road.

8. Utility infrastructure and corridors shall be sited so as to minimize aesthetic impacts, particularly in areas of local and regional scenic importance.

A. Wherever practicable, utility lines will be installed underground or behind structures in downtown and village centers

B. The use of wood support structures, appropriate conductor colors for the background, and landscape compatibility techniques are encouraged.

C. Municipalities, in their plans, should consider the visual impacts of the siting of utility poles. Traffic safety and water quality issues may also be pertinent in certain locations.

9. Resource areas, as identified by this Plan, shall be avoided wherever possible, in the location or routing of new substation or transmission facilities.

10. Substation facilities should be located in industrial areas or in those planned for industrial use whenever practical. In any case, such facilities should be sited as unobtrusively as possible.

Wastewater Treatment Goal

Improvement and expansion of wastewater treatment facilities and options so as to protect public health, maximize public investment and reinforce desired patterns of growth.

Policies:

1. This Plan supports efforts to improve existing wastewater collection and treatment systems.

2. Encourage municipalities to establish a schedule indicating when and for what uses remaining capacity should be allocated. A schedule of the number and types of hookups can serve a similar purpose.

3. Encourage continued efforts to improve water quality through the separation of combined sewers or other method to ameliorate the harmful impacts of combined sewer overflows.

4. Support efforts to upgrade components of aging wastewater systems to address depreciation, improve energy efficiency and increase flood resilience of the Region's systems.

A. Encourage coordination of upgrades to coincide with other municipal infrastructure projects (i.e. roads).

B. Perform outreach to municipalities whose systems are approaching 20-yr design life and connect local operators/commissions with available technical assistance.

5. In order to encourage municipalities to optimize the use of wastewater treatment capacities, municipalities are encouraged to participate in inter-municipal facilities or agreements. Inter-municipal facilities can prove cost effective for the communities involved. At the same time, capacity allocation agreements offer individual communities the option of encouraging or discouraging growth.

A. Provide model inter-municipal agreements upon request.

6. New or expanded wastewater treatment facilities should be planned where municipalities have immediate need or where additional growth is appropriate, including *Downtown Centers*, *Village Centers*, *Hamlets*, *some Resource-based Recreation areas like ski resorts*, and Transition/Infill and Enterprise areas.

A. Explore opportunities to develop a region-wide water and wastewater study to identify priority investments to supporting desired growth patterns.

7. Encourage planning for and installation of decentralized community wastewater treatment systems in villages, hamlets, and in clustered

housing developments, and ensure that agreements for those facilities adequately provide for ongoing maintenance and oversight.

A. Encourage formation of and support efforts of existing local Wastewater Advisory Committees.

B. Assist with grant writing and coordinate provision of technical assistance (i.e. soil mapping, wastewater studies, capacity-building) to local efforts to identify wastewater solutions.

C. Assist with public outreach and engagement efforts in planning for wastewater infrastructure.

8. This Plan encourages the extension of municipal sewage treatment collection systems to existing developments within currently unsewered drinking water source protection areas in order to protect underground water supplies from harmful septic system leachate.

9. Wherever possible, extensions of municipal wastewater collection systems should occur along or within existing public rights of way.

10. CVRPC will promote and encourage environmentally and fiscally sound solutions to the Region's sludge disposal problem.

11. Work with municipalities to improve outreach to on-site sewage disposal system owners through provision of guidance material explaining how to properly maintain their systems.

12. Support programs to assist with the replacement of failed on-site sewage disposal systems.

13. CVRPC encourages the use of shoreline zoning powers (24 V.S.A., Chapter 117, and Section 4411), in compliance with the Vermont Shoreland Protection Act, to regulate the design of sanitary facilities on lands adjacent to surface waters.

14. CVRPC urges communities to establish retrievable record keeping systems for "as built" municipal wastewater system engineering plans, so as to ensure exact knowledge of the placement of underground collection lines.

Water System Goal

Improvement and expansion of public water system facilities so as to

protect public health, maximize public investment, and reinforce desired patterns of growth.

Policies:

1. Where existing water supply systems are functioning properly, they should be utilized. Particularly when located in combination with the region's wastewater systems, the areas served by water supply systems are recommended for high-intensity development.

2. Land uses or activities that would measurably degrade the quality of water supply sources should be prohibited.

A. Assist communities in developing local regulations and/or incentives to protect aquifer recharge areas and source protection areas.

3. Work with the region’s small water supply systems to build administrative capacity, coordinate with each other and develop capital improvement plans and budgets.

A. Encourage participation in VT DEC’s Asset Management trainings.

B. Incorporate outreach and education regarding water and wastewater infrastructure planning into Municipal Transportation Capital Improvement Planning task in the Transportation Planning Initiative.

4. Inter-municipal water supply agreements are encouraged. The sharing of water resources can be a cost effective method of insuring that water supply adequately supports the municipal plan.

5. CVRPC encourages municipalities that have not already done so, to identify and protect backup or alternative sources of water.

A. Assist such efforts at the request of local officials.

B. Raise awareness of groundwater mapping resources available from the VT Agency of Natural Resources and U.S. Geological Survey.

6. Water service area expansions should be designed to encourage development in areas where growth is appropriate including Downtown Centers, Village Centers, Hamlets, Resource-based Recreation areas, and Enterprise areas and growth centers as identified by town plans.

7. Capacity expansion and water quality improvements to existing water supply systems are encouraged where such problems are impediments to concentrated growth.

8. CVRPC urges communities when designing and constructing public water systems and, to require the site engineer to provide "as-built" plans so as to ensure exact knowledge of the placement of underground collection lines. when the need for repair or replacement arises.

Solid Waste Goal

Safe, sound, cost-effective, and efficient solid waste management.

Policies:

1. For both environmental and economic reasons, support waste reduction as a top priority of the Region and support the concept of "zero waste" as outlined by Vermont's Universal Recycling Law and the policies of the Central Vermont Solid Waste Management District, Northeast Kingdom Waste Management District, Lamoille Solid Waste Management District and the Mad River Resource Management Alliance.

2. Encourage managing solid waste as close to the source as is reasonable, with a preference given to local or sub-regional solutions to waste management. Proper management of municipal solid waste should utilize environmentally sound systems and programs at the least cost possible.

3. Promote education about composting, recycling and waste reduction in the Region.

4. Encourage individuals or businesses in the Region to bear the cost of proper management of the waste generated.

   A. Support Extended Producer Responsibility (EPR) programs and sites for industries to recycle their own byproducts in the Region.

5. Support recycling and composting facilities and programs that promote individual participation and responsibility.

   A. Encourage the convenient and decentralized placement of local drop-off facilities.

6. Support the maintenance of collection centers for hard to recycle materials within the Region.

A. Support the presence of an Additional Recyclables Collection Center (ARCC) in a location central to the Region.

B. Support the siting and building of a facility to collect and recycle asphalt shingles and drywall in a location central to the Region.

7. Encourage composting of residential, commercial and institutional organic waste in order to maintain the materials' highest re-use value. Composting efforts should move toward being financially self-supporting and locally controlled.

A. Support the continuing presence and establishment of composting centers at appropriate sites within the Region

8. Continue to implement recycling and waste reduction measures in our internal operations, in accordance with Vermont's Universal Recycling Law.

9. Support projects that involve the distribution of Class A Biosolids from municipal wastewater treatment facilities only when only when Central Vermont Solid Waste Management District, Northeast Kingdom Waste Management District, Lamoille Solid Waste Management District or the Mad River Resource Management Alliance has worked with municipalities to ensure that said biosolids are safe and that municipal officials and other decision makers have been educated about the issue.

Wireless Telecommunication Facilities Goal

To promote effective and efficient communication systems.

Policies:

1. Telecommunication facilities should not be sited where they may create an attractive nuisance.

2. Telecommunication facilities should be sited, designed, maintained and operated so as to minimize negative impacts on natural, cultural and scenic resources. Use of stealth design and/or use of existing structures are encouraged where appropriate. New towers should be no taller than necessary to provide coverage. The policies of this Plan addressing ridgeline and hilltop development (see Natural Resources and Working Lands Element, Goal 3) are intended to apply to telecommunication facilities.

3. Use of existing towers, communication facilities, and structures where

possible, is encouraged and expected rather than development of new transmission and receiving stations. Permits for tower facilities should require permitees to accommodate additional users, appropriate to the structure, at a fair market rate.

4. Permits for towers should require a financial mechanism to ensure their removal by service providers should they be abandoned or rendered obsolete by advances in technology. Processes for establishing bonds should take inflation into account as many years can elapse between construction and removal.

5. Applicants must demonstrate that telecommunication facilities comply with FCC emission standards in order to protect public health and safety.

6. Assist service providers and municipalities to identify appropriate locations for the construction of new tower (or other facilities) necessary to achieve adequate coverage of the Region as well as locations that are not appropriate for new towers. CVRPC will act to implement the results of this effort through its participation in the Section 248 Process.

7. CVRPC will provide its "Model Telecommunication Facility" bylaw to all member municipalities and work with towns and cities to develop bylaw, ordinance, and/or town plan language to address facility siting. The Commission encourages municipalities that adopt telecommunications regulations to provide for an expedited permit process for small scale facilities.

8. New towers should be constructed in areas served by existing roads or trails.

9. Access roads should be designed to minimize their impact on scenic, agricultural, forestry, and natural resources.

Broadband Goal

Universal broadband availability and affordability.

Policies:

1. Encourage Municipalities to include broadband goals and strategies within local plans as tools to enhance economic development, education and overall resiliency.

2. Support expansion of broadband services and enhancements in underserved areas, *Downtown Centers* and *Village Centers*.

A. Encourage creation of public Wi-Fi zones in *Downtown Centers*, *Village Centers and Hamlets*.

B. Encourage expansion of wireless internet service providers in rural communities.

Emergency/Health Services Goal

To promote effective, efficient and accessible emergency and health care services.

Policies:

1. Adequate health care facilities and personnel should be planned and located throughout the Region so that all residents have access to such services. It is necessary that planning for these facilities be coordinated with population distribution and existing and future transportation patterns.

2. For all aspects of emergency/health service delivery, full consideration of the costs and benefits of cooperative and regional provision of these services is encouraged.

Emergency Management Goals

1. To build disaster resistant communities in Central Vermont through sound emergency planning and management.

2. To ensure that all communities in Central Vermont have the appropriate information, resources, and tools to respond to disaster events and recover from their impacts.

Policies:

1. Promote the importance of local emergency management plans to municipalities in Central Vermont.

2. Encourage municipalities to annually review and update their LEMPs for the new contact information and to identified risks.

3. Encourage municipalities to undertake and periodically review an all-hazards assessment in their community to identify potential hazards and

the at-risk people and property.

4. Encourage municipalities to adopt minimum standards for public roads, bridges, and culverts (using the Vermont Local Roads Program and FEMA's standards).

5. Encourage municipalities to implement land use policies and development regulations that consider the potential impacts of disasters on people and property.

6. Discourage residential, commercial, or industrial development in flood plains.

7. Maintain, wherever possible, vegetated buffer strips adjacent to all waterways to reduce the occurrence and magnitude of flooding.

8. Encourage municipalities to amend flood hazard regulations so they comply with current NFIP requirements.

9. Provide local officials with information on programs and funding available through FEMA and/or VEM for emergency management and hazard mitigation projects.

Crime and Safety Goals

Overall Goal: To minimize community conflicts within Central Vermont, reduce the Region's already low crime rate, and protect the community from violence and serious crimes.

Crime and Safety Goal 1: To prevent the social and economic conditions that often lead to community conflicts.

Policies:

1. To encourage the use of early intervention and prevention strategies in schools

2. To work to implement the other goals and policies of this Plan, particularly those regarding education, housing, and employment.

Crime and Safety Goal 2: To foster safe and supportive communities by educating municipal officials on crime issues, supporting prevention programs, encouraging re- habilitation strategies, and fostering public safety.

Policies:

1. To encourage municipalities to investigate the establishment of community based, victim focused crime prevention/justice initiatives.

2. To work with municipalities, SRS, and the Vermont criminal justice system to support the establishment of a regional restorative justice center.

3. To support the use of conflict reduction/resolution techniques and restorative processes in schools, law enforcement, and communities.

4. To gather and report information on crime and safety indicators as related to other indicators of community health to establish data on possible relationships therein.

5. To coordinate all crime/rehabilitation related efforts with municipalities and the Vermont criminal justice system.

6. To encourage State financial and technical support for community restorative justice programs.

Crime and Safety Goal 3: To protect the community from violence and other serious crimes.

Policies:

1. To support incarceration of violent offenders.

2. CVRPC should consider the need for, costs, benefits, and detriments of construction of new prison facilities within the Region.

Education Goal

To promote effective, efficient, accessible, and affordable educational facilities and services.

Policies:

1. New development that places a significant impact on local and regional educational systems must address and mitigate these impacts.

2. The construction of new educational facilities should occur in locally designated growth areas or in other locations that will maximize their convenience and accessibility to the population and infrastructure, and will

contribute to the vitality of communities.

3. Through improved coordination among planning commissions, school boards and the State Department of Education, a regional approach to planning for the placement and timing of construction of educational facilities is encouraged.

4. Municipalities and school districts are encouraged to employ capital budgeting and programming as a means to anticipate and plan for the payment of capital improvements to public schools.

5. CVRPC supports and promotes efforts to broaden access to adult and senior educational opportunities.

6. CVRPC supports and promotes efforts to broaden access to vocational education opportunities.

Child Care Goal

To ensure the availability of safe and affordable child care and to integrate child care issues into the planning process.

Policies:

1. Continue to inform municipalities of their statutory responsibility to plan for child care and assist in this effort upon request.

2. Encourage municipalities to assess local barriers (regulatory or otherwise) to the provision of child care services and to support them in taking action to remove or reduce those barriers.

3. Consider undertaking, in partnership with local advocacy organizations, a region-wide needs assessment for child care services. As part of such a program, CVRPC could examine the relationship between the location of jobs and the location of child care facilities.

4. Encourage the location of child care facilities in growth centers and existing settlements, near residential clusters, schools, and large employers, and along public transportation routes. Such locations can help reduce traffic, energy consumption, and the overall financial cost of day care for families.

Outdoor Recreation Goal

To promote adequate access to a wide range of high-quality outdoor recreation experiences to all sectors of the population.

Policies:

1. CVRPC will encourage and foster the provision of diverse outdoor recreational opportunities, with consideration given to the needs of the elderly, disabled, and economically disadvantaged.

2. CVRPC encourages, in particular, those recreation activities that focus on, respect, enhance, and educate, about the natural environment.

3. Recreation inventories and needs assessments should occur at the local and regional levels in order to determine deficiencies and conflicts, and to identify key recreational resources and opportunities on both public and private land.

4. Municipalities should develop and implement strategies to protect important recreation lands. Actions such as securing voluntary easements, fee or less than fee acquisition, subdivision or zoning regulations which contain provisions for common open space, impact fees or other contractual arrangements are encouraged as alternatives for achieving permanent or semi-permanent protection.

5. Public access to rivers, streams, lakes, ponds and recreation lands is a need in the Region. Municipalities, the State, and private groups, such as land trusts, should coordinate efforts to provide for improved access to the Region's surface waters. At the same time, significant water related natural areas should be maintained and protected.

6. Priority consideration should be given to rehabilitating and upgrading existing recreation facilities.

7. CVRPC supports the maintenance or upgrading of existing surface water classifications to reflect their actual recreational uses, except where lower classifications may be needed for municipal sewage treatment projects.

8. Landowners are encouraged to voluntarily keep their lands open for public recreation and enjoyment where possible, so as to maintain the Region's tradition of informal, resource-based recreation on private lands.

9. CVRPC will support future legislation to alleviate landowners of unreasonable liability burdens.

10. New development proposals are encouraged, through design, to make an effort to preserve access to recreational uses for the general public.

11. The Commission supports and encourages the creation and existence of inter municipal recreation districts. (Inter-municipal districts are legal arrangements whereby a governmental entity joins with another to provide recreational facilities or services. Through these arrangements, increased opportunities may exist for municipalities to acquire or develop land, provide services, or manage an area).

A. Accordingly, we will continue to provide administrative and technical assistance to the Wrightsville Beach Recreation District Board of Directors.

12. CVRPC will work towards and support the maintenance and development of trail and greenway networks to provide for recreational diversity, tourist amenity, habitat linkage, and low impact transportation choices. Specifically, the Commission will strive to:

- work with individual municipalities, at their request, to help plan local trails and greenways;
- work with groups of municipalities and/or citizens to promote the concept and realization of a regional trail and greenway network that connects and builds upon local initiatives;
- encourage the paving of shoulder for safe bicycle and pedestrian travel on all state highways in the region;
- encourage the development of multi-purpose trail corridors along abandoned rail beds;
- encourage municipalities to retain Class IV roads and public trails for public recreational use; and
- encourage the provision of recreation along utility corridors, as appropriate.

13. Downhill ski areas provide valuable recreational and economic benefits in Central Vermont. However, certain external costs (e.g. expanded demands on facilities and service, environmental impacts, etc...) are inherent in their operational and expansion activities, too. It is CVRPC's goal to enhance the viability of existing ski areas and foster their development in a manner which will enable them to remain competitive while ensuring that they will protect and co-exist with the natural, physical, and socio-economic

environment. Equitable means of sharing external costs between ski areas and their host towns are encouraged where such costs cannot be avoided. The Memorandum of Understanding between the Sugarbush Area Resort, CVRPC, and the Mad River Valley towns is a model for such positive coordination and communication.

14. Atmospheric pollution has become an increasing problem over the past few decades. It now threatens to disrupt global weather patterns and endanger public health. The impacts of air quality on recreation and tourism are also recognized. CVRPC will support measures to address air quality at the local, regional, state, federal, and global levels. Promotion of energy conservation practices will be the focus of such support (see Energy Element).

Cultural Resources Goal

To promote adequate access to a wide range of high-quality cultural experiences for all sectors of the population.

Policies:

1. CVRPC encourages the development of new cultural facilities and services (including studio space), in Central Vermont, particularly in or near existing settlements and growth centers, as such areas are most accessible to all segments of the population, and the proliferation of culture in such areas will strengthen their vitality.

2. The protection and preservation of existing cultural resources and activities is a goal of the Commission.

3. CVRPC will continue to work with cultural organizations where appropriate, to support cultural resources in Central Vermont.

4. The Commission encourages the rehabilitation or adaptive use of sites and structures for cultural pursuits.

5. CVRPC supports strengthening the role of cultural and artistic disciplines in public education.

Historical and Archeological Resources Goal

To promote the protection and use of the Region's historical and archeological resources.

Policies:

1. Municipalities are encouraged to provide a historic preservation section in their municipal plans. (CVRPC will assist in such an effort, if requested.)

2. CVRPC encourages development that preserves the historic and architectural character of town and village centers and the rural landscape.

3. Therefore, it is the policy of this Commission to support and encourage downtown revitalization programs and tax incentives and grants to encourage preservation. Downtown revitalization efforts are means to create jobs and to preserve our national heritage.

4. CVRPC encourages the restoration, rehabilitation and adaptation of historic structures where feasible, as this minimizes the environmental impact of development by conserving raw materials, using land already developed, employing existing services.

5. Where economically practical, rehabilitation of a historic site or structure should be designed to minimize the architectural impact and maintain the historic character of the site or building.

6. Where an area is not designated as a historic district, but where there are buildings of local historical significance, projects should be designed to maintain and protect the historic character of the area. Municipalities are encouraged to develop criteria that would assist in protecting the character of an area considered historic, whether designated as such or not.

7. The impact upon the historic character of the area should be considered when public or private municipal improvement projects (such as sidewalks, roads and traffic improvements) are proposed.

8. Activities having substantial impact on an important historical site or structure should be planned in consultation with the Division for Historic Preservation, Agency of Commerce and Community Development.

9. Additions to a historic building should be designed to minimize the visual impact upon the site or building.

10. Land development adjacent to or on an important prehistoric or historic archeological site should be designed to minimize the impact upon the site.

11. Prehistoric and historic archeological sites are recognized as important to Vermont's history. Any activity that may have an impact on a prehistoric or archeological site should be planned in consultation with the Division for Historic Preservation, Agency of Commerce and Community Development.

12. CVRPC will provide support to local, regional, and state non-profit historic preservation trusts upon request.

13. CVRPC will promote the awareness of historic preservation through periodic publication of funding sources available to municipalities and investment tax credits available to individuals.

Healthy Communities Goal

Land use and infrastructure design that ensures health equity.

Policies

1. Engage with and provide technical assistance to municipalities to address health issues in their town plans through the Vermont Health Equity Planning Toolkit and other health-related planning tools.
2. Assist municipalities seeking funds for health-related planning.
3. Assist municipalities with community engagement in the decision-making process to ensure that the built environment is equitably accessible to all.
4. Collaborate with municipalities and partners to hold trainings on those elements in the built environment that support the mental health of all in the community.
5. Engage with municipalities on options to conduct health impact and equity assessments when developing or updating plans, zoning reform or land development processes.
6. Collaborate with municipalities and partners to hold trainings on cultural competency and making public spaces inclusive and welcoming to all ages, abilities and backgrounds.
7. Assist towns in the creation of smoke free ordinances, alcohol ordinances and ordinances to protect children from marketing of tobacco products in local stores.
8. Train and assist municipalities with Smart Growth principles and how zoning

can facilitate healthy lifestyles, activities, and development patterns.

9. Facilitate cooperation between municipalities and health-promoting groups and agencies working towards healthy community design.
10. Increase food security and access to fresh, nutritionally balanced, affordable foods by prioritizing local food production and supporting transit routes and active transportation investment that connect residents to grocery stores and fresh foods.

7. HOUSING ELEMENT

Housing is the foundation of our historic towns and villages. The size, location, and cost of housing shape the communities in which we live. Providing a range of housing options for a variety of income levels and lifestyles contributes to the vitality of our communities. Housing impacts local economic development, school enrollment, land use, and traffic patterns, among others. Currently in Vermont:

- Average household sizes are decreasing; yet new construction house size is increasing;
- The population of people between ages 45 to 69 is expected to grow more rapidly than any other age group; The number of households headed by someone 55+ is projected to be 54% by 2029.[63]
- Incomes are not keeping pace with dramatically increasing home costs;
- New housing creation is falling short of the 5-year demand for housing;
- Much of the recent housing growth in the Region is happening outside of town and village centers.

This chapter reviews the number and types of housing units currently in existence, future trends in housing demand and costs, and outlines strategies to meet identified housing needs. Finally, it concludes with a list of resources that can be used by town officials and residents who are interested in this important issue.

Population Trends

The 2020 Census showed the population of the Central Vermont Region at 65,402.[64] The population of the Central Vermont planning area has experienced a slow growth rate. Between 2010 and 2020, the Region gained only 368 new residents.

That number would likely be even lower without the COVID-19 Pandemic,

[63] Vermont Housing Needs Assessment 2025-2029
[64] 2020 U.S. Census

which is speculated to have increased migration from denser urban areas to rural communities, like Vermont (VT Department of Taxes). Pandemic-related migration to Vermont has since slowed down and CVRPC will continue to measure its lasting impacts.

Table 40: Central Vermont Population and Household Growth

		2000	2010	2020	% Change (2000-2010)	% Change (2010-2020)
Orange County	Total Population	28,226	28,936	29,277	2.50%	1.20%
	Total Households	10,936	11,887	12,364	8.70%	4.01%
	Household Size	2.5	2.4	2.2	-4.00%	-8.33%
Washington County	Total Population	58,039	59,534	59,807	2.60%	0.50%
	Total Households	23,659	25,027	25,842	5.78%	3.26%
	Household Size	2.4	2.3	2.2	-4.17%	-4.35%

Source: US Census ACS 5-Year Estimates, US Decennial Census via Housingdata.org

It is notable that the number of occupants per household is trending down. Across Vermont, there are fewer children below age 17, down more than 3 percent since 2020. Household size has decreased by over 6% in Washington County and 11% in Orange County (the CVRPC planning region is all of Washington County and three towns in Orange County: Orange, Washington, and Williamstown). The increasing number of households containing a smaller number of people will have a significant effect on housing demand.

Vermont as a whole is aging, with a 54% of the population is projected to be 55+ by 2029. In Washington County, residents 45 and up comprise 70% of the population. In Orange, it is even higher at 74%.[65]

[65] Vermont Housing Needs Assessment 2025-2029

Table 41: Age of Householders in Washington and Orange Counties

	Washington County	Orange County
15 to 24 years	368	234
25 to 34 years	3,247	1,395
35 to 44 years	4,038	1,681
45 to 54 years	4,666	2,243
55 to 59 years	2,512	1,709
60 to 64 years	2,726	1,229
65 to 74 years	4,652	2,645
75 to 84 years	2,090	1,188
85 years or older	867	366
Total	25,166	12,690

Source:Housingdata.org

Figure 15: Projected Number of Vermont Households by Age of Householder 2029

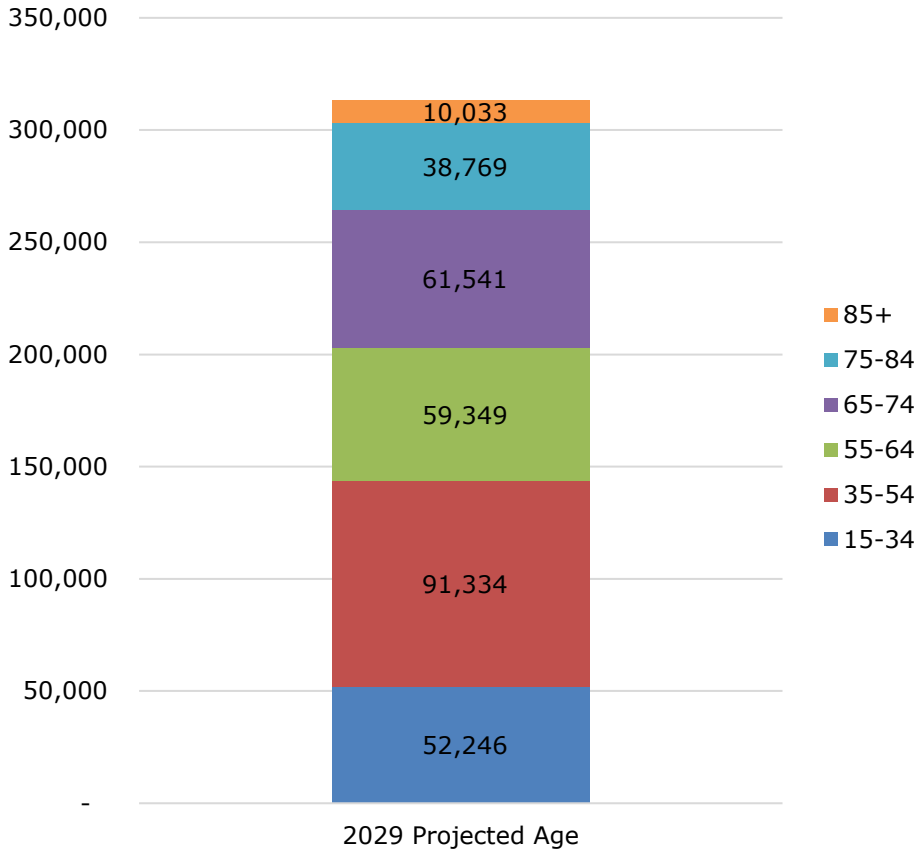


Table 42: Housing Needs at Different Life Stages

Age Group	Characteristics	Housing Needs
20s	• Lower incomes • High mobility • Small households	• Apartments
30s	• Beginning families • Small children • Low savings • Growing incomes	• 1st time homebuyers • Mobile homes • Condos
40s	• Growing families • Growing income	• Step up to larger homes • Additions and home improvements
50s	• Stable housing • Empty nest • Income peak	• Stay in current homes • Renovations and home improvements
60s	• End of income producing years	• "Begin process of downsizing"
70s	• Retirement • Reduced income • Risk of frailty	• Smaller homes • Condos • Retirement developments
80s and 90s	• Risk of frailty or dementia • More singles (widowed) than couples	• Assisted living • Institutional care

Source: VT Department of Housing & Community Affairs, VT 2006 Housing Needs Assessment

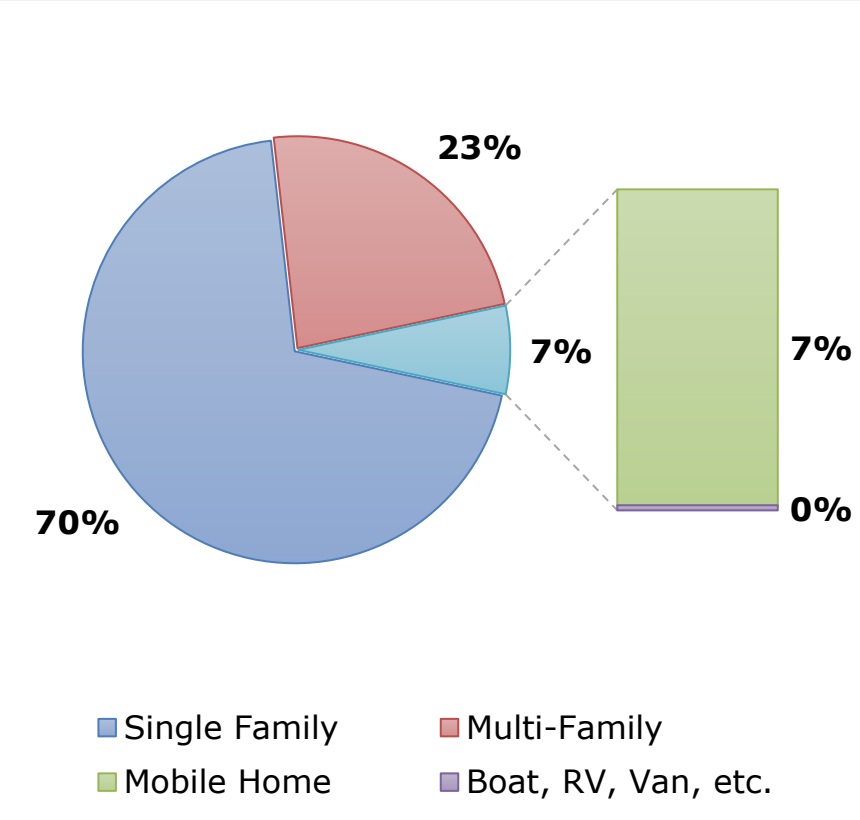
Housing Stock

Type, Age, and Use of Housing Stock

The 2025 Housing Needs Assessment found there were 33,195 total housing units in the Central Vermont Region (2020 Census). Of this total, 4,137 or 12% are seasonal units, leaving 29,058 year-round units that are occupied or available for occupancy. Having 12% of the total housing stock as seasonal, recreational, or occasional-use housing is well above the national average of 3% and points to the strong vacation-home market in Central Vermont.

In Washington and Orange Counties, 77% of the housing stock is owned, and 23% are rentals. Single-family homes make up the majority of the housing stock in the Region (70%). 23% of the housing stock consists of homes that contain more than one housing unit, for example, condominiums, two-family houses, or apartment buildings, and the remaining 7% are mobile homes.

Figure 16: Washington and Orange Counties Composition of Housing Stock

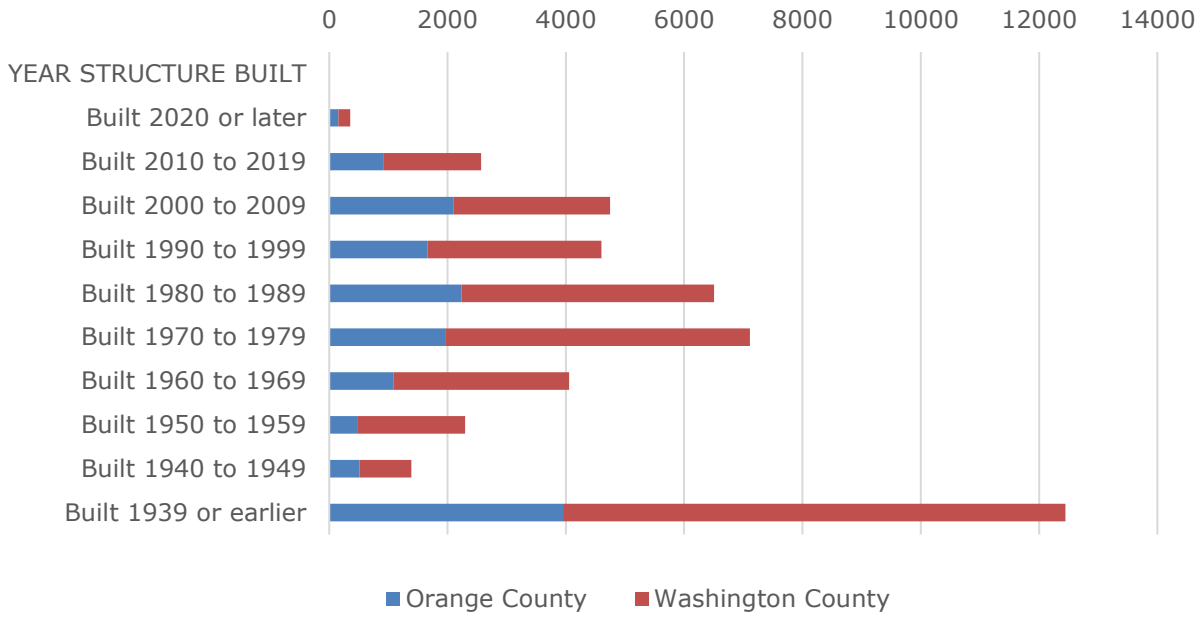


Source: US Census, 2024 ACS 5-Year

If trends over the last 30 years continue, about 70% of these households will be owners and 30% will be renters. The high cost of housing could push many households out of the home buying market. (See Housing Affordability section.)

Any discussion of the quantity of housing units available should also include the quality of those units. One rough measure of the quality of the housing stock is its age. In Washington and Orange Counties. 54% were built before 1980, approximately the time lead paint was banned nation-wide.

Figure 17: Age of Central Vermont Housing Stock



In addition to age, housing may have other issues, such as a lack of heating or coal heat, a lack of kitchen or plumbing facilities, or mobile homes built before 1979. The 2025 Housing Needs Assessment found that 14% of the households in Central Vermont had potential housing issues in 2022. This includes 3,093 owned and 1,099 rented residences.[66]

Housing Availability

One measure of a healthy housing market can be indicated by the vacancy rate. In general, a rental vacancy rate is considered healthy when it is approximately 5% and a healthy ownership vacancy rate is 3%. Any rate below the one considered "healthy" indicates that choices will be limited and prices generally increased. On the other hand, vacancy rates much above

[66] Not including vacancies. Source 2025 Housing Needs Assessment.

5% for rental units and 3% for ownership units may signify an oversupply of that type of housing or disinvestment in a particular area. According to a housing needs analysis performed by the state, there is concern about the health of Washington County's housing market because at the time of the last Census, it had a rental vacancy rate of 3.1% and an ownership vacancy rate of 1.5%, well below the rates considered healthy (Vermont Housing Needs Assessment 2025-2029).

Table 43: Vacancies in Central Vermont

	Orange County	Washington County	% of Totals
Total Vacant Units	2,336	5,149	
For rent	47	307	1%
For sale only	63	153	1%
Rented, not occupied	25	79	0%
Sold, not occupied	68	100	0%
For seasonal, recreational, or occasional use	1,590	3,734	14%
Other vacant	524	763	3%
Vacancy Rate = Vacant Units/ Total Number of Units x 100	6%	13%	19%

Source: US Census ACS 5-Year Estimates B25004, B25003, 2024 data Housing Costs

Housing Expense

Housing costs in Vermont have increased significantly over the last ten years. While housing prices rise as wages and income rise, throughout Vermont housing costs are rising much faster than income. Facts from the Vermont Housing Needs Assessment 2025-2029 help illustrate this issue:

- Homeowner median income in Vermont was $90,311, and renter median income was $43,102.
- A Vermont household would need an annual income of $118,731 to purchase the median-priced, $355,000 home.
- In Washington County, the average Fair Market Rent for a modest, two-bedroom apartment was $1,453 in 2024. This is 25-35%

higher than it was in 2019.[67]

- A Washington County household would have to earn $58,120 annually to afford that Fair Market Rent.

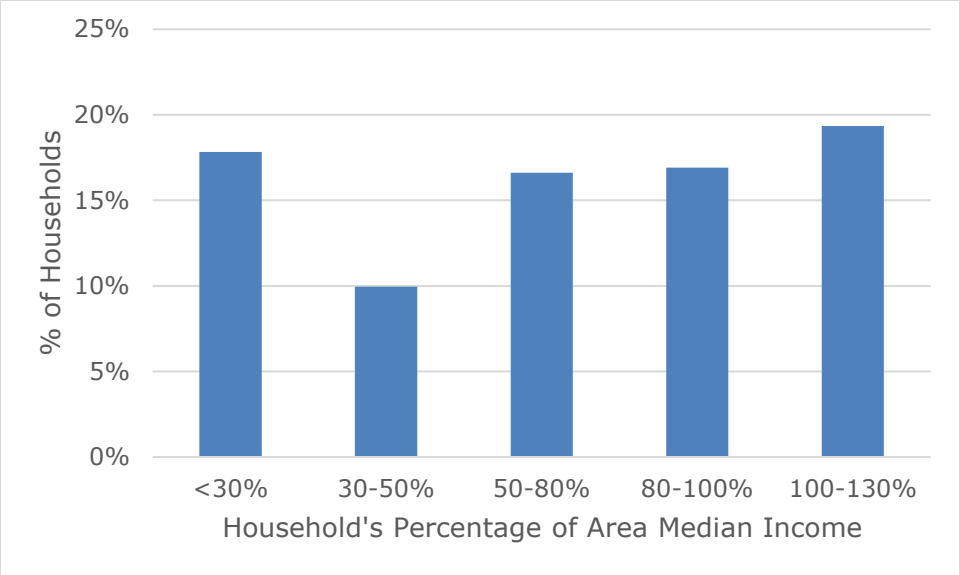
Table 44: Area Median Incomes

	Area Median Income	% AMI	1 person household	2 person household	4 person household
Washington County	$105,400	30%	$22,140	$25,320	$31,620
		50%	$36,900	$42,200	$52,700
		80%	$59,050	$67,450	$84,300
		100%	$73,800	$84,400	$105,400
		130%	$95,940	$109,720	$137,020
Orange County	$93,000	30%	$19,950	$22,800	$28,500
		50%	$33,250	$38,000	$47,500
		80%	$53,200	$60,800	$76,000
		100%	$66,500	$76,000	$95,000
		130%	$86,450	$98,800	$123,500

Source Data: HUD FY 2024 Income Limits Summary

[67] Vermont Housing Needs Assessment 2025-2029

Figure 18: Percentage of Households at Area Median Income



Source: US Census ACS 5-Year Estimates B25118

In Washington County, about 24% of households make less than 50% of the Area median income, or less than $36,500 for household annually. In Orange County 21% of households make less than $37,267 - 50% of the AMI.

Table 45: Area Median Rent and Housing Prices

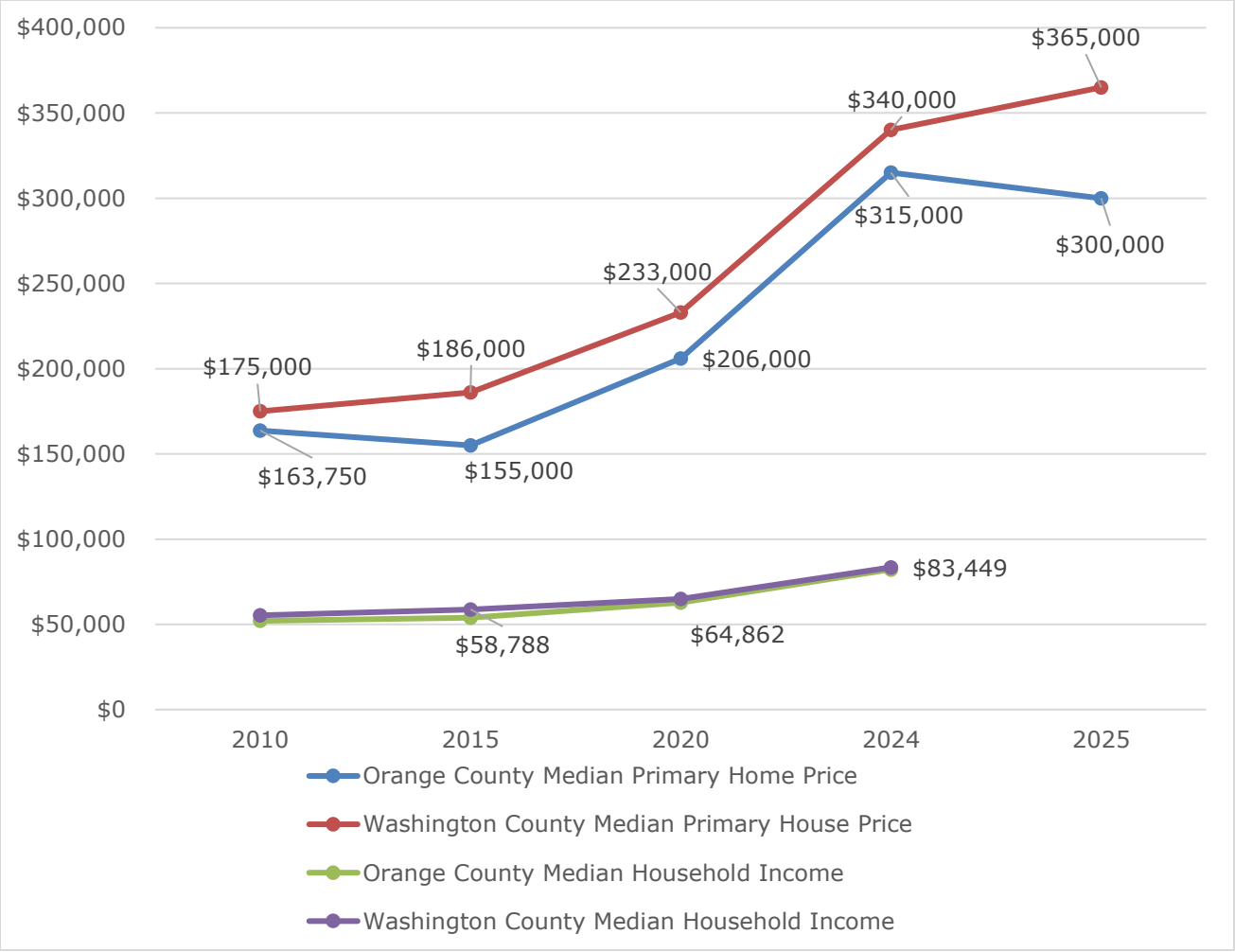
		2024	2025
Washington County	Median Primary House Price	$340,000	$365,000
	Median Secondary House Price	$330,000	$382,500
	Median Rent	$1,163	not yet available
Orange County	Median Primary House Price	$315,000	$300,000
	Median Secondary House Price	$224,268	$190,000
	Median Rent	$1,173	not yet available

Source: US Census ACS 5-Year Estimates B25064 and Vermont Department of Taxes, Property Tax Transfer (PTT) records

In Washington County, the median home sale price increased by 96% between 2015 and 2025 from $186,000 to $365,000 and in Orange County, the median price increased 94%, from $155,000 to $300,000. In order to afford that home in Washington County, a household would need to earn a yearly salary of $113,714. In Orange County, the household would need $100,366.

According to the Vermont Housing Needs Assessment 2025-2029, a Washington County household earning the median income of $77,278 would need an additional $36,436 to afford the median home, nearly 50% more. In Orange County, with a median income of $74,534, the gap is $25,832, close to 30%.

Figure 19: Median Income Compared to Median Home Price



Source: housingdata.org

Housing and Transportation Cost Burden

Housing costs are identified as a "burden" by the State planning statute (Ch. 117) if they consume more than 30% of the household's income. The number of burdened households has risen, given the significant increase in median house prices over the last several years. This increasing gap between what families are forced to pay for housing costs and what their incomes can afford has several negative side effects on the quality of life and the local economy. Burdened households may not be able to afford medical or educational costs. These households also have less disposable income to spend in local stores, restaurants and entertainment venues.

Many households find more affordable housing farther away from employment centers which causes long commutes and reduces the amount of time to spend with family. The cost savings on a home farther from town centers may be deceptive. Commuting costs increase substantially as families move farther away from jobs. These households also have less disposable income to spend in local stores, restaurants and entertainment venues. (Also see Housing Locations section.)

Vermont statute states that Regional Planning Commissions create a policy for households to avoid spending greater than 30% of their income on housing and not more than 15% of their income on transportation costs. Housing and transportation constitute a relatively small proportion of household budgets in the downtown areas of Central Vermont compared to households in lower-density municipalities. According to the data presented, only Barre City has a combined cost-burden of less than 45% of household income for these two expenses. These findings support the goals of encouraging housing affordability by placing new housing in and around dense, mixed-use core areas. Nevertheless, it is crucial to highlight that across Central Vermont, median spending on transportation never falls below the state-identified threshold of 15% of household income, indicating that density and access to services and transit alone are not enough to bring transportation costs below 15%.

Table 46: Transportation and Housing Cost Burden

	Percent of Income Spent on:		
Municipality	Housing & Transportation	Housing	Transportation
Barre City	39%	20%	19%
Barre Town	47%	21%	26%
Berlin	51%	30%	21%
Cabot	52%	25%	27%
Calais	57%	30%	27%
Duxbury	61%	33%	27%
East Montpelier	55%	31%	24%
Fayston	63%	35%	27%
Marshfield	55%	26%	28%
Middlesex	59%	31%	28%
Montpelier	48%	27%	20%
Moretown	56%	30%	27%
Northfield	47%	23%	24%
Orange	55%	26%	28%
Plainfield	52%	27%	25%
Roxbury	51%	23%	28%
Waitsfield	48%	25%	23%
Warren	59%	31%	28%
Washington	54%	25%	28%
Waterbury	49%	27%	22%
Williamstown	53%	26%	27%
Woodbury	55%	27%	28%
Worcester	55%	27%	28%

Source: 2025 Housing and Transportation Index – Center for Neighborhood Technology

Long commuting times have an impact on more than just quality of life, traffic, air pollution levels, natural resources. (For more information see: Land Use & Transportation Elements.) These long commutes also cost residents a significant amount of money. A resident who drives 40 miles round trip per day to work will spend about $640 per month ($7,540 per year)[68] on commuting expenses alone, while a 15-mile round-trip commute would cost significantly less. Current development patterns which locate housing far from jobs and services are costing residents both time and

[68] Internal Revenue Service. 2008 Standard Mileage Rate. The standard mileage rate for business is based on an annual study of the fixed and variable costs of operating an automobile.

money.

Table 47: Costs of Commuting

	40-mile round-trip commute	15-mile round-trip commute
Monthly Cost	$629	$236
Yearly Cost	$7,540	$2,827

**Assumptions: commuting 5 days per week at 2025 IRS rate ($.725)*

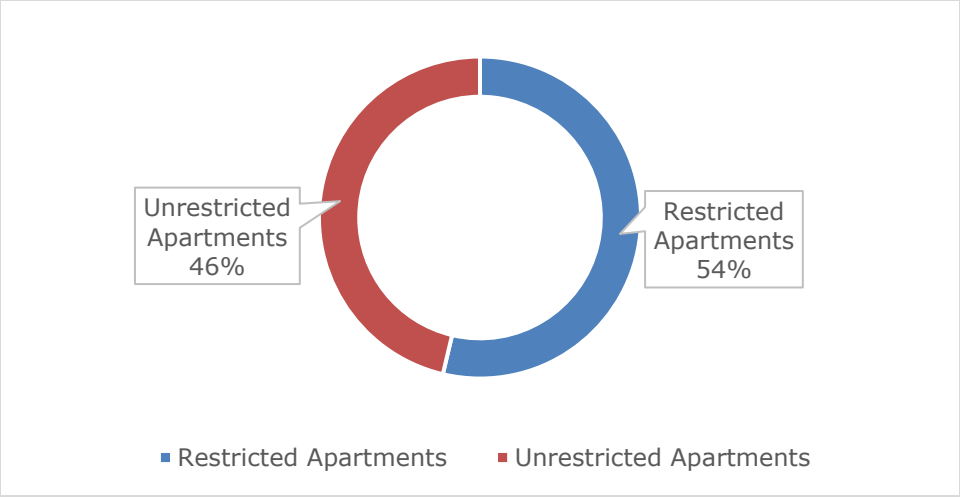
Subsidized Housing in Central Vermont

There are 57 subsidized housing developments in Central Vermont. In 2024, an estimated 7,408 rental units were available in the Central Vermont Region, and of those 1,785 were subsidized rentals, roughly one quarter of the total stock. According to the U.S. Department of Housing and Urban Development, there are 215 very-low-income households who received Section 8 rent subsidies (federal Housing Choice Vouchers) from the Barre Housing Authority and the Montpelier Housing Authority in 2025.[69]

In Central Vermont public housing authorities and the community land trust are working to provide our Region with perpetually affordable rental and homeownership units. Affordable housing developers can use Federal and State funding resources in order to subsidize units that will be maintained at affordable rates for income-eligible tenants. Affordability covenants or deed restrictions can be added to homeownership units to ensure homes remain affordable for a set period of time, even during resale, a mechanism used by community land trust model. Applying this model may be one way to expand the option of homeownership for very-low-income households who are currently homeowners in the region without creating a housing cost burden.

[69] Once issued, vouchers are not restricted to the geographic area where they were issued, so a recipient of a voucher from one of the Washington County public housing agencies (PHA) may use that voucher anywhere in the US where another program administers Section 8 vouchers. There are no PHAs in Orange County. *Source: U.S. Department of Housing and Urban Development, via housingdata.org*

Figure 20: Subsidized Rental Housing in Central Vermont



Source: Housingdata.org

Housing Market

Housing Supply Trends and Needs

During the ten-year period between 2015 and 2024, 1,354 new units were created in Washington County, and 558 in Orange County. While the number of multi-family homes increased in Washington County, Orange County saw a decrease in small, medium, and large multi-unit housing.

Care should be taken to create the type of units, in both size and price, that are needed by the Region's current and future residents. Keeping prices from soaring higher will require not just a raw increase in the number of housing units but the production of specific types of housing units. The Housing Targets in this chapter offer recommendations on how to meet projected regional growth by setting new housing goals for each municipality, identifying the size and type of housing, and calculating how much current residents can afford to pay for a rental or home purchase.

One challenge is that, as shown above, 70% of the owner-occupied homes in the region are single-family dwellings. Of those owned homes, 70% of those have 3 or more bedrooms. When compared with a downward trending household size, the current 2.2 person household will often buy more house than they need. As statutory changes reducing the minimum lot size take effect and Tier 1 exemptions facilitate development, it appears likely that single-family homes will decrease in size. CVRPC will be conducting more

research into the trends in development in the region to accurately gauge growth, cost and building type in new development. See Appendix B: Housing Target Methodology for more information.

Mobile, Modular and Manufactured Housing

Mobile, modular, and manufactured housing provide an important source of relatively affordable homeownership, with smaller footprints and flexible options for workforce households, first-time buyers, seniors, and small families. These factory-built homes are often constructed to high safety standards and can be more energy-efficient, helping reduce long-term heating and utility costs. Under the HOME Act (Act 47), municipalities must allow manufactured homes to be sited wherever single-family homes are permitted, reinforcing their role in expanding housing choice.

In Washington County, there are approximately 1,722 manufactured homes—about 7% of the housing stock. However, many of these parks are located in environmentally vulnerable areas; many are in floodways, and during the July 10, 2023 flood, 28 homes in the Berlin Mobile Home Park were destroyed and five additional homes at River Run Manor were condemned, underscoring the environmental burden of higher risks to lower-income residents.

Housing Locations

Rural Housing Density

In the early twentieth century, towns and villages were characterized by compact neighborhoods; yet today much of the housing growth in the Region is happening outside of town and village centers.

Low-density scattered development has been a significant concern to many towns in the Region as reflected in their town plans. Most towns now have land use and housing goals that include some version of the following statement: “Goal: Preserve the Town's historic settlement pattern, defined by compact villages surrounded by rural countryside.” (Warren Town Plan, 2019) The benefits of developing more dense, compact housing within or close to village and town centers at historic settlement densities are numerous and include:

- decreased land costs due to smaller lot sizes
- decreased development costs due to proximity to existing infrastructure
- increased opportunities to develop a variety of housing options for different lifestyles
- decreased automobile dependency due to proximity to amenities such as schools, shops, services, and jobs
- increased viability of mass transportation
- preservation of natural resources such as agricultural land and water resources.[70]

In spite of these benefits, rural municipalities continue to see higher housing growth than larger communities with the infrastructure available to support more dense growth.

Higher-Density Development

Local regulations and attitudes may be compounding the problem as well. GIS "Density Sampling," conducted as part of the Northwest Buildout Project, indicated that, in many traditional village and urban areas, allowable densities are often considerably less than those displayed by existing neighborhoods. NIMBY-ism (not-in-my-back-yard) has also been cited as a factor occasionally inhibiting denser new development.

Rural communities can also do more to promote compact housing by providing density bonuses and other incentives for "clustered" development, or finding suitable locations for village expansion or the development of new villages and "rural hamlets." (For more information on residential development patterns, see the Land Use Element.)

In order to encourage and support more dense development in Downtown and Village Centers, and Village and Planned Growth Areas, CVRPC recognizes the need to understand the current status of existing municipal water and wastewater systems. This data is surprisingly difficult to come by and there currently is no comprehensive state-wide data on capacity or usage for either service.

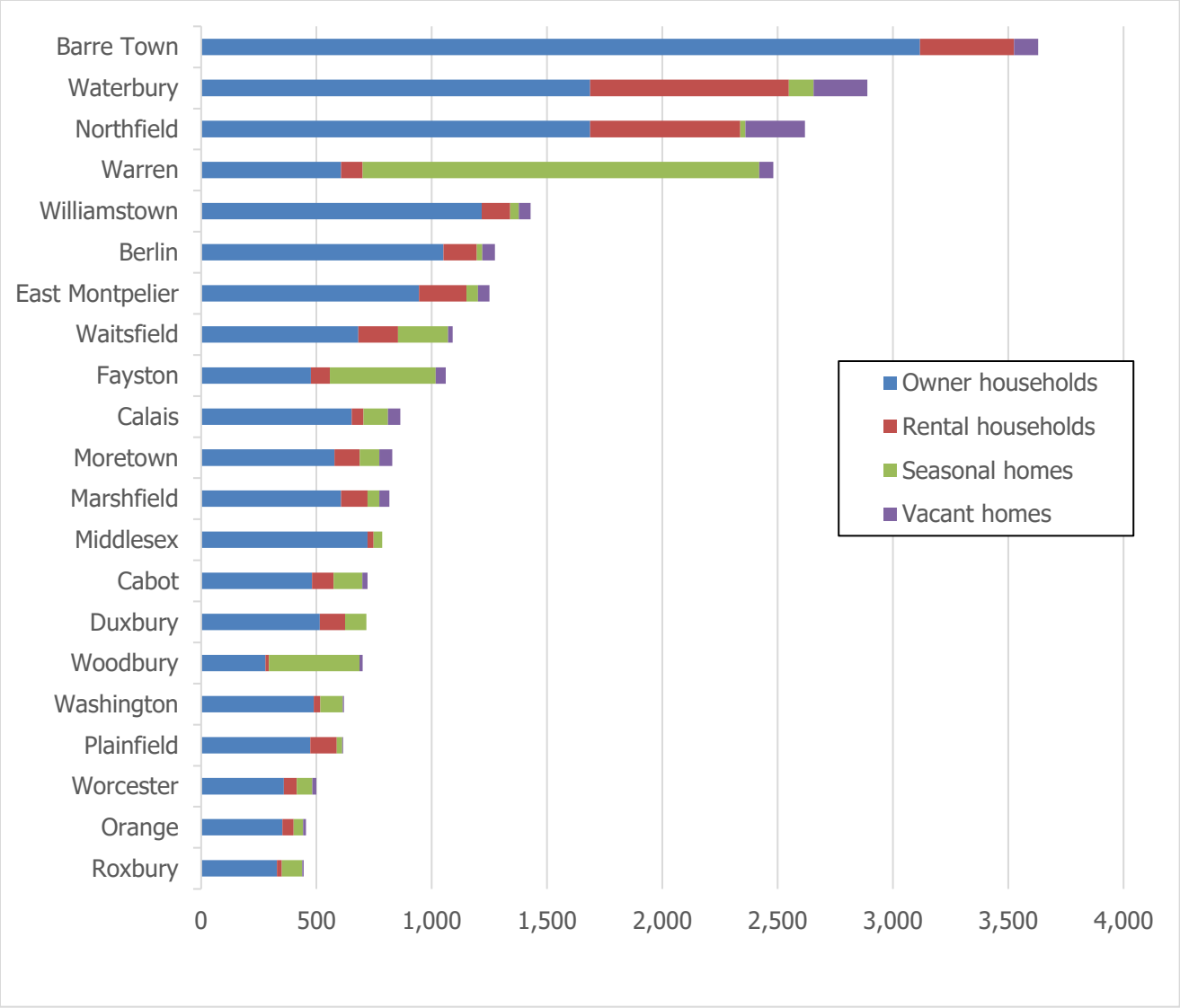
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[70] Central Vermont Regional Planning Commission. 2007. CVRPC Northwest Build-out Study Summary Report.

Recent statewide efforts by Regional Planning Commissions to implement the Small System Capacity and Resiliency Program through the Vermont Bond Bank are working to collect this data, identify the challenges small municipal water systems face, and quantify their current usage/ability to support more hookups. This information, combined with an assessment of their overall system health, will help communities understand their capacity for growth and plan for long-term infrastructure investments.

In addition to the Bond Bank Water System grant program, a funding source linked to the efforts outlined above, the Community Housing Infrastructure Program (CHIP) can help fund community efforts to centralize and expand the facilities and services needed to encourage and incentivize growth.

Figure 21: Current Distribution of Housing in Central Vermont



Source: US Census ACS 5-Year Estimates B25003 and B25004

Source:

Table 48: Current Distribution of Housing in Central Vermont

Location	Owner households	Rental households	Seasonal homes	Vacant homes	Total
Barre City	2,062	2,094	20	221	4,397
Barre Town	3,117	408	0	105	3,630
Berlin	1,051	144	24	55	1,274
Cabot	481	93	125	22	721
Calais	653	51	106	53	863
Duxbury	514	110	92	0	716
East Montpelier	945	205	50	50	1,250
Fayston	476	82	459	44	1,061
Marshfield	607	115	50	44	816
Middlesex	722	25	38	0	785
Montpelier	1,992	1,772	48	152	3,964
Moretown	578	110	84	57	829
Northfield	1,687	651	22	258	2,618
Orange	352	49	41	13	455
Plainfield	473	115	24	3	615
Roxbury	329	21	88	7	445
Waitsfield	682	172	216	20	1,090
Warren	607	93	1,720	61	2,481
Washington	488	29	97	5	619
Waterbury	1,687	861	108	233	2,889
Williamstown	1,216	124	37	52	1,429
Woodbury	279	15	393	13	700
Worcester	358	57	67	17	499

Source: US Census ACS 5-Year Estimates B25003 and B25004

Homelessness

The number of people who lack permanent shelter or who lack stable or secure housing continues to grow in Central Vermont, however it is a problem that is not easily tracked. People experiencing homelessness or housing insecurity are not counted in the U.S Census, and many times they do not seek assistance or shelter at local facilities. Some people "couch surf" at the homes of friends and family; others camp alone in their vehicles, tents or campers/RVs, while others live in encampments; and some live in abandoned buildings.

According to the 2024 Point in Time (PIT) counts conducted by the Vermont Coalition to End Homelessness, there are 317 households experiencing homelessness in the Central Vermont planning area. Of these, approximately 90 were children in 50 households. This count includes figures for Washington County and a proportional estimate for the three CVRPC municipalities in Orange County. Consequently, there is a need to create an additional 317 housing units to support this population.

Good Samaritan Haven provides emergency shelter assistance, food, and care in Central Vermont, with a network of facilities in Barre City, Barre Town, Berlin, and Montpelier. In addition to the overnight shelters, transitional housing and shelter are provided by a number of organizations, including Good Beginnings of Central Vermont, Champlain Housing Trust, and Pathways Vermont. Transitional housing provides the bridge between homelessness and permanent housing, offering both short-term housing and case management to assist families transitioning from homelessness into permanent housing.

For those who choose not to access transitional housing or social services, compounding challenges can include hygiene and sanitation; personal safety and security; access to laundry; access to water, food preparation and storage; electricity and communication; as well as access to medical and pet care. Recent efforts have focused on creating shelter options during extremely cold weather, particularly in the Barre-Montpelier area.

It is important to acknowledge the complexity of homelessness and the frequent need for additional services. New construction is often not enough. Therefore, CVRPC recognizes that housing designed to alleviate homelessness should likely be situated where supportive services are already available, rather than evenly distributed across the region.

Municipal Responsibilities and Resources

The Fair Housing Act

State and Federal housing laws help protect against housing discrimination. Under the Federal Fair Housing Act and its 1988 amendments, individuals may file complaints alleging housing discrimination on the basis of race, color, national origin, religion, gender, handicap, or familial status. Individuals may also allege related acts of discrimination that are governed by other federal laws such as the Civil Rights Act of 1964. Vermont law (9 VCS 4503) prohibits any person from engaging in unfair housing practices such as the refusal to sell or rent, as well as many other actions involved in the advertisement, financing, and brokering of a dwelling.

A municipality has fair housing responsibilities regardless of whether or not the Federal government has funded the activity that is the basis for the complaint. A fair housing violation does not require a discriminatory intent; a violation can be found simply because municipal officials carried out regular activities in a routine way and failed to recognize their special fair housing responsibilities. In addition Chapter 117 section 4412 outlines required provisions and prohibited effects by which municipalities must abide.

Municipalities carry out four broad categories of activities that affect housing. Each can trigger municipal fair housing responsibilities:

- Regulatory activities – When a municipality enacts and administers regulations (e.g. zoning or building codes) that affect existing or potential residential properties;
- Provision of services – When a municipality provides routine services in residential areas or to residents;
- Provision of subsidies – When a municipality offers financial incentives (e.g. grants, loans, or loan guarantees) or special services (e.g. infrastructure projects or housing rehabilitation services) to residential property owners or to residents; and
- Proprietary activities – When a municipality buys or sells real property, particularly if the property was used or will be used as a residence.

Under the Fair Housing Act, a person who believes that he or she is a victim of housing discrimination may file either a complaint with the Department of Housing and Urban Development (HUD) or a lawsuit in federal or state court. If a municipality must defend itself against a complaint based on the Fair Housing Act, or if it is found to have violated the Act, the costs can be considerable. For more information on Fair Housing laws, visit the HUD

website at http://hud.gov.

Advocacy & Housing Committees

Local housing groups have proven effective at addressing local housing needs and can be a valuable resource in assisting town select boards and planning commissions in decision-making. Yet no single municipality acting alone can address the Region's housing needs. All 23 cities and towns can work together in advocacy and partnership with other housing organizations in order to meet current and future housing needs in sustainable ways.

Housing Resources

Advocacy

- Housing and Homelessness Alliance of Vermont. Home - Housing & Homelessness Alliance of Vermont. Organization working to promote awareness and policies for affordable housing and to end homelessness in Vermont.

Data Sources

- American Census. https://data.census.gov/ Database of Regional and national statistics.
- Vermont Housing Data. www.housingdata.org. Database of Vermont, including a directory of affordable housing, housing profiles, and policy resources.

Guides

- HUD's Regulatory Barriers Clearinghouse. RBC Home Page | HUD USER. U.S. Department of Housing and Urban Development's guide to solutions to state and local regulatory barriers to affordable housing.
- Vermont Housing Needs Assessment Guide. www.housingdata.org. Guide to help community groups determine the need for affordable housing within their cities or towns.

Organizations

- Downstreet Housing and Community Development https://downstreet.org/ Organization working to develop and manage affordable rental and homeownership housing opportunities in Central Vermont.

Housing Target

According to the 2025 Vermont Housing Needs Assessment (HNA)[71], the number of new housing units needed in the Central Vermont Region in 2030 are between 2,540 and 3,864 and for 2050 between 8,045 and 15,856. Per statute, CVRPC has disaggregated targets by municipality and zoning district, as well as by unit type, size, and affordability.

Table 49: Central Vermont Regional Housing Targets

	2030	**2050**
Low	2,540	8,045
High	3,864	15,856

Municipal Housing Targets

Given the interdependent economy and society of the Region, the housing needs of the Region affect every community. The purpose of the Regional Housing Targets is to establish a long-term vision for housing in Central Vermont and is to be used to measure progress.

The 2026 CVRPC Regional Plan establishes the objective of strategically planning population growth around dense mixed-use core areas. While CVRPC believes there are advantages for municipalities to focus new growth in their centers, there is nothing in these targets to prevent the majority of new housing from being in low-density suburban or exurban districts. Further, we recognize that many folks moving to Central Vermont mostly prefer to live in rural or very rural locations; therefore, it would be folly not to plan for continued growth in our rural municipalities. Therefore, this plan will continue to use the statutory language of *targets*, while in practice, these numbers describe both targeted growth and predicted growth.

Municipal housing targets were set by factoring in both the community's population and its ability to accommodate future development. This was done by identifying the areas in each municipality appropriate for high-density, medium-density, and low-density housing, and by assigning Future Land Use categories to each parcel. The totals for each town were then

[71] 2025 Vermont Housing Needs Assessment, Vermont Housing Finance Authority for the Vermont Department of Housing and Community Development.

compared against the regional totals and assigned a percentage of the overall target housing units, with 40% of the regional targets going to Downtown Centers and Planned Growth Areas and 20% to Village Centers and Village Areas. The remaining 40% were allocated based on each municipality's share of the regional population.

Table 50: Central Vermont Municipal Housing Targets

	2030 Low Target	2030 High Target	2050 Low Target	2050 High Target
	2,540	**3,864**	**8,045**	**15,856**
Barre City	412.1	626.9	1,305.3	2,572.6
Barre Town	257.0	391.0	814.1	1,604.5
Berlin	147.3	224.0	466.4	919.2
Cabot	49.4	75.2	156.6	308.6
Calais	31.9	48.5	101.1	199.2
Duxbury	24.0	36.5	75.9	149.6
East Montpelier	108.1	164.5	342.5	675.0
Fayston	20.8	31.6	65.8	129.7
Marshfield	53.8	81.9	170.4	335.9
Middlesex	34.1	51.8	107.9	212.6
Montpelier	662.9	1,008.5	2,099.7	4,138.3
Moretown	41.2	62.6	130.4	257.0
Northfield	196.6	299.1	622.7	1,227.3
Orange	26.9	40.9	85.1	167.8
Plainfield	57.6	87.6	182.4	359.5
Roxbury	23.9	36.4	75.8	149.3
Waitsfield	59.9	91.1	189.6	373.7
Warren	43.3	65.9	137.2	270.5
Washington	25.6	39.0	81.2	160.0
Waterbury	155.1	235.9	491.1	967.9
Williamstown	66.9	101.7	211.7	417.3
Woodbury	15.0	22.9	47.6	93.8
Worcester	26.7	40.6	84.5	166.6
	2,540.0	3,864.0	8,045.0	15,856.0

In determining FLUA classifications, CVRPC considered a variety of factors, including each municipality's Town/City Plan and locally identified future land uses, local zoning regulations, the presence of existing or potential for infrastructure like municipal water or sewer service, and current and potential state designations for Downtown Centers, Village Centers, etc.

This information was used to identify areas appropriate for future housing, as well as those better suited for recreation, agriculture, and conservation. For more details on how these determinations were made, see Appendix C: Future Land Use Area Methodology.

Housing Units by Future Land Use Areas

The balance of future land use areas below reflects the intention to promote clustered development, support medium-density infill in transition areas, and steer low-density development by encouraging conversion of seasonal residences to full-time, commercial properties to residential use, and replacing homes in hamlets and working lands.

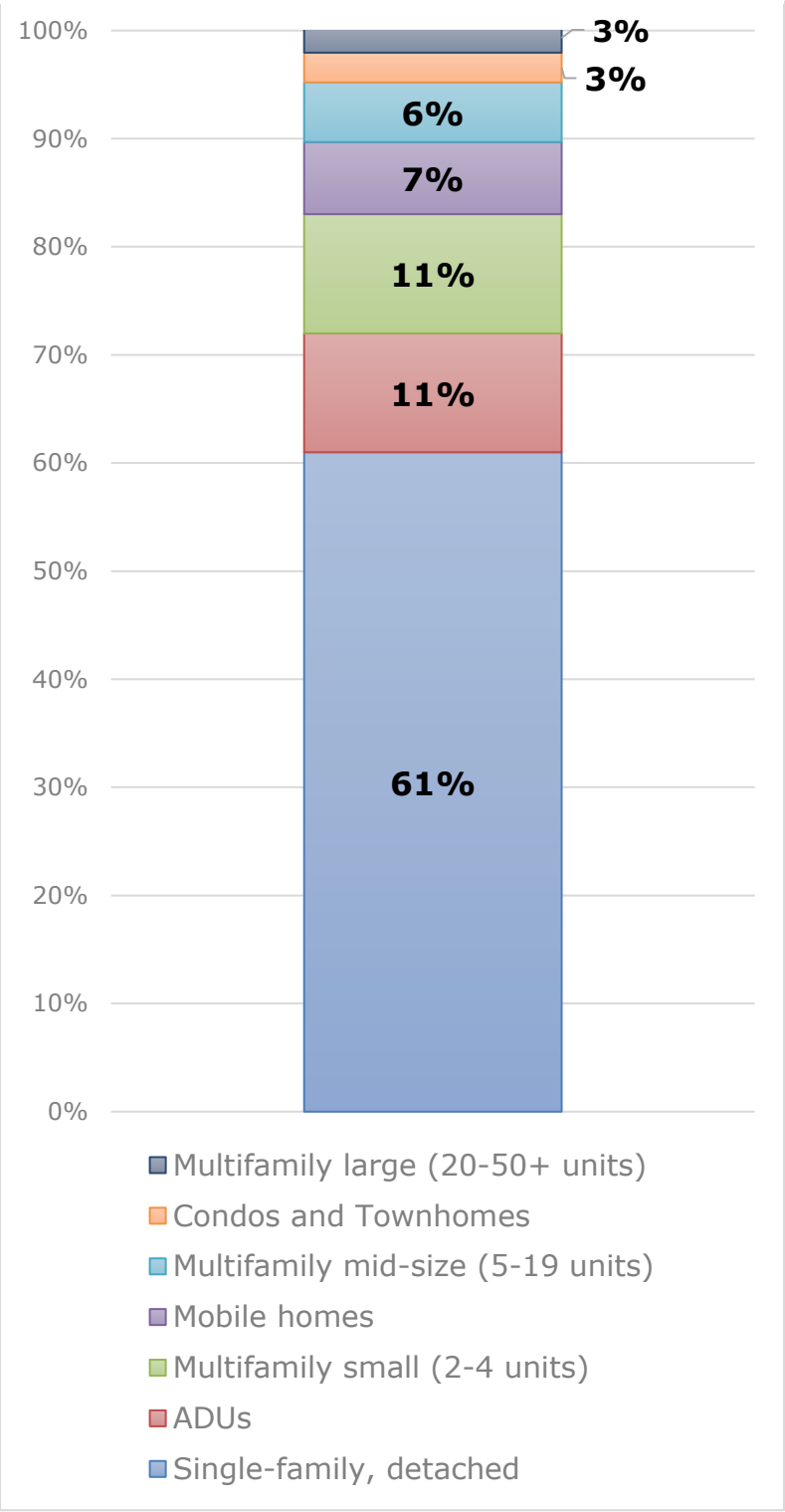
Table 51: Percentage High-Density Future Land Use Areas and Resulting 2030 Regional Housing Targets Central Vermont

Low 2030 Regional Housing Targets: 2,540 total

Future Land Use Category	% of Total Regional Land Area	Number of Units
Downtown Centers and Planned Growth Areas	0.88%	1,016
Village Center and Village Areas	0.94%	508

Housing Targets by Unit Type

Figure 22: Housing Targets by Unit Type



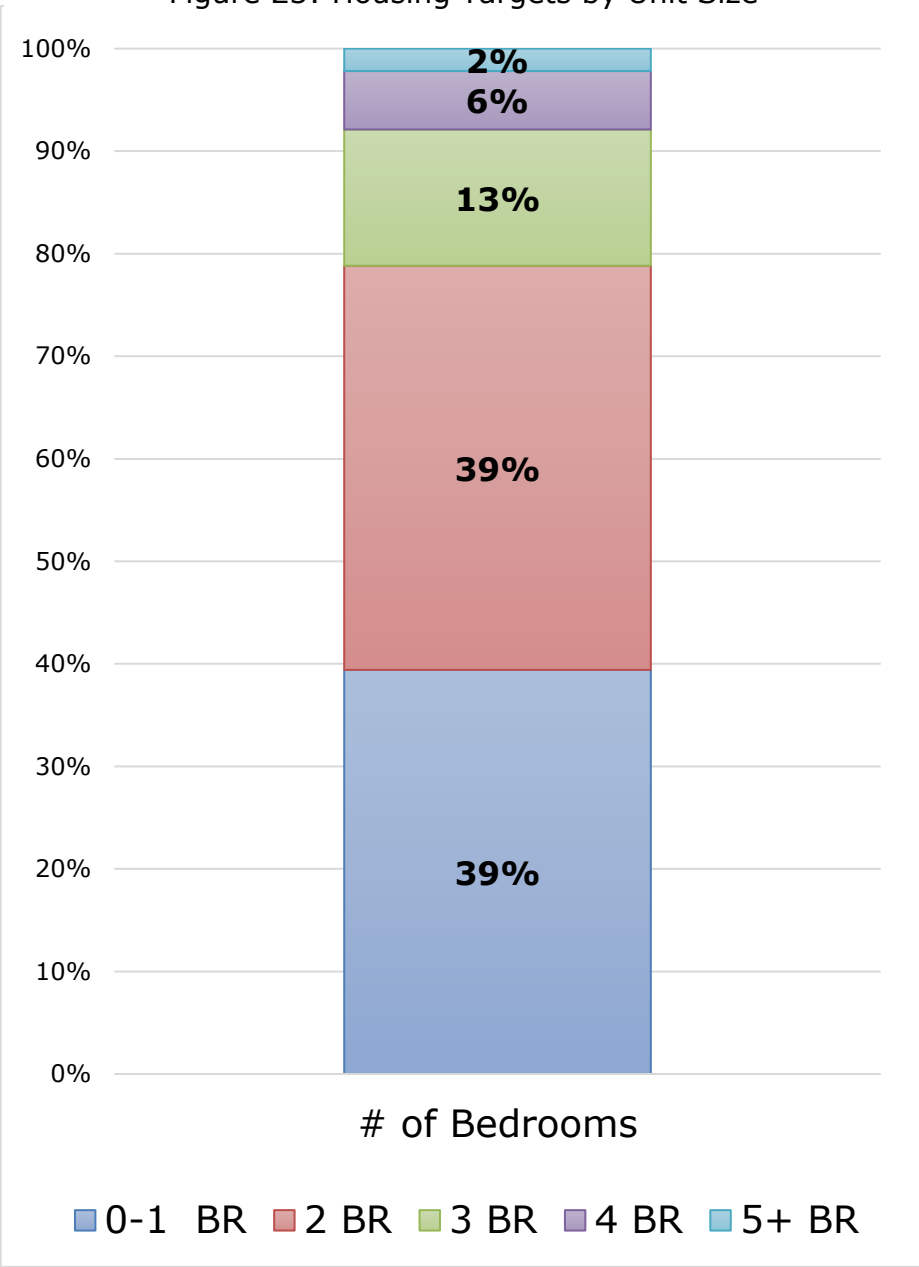
Single-family homes make up the vast majority of Central Vermont's housing stock, and will likely continue to be the home of choice for new homeowners and some renters.

Small multi-family rentals are likely to attract families with children, which is a key demographic Vermont is targeting.

As stated above, mobile homes offer affordability and autonomy with the support of infrastructure and community, as do condos and ADUs, with the ability to connect to neighbors in communal spaces.

Housing Targets by Unit Size

Figure 23: Housing Targets by Unit Size

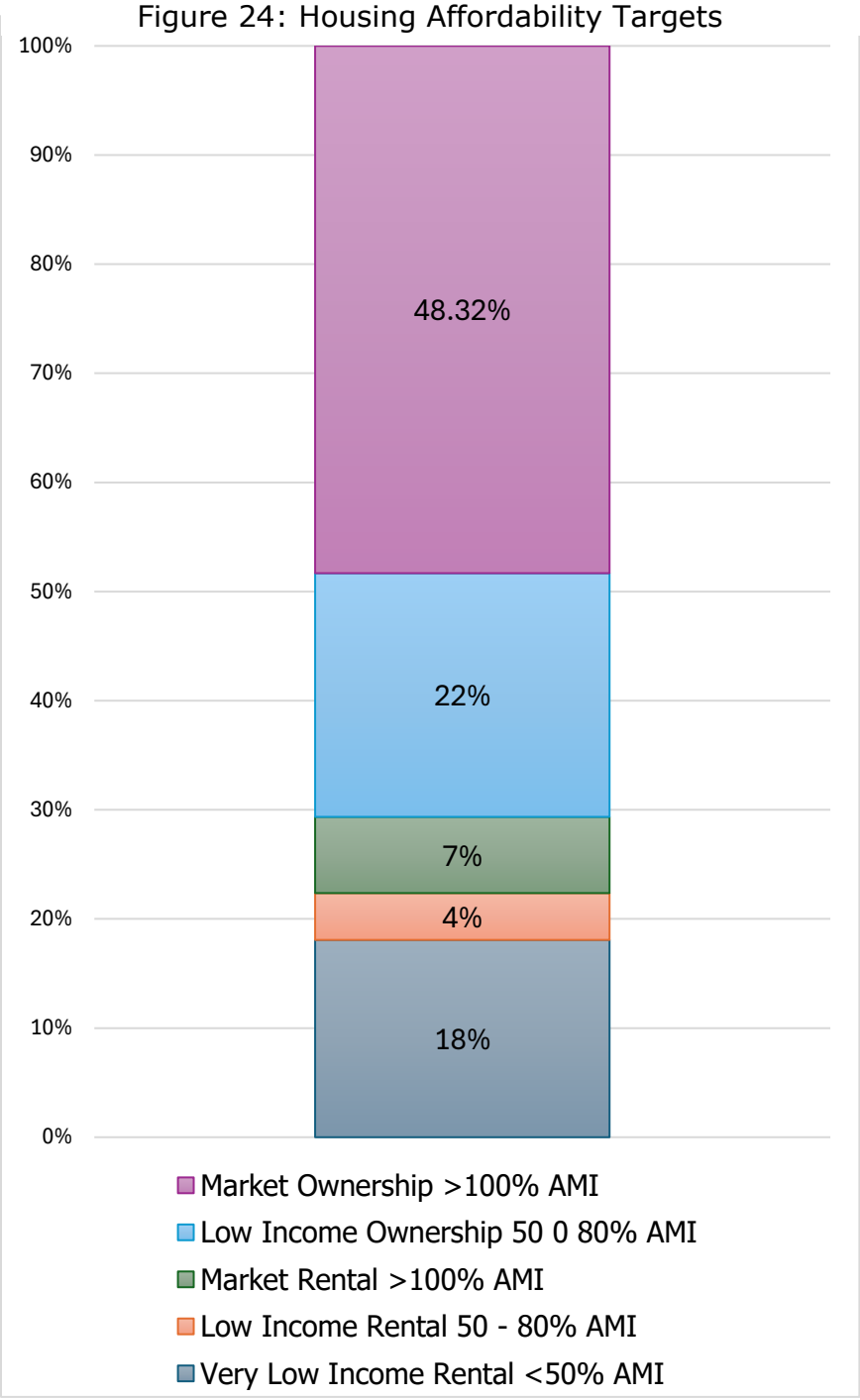


As household size continues to decrease, the popularity of studio, 1- and 2-bedroom units will continue to grow.

These targets for unit size address the disproportionate number of 3+ bedroom homes currently available in the market.

Housing Affordability Targets

Figure 24: Housing Affordability Targets



As discussed above in the Housing Affordability section, there is an increasing gap between area median incomes and area median rental/sale price.

The targets here use the current range of household incomes for renters and owners in Central Vermont.

In Washington and Orange counties, 17% of the homeowning households make less than 50% of the Area Median Income (AMI). This points to homeowners who may have inherited their homes or purchased before housing prices rose so sharply. In assigning these housing targets, we allocated this segment of households to future low-income rentals.

Conclusion

CVRPC encourages member municipalities and residents to address the Region's shortage of affordable housing through various methods. These include diversifying the types of new housing units constructed, increasing density in new and existing housing units, and zoning for growth close to existing population centers and infrastructure and out of natural disaster hazard areas. The following are goals and strategies to ensure that all Central Vermont residents have housing that meets their needs.

Housing Goals, Polices and Strategies

Housing Goal 1

To promote the development of housing opportunities for all residents of the Region, including and especially, affordable, elderly, and special needs housing.

Housing Goal 2

To encourage innovative planning, design, and development of housing which minimizes its costs, energy consumption, and environmental impacts.

Housing Goal 3

To promote preservation of the existing housing stock and the development of future housing in the centers and neighborhoods of the Region.

Housing Goal 4

To support the coordination between public, private, and non-profit agencies involved with planning, financing, and developing affordable housing.

Housing Goal 5

Encourage large employers to explore and implement employer assisted housing.

Housing Policies

1. The Region's towns, non-profits, and state agencies should work collaboratively to address the Region's housing needs.

2. Municipal plans should assess the community's ability to meet the goals

set out in the Regional Housing Targets.

3. Municipalities should encourage housing at the maximum densities allowed by local plans and regulations and at densities at or above those of their traditional/existing neighborhoods.

4. Municipalities should seek to ensure at least 20 percent of the housing stock is affordable, as defined by 24 VSA, Chapter 117, Section 4303.

5. The majority of new housing should be constructed in centers and neighborhoods identified on the regional Future Land Use Map.

6. The Region's existing housing stock should be preserved and renovated. Adaptive reuse of older and historic buildings should be encouraged especially in downtown and village centers.

7. Housing units that are affordable to households below the area median income and housing near employment centers should be encouraged.

Housing Strategies

1. Assist towns in finding the resources needed to carry out housing needs analyses to identify the specific types of housing most needed by the community.

2. Provide communities with tools and resources to implement the Regional Housing Targets.

3. Encourage the adoption of local land use regulations and bylaws that allow concentrated development where appropriate infrastructure can be made or is available.

4. Review town plans to assure that all towns in the Region have a housing element that identifies housing issues and outlines steps through which housing needs will be addressed.

5. Assist towns with the process of determining areas for growth on the regional Future Land Use Map.

6. Help towns to identify potential partners for affordable housing development.

7. Continue advocating for state policies and funding initiatives that increase housing opportunities for the Region's residents.

8. Make Geographic Information System technology and other tools

available to communities so they may analyze the impact of existing and/or proposed zoning policy on the potential for housing development.

9. Continue support of local housing groups.

10. Promote the density building land use strategies discussed in this Chapter and in the Future Land Use Element as a matter of course through our technical assistance programs.

11. Provide municipalities with resources for ADU design and construction.

12. Actively participate in the Act 250 process to support appropriate housing development.

13. Continue to assist any municipalities which have not yet adopted the 2023 HOME Act required changes.

14. Support placement of mobile homes and manufactured housing, and modular construction models through local planning and zoning standards.

15. Encourage towns to develop a streamlined permitting process for housing along with density bonuses and lowering of impact fees in downtown centers, village centers, planned growth areas and village areas.

8. ECONOMIC ELEMENT

A healthy economy is essential to maintaining Vermont's quality of life. A diversified and dynamic economy provides employment, stimulates social and cultural interaction, and provides the resources for the provision of a wide variety of community services, including education, health care and a well maintained physical infrastructure. On the individual level, a diversified economy offers greater opportunities for individuals to engage in satisfying and meaningful occupations and pursuits.

Economic vitality is a balance between human, natural and capital resources. The interaction of these factors determines the scale and intensity of growth and development. The Economic Element of the Central Vermont Regional Plan focuses on making effective use of the wide range of resources available in the region, while maintaining the balance of these resources.

Discussion: General Economic Profile

Like the rest of Vermont, the Central Vermont economy has evolved from an agricultural/ manufacturing emphasis to a more complex mixture of economic activity. The growth of the travel/ hospitality/recreation industry, for instance, has contributed to the expansion of the retail and wholesale trades, and other services like construction and mortgage banking. Manufacturing, which has expanded to include food processing, plays a significant role in the attraction of tourists and the diversification of agriculture. No one sector can stand alone; changes in one will have an effect on all the others.

The region's diverse economy is divided among a variety of activities. This industry distribution is supported by an equally diverse educational and occupational profile of the work force. Of the adult population in Central Vermont, 87.3% have a high school diploma or better. 42.2% have either a Bachelor's degree or graduate-professional degree. Central Vermont has a higher relative number of collegiate degrees, including, Bachelors and Graduate/ Professional, compared to Vermont (41.13%) and the United States (34.14%).[72] The occupational profile of the work force indicates that the largest category falls into health care and social assistance, retail trade or educational services.

Most of the region's employment is concentrated in the urban core, which is made up of Montpelier, Berlin, Barre City and Barre Town, with most of the balance of employment opportunities found in Waterbury, Northfield and the Mad River Valley towns.



Cabot Creamery, Cabot, Vermont

Just as the region's economy has evolved from locally focused agriculture and manufacturing to its current place in the more complex New England and national marketplace, it will continue to evolve as markets change and competition in all sectors becomes more global.

Central Vermont has a diverse economy. However, many of its top industries are similar to elsewhere in the state. As host to the state capital, Montpelier, the Central Vermont economy is characterized by a high percentage of employment in the public administration sector. As seen below on Map 31 below, there are high concentrations of state office buildings in Central Vermont. Since the COVID-19 Pandemic, however, many state workers have been working remotely, thus decreasing the day-to-day business transactions in major economic centers (Montpelier, Barre City, and Waterbury).

[72] S1501: Educational Attainment - Census Bureau Table

Map 32: Municipal, State & Federal Facilities

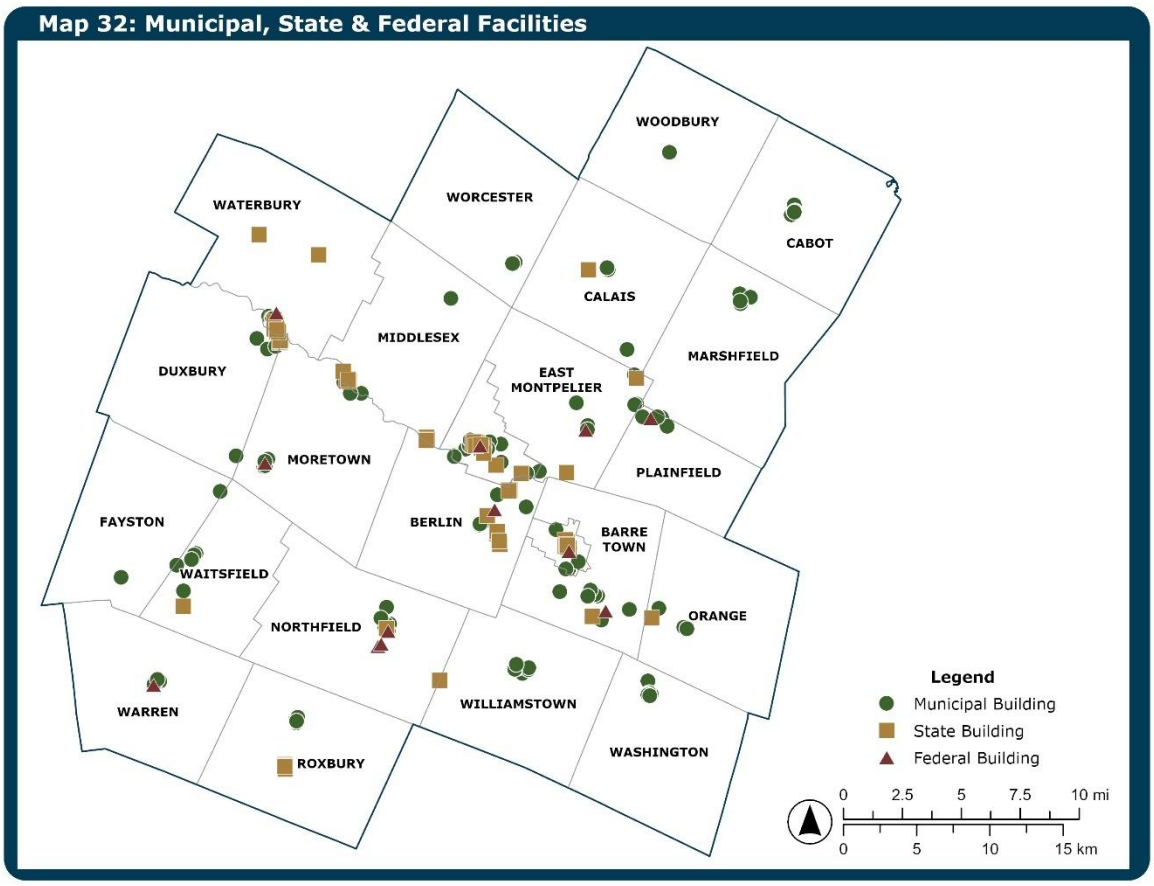


Table 52: Job Counts by NAICS Industry

Industry Sector	Total	Percent
Health Care and Social Assistance	4,003	13.87%
Retail Trade	3,652	12.65%
Educational Services	3,164	10.96%
Accommodation and Food Services	2,511	8.70%
Manufacturing	2,426	8.40%
Professional, Scientific, and Technical Services	2,131	7.38%
Public Administration	2,209	7.65%
Finance and Insurance	1,991	6.90%
Construction	1,426	4.94%
Other Services (excluding Public Administration)	1,145	3.97%
Administration & Support, Waste Management and Remediation	1,071	3.71%
Wholesale Trade	834	2.89%
Information	419	1.45%
Transportation and Warehousing	467	1.62%
Arts, Entertainment, and Recreation	381	1.32%
Real Estate and Rental and Leasing	321	1.11%
Utilities	235	0.81%
Management of Companies and Enterprises	230	0.80%
Agriculture, Forestry, Fishing and Hunting	166	0.58%
Mining, Quarrying, and Oil and Gas Extraction	83	0.29%
Total Primary Jobs	28,865	100.00%

Source: OnTheMap (2023)

The granite industry has long been at the heart of the Central Vermont Region's manufacturing sector. The region is a melting pot of ethnic heritage brought about by the influx of immigrants drawn to the region's granite quarries and manufacturing plants. In recent years, the industry has emphasized diversification of its product line and improvement of its fabrication processes. Innovation has led to reductions in such health and environmental hazards as dust and sludge, and has led to greater utilization of processing wastes.

Ski areas are viewed as one of the Region's resources, combining economic benefits and recreational opportunities. Ski area growth has direct implications for the natural, physical and socio-economic environments. The ski industry also presents the potential for secondary impacts through associated employment in the service and construction sectors, as well as the expansion of seasonal and permanent housing. A challenge exists to balance the competing demands of accommodating growth while preserving resources.

By its nature, the ski industry operates within some of the more environmentally sensitive areas of the Region. The ski areas, themselves, have often recognized the strong relationship between the health of the environment and the health of the ski industry and have demonstrated a desire to ensure that ski-related development respects the natural environment.

Central Vermont continues to have significant ties to the agricultural and forest-based economies. In addition to direct economic contribution, farms and forests helps to define the Region's cultural identity and provides Central Vermont residents with open space, recreational opportunities, aesthetic pleasure, and a sense of place. The continued economic viability of these highly valued working landscapes will be a key factor in preventing the conversion of these lands to other uses.

Though a variety of economic and social factors continue to threaten the local sourcing that was common in the past, new economic and social forces make this a good time to look anew at local food and wood product manufacturing. Many farmers are growing for local markets, local processors are feeling pressure for growth, the majority of maple producers have diversified their operations, and public interest in maintaining our agricultural economy is clearly on the rise.

Economic Development

Self Sufficiency

Research has shown that community and economic development are best supported when local solutions and resources are brought to bear on local problems.

Small, new businesses are the backbone of economic development and job creation. In Washington County, enterprises with less than 20 employees comprise roughly 71.54% of establishments while providing 23.4% of employment.[73] Even though initial employment gains may be small, start-up businesses have immediate impacts on the local economy. Small companies tend to hire locally, buy locally and put more money into the local economy

[73] 2022 SUSB Annual Data Tables by Establishment Industry

than they take out.

Over the past decade Vermont has become a leader in small business formation, with the Central Vermont region adding its share of new, small, innovative businesses to the list. In Vermont, 99% of Vermont businesses fit the definition of a small business and small business employees accounted for 60.4% of total employees in the state.[74]

Business development is influenced by a number of factors, as is the ability of the Central Vermont region to nurture, attract, and retain the businesses that are crucial to the economy. The Central Vermont Regional Plan attempts to capitalize on the region's positive factors, and also identify problems along with potential solutions.

Education

The quality of the work force and quality of life are directly related to community emphasis on education. Elementary and high school education are the basis of the human infrastructure. They provide the skills necessary for individuals to interact with one another in civil and meaningful ways. They are also the source of basic vocational skills in communications, mathematics, and problem solving.

As our society becomes more technologically advanced, these elementary skills take on even greater importance. Complex manufacturing techniques require workers who can process information and manipulate advanced machinery. Information management requires the ability to identify, isolate and utilize a wide variety of data.

The Central Vermont region is served by a high quality public and private school system. The region's seven high schools provide curricula ranging from college preparatory to vocational education. Several high schools have received state recognition for excellence in education. The region's elementary schools are in the forefront of the educational reform movement, making great strides in performance based programs, several of which have been recognized at the national level, and curriculum integration.

While an elementary and high school education can provide the building

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[74] Small Business Economic Profile VT

blocks for an educated work force, individual advancement and technological improvement will depend on the development of life-long learning habits and opportunities for all workers. The public education system must expand to meet the vocational needs of adults. Public and private institutions and employers must take a proactive role in identifying the skills necessary for economic vitality in the future, and take the steps necessary to prepare and retain the work force.

Examples of the programs needed to foster workforce training include: the VT Department of Labor's registered apprenticeships program, which provides work experience and training, and the Central Vermont Career Center, which is the region's provider of Career Technical Education and provides training and a pipeline between students and employers.

Additionally, Central Vermont benefits from local post-secondary educational institutions like the Community College of Vermont and Norwich University. Institutions of higher education play an important role both as major employers and as support institutions for technology-based industry.

Transportation and Communication

A number of factors contribute to the appeal of Central Vermont to businesses. The transportation system in Central Vermont provides ready access to markets for goods produced here, as well as facilitating the flow of tourists into the region from the major northeast metropolitan areas. The region is served by the interstate highway system and national freight and passenger rail service. Private business and general aviation are served by the all-weather Edward F. Knapp State Airport, and passenger air service is readily accessible through the Burlington International Airport.

The State's communications policy and planning have benefited Central Vermont in the form of a network of telecommunications infrastructure that enables information-based industries to link into a worldwide telecommunications network. There remain challenges to both take advantage of this advanced technology, and to keep pace with the developments of this quickly changing industry. The increasing region-wide availability of the state-of-the-art telecommunications/information technology infrastructure (including high speed internet access and wireless communications) is increasing work options for Central Vermonters.

Quality of Life as an Economic Consideration

Quality of life is a difficult concept to define, yet many would agree that it stems from the sense of security and well-being that comes from being part of a community. Central Vermont's small town character, with its opportunities for participatory government, diverse social interaction, and human scale commerce plays a major role in maintaining an excellent quality of life.

Essential to a high quality of life is a dynamic and varied cultural experience. The village as the center of social activity provides the critical mass necessary for a flourishing interchange of ideas, art and culture. The traditional New England village is a virtual textbook of human history. The variety of architectural styles reveal the economic and social fortunes of its inhabitants, past and present.

The New England village is considered by many to be the pinnacle in land use design. In scale and function, it satisfies our needs for privacy, community and livelihood. Maintaining historic development patterns of village centers surrounded by resource based agricultural, mineral, forest and recreational activities balances economic and environmental interests. Concentrating growth and development within the confines of a downtown or village center allows the community to implement infrastructure improvements in an efficient and effective manner that will improve the quality of life while limiting the degradation of the environment.

Central to the preservation and development of village patterns and commerce are affordable public utilities and services that allow increases in residential and commercial densities. While the costs of water and sewer for dispersed development can be borne by individual owners and users, public systems that benefit the entire community are frequently beyond the capacity of individual users to support. Equitable methods of financing that recognize the social, economic and environmental benefits of public infrastructure must be developed.

The availability of safe and affordable childcare services is critical to the Central Vermont Region. Quality childcare benefits families by preparing children for schooling and social interaction while enabling parents to work and provide income. It benefits businesses by expanding the workforce and creating more reliable, productive employees. Furthermore, childcare facilities are businesses themselves and their existence expands local and Regional economies directly through the hiring of workers and purchase of

goods and services. The need for childcare is prevalent across the state: of Vermont children under 5 years old, 76.7% have all available parents participating in the labor force. This indicates that a significant portion of children are in the care of someone other than their parents for at least part of the day.[75]

Challenges

A number of obstacles have been identified as impediments to economic development. The limited number of clearly identified, well-serviced, commercial/industrial sites hampers the ability of local businesses to expand and new ventures to develop. Some sites are identified as commercial or industrial in town zoning ordinances, but lack the needed sewer, water, electrical services or transportation infrastructure, while other areas have services available, but are not zoned for commercial/industrial use.

Similarly, the capacity of some of the region's existing public infrastructure is being severely strained by age, quality and the demands being placed on it from all sectors. The costs of upgrading and expanding public facilities often out pace the ability of users to pay.

The lack of venture and expansion capital is a serious obstacle to business development, especially for smaller enterprises. In Vermont's small business climate, where loans have traditionally been made as much on the credibility of the individual as on the assets of the company, the effect has been profound.

Utility costs represent a substantial portion of the operating costs of many alone mean increased energy use and cost compared to other areas. Conflicting and sometimes lengthy permit decisions have also complicated the development process. Development proposals are reviewed by numerous state agencies, local boards and regional planning and environmental commissions, each adding its own perspective and requirements. The myriad of permits that are sometimes required can tend to discourage the inexperienced business-person.

There has been much discussion in recent years regarding salaries in

[75] Stalled at the Start 2024

Vermont and the desirability of compensating workers with a "livable wage" (defined as the hourly wage/annual income necessary to cover all basic needs plus all relevant local, Federal, and State taxes. Basic needs include: food, housing, child care, transportation, health care, clothing, household and personal expenses, and insurance).

The Region's downtowns and villages were primarily established along the Winooski River and its major tributaries. This development pattern leaves our communities very susceptible to flood damages amongst other natural hazards and weather events that can affect community vitality and economic activity. This vulnerability became extremely evident during 2011 flood events, including Tropical Storm Irene, during which a great number of businesses were directly impacted by flood damage or indirectly impacted due to road closures, tourism impacts or dips in local spending. As well, in the July 2023 flood, total damage to the Region's economy was estimated at $300 million and the average economic injury per business was $150,000; one business reported $6.5 million in damage. 46.6% of businesses in the region reported economic injury that severely impacted their ability to reopen, which extended the opening of their establishments more than 120 days (about 4 months) after the flood occurrence. BIPOC, New American, and Low and Middle Income (LMI) business owners faced even greater difficulties in opening due to communication barriers and accessing resources and contractors. Also, nearly all the businesses in the Region that were damaged by flooding had difficulty accessing funding to repair their properties.

There is a need to incorporate an economic component into future analyses related to our communities' flood vulnerabilities and to include actions to better prepare businesses for future flood events.

The Demographic Challenge

Continued economic vitality depends on the existence of a skilled, knowledgeable and innovative "next generation" workforce. With an older than average and rapidly aging population, along with one of the lowest percentage of people in the 25 to 29 age group in the nation, Vermont faces some serious challenges in this regard.

The percentage of Vermonters 19 years or younger has been consistently decreasing since 2000, while the population of Vermonters 65 years and

older has increased. As Vermont's population ages out of the workforce, a smaller proportion of working adults must support a larger proportion of the population than in the past. Loosely defining working age as 20 years to 65 years, the following table illustrates how an aging population will put additional pressure on the number of adults in the labor force. Further, the number of Central Vermonters under age 20 has decreased in this same period, potentially indicating additional future scarcity in the workforce.

Table 53: Age of Vermonters in the Workforce

	2010	2015	2022
Working age (20-64 year)	62%	64%	59%
Younger and older Central Vermonters	38%	36%	41%

Source: ACS 2022 – Table S0101

CVRPC must recognize these trends and strive to support and cultivate opportunities for young people to stay in, return to, or discover our Region as an exciting and affordable place to work and live.

Summary

Vermont's "quality of life," its work force, the environment, and Vermont's positive marketing image are assets to doing business in Central Vermont.

Central Vermont has the underpinnings of a strong economy. The diversity of its larger employers, the number of small employers, the variety and level of skills found in its labor force, and the quality of life are its prime assets. In conjunction with local governments, businesses and other regional development groups, the Central Vermont Regional Planning Commission will participate in economic development efforts by helping communities capitalize on their assets and helping the region and state to overcome economic obstacles.

The purpose of this element is to guide and plan for economic development that will create employment in Central Vermont which keeps pace with the region's labor force, provides an adequate flow of taxable economic activity to fund State programs, and increases the wealth and economic well being

of residents.

Economic Goals, Policies and Strategies

Economic Goal 1

Full employment[76] and the creation and preservation of high-quality jobs in a diverse range of occupations.

Economic Goal 2

Business retention, growth and development that anticipate and meet market opportunities.

Policy 1: Promote career exploration and education planning for all young people and reduce barriers to participation in some form of post-secondary education or training.

a) Promote sharing of best practices within the Region's supervisory unions with regards to dual-enrollment, work-based learning internship and apprenticeship programs and assist with identifying resources and incentives for these efforts.

b) Promote an annual regional Student Career Day/Job Fair event targeted to High School students for summer employment, job shadow opportunities and internships.

c) Facilitate effort to identify partners and formalize network of STEM-related (science, technology, engineering and math) companies, high schools, educational institutions, Tech Centers, and Community College of Vermont (akin to Vermont Youth Conservation Corps. concept, applied to STEM sectors) to provide hands-on training and internships.

d) Identify, inventory and support resources programs that place emphasis on sound management and mentorship for young workers, particularly at-risk youth, in partnership with service providers such as Washington County Youth Services Bureau and ReSource/ReBuild.

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[76] The level of employment, or unemployment rate, which provides the maximum sustainable rate of economic growth and Gross Domestic Product without resulting in accelerating inflation. A Full Employment rate that is also just above the rate which will cause inflationary pressure, is called the Non-Accelerating Inflation Rate of Unemployment (VT Dept. of Labor).

e) Support and engage with Young Professionals organizations to better understand professional development needs and barriers to workforce stability in younger workers.

Policy 2: Deliver training and life-long learning to retain and expand a robust workforce with skills to match needs for current and future available jobs.

a) Support availability and awareness of training programs for underutilized workforce populations (e.g. dislocated, special needs and older workers) to attain skills to transition to new careers.

b) Increase local delivery of information regarding regional workforce training resources (e.g. Front Porch Forum, employer groups/trade associations, municipal websites).

c) Promote partnerships with digital workforce training programs such as those piloted by the Vermont Digital Economy Project to increase access to workforce training opportunities, including those in more rural communities.

d) Encourage and collaborate with the State to conduct or reference existing labor skills gap analyses, where available, to: i) improve workforce data availability, ii) identify the types of jobs that businesses need to fill, and iii) document anticipated skills shortages.

Policy 3: Focus retention, growth and development efforts on industries and businesses that are a good fit with the Region's existing economic base and support sustainable economic development.

a) Increase collaboration between regional planning and economic development organizations, such as Central Vermont Economic Development Corporation, Capstone Community Action and Central Vermont Chamber of Commerce, in order to accomplish strategies identified in Policy 3.

b) Support and encourage expansion in sectors that are poised for growth, such as: health care, high tech manufacturing, software development and information technology, value added agriculture, higher education and recreation and tourism.

c) Support education on sustainable business best practices, on topics such

as recycling, use of environmentally friendly materials and processes, and implementing energy efficiency improvements.

d) Explore opportunities to expand value-added manufacturing networks (i.e. processing, storage, distribution, wholesale, retail, direct-to-consumer) and information exchanges.

e) Develop and disseminate information on development incentives, techniques and resources for towns and local development groups.

f) Provide a range of information regarding regulatory processes and available financial and technical resources and, where feasible, facilitate trainings for developers, entrepreneurs and business owners.

g) Research cooperative development models (e.g. Evergreen Cooperatives in Cleveland, Cooperative Development Institute in Massachusetts, Cooperative Vermont in Burlington) and identify potential partnerships between the Region's cooperatives (the credit unions, food coops, and few worker-owned cooperatives) and other major "anchor" institutions (the State, educational institutions, etc.) to encourage more cooperative development in the Region.

Policy 4: Promote entrepreneurship and innovation in all business sectors and encourage small and micro business development.

a) Assess zoning and other regulatory barriers to entrepreneurship and small and micro business development, including home-based businesses and diversified agricultural enterprises.

b) Continue to expand availability and improve the quality of broadband to enable telecommuting and home-based work opportunities, particularly in more rural areas of the Region.

c) Identify policy and programmatic gaps and opportunities to expand access to capital for businesses, particularly knowledge-based.

d) Work with Capstone Community Action partners to explore opportunities to develop a network where local businesses and investors come together to identify capital needs, investment, and opportunities to apply commercial strategies to maximize improvements in social and environmental well-being.

e) Encourage organizations or professional associations to provide

networking and a unified voice to creative economy sectors (writers, web designers, etc.).

f) Explore opportunities for regional innovation partnerships and/or technology transfer with employers, educational and research institutions and other public partners.

g) Encourage online marketing training and technology use for small and micro businesses.

h) Increase collaboration with business development organizations to enhance delivery of technical assistance to the wide range of small and micro businesses and entrepreneurial enterprises serving the Region.

Policy 5: Implement the goals and policies presented in the Utilities, Facilities and Services and Land Use elements of this Plan that enhance and optimize quality of place to attract and retain employers and residents.

These efforts to enhance and optimize quality of place include preservation of historic and cultural assets; maintaining the scenic qualities of our agricultural and forest lands, protection of natural resources and environmental quality, expansion of local food systems and healthy lifestyles, and increased access to recreational opportunities and amenities

Policy 6: Ensure availability of commercial and industrial space to meet employment and business expansion needs.

a) Assess capacity of commercial and industrial space using available data, including existing GIS information, and identify the various types of commercial and industrial space needs.

b) Assist municipalities in promoting marketable sites and identifying assets, deficits and options available to meet industrial and commercial site development needs; for example, the potential for use of small wastewater treatment systems.

c) Maintain inventory and support the reclamation and redevelopment of blighted, contaminated or potentially contaminated sites (i.e. “brownfields”). Continue to actively seek funds to facilitate this effort.

d) For uses that do not require a rural location, guide and assist commercial, industrial and institutional uses to locate in downtowns,

villages and adjacent industrial areas, or at those locations in the fringe areas that have been significantly developed and are zoned for such purposes.

Policy 7: Implement the goals and policies presented in the Energy, Utilities, Facilities and Services and Transportation elements of this Plan to maintain and plan for adequate infrastructure, energy, telecommunications, and transportation systems to accommodate and support business growth and expansion. These efforts to maintain and plan for adequate systems to support business growth and expansion include support of:

- A transportation system that efficiently transports goods and services and employees to their place of work;
- An efficient and stable energy system that provides for reduced costs, consumption and reliance on nonrenewable energy sources;
- State-of-the-art telecommunications/broadband infrastructure that would increase work options and reduce commuting and its impacts on the transportation infrastructure and the environment; and
- Water, wastewater and storm water management systems in locations that allow for appropriately-scaled commercial and industrial expansion, higher densities and co-location of jobs, housing and services.

Policy 8: Support the continued use and sustainability of our natural resources and associated industries.

a) Encourage the continued productivity of viable mineral resources.

b) Facilitate the use of locally obtained materials for building and highway construction and maintenance. Assist municipalities in mapping the important, accessible resources.

c) Ensure that resource extraction operations follow best management practices to minimize impacts to the local and surrounding environment and other land uses, and to allow for site restoration.

d) Implement the goals and policies presented in the Land Use element of this Plan related to continued use, sustainability and protection of productive forests and prime agricultural soils.

Economic Goal 3

Incomes sufficient to meet or exceed basic needs with opportunities to advance and to achieve financial security.

Policy 9: Support and encourage the business community and policy makers in developing strategies for the retention and creation of jobs that pay a livable wage.[77]

a) Research and develop case studies of businesses that are pursuing or have achieved a livable wage for employees as a goal, research and identify primary barriers to businesses being able to pay livable wages, and research impacts of livable wage policies and incentives on the economies of other places.

Policy 10: Implement the goals and policies presented in the Housing, Transportation and Utilities, Facilities and Services elements to expand access to resources that promote stability in the workforce, including workforce housing, transportation solutions, affordable child care, and medical and mental health care.

Policy 11: Support efforts to develop and disseminate information on career pathways and advancement opportunities for industry sectors poised for growth.

a) Encourage employers to provide training and education opportunities for employees of all ages to acquire, maintain, and improve the skills and knowledge necessary to advance.

b) Support statewide initiatives such as the STEM (science, technology, engineering and mathematics) Equity Pipeline and other Statewide Consortia developing career pathways in priority sectors identified in the 2020 Statewide CEDS, such as health care and value-added agriculture.

Policy 12: Support projects identified in the 2020-2025 West Central Vermont Comprehensive Economic Development Strategy.

Economic Goal 4

Dynamic and resilient downtowns, villages, and commercial districts.

[77] Defined in statute as the hourly wage required for a full-time worker to pay for one-half of the basic needs budget for a 2-person household, with no children, and employer-assisted health insurance, averaged for both urban and rural areas (VT Legis. Joint Fiscal Office).

Policy 13: Find new uses and opportunities for vacant and under-utilized sites and buildings.

a) Encourage and support Centers and Neighborhoods to pursue benefits under the Community Investment Program.

b) Assist participating municipalities in determining eligibility for Tier 1 status on the regional Future Land Use map and for Center or Neighborhood State designations and in utilizing technical assistance and incentives to preserve and reuse significant, economically viable, and historic structures.

c) Support rezoning of Centers and planned growth areas for mixed-use development, encompassing commercial, light manufacturing, artisan, and residential uses at traditional village density.

d) Assist municipalities in planning for capital investments, identifying barriers to redevelopment or reuse, and planning for adaptive reuse of buildings.

e) Support and prioritize assistance with community-identified priority/anchor revitalization projects in existing downtown, village, and new town centers, as previously designated under 24 V.S.A. Chapter 76A, and in Downtown and Village Centers, Planned Growth Areas and Village Areas as they are identified in the Future Land Use Map.

Policy 14: Focus infrastructure investments in downtowns, village centers and growth centers, as previously designated under 24 V.S.A. Chapter 76A, and in Downtown and Village Centers, Planned Growth Areas and Village Areas, and promote use of healthy community design principles in public investments and land use regulations.

a) Promote incorporation of Healthy Community Design[78] and Complete Streets[79] principles into public infrastructure, redevelopment projects, land use regulations, and community engagement efforts.

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[78] Healthy Community Design links traditional concepts of planning (land use, transportation, community facilities, parks and open spaces) with health themes (physical activity, public safety, access to nutritious food, air and water quality, mental health and social equity) (Vermont Dept. of Health).

[79] Complete Streets are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities (Smart Growth America).

b) Assist municipalities in pursuing resources to upgrade infrastructure, including roads, sidewalks, bike paths, multi-use paths, bridges, rail, water, wastewater, and stormwater. Promoted shared services via inter-municipal agreements where appropriate.

Policy 15: Increase economic resilience by mitigation of and adaptation to extreme weather events and flooding.

a) Encourage and assist employment centers with participation in FEMA's Community Rating System to enhance community-wide floodplain management efforts and reduce flood insurance premiums.

b) Develop and implement outreach strategies targeted to business and residential property owners to raise awareness of flood risk and promote strategies and resources to reduce vulnerabilities.

c) Work with communities to upgrade flood hazard bylaws and improve storm water mitigation strategies in order to minimize risks to homes, businesses, and public infrastructure.

d) Encourage communities to direct new commercial or industrial development to areas not at risk from erosion and inundation flood hazards, where feasible.

e) Consider the benefit to local and regional economic resilience when prioritizing assistance with Hazard Mitigation Assistance grants.

Policy 16: Support coordinated and complementary efforts to market the Region's unique, yet-connected downtowns and villages.

a) Utilize results from Vermont Downtown Action Team retail market analyses to assist with marketing available commercial space, business recruitment, and start-up support.

b) Promote collaborative marketing with common themes among regional downtowns and villages, chambers of commerce, scenic byway committees, and Vermont Tourism via region-wide events and tours (e.g., cycling, hiking, food, farm, and brewery, covered bridges, stone arts, and fall foliage) targeted to both visitors and residents.

c) Support formation and expand the capacity of community-based or business associations focused on village vitality, marketing, and enhancements.

Economic Goal 5

Sustainable and viable agricultural and forest lands.

Policy 17: Promote and expand asset-based recreation and tourism with an emphasis on year-round offerings.

a) Support efforts to develop and update local and region-wide inventories of natural, historic, scenic, agricultural and recreational assets at the local level to support tourism and quality of life promotion.

b) Investigate the feasibility of a region-wide promotion effort similar to Newport's "Fresh by Nature."

c) Identify gaps in offerings and support expansion of facilities to develop off-season activities, host multi-day events, conferences and weddings, and various related support services.

d) Work with municipalities to identify viable options for expanded commercial and public outdoor recreational facilities, including trail development and related infrastructure that are environmentally and culturally sustainable.

e) Explore options and pursue resources to update VT TrailFinder website.

Policy 18: Foster collaborative partnerships among regional food system stakeholders.

a) Assist with identifying sustainable collaborative frameworks and funding sources to continue the work of the Central Vermont Food Systems Council.

b) Collaboratively host an annual meeting focused on best-practice partnerships among economic development, land use planning and conservation stakeholders to support local food systems.

c) Promote representation of the agricultural and/or forestry sector on town and regional economic development committees/boards.

d) Promote the Handbook for Local Action in Sustainable Agriculture, developed by the State and targeted to municipal officials, boards, and staff, and local volunteers.

Economic Goal 6

Maintain equitable economic growth in communities with high unemployment or low per capita income.

Strategies

1. Identify communities with persistent unemployment or poverty.

2. Align regional development programs to concentrate resources in distressed communities.

3. Promote:

   a) infrastructure investments that improve economic competitiveness;

   b) federal and state initiatives aimed at rural economic revitalization;

   c) access to public services that support workforce participation;

   d) community participation in economic development programs;

   e) workforce training tailored to community-specific needs; and

   f) initiatives that expand local job creation in communities with persistent unemployment or poverty.

4. Provide technical assistance to municipalities to:

   a) plan for inclusive workforce participation by addressing barriers such as housing, childcare and transportation;

   b) integrate childcare, healthcare, and transportation access into local economic development plans; and

   c) attract sustainable businesses.

5. Evaluate progress using income, employment and community well-being metrics.

Policies

1. Support:

   a) affordable workforce housing initiatives in distressed communities;

   b) childcare, healthcare and transportation initiatives that remove workforce barriers;

   c) workforce training tailored to local needs in high-unemployment

communities;

d) targeted public investment in communities with persistent unemployment;

e) flexible, locally driven approaches to addressing economic inequity;

f) broadband access and digital equity programs in underserved areas;

g) equitable distribution of regional economic development funds; and

h) federal and state initiatives focused on rural economic revitalization.

2. Oppose:

a) economic development initiatives that bypass distressed communities;

b) development projects that increase cost burdens on existing residents without providing local economic benefits;

c) policies that increase financial or regulatory barriers for small businesses; and

d) the displacement of low-income residents from revitalizing communities.

3. Require:

a) inclusive public engagement in economic planning processes; and

b) equity impact analyses for proposals requesting regional planning commission support for funding in distressed communities, to assess both benefits and risks of displacement.

4. Employ community well-being and income metrics in evaluating program success.

9. Implementation Plan

CVRPC's priorities continue to lie at the nexus between land use, transportation, hazard mitigation, conservation, and energy planning. CVRPC recognizes that some of the most important work we can do to positively impact the region is through providing technical assistance to our member municipalities.

In addition to the Implementation Plan below, the Statement of Basic Policies in the introduction to this document contains a vision of CVRPC's vision for the Region, and the values that guide its work. Finally, throughout the document, goals, policies, and strategies at the end of each chapter call out specific actions to make this vision a reality.

Progress Measures:

- Regional Plan actions are accomplished.
- Municipal plans continue to make progress towards achieving state planning goals, thereby receiving regional approval.
- State agency plans and programs are consistent with the Regional Plan.
- Municipalities achieve efficient local governance by working together on shared goals through intermunicipal districts or by using other tools.

Action / Strategy	Area	Recommended Lead / Partner	Estimated Cost	Timing	Priority	Financing
CVRPC will review this Plan in preparing its annual work program and in all of its internal decision-making to ensure that our actions are consistent, defensible, and purposeful.	Region	RPC	Low	Annually in April and on-going	High	CVRPC
A Regional Plan implementation schedule, which will establish priorities of key Plan goals for implementation, followed by an annual review to evaluate progress, analyze current data, reassess priorities, and consider possible amendments to the Regional Plan.	Region	RPC	Medium	5 years with subsequent annual reviews	High	CVRPC and State agreements
CVRPC will continue to provide technical assistance to member municipalities in the areas of community planning, bylaw development and administration, capital budgeting, community development, and GIS in accordance with our membership services policies,	Region	RPC / Municipalities	$600,000 - 800,000 annually	Annually	High	CVRPC, Towns, State and Federal grants and agreements
CVRPC will employ public engagement processes that centers the voices of marginalized and underserved populations in planning.	Region	RPC / Municipalities / Service Providers	$6,000	Ongoing	High	CVRPC and project-based grants
When seeking Regional approval or as requested by municipalities, CVRPC will review municipal plans for consistency with this Plan.	Region	Municipalities / RPC	$2,500 per plan	Within 60 days of request	High	State agreements

Action / Strategy	Area	Recommended Lead / Partner	Estimated Cost	Timing	Priority	Financing
CVRPC will continue to provide local officials and interested citizens with information and training on the complete range of topics and issues presented in this Plan. We will do so through periodic workshops, newsletters, public forums, and the provision of materials and information upon request.	Region	RPC	$20,000 annually	Annually and at regular intervals throughout the year	Medium	CVRPC and project-based grants
CVRPC will review State agency plans and programs to assure that they are consistent with the goals and policies of this Plan and those of member towns.	Region	RPC / Municipalities	$3,000 annually	Annually as needed	Medium	CVRPC, State grants & agreements
CVRPC will continue to engage with the state on planning initiatives and studies.	Region	RCP / ANR / ACCD and others	$6,000 annually	Ongoing	High	CVRPC, State grants and agreements
CVRPC will maintain and strengthen its commitment to regional and intermunicipal issues and programs in accordance with, and in support of, this Plan. Specifically, we will continue our technical support services for the Mad River Valley Planning District, the Wrightsville Beach Recreation District, and the Mad River Solid Waste Alliance.	Region	RPC /Municipalities & Intermunicipal Districts	$20,000 annually	Ongoing	High	Districts, CVRPC, State agreements

Action / Strategy	Area	Recommended Lead / Partner	Estimated Cost	Timing	Priority	Financing
CVRPC will continue to provide region-wide transportation planning services.	Region	RPC / VTrans	$250,000 annually	Ongoing	High	State agreement, Towns
CVRPC will develop a Safety Action Plan with a goal of zero traffic fatalities – Vision Zero – for Central Vermont	Region	RPC/VTrans	$150,000	Ongoing	Medium	Grant funded
CVRPC will respond to inter-town conflicts or opportunities with mediation or technical assistance services, where appropriate.	Region	RPC / Municipalities	Low	As requested	Medium	CVRPC, Towns
CVRPC will continue to participate in Act 250 proceedings in accordance with our adopted guidelines to advance the goals of this Plan.	Region	RPC	$10,000 annually	As needed	Medium	State agreements
Provide facilitation for municipalities to develop discrete flood prevention and mitigation projects with the goal of short immediate implementation.	Region	RPC /Municipalities / ANR/ CWSP	$25,000	Ongoing	High	Annual funding and grant opportunities

APPENDICES

Appendix A – Energy Supplement

Appendix B – Housing Target Methodology

Appendix C – Future Land Use Area Acreage by Municipality

Appendix D – Environmental Benefits and Burdens Analysis

Appendix E – Substantial Regional Impact Definition

Energy Supplement

1. Policy Frameworks
2. Current Regional and Municipal Energy Use
3. Regional and Municipal Targets
4. Regional LEAP Targets Breakout (State)
5. Approach to Regional and Municipal Existing Energy Generation
6. Supporting Materials for Mapping and Siting Analyses

1. Policy Frameworks

Act 174 Enhanced Energy Planning:

During the 2016 legislative session, the State of Vermont passed Act 174, an act related to improving the siting of energy projects. Act 174 outlines a path whereby regions and municipalities could receive "substantial deference"[1] for applications that seek to receive a Certificate of Public Good before the Public Utility Commission (formerly the Public Service Board) if certain considerations were incorporated into a regional or municipal development plan. Act 174 provides an avenue for regions and municipalities to have increased input in Public Utility Commission determinations for Certificates of Public Good regarding renewable energy generation facilities. Otherwise, a plan will receive "due consideration" in the Section 248 review process. Act 174 is categorized as enhanced energy planning and goes beyond what is outlined in 24 VSA 117 Section §4348a and §4382 respectively. In general, the requirements of Act 174, updated in 2022 in line with the Climate Action Plan, work in conjunction with the existing statutory information required to be included in a regional plan's energy element (as described in 24 V.S.A. § 4348a(a)(3)). Furthermore, the standards outlined in Act 174 require regional and municipal plans to be consistent with the following State Goals and Policies:

- Greenhouse gas reduction requirements under 10 V.S.A. § 578(a)
  - 26% from 2005 levels by 2025
  - 40% from 1990 levels by 2030
  - 80% from 1990 levels by 2050
- The 25 x 25 goal for renewable energy under 10 V.S.A. § 580 (25% in-state renewables supply for all energy uses by 2025)
- Building efficiency goals under 10 V.S.A. § 581 (e.g., reduce fossil fuel consumption across all buildings by 10% by 2025)
- State energy policy under 30 V.S.A. § 202a and the recommendations for regional and municipal planning pertaining to the efficient use of energy and the siting and development of renewable energy resources contained in the State energy plans adopted pursuant to 30 V.S.A. §§ 202a and 202b
  - Includes meeting 90% of energy needs with renewable sources by 2050 (as well as intermediate targets and sector-specific targets)

[1] According to Act 174 of 2016, "substantial deference" means that a land conservation measure or specific policy shall be applied in accordance with its terms unless there is a clear and convincing demonstration that other factors affecting the general good of the State outweigh the application of the measure or policy. The term shall not include consideration of whether the determination of energy compliance should or should not have been affirmative under 24 V.S.A. § 4352.

- The distributed renewable generation and energy transformation categories of resources to meet the requirements of the Renewable Energy Standard under 30 V.S.A. §§ 8004 and 8005 (2024 Act 179 changed key tier requirements to reflect 100% renewable electricity by 2035 and created two new tiers: Tier 4 new regional renewable energy and Tier 5 on load growth)

This plan integrates and references the following:

- State Comprehensive Energy Plan (CEP) 2022
  - Low-Emissions Analysis Platform (LEAP) informs statewide targets, methodology update and target update (2022)
  - **Appendix B- Act 174 Standards:** The 2022 Comprehensive Energy Plan (CEP), published on January 14, 2022, includes several important updates to the Act 174 enhanced energy standards
- State Climate Action Plan (2021 and 2025 update) 10 V.S.A § 592
- Long Range Transmission Plan Update (VELCO) (2024) (especially solar optimization transmission and distribution resources constraints)
- Utility Integrated Resource Plans (Green Mountain Power, Washington Electric, Northfield Electric Department, and Hardwick Electric Department)

The Central Vermont Regional Planning Commission first received a Determination of Energy Compliance (DOEC) through the Vermont Public Utilities Commission (PUC) with the 2018 Regional Energy Plan adopted as an amendment and Appendix A-7 of the 2016 Regional Plan. Since then, 7 municipalities have received determinations of energy compliance via municipal enhanced energy plans including Barre Town, Northfield, Waterbury, Waitsfield, Middlesex, Plainfield, and Woodbury, 1 municipality has a Net Zero Action Plan (Montpelier), 6 are currently in the Enhanced Energy Planning process (including Worcester, East Montpelier, Marshfield, Moretown, Calais, and Williamstown), and at least 3 more municipalities had developed drafts which were interrupted by the pandemic (and while they have not yet submitted their plans for approval, do include targets, maps, and preferred siting language in their existing town plans). Municipal breakouts of the Regional analyses and targets-based State forecasting from the Low Emissions Analysis Platform (LEAP)[2], as well as municipal breakouts of the mapping products to support municipal planning and implementation, will be posted and hosted on the CVRPC website once this plan has been reviewed and approved (drafts will be made available to support the 5+ municipalities currently working on their enhanced energy plans).

Equity Framework

Energy burden is just one metric to consider when assessing potential impacts and needs. In Central Vermont, outages (frequency and duration), income,

[2] a software tool for energy system modeling and emissions accounting, across residential, commercial, industrial, and transportation energy use

distribution utility, and fuel assistance uptake, are key recurring considerations throughout this plan and the region. New tools and metrics have been and continue to be developed at the State and Federal level with varying applicability to Vermont (inset below). CVRPC is committed to continuing to engage with these tools and resources and integrate them into future planning:

Federal Indices/Programs*	State Definitions	State Indices/Tools

• Justice40+/-
  • Energy Justice Mapping Tool-Disadvantage Communities Reporter (no longer available)
  • Climate and Economic Justice Screening Tool (recreation)
  • EPA-EJ screening and mapping tool (Yale recreation)
▪ Economic Innovation Group's Distressed Communities Index (DCI) Interactive Map: relative distress scores and economic distress characteristics
▪ DOE's Low-Income Energy Affordability Data (LEAD) Tool
▪ Social Vulnerability Index Score (relative health burden; GMP used as part of their scoring)
▪ EIG's Opportunity Zone Activity Map, Distressed Energy Community,
▪ Disadvantaged Community
*some of these tools are no longer in use by the Federal Government nor available but still useful to read materials and review associated data sets
	As defined by Act 154, environmental justice populations are "any census block group in which: (A) the annual median household income is not more than 80% of the State median household income; (B) Person of Color and Indigenous Peoples comprise at least 6% or more of the population; or (C) at least 1% or more of households have limited English proficiency."	▪ Vermont Environmental Disparity Index and Environmental Risk
		▪ Forthcoming Environmental Justice Communities Tool (Act 154 2022)
		▪ Municipal Vulnerabilities Index (Climate Action Office)
		▪ Vermont Community Index/Underserved Communities (AOA)
		▪ Vermont Department of Health's vulnerability indicators

Most of these tools rely on American Community Survey data and the census tract resolution is often too coarse to be very useful. Using the Climate & Economic Justice Screening Tool (CJEST) associated with the Justice 40 campaign (which uses data from DOE's LEAD Score, the EPA's EJScreen, and ACS) only 1 Barre City Tract would qualify as disadvantaged in Central Vermont. Although the 36 burden indicators in the improved energy justice map viewer could be useful in the context of project prioritization at the state and perhaps at the regional level, they do not provide useful insights for municipal scale planning. These indicators are attached to eligibility for funding and technical assistance programs making them useful and important guardrails, albeit coarse ones. Community asset inventories, needs

assessments, engagement, and related efforts will be necessary to drive frontline community identification for prioritization. An iterative process at the project scale is an effective strategy for ensuring that projects align with community needs and priorities, fostering more equitable outcomes and sustainable development in the long run. This approach allows for continuous feedback and adaptation, enabling stakeholders to respond to the evolving challenges and opportunities within the community.

Table A1 Energy Burden (2019 Efficiency Vermont Report[3])

Town	Median Household Income	Electricity Spending	Thermal Spending	Transportation Spending	Total Spending	Total Energy Burden	Energy Burden Group
Barre City	$35,225	$1,110	$1,965	$2,227	**$5,302**	**15.1%**	Highest
Cabot	$43,864	$1,096	$2,081	$2,725	**$5,902**	**13.5%**	High
Plainfield	$48,529	$987	$2,222	$2,657	**$5,865**	**12.1%**	High
Worcester	$49,167	$1,085	$1,882	$2,757	**$5,724**	**11.6%**	High
Williamstown	$57,792	$1,221	$2,317	$2,584	**$6,122**	**10.6%**	Moderate
Washington	$56,696	$1,213	$2,062	$2,693	**$5,968**	**10.5%**	Moderate
Roxbury	$56,667	$1,059	$1,987	$2,703	**$5,749**	**10.1%**	Moderate
Berlin	$59,792	$1,161	$2,120	$2,585	**$5,866**	**9.8%**	Moderate
Marshfield	$60,833	$1,081	$2,050	$2,680	**$5,812**	**9.6%**	Moderate
Orange	$62,829	$1,094	$2,089	$2,692	**$5,874**	**9.3%**	Moderate
Waterbury	$65,750	$1,131	$2,426	$2,557	**$6,114**	**9.3%**	Moderate
Warren	$66,250	$1,101	$2,343	$2,608	**$6,052**	**9.1%**	Moderate
Barre Town	$70,521	$1,204	$2,396	$2,669	**$6,268**	**8.9%**	Low
East Montpelier	$67,844	$1,209	$2,131	$2,678	**$6,018**	**8.9%**	Low
Calais	$64,766	$964	$1,974	$2,747	**$5,685**	**8.8%**	Low
Moretown	$69,375	$1,135	$2,223	$2,707	**$6,065**	**8.7%**	Low
Woodbury	$63,438	$949	$1,839	$2,755	**$5,543**	**8.7%**	Low
Northfield	$67,750	$1,105	$2,099	$2,585	**$5,789**	**8.5%**	Low
Montpelier	$60,793	$957	$1,804	$2,288	**$5,049**	**8.3%**	Low
Middlesex	$74,188	$1,130	$2,191	$2,749	**$6,071**	**8.2%**	Low
Duxbury	$75,000	$1,074	$2,276	$2,752	**$6,103**	**8.1%**	Low
Fayston	$79,940	$1,080	$2,646	$2,681	**$6,407**	**8%**	Low
Waitsfield	$78,264	$1,189	$2,317	$2,660	**$6,166**	**7%**	Low

Comparisons between the 2019 and 2023 Total Energy Burden and shifts are included in the table below. Though difficult to compare the two reports and

[3] The 2023 Report did update this data, however the update also changed methodology, especially for the transportation sector, which relied on national datasets with coarse resolution for our communities. Furthermore, the thresholds for the categories were shifted in the 2023 report; shifting the baseline to mask the severity of downward trends didn't accurately reflect the pandemic era conditions of the updated report. Therefore, we prefer to use the 2019 Report which had a more bottom-up approach. The map viewers associated with the 2023 report update however, are useful community tools. https://www.efficiencyvermont.com/2023-vermont-energy-burden-report

track "progress" it appears Barre City, Cabot, Montpelier, and Waterbury all saw improvements, while Middlesex and Moretown stayed the same, and all other towns worsened. The 2023 Report included a state average burden of 11% and expenditure of $7,000; approximately 9 of 23 municipalities are more burdened than the statewide average.

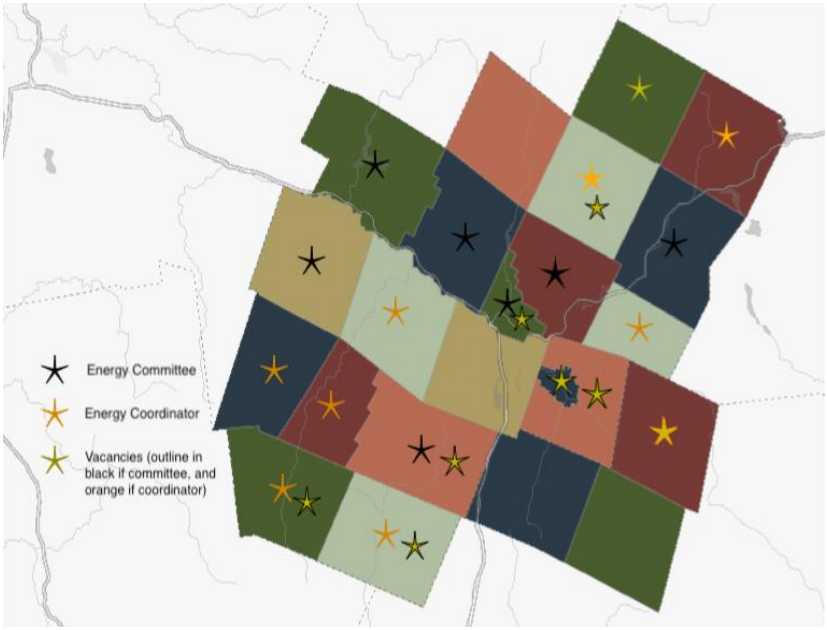
Table A2 Efficiency VT Total Energy Burden By Town 2019 vs. 2023

Town	2019 Total Energy Burden	2023 Total Energy Burden	Update
Barre City	15.10%	12%	Improved
Barre Town	8.90%	9%	Worse
Berlin	9.80%	7.90%	Worse
Cabot	13.50%	11.70%	Improved
Calais	8.80%	9.50%	Worse
Duxbury	8.10%	10.10%	Worse
East Montpelier	8.90%	10.60%	Worse
Fayston	8.00%	8.30%	Worse
Marshfield	9.60%	11.90%	Worse
Middlesex	8.20%	8.20%	Same
Montpelier	8.30%	7.90%	Improved
Moretown	8.70%	8.70%	Same
Northfield	8.50%	10.30%	Worse
Orange	9.30%	12%	Worse
Plainfield	12.10%	14.30%	Worse
Roxbury	10.10%	10.30%	Worse
Waitsfield	7.90%	10.90%	Worse
Warren	9.10%	11.90%	Worse
Washington	10.50%	11.50%	Worse
Waterbury	9.30%	7.50%	Improved
Williamstown	10.60%	10.70%	Worse
Woodbury	8.70%	11.50%	Worse
Worcester	11.60%	11.50%	Worse

Climate Council Principles:

This plan also follows the guidelines established by the State of Vermont Climate Council's Guiding Principles for a Just Transition; energy planning, policies, and strategies were developed with these guiding principles.

Municipal Energy Planning:



Central Vermont has 17 towns with Energy Committees and/or Coordinators and 3 towns with vacant or inactive Energy Committees or Coordinators. Energy Committees and Coordinators have varying roles:

- Advise town legislative and planning bodies concerning Town energy policy including enhanced energy planning, project development/review, etc.,
- Promote municipal energy efficiency and resilience, and lower energy costs,
- Develop municipal/community projects from renewable energy generation and storage projects to running WindowDressers Community Builds (see insert),
- Develop and implement community outreach, education, & neighbor: neighbor campaigns to provide residents and businesses with resources to reduce energy burdens, improve energy efficiency, and reduce greenhouse gas emissions.

CVRPC has noticed a significant increase in engagement with enhanced energy and other planning processes at the local, regional, and state levels in parallel with town participation in programs like the Municipal Energy Resilience Grant Program (Act 172), previously available federal incentives programs like through the IRA (Inflation Reduction Act), etc. as well as state incentive programs. Towns see a role for themselves in project development while feeling urgency to reduce municipal energy spending and community energy burdens while increasing community resilience in the face of global climate change. Energy committees and coordinators are most effective when working in tandem with other town leadership and staff; when integrated into capital planning and project development, town planning processes, and project review.

2. Methodology: Regional & Municipal Energy Use

Current Energy Use By Sector

Current residential and commercial & industrial electricity usage data is provided by Efficiency Vermont (both municipal and regional totals), transportation and thermal sector data is estimated via the Municipal Consumption Tool which pulls from a variety of sources including the Vermont Department of Public Service, American Community Survey, Vermont Department of Labor, the Vermont Department of Motor Vehicles, and DriveElectric (VEIC) (see each sector below).

Table A3 Municipal and Regional Current Energy Use Summary

TOWN	Transportation (MMBTU)	Thermal Residential (MMBTU)	Thermal Commercial (MMBTU)	Electric Residential (kWh)	Electric Residential (MMBTU)	Electric Commercial & Industrial (kWh)	Electric Commercial & Industrial (MMBTU)
Barre City	386,857	491,280	310,430	44,765,365	152,739	49,882,552	170,199
Barre Town	428,698	405,375	87,240	10,719,568	36,575	6,025,649	20,560
Berlin	124,286	131,450	175,087	8,175,942	27,896	33,128,436	113,034
Cabot	79,685	74,230	17,768	5,168,824	17,636	13,711,977	46,785
Calais	80,105	77,510	22,676	5,499,812	18,765	746,575	2,547
Duxbury	82,165	68,640	17,828	4,472,807	15,261	1,943,877	6,633
East Montpelier	129,567	143,750	37,688	9,345,147	31,886	3,112,484	10,620
Fayston	73,869	57,435	33,047	7,132,031	24,334	2,203,224	7,517
Marshfield	82,973	95,985	28,867	5,055,778	17,250	1,573,581	5,369
Middlesex	102,239	85,905	37,986	5,965,152	20,353	3,292,690	11,235
Montpelier	333,619	446,520	575,660	26,244,518	89,546	45,989,614	156,917
Moretown	82,404	82,000	54,853	6,367,565	21,726	1,697,211	5,791
Northfield	253,557	277,940	82,897	15,197,881	51,855	12,348,891	42,134
Orange	46,847	40,100	1,643	3,927,941	13,402	744,708	2,541
Plainfield	66,357	76,050	50,233	4,671,062	15,938	1,907,587	6,509
Roxbury	52,658	42,000	23,614	2,424,845	8,274	594,650	2,029
Waitsfield	81,896	111,020	139,517	9,010,187	30,743	8,801,953	30,032
Warren	86,656	77,000	72,001	16,068,190	54,825	20,246,629	69,081
Washington	59,938	54,285	7,447	3,958,906	13,508	479,471	1,636
Waterbury	251,329	312,525	233,860	21,953,856	74,907	31,320,841	106,867
Williamstown	191,574	186,060	56,351	11,683,695	39,865	5,011,366	17,099
Woodbury	37,288	39,690	2,737	3,685,176	12,574	237,883	812
Worcester	44,169	44,440	14,198	2,941,279	10,036	569,913	1,945
Regional Total	3158735.18	3421190.00	2083629.62	234,435,527	799,894	245,571,762	837,891
Source	Current Transportation Municipal Consumption Tool (2024 ACS)	Current Heat Municipal Consumption Tool (2024 ACS)	Current Heat Municipal Consumption Tool (2023 PSD)	2025 Efficiency VT Actual Usage			

Current Electricity Usage (Actual): Current residential and commercial & industrial electricity usage data is provided by Efficiency Vermont in kWh (kilowatt hours) on an annual basis, as reported by electric distribution utilities.
**note kWh*0.003412=MMBTU and cost estimate only covers actual energy consumption (not other service fees)*

Current Transportation Energy Use Estimates (Light-Duty): This data was developed using the Department of Public Service's Municipal Consumption worksheet. The total number of vehicles comes from American Community Survey (ACS) 5-Year Estimates. Average annual VMTs, accounts for slightly longer-than-average commutes and more incidental trips in the rural and commuter parts of our region. Total vehicle miles travelled assumes an average fuel economy of 22 miles per gallon. Registered EVs was determined by the Vermont Energy Investment Corporation (Drive Electric) and uses a low midpoint between the Dept. of Public Service's average of 7,000 VMTs per EV annually and the average of 12,000 for ICE vehicles taking into account early trends in EV adoption including reducing trips in adverse weather and co-incidence of alternative transportation modes as well as the high % of our region who is retired and thus without a daily commute. Municipal Consumption Tool includes data by Town and EV registrations provided below.

Current Commercial Thermal Energy Use Estimates: These estimate are derived from the Municipal Consumption Tool created by the Department of Public Service, which uses data from the Vermont Department of Labor's Economic and Labor Market Information web site: http://www.vtlmi.info. The worksheet determines the municipality's share of the regional commercial building stock and applies assumptions from the Energy Information Institute's Survey of Commercial Uses. The estimate does not include industrial uses, which are highly variable. Data was provided by PSD for 2023.

Current Residential Heating Energy Use and Cost Estimates

Data Considerations for underpinning data

- These estimates have been updated in the energy chapter to be based on 2024 ACS 5-year estimates which have large margins of error especially in rural areas and **only identify one primary heating fuel while many residents use two or more.**
    - Municipal Consumption Tool Current Heat tabs updated with 2024 ACS 5-year data for occupation, fuel tenure, housing characteristics (year built, number of bedrooms, etc.), etc. Commercial not updated (PSD provided 2023)
- Due to large margins of error, it is difficult to determine if there are indeed less than 1% of households still using coal and without fuel; it is difficult to interpret the categories of solar and other, solar may refer to passive or active solar heating, or given the rise since the last plan it's possible respondents have installed solar panels and have heat pumps and are misidentifying their fuel type.
- Tables in the Energy Chapter are based on total occupied units, but there are many seasonal, recreation, and/or occasional use (2nd) homes across the region (2022 ACS 5-Year Average B25004 Vacancy Characteristics). The table below supplies an additional adder to take into consideration thermal use in these homes: 4,137 homes across the region account for approximately 97,201.5 additional MMBTUs of energy use (conservatively). While thus far fewer low-temperature degree days in the winter have yet to result in reduced fuel consumption in the winter (without stable declining temperatures, residents may not adjust as naturally to cold temperatures),

more frequent high-temperature degree days are associated with increased heat-related health issues (VDH Climate Dashboard) including Central Vermont where few have adopted air conditioning and the threshold for health impacts is lower (86 as compared to 90 in Burlington). The increased use of air conditioning in the region will need to be assessed in future updates, as we continue to experience increasingly extreme storms, loss of stable seasons, and overall warmer, wetter conditions associated with Climate Change.

Tables A4 2024 ACS- 5 year estimate Regional Residential Fuel Use by Type and Town

% of Fuel Use by Tenure	Orange						Washington					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	0	0.0%	0	0.0%	**0**	**0.0%**	16	3.2%	0	0.0%	**16**	**3.1%**
Bottled, tank, or LP gas	72	20.5%	5	10.2%	**77**	**19.2%**	109	22.1%	13	46.4%	**122**	**23.4%**
Electricity	4	1.1%	4	8.2%	**8**	**2.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Fuel oil, kerosene, etc.	180	51.1%	29	59.2%	**209**	**52.1%**	191	38.7%	3	10.7%	**194**	**37.2%**
Coal or coke	4	1.1%	0	0.0%	**4**	**1.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	74	21.0%	11	22.4%	**85**	**21.2%**	169	34.2%	12	42.9%	**181**	**34.7%**
Other Fuel (Includes Solar)	18	5.1%	0	0.0%	**18**	**4.5%**	9	1.8%	0	0.0%	**9**	**1.7%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	352		49		**401**		494		28		**522**	

% of Fuel Use by Tenure	Williamstown						Barre City					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	0	0.0%	0	0.0%	**0**	**0.0%**	95	4.6%	106	5.2%	201	4.9%
Bottled, tank, or LP gas	290	24.1%	97	78.9%	**387**	**29.1%**	225	10.9%	402	19.8%	627	15.3%
Electricity	47	3.9%	0	0.0%	**47**	**3.5%**	102	4.9%	467	23.0%	569	13.9%
Fuel oil, kerosene, etc.	660	54.8%	27	21.1%	**687**	**51.7%**	1,388	67.3%	997	49.1%	2385	58.3%
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	0	0.0%
Wood	163	13.5%	0	0.0%	**163**	**12.3%**	142	6.9%	33	1.6%	175	4.3%
Other Fuel (Includes Solar)	45	3.7%	0	0.0%	**45**	**3.4%**	101	4.9%	27	1.3%	128	3.1%
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	9	0.4%	0	0.0%	9	0.2%
Total Occupied Housing Units	1,205		124		**1329**		2,062		2,032		**4094**	

% of Fuel Use by Tenure	Barre Town						Berlin					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	28	0.9%	29	7.1%	**57**	**1.6%**	5	0.5%	0	0.0%	**5**	**0.4%**
Bottled, tank, or LP gas	428	13.7%	166	#VALUE!	**594**	**16.9%**	283	26.9%	51	35.4%	**334**	**27.9%**
Electricity	108	3.5%	134	32.8%	**242**	**6.9%**	63	6.0%	0	0.0%	**63**	**5.3%**
Fuel oil, kerosene, etc.	2,090	67.1%	79	19.4%	**2169**	**61.5%**	532	50.6%	73	50.7%	**605**	**50.6%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	376	12.1%	0	0.0%	**376**	**10.7%**	157	14.9%	9	6.3%	**166**	**13.9%**
Other Fuel (Includes Solar)	87	2.8%	0	0.0%	**87**	**2.5%**	11	1.0%	0	0.0%	**11**	**0.9%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	11	7.6%	**11**	**0.9%**
Total Occupied Housing Units	3,117		408		**3525**		1,051		144		**1195**	

% of Fuel Use by Tenure	Cabot						Calais					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	0	0.0%	4	4.3%	**4**	**0.7%**	26	4.2%	0	0.0%	**26**	**3.9%**
Bottled, tank, or LP gas	78	16.3%	8	8.6%	**86**	**15.1%**	106	17.0%	20	39.2%	**126**	**18.7%**
Electricity	13	2.7%	13	14.0%	**26**	**4.6%**	10	1.6%	0	0.0%	**10**	**1.5%**
Fuel oil, kerosene, etc.	145	30.3%	38	40.9%	**183**	**32.0%**	245	39.3%	22	43.1%	**267**	**39.6%**
Coal or coke	1	0.2%	0	0.0%	**1**	**0.2%**	7	1.1%	0	0.0%	**7**	**1.0%**
Wood	171	35.8%	26	28.0%	**197**	**34.5%**	192	30.8%	9	17.6%	**201**	**29.8%**
Other Fuel (Includes Solar)	70	14.6%	4	4.3%	**74**	**13.0%**	37	5.9%	0	0.0%	**37**	**5.5%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	478		93		571		623		51		**674**	

% of Fuel Use by Tenure	Duxbury						East Montpelier					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	3	0.6%	11	10.0%	**14**	**2.2%**	8	0.8%	0	0.0%	**8**	**0.7%**
Bottled, tank, or LP gas	188	36.6%	51	46.4%	**239**	**38.3%**	295	31.2%	20	9.8%	**315**	**27.4%**
Electricity	4	0.8%	3	2.7%	**7**	**1.1%**	10	1.1%	12	5.9%	**22**	**1.9%**
Fuel oil, kerosene, etc.	160	31.1%	35	31.8%	**195**	**31.3%**	397	42.0%	160	78.0%	**557**	**48.4%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	150	29.2%	5	4.5%	**155**	**24.8%**	199	21.1%	13	6.3%	**212**	**18.4%**
Other Fuel (Includes Solar)	9	1.8%	5	4.5%	**14**	**2.2%**	36	3.8%	0	0.0%	**36**	**3.1%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	514		110		**624**		945		205		1150	

% of Fuel Use by Tenure	Fayston						Marshfield					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	12	2.5%	0	0.0%	**12**	**2.2%**	13	2.2%	0	0.0%	**13**	**1.8%**
Bottled, tank, or LP gas	299	62.8%	68	95.8%	**367**	**67.1%**	114	18.9%	27	24.8%	**141**	**19.8%**
Electricity	12	2.5%	0	0.0%	**12**	**2.2%**	23	3.8%	0	0.0%	**23**	**3.2%**
Fuel oil, kerosene, etc.	79	16.6%	3	4.2%	**82**	**15.0%**	219	36.4%	33	30.3%	**252**	**35.4%**
Coal or coke	4	0.8%	0	0.0%	**4**	**0.7%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	70	14.7%	0	0.0%	**70**	**12.8%**	197	32.7%	49	45.0%	**246**	**34.6%**
Other Fuel (Includes Solar)	0	0.0%	0	0.0%	**0**	**0.0%**	36	6.0%	0	0.0%	**36**	**5.1%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	476		71		**547**		602		109		**711**	

% of Fuel Use by Tenure	Middlesex						Montpelier					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	5	0.7%	0	0.0%	**5**	**0.7%**	59	3.0%	162	9.3%	**221**	**5.9%**
Bottled, tank, or LP gas	235	32.5%	14	56.0%	**249**	**33.3%**	339	17.2%	502	28.8%	**841**	**22.6%**
Electricity	6	0.8%	0	0.0%	**6**	**0.8%**	191	9.7%	392	22.5%	**583**	**15.7%**
Fuel oil, kerosene, etc.	222	30.7%	6	24.0%	**228**	**30.5%**	1,069	54.1%	609	34.9%	**1678**	**45.1%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	237	32.8%	5	20.0%	**242**	**32.4%**	300	15.2%	22	1.3%	**322**	**8.7%**
Other Fuel (Includes Solar)	17	2.4%	0	0.0%	**17**	**2.3%**	18	0.9%	52	3.0%	**70**	**1.9%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	6	0.3%	**6**	**0.2%**
Total Occupied Housing Units	722		25		**747**		1,976		1,745		**3721**	

% of Fuel Use by Tenure	Moretown						Northfield					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	5	0.9%	0	0.0%	**5**	**0.8%**	9	0.6%	20	3.5%	**29**	**1.4%**
Bottled, tank, or LP gas	254	45.6%	29	29.3%	**283**	**43.1%**	197	12.5%	118	20.8%	**315**	**14.7%**
Electricity	22	3.9%	32	32.3%	**54**	**8.2%**	37	2.4%	86	15.2%	**123**	**5.8%**
Fuel oil, kerosene, etc.	165	29.6%	21	21.2%	**186**	**28.4%**	965	61.4%	283	50.0%	**1248**	**58.4%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	84	15.1%	13	13.1%	**97**	**14.8%**	341	21.7%	26	4.6%	**367**	**17.2%**
Other Fuel (Includes Solar)	21	3.8%	4	4.0%	**25**	**3.8%**	23	1.5%	33	5.8%	**56**	**2.6%**
No fuel used	6	1.1%	0	0.0%	**6**	**0.9%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	557		99		**656**		1,572		566		**2138**	

% of Fuel Use by Tenure	Plainfield						Roxbury					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	0	0.0%	0	0.0%	**0**	**0.0%**	4	1.2%	0	0.0%	**4**	**1.1%**
Bottled, tank, or LP gas	114	24.1%	14	12.5%	**128**	**21.9%**	55	16.7%	5	23.8%	**60**	**17.1%**
Electricity	4	0.8%	2	1.8%	**6**	**1.0%**	0	0.0%	1	4.8%	**1**	**0.3%**
Fuel oil, kerosene, etc.	164	34.7%	75	67.0%	**239**	**40.9%**	170	51.7%	15	71.4%	**185**	**52.9%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	2	0.6%	0	0.0%	**2**	**0.6%**
Wood	163	34.5%	14	12.5%	**177**	**30.3%**	95	28.9%	0	0.0%	**95**	**27.1%**
Other Fuel (Includes Solar)	28	5.9%	7	6.3%	**35**	**6.0%**	3	0.9%	0	0.0%	**3**	**0.9%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	473		112		**585**		329		21		**350**	

% of Fuel Use by Tenure	Waitsfield						Warren					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	%	#	%	#	%	#	%	#	%
Utility gas	9	1.3%	28	16.3%	**37**	**4.3%**	9	1.5%	12	12.9%	**21**	**3.0%**
Bottled, tank, or LP gas	345	50.6%	85	49.4%	**430**	**50.4%**	368	60.6%	48	51.6%	**416**	**59.4%**
Electricity	104	15.2%	10	5.8%	**114**	**13.3%**	49	8.1%	0	0.0%	**49**	**7.0%**
Fuel oil, kerosene, etc.	142	20.8%	14	8.1%	**156**	**18.3%**	85	14.0%	19	20.4%	**104**	**14.9%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	72	10.6%	0	0.0%	**72**	**8.4%**	96	15.8%	0	0.0%	**96**	**13.7%**
Other Fuel (Includes Solar)	10	1.5%	35	20.3%	**45**	**5.3%**	0	0.0%	14	15.1%	**14**	**2.0%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	682		172		**854**		607		93		**700**	

% of Fuel Use by Tenure	Waterbury						Woodbury					
	Owner Occupied		Renter Occupied				Owner Occupied		Renter Occupied		Total Occupied	
	#	%	#	5	♯	%	#	%	#	%	♯	%
Utility gas	13	0.8%	0	0.0%	**13**	**0.6%**	2	0.7%	0	0.0%	**2**	**0.7%**
Bottled, tank, or LP gas	850	52.0%	391	57.5%	**1241**	**53.6%**	77	27.6%	4	26.7%	**81**	**27.6%**
Electricity	124	7.6%	178	26.2%	**302**	**13.0%**	3	1.1%	0	0.0%	**3**	**1.0%**
Fuel oil, kerosene, etc.	413	25.3%	91	13.4%	**504**	**21.8%**	68	24.4%	5	33.3%	**73**	**24.8%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Wood	217	13.3%	0	0.0%	**217**	**9.4%**	127	45.5%	6	40.0%	**133**	**45.2%**
Other Fuel (Includes Solar)	18	1.1%	20	2.9%	**38**	**1.6%**	2	0.7%	0	0.0%	**2**	**0.7%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	0	0.0%	0	0.0%	**0**	**0.0%**
Total Occupied Housing Units	1,635		680		**2315**		279		15		**294**	

% of Fuel Use by Tenure	Worcester						REGION TOTAL					
	Owner Occupied		Renter Occupied		Total Occupied		Owner Occupied		Renter Occupied		Regional Total	
	#	%	#	%	♯	%	Totals	%	Totals	%	**Totals**	**%**
Utility gas	0	0.0%	0	0.0%	**0**	**0.0%**	321	2%	372	5%	**693**	**2%**
Bottled, tank, or LP gas	103	29.7%	28	49.1%	**131**	**32.4%**	5,424	26%	2,166	31%	**7,590**	**27%**
Electricity	8	2.3%	0	0.0%	**8**	**2.0%**	944	4%	1,334	19%	**2,278**	**8%**
Fuel oil, kerosene, etc.	114	32.9%	20	35.1%	**134**	**33.2%**	9,863	47%	2,657	38%	**12,520**	**45%**
Coal or coke	0	0.0%	0	0.0%	**0**	**0.0%**	18	0%	0	0%	**18**	**0%**
Wood	122	35.2%	9	15.8%	**131**	**32.4%**	3,914	19%	262	4%	**4,176**	**15%**
Other Fuel (Includes Solar)	0	0.0%	0	0.0%	**0**	**0.0%**	599	3%	201	3%	**800**	**3%**
No fuel used	0	0.0%	0	0.0%	**0**	**0.0%**	15	0%	17	0%	**32**	**0%**
Total Occupied Housing Units	347		57		**404**		21,098		7,009		**28,107**	

The following explains the series of steps that CVRPC has taken to calculate estimates of Residential Heating Energy use, square footage, and costs for the Central Vermont region. According to the Department of Public Service, residences in New England use somewhere about 45,000 to 80,000 BTUs of heat energy per square foot annually, averaging statewide at about 110 MMBTUs per residence per year for space and water heating. Space heating is by far the biggest use, and older building stock can require significantly more energy to heat.

Caveats:

- ACS data is based on random sampling over a multi-year period with large margins of error especially for rural communities like many in the Central Vermont Region. As the writing of this plan, it remains the most consistent and comprehensive data available on residential heating.
- ACS data identifies only one primary source of heating. In reality, many residents use two or more resources.

1. **Data (ACS 2022 5-Year Estimates used)**
    a. B25117 Tenure by House Heating Fuel,
    b. B25010: Average Household Size of Occupied Units by Tenure,
    c. DP04 Selected Housing Characteristics,
    d. Total Housing Units.
    e. These data can be downloaded into an excel spreadsheet, CSV, or other file type. CVRPC did this by town and aggregated them in excel (Tables).

House heating fuel is categorized on the ACS questionnaire as follows:

Utility Gas: This category includes gas piped underground from a central system to serve the neighborhood. The only utility in Vermont that delivers gas in this manner (i.e. natural gas) is Vermont Gas, and its service area is well outside of our region. A small number of ACS respondents indicated that they heated with "utility gas." It is most likely that they confused this source with bottled, tank or LP gas. We therefore made adjustments to account for this error.
Bottled, Tank, or LP Gas: This category includes liquid propane gas stored in bottles or tanks that are refilled or exchanged when empty. This is the second most dominant heat source for owner- and renter-occupied homes.
Electricity: This category includes electricity that is generally supplied by means of above or underground electric power lines. Census data does not distinguish between types of electric heat (e.g. resistance vs. heat pumps). We assume that additional homes in this category since he last plan and in the future are new heat pumps and not new resistance heat.
Fuel Oil, Kerosene, etc.: This category includes fuel oil, kerosene, gasoline, alcohol, and other combustible liquids. This category (oil) is the leading source of heat in the region overall, and for both owner- and renter-occupied homes.

Coal or coke: This category includes coal or coke that is usually distributed by truck. Some households in our region use anthracite in stove, furnaces, and boilers. There are very few of these, if any, still in the region, as the margin of error suggests potential to be zero.
Wood: This category includes purchased wood, wood cut by household members on their property or elsewhere, driftwood, sawmill or construction scraps, or the like. Wood is a close third largest source of heat in the region for owner-occupied homes, much of which is likely cordwood.
Solar Energy: This category includes heat provided by sunlight that is collected, stored, and actively distributed to most of the rooms. It is difficult to anticipate what residents mean when they select this option given new technology; thus we combine with other fuel.
Other Fuel: This category includes all other fuels not specified elsewhere. This category very likely consists of non-fossil fuel sources, but it is difficult to make further assumptions.

2. **Determine total square footage of housing by tenure:** For renter households, multiply the average household occupancy (e.g. 2.24 people) by **500 sq ft per person** (this number is a constant; it comes from the US Census Bureau's 2011 American Housing Survey and represents the national average size of a housing rental housing unit per occupant). For owner households, multiply the average occupancy by **800 sq ft per person** (from the same report). This provides an estimate—albeit, a very rough one—for the total square footage of occupied housing.
   Note: This is one of several areas where the methods could be improved in the future as these are only very broad estimates.

3. **Square Footage by Fuel Type:** In order to estimate the amount of space being heated by each fuel, the percentage of each fuel type was generated for owner- and renter-occupied households. Once the fuel use as percentages of total Renter and Owner households were calculated, the percentage for each fuel was multiplied by the total estimated square footage calculated in step 2.

4. **Energy Required for Heating:** This step is very simple. CVRPC used a basic estimate to take square footage and turn it into a calculation of the energy required for heating. The Department of Public Service cites a range of estimates for heat energy intensities per square foot from 45,000BTUs to 80,000BTUs for poorly insulated, leaky buildings for example pre-1940s housing units among others. Given the aging housing stock across the region, CVRPC used 60,000 BTUs as a generic estimate of the annual energy required to heat one square foot of housing annually in Vermont. In other words, all of the total square footages were multiplied by 60,000 BTUs/square feet.

Note: In the future CVRPC might account for energy efficiency here, based on the number of buildings that have been weatherized or the percentage of buildings built in each decade (assuming that older buildings are less energy efficient in general when not weatherized). But for the purpose of consistency with initial calculations—the goal of which is to establish a general understanding of energy use in our regions—and without a good baseline of total homes weatherized, this method seems sufficient.

5. **Convert to units of fuel and determine cost:** The total Energy required for each fuel type was divided by the Energy generated from one unit of that fuel type. CVRPC used the following estimates of energy/unit and cost per unit estimates below (Units used divided by cost per Unit). Note, ACS does not account for wood pellet use, a conversion and cost estimate is included in the table below so that municipalities who wish to account for pellet use may do so.

Table A5 Fuel Cost Estimates

Fuel Type	**Standard Unit**	**BTUs**	**Cost**	**Total Regional Cost (Current Use)**	**Source (cost/unit)**
Fuel Oil, kerosene, etc.	Gallon	140,000	$4.133	40,869,208.29	Vermont Average Residential-EIA (March 2024)
Bottled, tank, or LP gas (propane)	Gallon	91,000	$3.575	30,470,927.14	Vermont Average Residential-EIA (March 2024)
Coal or coke	Ton	19,590,000	$500	44,949.46	VT newspapers and quote VT&NH suppliers
Wood (seasoned)	Cord	20,000,000	$350	7,709,887.50	(275 green-450 kiln dried) VT newspapers and quoted VT suppliers
Wood Pellets	Ton	16,400,000	$405		Vermont wood/pick-up; Energy Co-op of VT
Electricity	Kilowatt hour	3,414	$0.2109	3,939,594.36	**VT State Energy Profile, US Energy Information Administration**
Other Fuel (includes solar)				4,142,353.99	
Regional Total Cost				$87,176,920.74	

6. **Determine energy use for seasonal units:** There is no corresponding ACS data on heating sources of vacation/second/seasonal homes, though for several of the towns in the Central Vermont region, these make up a

significant portion of overall homes. The Department of Public Service guidelines suggest that on average, seasonal homes account for about 5% of the thermal energy used in a year-round home (for example a seasonal camp may not have a central heating system, but it still may use propane to heat the water, have a woodstove or fireplace for unseasonably cool nights, etc.). This guidance does not quite match the Central Vermont region as several communities with many seasonal residents use their properties throughout the winter specifically and/or for more than occasional use. Thus, for estimation purposes we assigned 10% to seasonal units in the towns on the eastern half of the region featuring many lakes with summer seasonal population influx, and 25% for those on the western half of the region proximate to the region's winter recreation areas. Here is the formula for calculating MMBTUs for seasonal units:

Number of seasonal units (ACS) x Average MMBTUs per Owner-Occupied Unit (110) x 0.1 (or 0.25) = Total MMBTUs Seasonal

Table Current Regional Residential Thermal Energy Adder (MMBTU) for Seasonal/Vacation Homes

	Seasonal/Vacation Homes	MMBTUs	% Use
Orange	36	396	0.1
Washington	55	605	0.1
Williamstown	73	803	0.1
Barre City	0	0	0.1
Barre Town	27	297	0.1
Berlin	57	627	0.1
Cabot	116	1276	0.1
Calais	117	1287	0.1
Duxbury	56	1540	0.25
East Montpelier	30	330	0.1
Fayston	565	15537.5	0.25
Marshfield	45	495	0.1
Middlesex	48	1320	0.25
Montpelier	88	968	0.1
Morteown	77	2117.5	0.25
Northfield	58	1595	0.25
Plainfield	19	209	0.1
Roxbury	124	3410	0.25
Waitsfield	233	6407.5	0.25
Warren	1735	47712.5	0.25
Waterbury	171	4702.5	0.25
Woodbury	341	3751	0.1
Worcester	66	1815	0.25
Totals	**4,137**	**97,201.5**	

7. **Final Data Combination:** Results were combined and displayed.

3. Regional & Municipal Energy Targets

Please refer to the Department of Public Service's Act 174 Landing Page which has guidance for regions and municipalities and a host of tools used in the analyses that support this plan. This supplement provides additional, not comprehensive, methodological information so as not to duplicate that which is already laid out by the State. Full details of the LEAP Model methods, data sources and assumptions may be found as Appendix D to the 2022 Comprehensive Energy Plan[4]. Lastly, data updates and new analyses will be posted on the CVRPC webpage along with municipal breakouts for targets which will be published throughout the Fall/Winter 2026 and updated as municipalities adjust for their own enhanced energy planning needs.

Vermont's Regional Planning Commissions have been tasked with developing reasonable estimates for local consumption across the transportation, heating, and electric energy sectors. While these estimates use best available data, they should not be considered a unit-by-unit audit of energy use. Rather, they serve as a starting point for better understanding our region's current energy use patterns, the cost drivers, and what we need to do to achieve long-range energy goals. Note, estimates and targets are frequently given in British Thermal Units (BTUs) and millions of BTUs (MMBTUs) in order to allow for comparison between different energy types.

Using the regionalized LEAP results provided by the Department of Public Service, targets are established to provide milestones for thermal efficiency; renewable energy use; and conversion of thermal and transportation energy from fossil fuel based to renewable resources. These milestones are intended to help the region measure progress towards the overall goals and are not identified as requirements.

Regional LEAP targets were disaggregated using each municipality's share of current regional energy use, municipal disaggregation factors (share of regional energy use and thus share of regional target) were calculated separately for transportation (Light Duty Vehicles), residential thermal, commercial thermal, residential electric, and commercial electric to ensure that residential/commercial targets were also proportionate (not just energy sector based). Targets are established for the years 2025, 2035, and 2050 which coincide with the State Comprehensive Energy Plan (update 2022). Targets include both a "business as usual" baseline and the CAP (Climate Action Plan) mitigation scenario targets. **CVRPC adopts the CAP (Climate Action Plan) Mitigation scenario targets in line with State Policy and the Comprehensive Energy Plan.** Full Municipal LEAP Target Excel Workbooks will be posted to the CVRPC Website. Below municipal breakouts of priority targets are provided for 2050.

[4] https://publicservice.vermont.gov/content/2022-cep-analysis-greenhouse-gas-emission-reduction-pathways-vermont

Table A6 Municipal Share of Regional Energy Use (used to disaggregate Regional Targets to Municipal Targets)

TOWN	Transportation	Thermal Residential	Thermal Commercial	Electric Residential	Electric Commercial & Industrial
Barre City	12.25%	14.36%	14.90%	19.50%	21.90%
Barre Town	13.57%	11.85%	4.19%	4.74%	2.48%
Berlin	3.93%	3.84%	8.40%	3.56%	13.64%
Cabot	2.52%	2.17%	0.85%	2.20%	5.34%
Calais	2.54%	3.72%	1.09%	2.31%	0.21%
Duxbury	2.60%	2.01%	0.86%	1.84%	0.82%
East Montpelier	4.10%	4.20%	1.81%	3.92%	1.22%
Fayston	2.34%	1.68%	1.59%	2.92%	0.89%
Marshfield	2.63%	2.81%	1.39%	2.19%	0.64%
Middlesex	3.24%	2.51%	1.82%	2.50%	1.27%
Montpelier	10.56%	13.05%	27.63%	11.04%	18.25%
Moretown	2.61%	2.40%	2.63%	2.63%	0.63%
Northfield	8.03%	8.12%	3.98%	6.49%	6.63%
Orange	1.48%	1.17%	0.08%	1.70%	0.29%
Plainfield	2.10%	2.22%	2.41%	2.02%	0.82%
Roxbury	1.67%	1.23%	1.13%	1.06%	0.24%
Waitsfield	2.59%	3.25%	6.70%	3.76%	3.45%
Warren	2.74%	2.25%	3.46%	6.87%	6.61%
Washington	1.90%	1.59%	0.36%	1.70%	0.18%
Waterbury	7.96%	9.13%	11.22%	9.05%	12.11%
Williamstown	6.06%	5.44%	2.70%	5.13%	2.09%
Woodbury	1.18%	1.16%	0.13%	1.60%	0.09%
Worcester	1.40%	1.30%	0.68%	1.27%	0.21%
Source	**Current Transportation Municipal Consumption Tool**	**Current Heat Municipal Consumption Tool**	**Current Heat Municipal Consumption Tool**	**Efficiency VT Actual Usage**	**Efficiency VT Actual Usage**

TARGETS: Thermal Efficiency & Fuel Switching Targets (Residential & Commercial)

Targets for thermal efficiency of residential and commercial structures are based on a methodology developed by the regional Long-range Energy Alternatives Planning (LEAP) analysis carried out by the Department of Public Service and then disaggregated using municipal share of regional energy use determined via the Municipal Consumption Tool and then converted where appropriate with accepted measure conversions provided in the Analysis and Targets Aid Bottom Up tool. Residential targets use the mean MMBTUs for occupied households in the municipality, which were calculated by CVRPC. Commercial targets use the data from the Vermont Department of Labor. Data in table A7 represent the percentages of municipal households and commercial establishments that will need to be weatherized in the target years. The targets are cumulative. Targets assume a 6% increase in number of housing units/commercial establishments over each period. Weatherization projects are

assumed to achieve an average of 25% reduction in MMBTUs for residential units and 20% for commercial establishments, although some weatherization projects can actually achieve deeper savings. As with thermal efficiency targets, these targets assume a 6% increase in number of housing units/commercial establishments over each period. Full Municipal LEAP Target Breakouts will be posted on the CVRPC website; below reflects the final 2050 cumulative target for priority measures including residential weatherization, residential and commercial heat pumps, residential heat pump hot water heaters, and residential high efficiency cord wood conversions.

Table A7 2050 Cumulative Targets by Town- Priority Thermal & Efficiency

Municipality	Residential CCHP	Residential Weatherization	Residential Heat Pump Water Heaters	High Efficiency Cord Wood	Commercial CCHP
Barre City	6099	3895	4623	140	3274
Barre Town	5033	3214	3815	301	920
Berlin	1632	1042	1237	133	1847
Cabot	922	589	699	158	187
Calais	1580	1009	1198	161	239
Duxbury	852	544	646	124	188
East Montpelier	1785	1140	1353	170	398
Fayston	713	455	540	56	349
Marshfield	1192	761	903	197	304
Middlesex	1066	681	808	194	401
Montpelier	5543	3540	4202	258	6072
Moretown	1018	650	772	78	579
Northfield	3451	2204	2616	294	874
Orange	498	318	377	68	17
Plainfield	944	603	716	142	530
Roxbury	521	333	395	76	249
Waitsfield	1378	880	1045	58	1472
Warren	956	610	725	77	759
Washington	674	430	511	145	79
Waterbury	3880	2478	2941	174	2467
Williamstown	2310	1475	1751	130	594
Woodbury	493	315	374	106	29
Worcester	552	352	418	105	150

TABLES A8 and A9 below provide a coarse look at progress towards these targets in recent years. Updates to these Tables will be posted annually on the CVRPC website so town's can use the most recent data for their local plans.

Table A8 Summary of 2020-2023 Residential Weatherization (Efficiency Vermont projects include Home Performance with Energy Star, other weatherization projects, and residential new construction projects; their total savings include all measures)

Project Type	2020	2021	2022	2023

Total Homes Weatherized (Capstone only)	78		143		112		173	
Performance with ENERGY STAR (Efficiency VT)	136		123		70		329	
Weatherization (Efficiency VT)	40		46		57		143	
Residential New Construction	8		21		25		54	
Total kWh Saved (Capstone)	526.28		49,639.31		38,114.35		106,643.73	
Total MMBTUs Saved (Capstone)	2,680.07		2,843.15		5,220.97		6,915.32	
Total kWh Saved (Efficiency VT))*	3,476,376		471,560					
Thermal MMBTUs Saved (Efficiency VT)*	13,800		32,206		31,520			
Town Totals	Capstone (Homes)	Efficiency Vermont (Projects)	Capstone (Homes)	Efficiency Vermont (Projects)	Capstone (Homes)	Efficiency Vermont (Projects)	Capstone (Homes)	Efficiency Vermont (Projects)
Barre City	20	31	25	38	19	28	38	
Barre Town	10	7	14	1	11	4	11	
Berlin	3	4	3	2	12	3	8	
Cabot	1	4	2	3	6	2	8	
Calais	2	8	2	7	3	2	9	
Duxbury	0	0	0	4	1	5	1	
East Montpelier	5	6	2	3	3	5	6	
Fayston	1	3	0	3	2	5	0	
Marshfield	1	4	2	3	2	2	2	
Middlesex	2	5	0	5	1	5	5	
Montpelier	10	41	16	46	17	27	28	
Moretown	2	5	2	10	3	3	1	
Northfield	5	10	29	12	14	6	10	
Orange	2	0	3	0	2	0	6	
Plainfield	1	8	3	4	2	1	3	

Roxbury	2	3	0	2	1	1	1	
Waitsfield	1	6	2	2	0	9	0	
Warren	0	9	2	12	1	11	0	
Washington	1	0	3	3	0	4	4	
Waterbury	4	20	1	25	3	21	7	
Williamstown	4	7	28	3	4	2	14	
Woodbury	0	0	1	2	3	2	3	
Worcester	1	3	3	0	2	4	8	
Regional Total	**78**	**184**	**143**	**190**	**112**	**152**	**173**	

Table A9 Capstone Weatherization Central Vermont 2020-2023

	2020	2020						2021	2021						2022	2022						2023	2023					
Town Totals	Total Homes	Multi Family Buildings	Multi Family Units	Single Family Homes	Occupants	kWh Savings	MMBTU Savings	Total Homes	Multi Family Buildings	Multi Family Units	Single Family Homes	Occupants	kWh Savings	MMBTU Savings	Total Homes	Multi Family Buildings	Multi Family Units	Single Family Homes	Occupants	kWh Savings	MMBTU Savings	Total Homes	Multi Family Buildings	Multi Family Units	Single Family Homes	Occupants	kWh Savings	MMBTU Savings
Barre City	20			20	44		530.75	25	9	4	21	37	3902.88	710.39	19	8	8	11	39	1865	586.17	38	7	11	27	69	8435.38	1519.96
Barre Town	10	8	3	7	18	145.5	837.31	14			14	34		433.98	11	5	8	3	17	8467	1040.36	11			11	23		361.96
Berlin	3			3	4		91.32	3			3	4		40.02	12	15	10	2	17	27650.35	366.88	8			8	22		307.24
Cabot	1			1	5		53.17	2			2	3		64.97	6			6	15		299.88	8			8	10		252.04
Calais	2			2	3		99.83	2			2	6		67.31	3			3	4		104.11	9	8	3	6	19	93766.02	781.62
Duxbury	0			0	0		0.00	0			0	0		0.00	1			1	1		42.51	1			1	1		13.07
East Montpelier	5			5	6		153.83	2			2	3		31.36	3			3	5		448.32	6			6	10		247.79
Fayston	1			1	1		8.15	0			0	0		0.00	2			2	2		106.66	0			0	0		0.00
Marshfield	1			1	5		90.71	2			2	4		24.43	2			2	4		53.14	2			2	2		57.67
Middlesex	2			2	2		110.84	0			0	0		0.00	1			1	1		9.47	5			5	7		241.58
Montpelier	10	4	5	5	13	380.78	82.12	16	15	6	10	27	1408	428.42	17	9	6	11	32	132	752.30	28	19	20	8	36	4090.33	1106.17
Moretown	2			2	2		42.55	2			2	3		44.51	3			3	4		261.37	1			1	3		17.10

Northfield	5			5	8		108.69	29	9	20	9	50	1330	196.57	14			14	39		486.82	10			10	24		461.47
Orange	2			2	5		37.92	3			3	9		42.40	2			2	5		71.84	6			6	12		275.08
Plainfield	1			1	2		18.87	3			3	6		104.90	2			2	5		83.93	3			3	4		127.20
Roxbury	2			2	4		77.70	0			0	0		0.00	1			1	5		32.18	1			1	1		69.65
Waitsfield	1			1	2		35.67	2			2	2		47.14	0			0	0		0.00	0			0	0		0.00
Warren	0			0	0		0.00	2			2	5		42.96	1			1	1		12.61	0			0	0		0.00
Washington	1			1	3		10.20	3			3	5		90.32	0			0	0		0.00	4			4	8		219.25
Waterbury	4			4	5		102.28	1			1	1		30.94	3			3	4		60.57	7			7	10		192.24
Williamstown	4			4	11		135.88	28	4	22	6	51	4299.43	165.70	4			4	11		215.52	14	3	3	11	36		430.90
Woodbury	0			0	0		0.00	1			1	4		38.70	3			3	5		153.77	3			3	8		51.26
Worcester	1			1	3		52.27	3			3	3		238.14	2			2	4		32.54	8	4	4	4	21	352	182.06
Regional Total	**78**	12	8	70	**146**	**526.28**	**2680.07**	**143**	37	52	91	**257**	**49639.31**	**2843.15**	**112**	37	32	80	**220**	**38114.35**	**5220.97**	**173**	41	41	132	**326**	**10643.73**	**6915.32**

Advanced Wood Heat Target Creation

The regional CAP LEAP targets provided by the Public Service Department include targets for heat pump and heat pump hot water heaters which model the state's general electrification policy with all other fuel types, other than biodiesel, decreasing dramatically. This was a significant issue for several of our communities, for whom cord wood heat is an important fuel source. The Central Vermont approach to the thermal sector, specifically for residential heat, incorporates the sustained use of wood (cord wood) (stand alone or in combination with heat pumps). This approach is integrated into the plan via:

- A high-efficiency cord wood target (to replace outdated inefficient cord wood stoves and boilers; cord wood as the preferred option where wood heating is chosen in new builds),
- promoting the use of high-efficiency cord wood stoves with heat pumps (we do not reduce the target for heat pumps),
- providing context on the use of wood heat across income-levels, the availability of cord wood including via wood pantries, the intersection with high frequency and duration of electric outages, and the significant reduction in energy use still achieved via wood heat stove conversion (especially when paired with heat pumps).

While up to 47% of Vermonters rely on wood heat as their primary or secondary heating fuel in their homes and state programs have supported advanced wood heat conversions in schools and commercial buildings, the state's electrification targets include a decline in wood heat use along with fossil fuels. CVRPC takes a different approach tailored to our needs, resources, and communities. CVRPC supports the transition from fossil fuel heating fuels using not only heat pumps, but also strongly supports the conversion of inefficient wood stoves to high efficiency cord wood stoves- our targets for the thermal sector reflect this commitment. This custom target still reduces air pollution emissions, reduces heating costs, the amount of wood fuel used, provides a pathway for those with frequent and long-duration electric outages, and provides an accessible option for many Vermonters.

There are clear geographic and demographic trends across the region regarding wood use; 34-43% of households use wood heating in the north part of our region, 15-26% in the less densely populated municipalities throughout the rest of the region and significantly fewer households use wood heating in our density centers (only 4-14%). In owner inhabited homes wood heating is relatively consistent across income levels. However, several characteristics make efficient wood heat a particularly important pathway for fixed and low-income residents in our region to reduce their costs and greenhouse gas emissions. Unlike heat pumps, for which potential savings or costs can vary significantly depending on utility territory among other factors, cost savings from the use of high efficiency

wood stoves are often more straightforward. Furthermore, according to the State's Residential Fuel Assessment, over 1/3 of households using wood heat (as primary and secondary fuel) report that they, an immediate family member, or friend, cut or gathered the wood personally.

Table A10 Current Wood Fuel Use in Occupied Housing Units by Town

	Owner Occupied		Renter Occupied		Total Occupied	
Orange	74	21.0%	11	22.4%	**85**	**21.2%**
Washington	169	34.2%	12	42.9%	**181**	**34.7%**
Williamstown	163	13.5%	0	0.0%	**163**	**12.3%**
Barre City	142	6.9%	33	1.6%	175	4.3%
Barre Town	376	12.1%	0	0.0%	**376**	**10.7%**
Berlin	157	14.9%	9	6.3%	**166**	**13.9%**
Cabot	171	35.8%	26	28.0%	**197**	**34.5%**
Calais	192	30.8%	9	17.6%	**201**	**29.8%**
Duxbury	150	29.2%	5	4.5%	**155**	**24.8%**
East Montpelier	199	21.1%	13	6.3%	**212**	**18.4%**
Fayston	70	14.7%	0	0.0%	**70**	**12.8%**
Marshfield	197	32.7%	49	45.0%	**246**	**34.6%**
Middlesex	237	32.8%	5	20.0%	**242**	**32.4%**
Montpelier	300	15.2%	22	1.3%	**322**	**8.7%**
Morteown	84	15.1%	13	13.1%	**97**	**14.8%**
Northfield	341	21.7%	26	4.6%	**367**	**17.2%**
Plainfield	163	34.5%	14	12.5%	**177**	**30.3%**
Roxbury	95	28.9%	0	0.0%	**95**	**27.1%**
Waitsfield	72	10.6%	0	0.0%	**72**	**8.4%**
Warren	96	15.8%	0	0.0%	**96**	**13.7%**
Waterbury	217	13.3%	0	0.0%	**217**	**9.4%**
Woodbury	127	45.5%	6	40.0%	**133**	**45.2%**
Worcester	122	35.2%	9	15.8%	**131**	**32.4%**

Source: 2024 ACS 5-year average B25117 Tenure by House Heating Fuel

Not all forms of advanced wood heat are equally in line with the state's goals for air quality, forest ecology, and energy (see Challenges starting page 196 2022 CEP, see the CEP for more on wood supply and current programs as well). CVRPC is thus focusing on the hyper-local benefits and opportunities presented via cord wood, while further consideration of wood pellets and chips would be needed before integration into preferred fuel types. Therefore CVRPC still feels advanced cord wood heat is important to include in our thermal energy transition because wood heat has an additional role to play in managing and reducing peak winter electrical loads, either stand-alone or in combination with heat pumps, wood stoves provide opportunities for homes, schools, and municipal buildings to avoid peak electric costs including during cold snaps. In addition to flexibility, advanced

wood heat options can provide resilience benefits, as is included in the CEP and CAP.

Method:

Table 12 in the Energy Chapter provides a new target developed by CVRPC in recognition of the role cordwood heating plays in the region and can continue to do so as part of our energy policy and goals. These targets focus on the conversion of aged and/or inefficient woodstoves to high-efficiency replacements. These targets are based on:

- the constants used in current use estimates,
- Efficiency Vermont projects that advanced wood heat conversion reduces fuel use by approximately 1/3, which was further reduced to 2/3 when paired with weatherization and conversion of some wood heating use from the primary to secondary heating source (representing an average per household reduction from 5.69 cords per year to 1.9 cords).

While data on wood heating is coarse, see detailed discussion above, this target uses current use as a starting point in 2025, and strives for 20% of households to convert per target year until 80% have verted in 2050. These numbers are broad enough to account for the unknown number of existing high-efficiency wood stoves. Updating these targets increases the demand for wood relative to the LEAP targets provided by the Department of Public Service for the target year 2050 but reflect a significantly lower estimation of demand in all previous years. CVRPC is working with the Department of Public Service and other partners to refine these LEAP targets to better reflect current use. And while these updates are not yet incorporated in the analysis, the proposed CVRPC wood targets for residential heating remains in line with a transition from fossil fuels and inefficient heating types (e.g. electric resistance) towards residential heating demand dominated by high-efficiency cold climate heat pumps and cordwood technologies.

Table A11:

Targets for Residential High Efficiency Wood Heat Conversions

	2025	2030	2035	2040	2050
Existing Wood (homes)	4000	3200	2400	1600	800
New High Efficiency Wood Heat (homes)	0	800	1600	2400	3200
% converted	0%	20%	40%	60%	80%
Total Cords Used	22730	19725	16691	13656	10621
Thousands MMBTUs	454.608	394.507	333.813	273.120	212.427

This would impact the State's trajectory of residential wood demand (crossed out below and replaced with CVRPC's targets (bolded below), our target still achieves demand reductions via high efficiency cord wood stove conversions instead of solely converting wood heat to heat pumps.

Table A12 CAP Mitigation Regional Residential Thermal Energy Demand Adjustments

CAP Mitigation Regional **Residential** Thermal Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	120	264	376	487	595	633
HP	1	136	231	322	413	453
HPWH	2	23	49	76	103	104
Electric Resistance	40	29	21	14	8	7
~~Wood (State default)~~	~~910~~	~~733~~	~~535~~	~~400~~	~~286~~	~~182~~
Wood (CVRPC)		**455**	**395**	**334**	**273**	**212**
Propane	475	375	273	183	101	67
Wood Pellets	225	69	57	50	45	42
Biodiesel	-	51	224	285	245	176
Heating Oil	1,140	827	404	140	-	-
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**2,870**	**2,318**	**1,869**	**1,544**	**1,272**	**1,100**

In the future CVRPC will work towards incorporating further adjustments to the targets associated with incorporating district heating, thermal energy networks, and geothermal.

Fuel Switching Transportation Targets

Targets for switching from fossil fuel-based vehicles to EVs are the predominant focus for municipalities in the transportation sector. This target is calculated using the Regional LEAP data and disaggregated the regional target based on the municipal share of current vehicles (light duty only). The targets are cumulative. Full municipal target breakouts will be posted on the CVRPC website, below is a summary of the priority 2050 target (total EVs).

Table A12 Total Passenger EV Target

TOWN	Total EVs Passenger Car Stock
Barre City	3256
Barre Town	3608
Berlin	1046
Cabot	671
Calais	674
Duxbury	691

East Montpelier	1090
Fayston	622
Marshfield	698
Middlesex	860
Montpelier	2808
Moretown	693
Northfield	2134
Orange	394
Plainfield	558
Roxbury	443
Waitsfield	689
Warren	729
Washington	504
Waterbury	2115
Williamstown	1612
Woodbury	314
Worcester	372

Table A12 displays a target for switching from fossil fuel-based vehicles to EVs. This target is calculated using the Regional LEAP data and disaggregated the regional target based on the municipal share of current vehicles (light duty only). The targets are cumulative. Below that, Table A13 provides recent EV registrations, longer term pace of adoption can be found on EAN's Dashboard by RPC and by Town, note the impact in the table below of both federal and state incentives.

Table A13 Recent EV Registrations by Town

County	**EV Registration Jan. 2023**			**EV Registration Jan. 2024**			**Increase 2023-2024**	
Municipality	**AEV**	**PHEV**	**Total EVs**	**AEV**	**PHEV**	**Total EVs**	**Count**	**%**
Washington County Total	569	487	1056	**896**	**580**	**1476**	**420**	**40%**
Barre City	53	55	108	88	73	161	53	49%
Barre Town	5	9	14	9	16	25	11	79%
Berlin	23	15	38	32	22	54	16	42%
Cabot	4	7	11	4	8	12	1	9%
Calais	20	19	39	33	20	53	14	36%

Duxbury	4	2	6	9	3	12	6	100%
East Montpelier	21	12	33	28	18	46	13	39%
Fayston	2	5	7	3	4	7	0	0%
Marshfield	12	11	23	18	14	32	9	39%
Middlesex	28	20	48	41	20	61	13	27%
Montpelier	164	150	314	257	151	408	94	30%
Moretown	29	7	36	38	17	55	19	53%
Northfield	20	20	40	36	22	58	18	45%
Plainfield	20	26	46	35	37	72	26	57%
Roxbury	2	1	3	4	0	4	1	33%
Waitsfield	41	26	67	66	31	97	30	45%
Warren	34	22	56	51	33	84	28	50%
Waterbury	75	69	144	126	81	207	63	44%
Woodbury	0	2	2	0	2	2	0	0%
Worcester	12	9	21	18	8	26	5	24%
Orange	3	0	3	5	1	6	3	100%
Washington	5	2	7	5	3	8	1	14%
Williamstown	11	8	19	15	12	27	8	42%
REGIONAL TOTAL	**588**	**497**	**1085**	**921**	**596**	**1517**	**432**	**40%**

Electric Efficiency Targets

Efficiency and conservation measures are integrated into the thermal sector targets. Electricity efficiencies were embedded into the 20-year load forecast used in the updated LEAP model, thus are not an output of their own (and why the Public Service Department removed the Electric Sector tab of the updated Analysis & Targets Tool). The Energy Chapter thus emphasizes the thermal and transportation sector; although further efficiency targets are provided below. The Public Service Department provided regional estimates of electric energy savings associated with the implementation of efficiency programs based on the 2022 Energy Efficiency Market Potential Study for 2025-2050 (these targets are cumulative).Table A14 below shows possible electric energy efficiency savings

(MWh), Tables A17&18 below include measures that can be used to achieve those savings, while Tables A15&16 show the co-benefits of these efficiency measures on reducing peak demand pressure (seasonal impacts).

Table A14 Program Achievable Electric Energy Efficiency Savings (MWh)		**2025**	**2030**	**2035**	**2040**	**2050**
Residential	Incremental Annual	2,459	2,583	2,801	2,707	3,010
Residential	Cumulative Annual	4,861	16,566	27,893	35,147	51,456
Non-Residential	Incremental Annual	4,361	3,961	3,966	3,909	4,546
Non-Residential	Cumulative Annual	8,740	28,611	43,894	42,904	39,581
Total	Incremental Annual	6,820	6,544	6,767	6,616	7,556
Total	Cumulative Annual	13,601	45,177	71,787	78,052	91,037

Table A15. Program Achievable Electric Energy Efficiency Summer Capacity Savings (MW)		**2025**	**2030**	**2035**	**2040**	**2050**
Residential	Incremental Annual	0.20	0.17	0.20	0.18	0.2
Residential	Cumulative Annual	0.42	1.22	1.86	2.11	2.2
Non-Residential	Incremental Annual	0.74	0.62	0.61	0.59	0.7
Non-Residential	Cumulative Annual	1.48	4.72	7.22	6.87	6.0
Total	Incremental Annual	0.94	0.79	0.81	0.77	0.3
Total	Cumulative Annual	1.90	5.93	9.08	8.97	6.2

Table A16. Program Achievable Electric Energy Efficiency Winter Capacity Savings (MW)		**2025**	**2030**	**2035**	**2040**	**2050**
Res	Incremental Annual	0.49	0.52	0.56	0.54	0.6
Res	Cumulative Annual	0.97	3.32	5.68	7.27	10.8
Non-R	Incremental Annual	0.63	0.59	0.59	0.58	0.7
Non-R	Cumulative Annual	1.27	4.21	6.51	6.34	5.9

Total	Incremental Annual	1.13	1.11	1.14	1.12	1.3
Total	Cumulative Annual	2.23	7.54	12.19	13.61	16.6

Table A17. Residential Incremental Annual MWH- by End-Use	2025	2030	2035	2040	2050
Appliances	493	431	519	507	694
Hot Water	352	328	383	330	381
HVAC Equipment	1060	1432	1469	1490	1,558
HVAC Shell	43	49	40	27	11
Lighting	156	9	12	10	12
Misc. Loads	219	173	227	190	233
Motor	14	13	17	14	16
Whole Building	122	147	135	138	137

Table A19. Non-residential Incremental Annual MWH- by End-Use	2025	2030	2035	2040	2050
Compressed Air	282	292	289	289	333
Plug Loads	61	103	111	109	127
Heating and Cooling	279	316	337	338	390
Ventilation And Circulation	262	325	372	395	449
Lighting	2520	1733	1578	1477	1,756
Refrigeration	462	526	566	586	670
Water Heat	143	190	201	189	224
Motors	129	125	124	124	142
Other	175	302	341	355	406

Electricity use is expected to increase dramatically by 2050 so demand-side management and upgrades, such as hardwiring, lighting fixtures, appliances, and demand-management programs, are also an important part of this scenario, especially since electricity is replacing other fuel-burning thermal applications.

4. Regional Leap Targets

These are the original targets provided to CVRPC by the Department of Public Service; these were disaggregated from the State targets based on the table below.

Overview - LEAP Regionalization for Regional Planning Commission Enhanced Energy Planning

As part of the development of Vermont's Comprehensive Energy Plan (CEP) and Climate Action Plan (CAP), Stockholm Environment Institute (SEI) and Northeast States for Coordinated Air Use Management (NESCAUM) developed a scenario model of Vermont's energy consumption and emissions and used the model to construct pathways to meet statutory greenhouse gas (GHG) reduction obligations under the state's Global Warming Solutions Act (GWSA). The model was built using SEI's Low Emissions Analysis Platform (LEAP), a software tool for energy system modeling and emissions accounting. The model contains a representation of residential, commercial, industrial and transport energy use at a state level.

In order to support enhanced energy planning at the regional and municipal levels, the Department has undertaken an effort to "regionalize" final energy demand outputs from the statewide LEAP modeling for four core sectors: residential, commercial, industrial, and transportation. Disaggregation of those results for each of the regions was based on key drivers of energy demand. This has been done for:

1. The **Baseline** (business-as-usual) scenario developed to estimate Vermont/regional energy demand under normal policy and programmatic conditions and
2. The **Central GWSA Mitigation ("CAP Mitigation")** scenario to meet state's GHG reduction requirements.

Table A20 Regionalization of LEAP Targets

Share of Statewide:	CVRPC	Source	Used for:
Population	10.2%	Generation Scenario Tool (for consistency)	Share of non-road transportation. Note: All transportation related natural gas demand was allocated to CCRPC
Housing Units	11.1%	Data submitted via RPCs in data template - almost all from the American Community Survey	Residential non-natural gas energy demand & technology adoption (total and thermal energy use, new CCHPs)

Commercial Floorspace	11.2%	Data submitted via RPCs in data template - almost all used SQ FT / Employee * Number of Employees Method; SQFT/Employee from Jim Sullivan (BCRC), Number of Employees from VDOL and/or Census	Commercial non-natural gas energy demand & technology adoption (total consumption, new CCHPs)
Passenger Cars	10.0%	DMV Registration Database	On-Road Transportation Energy Use (Passenger Car, Light Trucks, Medium and Heavy Duty). Note: All transportation related natural gas demand was allocated to CCRPC
Light Trucks	10.5%		
Medium Duty Vehicles	9.4%		
Heavy Duty Vehicles	9.8%		
NAICS Codes	8.9%	Census Data on NAICS Manufacturing Codes (31-33)	Industrial Data
Natural Gas - Residential	0.0%	VGS Historical Usage Data	Residential, Commercial, and Industrial Sector Natural Gas Usage
Natural Gas - Commercial	0.0%		
Natural Gas - Industrial	0.0%		

Resources

Full details of the LEAP Model methods, data sources and assumptions may be found as **Appendix D to the 2022 Comprehensive Energy Plan**: https://publicservice.vermont.gov/content/2022-cep-analysis-greenhouse-gas-emission-reduction-pathways-vermont

Appendix E to the Comprehensive Energy Plan also provides a summary of the report in Appendix D in slide format, although please note that some assumptions in the modelling were revised following the issuing the of the Comprehensive Energy Plan:
https://publicservice.vermont.gov/sites/dps/files/documents/CEP_AppendixE_LEAPModelingSlides.pdf

The **Vermont Pathways Report** prepared for the Agency of Natural Resources also provides information on the analysis done using the model, including some of the revisions made after the CEP was published (see Table 1 pg 1):
https://climatechange.vermont.gov/sites/climatecouncilsandbox/files/2022-03/Pathways%20Analysis%20Report_Version%202.0.pdf

Tables A21 Full Regional LEAP Targets from PSD

Baseline Total Regional **Residential** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	797	636	691	725	743	758
Wood	910	872	752	685	657	635
Propane	699	619	580	558	552	552
Wood Pellets	225	76	66	61	59	58
Biodiesel	-	-	-	-	-	-
Heating Oil	1,214	1,115	982	906	874	848
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**3,845**	**3,318**	**3,071**	**2,935**	**2,885**	**2,852**

CAP Mitigation Total Regional **Residential** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	797	719	837	955	1,071	1,114
Wood	910	733	535	400	286	182
Propane	699	520	378	248	125	93
Wood Pellets	225	69	57	50	45	42
Biodiesel	-	55	251	336	321	254
Heating Oil	1,214	898	453	165	-	-
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**3,845**	**2,994**	**2,511**	**2,154**	**1,849**	**1,683**

Baseline Regional **Residential** Thermal Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	120	184	236	269	284	293
HP	1	70	125	155	169	175
HPWH	2	2	2	2	2	2
Electric Resistance	40	34	30	27	26	26
Wood	910	872	752	685	657	635
Propane	475	442	402	380	373	372
Wood Pellets	225	76	66	61	59	58
Biodiesel	-	-	-	-	-	-
Heating Oil	1,140	1,040	906	830	797	771
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**2,870**	**2,614**	**2,363**	**2,224**	**2,170**	**2,129**

CAP Mitigation Regional **Residential** Thermal Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	120	264	376	487	595	633
HP	1	136	231	322	413	453
HPWH	2	23	49	76	103	104
Electric Resistance	40	29	21	14	8	7
Wood	910	733	535	400	286	182
Propane	475	375	273	183	101	67
Wood Pellets	225	69	57	50	45	42
Biodiesel	-	51	224	285	245	176
Heating Oil	1,140	827	404	140	-	-
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**2,870**	**2,318**	**1,869**	**1,544**	**1,272**	**1,100**

Baseline Regional **Residential** New Cold Climate Heat Pumps						
Technology	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
ASHP 2 Head	397	1,200	2,278	2,911	3,218	3,381
ASHP Central	607	1,835	3,483	4,451	4,919	5,169
ASHP HE	583	1,763	3,346	4,275	4,725	4,964
GSHP HE	72	218	414	528	584	614
Total	**1,658**	**5,017**	**9,521**	**12,166**	**13,446**	**14,127**

CAP Mitigation Regional **Residential New** Cold Climate Heat Pumps						
Technology	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
ASHP 2 Head	423	2,549	4,686	6,836	8,995	10,093
ASHP Central	658	3,964	7,311	10,705	14,155	15,727
ASHP HE	622	3,743	6,882	10,039	13,210	14,821
GSHP HE	77	463	851	1,241	1,633	1,832
Total	**1,780**	**10,720**	**19,730**	**28,820**	**37,993**	**42,473**

Regional **Residential** New Retrofits (Number of Housing Units)						
Scenario	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
Baseline Scenario	1,378	2,847	4,205	5,496	6,833	9,658
CAP Mitigation	2,202	7,758	13,314	16,767	20,219	27,125

Regional **Residential** New Heat Pump Water Heaters (Number of Units)						
Scenario	**2020**	**2025**	**2030**	**2035**	**2040**	**2050**
Baseline Scenario	483	569	573	578	581	593
CAP Mitigation	483	7,046	15,213	23,465	31,809	32,196

ASHP= Air Source Heat Pumps
GSHP= Ground Source Heat Pumps
2 Head refers to distributed or zoned systems (independent) vs Central (loop) wherein one main pump loops feeds all zones; HE refers to hybrid systems

Baseline Total Regional **Commercial** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	771	749	756	759	755	747
Gasoline	74	83	85	87	88	92
Kerosene	1	1	1	1	1	1
Wood	184	194	206	219	230	262
Ethanol	5	6	6	6	6	6
Solar	19	50	51	52	53	55
Heat	-	-	-	-	-	-
Propane	472	329	320	316	330	346
Residual Fuel Oil	12	5	5	5	5	5
Wood Pellets	-	-	-	-	-	-
Biodiesel	-	-	-	-	-	-
Heating Oil	535	309	268	233	203	161
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**2,073**	**1,723**	**1,697**	**1,677**	**1,672**	**1,675**

CAP Mitigation Total Regional **Commercial** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	771	816	890	963	1,007	995
Gasoline	74	83	85	87	88	92
Kerosene	1	1	0	0	-	-
Wood	184	194	206	219	230	262
Ethanol	5	6	6	6	6	6
Solar	19	50	51	52	53	55
Heat	-	-	38	57	96	96
Propane	472	258	164	74	4	2
Residual Fuel Oil	12	5	5	5	5	5
Wood Pellets	-	10	20	30	39	46
Biodiesel	-	16	74	111	150	156
Heating Oil	535	256	133	55	-	-
Biogas	-	-	-	-	-	-
Natural Gas	-	-	-	-	-	-
Total	**2,073**	**1,693**	**1,673**	**1,659**	**1,679**	**1,716**

Baseline Regional **Commercial** New Cold Climate Heat Pumps						
	2020	**2025**	**2030**	**2035**	**2040**	**2050**
New CCHP	316	960	1,827	2,333	2,580	2,710

CAP Mitigation Regional **Commercial** New Cold Climate Heat Pumps						
	2020	**2025**	**2030**	**2035**	**2040**	**2050**
New CCHP	316	5,682	11,298	17,184	21,120	21,977

Baseline Total Regional **Industrial** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	432	420	408	392	397	416
Natural Gas	-	-	-	-	-	-
Gasoline	43	41	42	42	43	45
Kerosene	1	2	2	2	2	2
Diesel	267	295	287	285	286	290
LPG	26	26	25	25	25	24
Wood	32	18	18	18	19	20
Biogas	-	-	-	-	-	-
Ethanol	3	3	3	4	4	4
Lubricants	15	11	11	11	11	12
Biodiesel	-	19	25	25	25	22
Residual Fuel Oil	15	9	9	10	10	10
Wood Waste Solids	8	1	2	2	2	2
Asphalt and Road Oil	411	301	307	313	319	332
Total	**1,253**	**1,146**	**1,139**	**1,129**	**1,143**	**1,179**

CAP Mitigation Total Regional **Industrial** Sector Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	432	420	408	392	397	416
Natural Gas	-	-	-	-	-	-
Gasoline	43	41	41	41	42	44
Kerosene	1	2	2	2	2	2
Diesel	267	212	143	72	-	-
LPG	26	26	25	25	25	24
Wood	32	18	18	18	19	20
Biogas	-	-	-	-	-	-
Ethanol	3	4	4	5	5	5
Lubricants	15	11	11	11	11	12
Biodiesel	-	102	169	238	312	312
Residual Fuel Oil	15	9	9	10	10	10
Wood Waste Solids	8	1	2	2	2	2
Asphalt and Road Oil	411	301	307	313	319	332
Total	**1,253**	**1,146**	**1,139**	**1,129**	**1,143**	**1,179**

Baseline Total Regional **Passenger Car** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	1	15	28	60	116	228
Gasoline	1,059	782	704	634	545	376
Diesel	8	3	2	1	1	1
Ethanol	72	60	56	52	46	34
CNG	-	-	-	-	-	-
Biodiesel	0	0	0	0	0	0
Total	**1,139**	**861**	**790**	**748**	**708**	**639**

CAP Mitigation Total Regional **Passenger Car** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	1	19	73	168	257	347
Gasoline	1,059	751	575	365	196	48
Diesel	8	3	2	1	1	0
Ethanol	72	64	55	38	23	5
CNG	-	-	-	-	-	-
Biodiesel	0	0	0	0	0	0
Total	**1,139**	**838**	**705**	**572**	**477**	**400**

Baseline Regional **Passenger Car EV and PHEV Stock** (Number of Vehicles)						
Vehicle Type	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Battery Electric	22	797	1,717	3,688	7,073	14,681
Plug In Hybrid	55	215	244	368	602	1,106
Total	**77**	**1,012**	**1,961**	**4,056**	**7,675**	**15,788**

CAP Mitigation Regional **Passenger Car EV and PHEV Stock** (Number of Vehicles)						
Vehicle Type	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Battery Electric	22	1,093	4,719	11,272	17,892	26,546
Plug In Hybrid	55	208	195	160	101	36
Total	**77**	**1,301**	**4,913**	**11,431**	**17,994**	**26,582**

Baseline Total Regional **Light Truck** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	0	5	10	22	48	112
Natural Gas	-	-	-	-	-	-
Gasoline	2,306	2,066	1,820	1,625	1,442	1,192
Diesel	44	42	45	46	43	38
Ethanol	158	160	146	134	123	108
CNG	-	-	-	-	-	-
Biodiesel	1	3	4	4	4	3
Total	**2,509**	**2,275**	**2,024**	**1,832**	**1,660**	**1,453**

CAP Mitigation Total Regional **Light Truck** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	0	25	138	313	455	552
Natural Gas	-	-	-	-	-	-
Gasoline	2,306	1,965	1,453	892	456	119
Diesel	44	38	32	22	10	3
Ethanol	158	169	139	94	53	14
CNG	1	0	0	0	0	0
Biodiesel	1	3	3	3	2	1
Total	**2,510**	**2,200**	**1,766**	**1,324**	**975**	**688**

Baseline Regional **Light Duty Truck EV and PHEV Stock** (Number of Vehicles)						
Vehicle Type	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Battery Electric	3	173	375	870	1,937	4,871
Plug In Hybrid	33	128	260	527	1,021	2,413
Total	**36**	**301**	**635**	**1,397**	**2,959**	**7,284**

CAP Mitigation Regional **Light Duty Truck EV and PHEV Stock** (Number of Vehicles)						
Vehicle Type	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Battery Electric	3	1,163	6,926	16,289	24,669	33,219
Plug In Hybrid	33	122	169	161	107	40
Total	**36**	**1,285**	**7,095**	**16,450**	**24,776**	**33,259**

Baseline Total Regional **Medium Duty** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	-	0	0	1	1	1
Natural Gas	-	-	-	-	-	-
Gasoline	111	213	239	268	301	350
Diesel	168	278	302	325	347	379
LPG	1	3	4	5	6	8
Ethanol	8	17	19	22	26	32
Biodiesel	6	18	26	28	31	28
Total	**294**	**528**	**591**	**649**	**711**	**798**

CAP Mitigation Regional **Medium Duty** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	-	26	101	217	330	463
Natural Gas	-	-	-	-	-	-
Gasoline	111	193	172	128	86	34
Diesel	168	249	210	142	82	28
LPG	1	3	3	2	1	0
Ethanol	8	17	17	14	10	4
Biodiesel	6	18	21	18	13	7
Total	**294**	**505**	**524**	**521**	**523**	**536**

Baseline Regional **Heavy Duty** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	-	0	0	0	0	0
Natural Gas	-	-	-	-	-	-
Gasoline	0	0	0	0	0	0
Diesel	718	370	269	215	191	163
Ethanol	0	0	0	0	0	0
Biodiesel	24	24	23	19	17	12
Total	**742**	**394**	**292**	**233**	**208**	**176**

CAP Mitigation Regional **Heavy Duty** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Electricity	-	12	47	99	145	181
Natural Gas	-	-	-	-	-	-
Gasoline	0	0	0	0	0	0
Diesel	718	347	210	111	57	12
Ethanol	0	0	0	0	0	0
Biodiesel	24	25	21	14	9	3
Total	**742**	**384**	**278**	**225**	**211**	**195**

Baseline Regional **Non-Road** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Diesel	114	108	109	109	110	111
Biodiesel	4	7	9	10	10	8
Avgas	4	5	5	5	5	5
Jet Kerosene	148	148	149	150	151	152
Sustainable Aviation Fuel	-	-	-	-	-	-
Gasoline	40	36	37	37	37	37
Ethanol	3	3	3	3	3	4
Lubricants	31	24	24	24	25	25
Natural Gas	-	-	-	-	-	-
Total	**344**	**332**	**336**	**338**	**340**	**342**

CAP Mitigation Regional **Non-Road** Final Energy Demand (Thousand MMBTUs)						
Fuel	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Diesel	114	108	109	109	110	111
Biodiesel	4	8	11	14	18	26
Avgas	4	5	5	5	5	5
Jet Kerosene	148	146	134	122	110	86
Sustainable Aviation Fuel	-	2	15	28	40	66
Gasoline	40	36	37	37	37	37
Ethanol	3	3	4	4	4	4
Lubricants	31	24	24	24	25	25
Natural Gas	-	-	-	-	-	-
Total	**344**	**333**	**338**	**343**	**349**	**360**

Baseline Regional **Greenhouse Gas Emissions** (Thousand Metric Tonnes CO2e)						
Sector	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Transportation	356	308	281	262	244	216
Residential	138	125	112	105	102	100
Commercial	77	51	48	45	44	43
Industrial	27	28	28	27	28	28
Electricity	28	29	22	19	28	51
Total	626	540	491	458	446	437

CAP Mitigation Regional **Greenhouse Gas Emissions** (Thousand Metric Tonnes CO2e)						
Sector	**2015**	**2025**	**2030**	**2035**	**2040**	**2050**
Transportation	356	292	224	148	88	37
Residential	138	102	60	30	10	7
Commercial	77	43	28	17	9	9
Industrial	27	22	17	12	6	7
Electricity	28	31	39	48	34	10
Total	626	490	368	255	147	70

5. Approach to Regional and Municipal Existing Energy Generation

- See Utilities, Facilities, and Services Element For Summary Tables by Town for Generation and Storage and full Existing Generation Workbook which will be updated annually (as data allows) on the CVRPC website.

Significant effort was made to aggregate the most comprehensive list of existing renewable energy generation sites possible for the region. The Department of Public Service periodically provides an updated Distributed Generation Inventory which includes projects from a database the reports sites and capacity from Certificates of Public Good submitted to the Public Utility Commission. CVRPC worked with both the Department of Public Service and Distribution Utilities (DUs) to conduct significant data cleaning of DU source data to address significant challenges in previous iterations including spelling errors, differences in notation and space, village and non-town names, incorrect zip codes, etc.. While these may sound like minor inconveniences, it was impossible to attribute over 300 projects to either Barre City or Barre Town due to such issues which have now been resolved. The data however is still incomplete for smaller DUs.

CVRPC used the corrected 2024 DG Inventory from PSD as the base for existing generation totals and added a column for municipality and aggregated projects by town, removing inactive projects, and splitting existing and proposed plants. Projects were split two ways, first into town tabs then by generation and storage, resource type, size, and sorted by DU; secondly all CVRPC projects were split by Generation and Storage, Size, Resource Type, and sorted for Town and DU. Distribution Utility Integrated Resource Plans were then skimmed for missing assets of all types. Furthermore, for hydroelectric facilities, Federal Energy Regulatory Commission records and Low Impact Hydropower Institute records were compared, as were town plans and the State Comprehensive Energy Plan to identify additional plants. Projects were then split into Category I-III by size, and totals could be calculated including regional and municipal totals of generation by technology type and size, number of generation projects by technology type and size, municipal shares of regional totals, storage capacity by town and size, etc.. Estimated annual MWh output per installed MW nameplate capacity were calculated using constants provided in the table below which are consistent with those used by the Public Service Department and in the Generation Scenarios Tool. Actual annual output was used for hydroelectric facilities, given seasonal variability and flood mitigation and other impacts to performance, taken directly from DU IRPs, FERC, and LIHI records. These and other additional sites from mapping datasets and town plans were added to the 2024 DG Inventory Base with subsequent DG Inventory additions added as well (2025 was the last). CVRPC also publishes monthly small scale DER totals by Town that have applied for Certificates of Public Good via the Project Review Committee Memos. Ongoing efforts to integrate all these datasets continue in parallel with working with utility partners. Note storage data is currently only provided by GMP and not mapped.

As the Department of Public Service embarks on a data initiative, CVRPC is dedicated to supporting their efforts to address outstanding data integrity issues and improve the reliability and availability of a single consistent data source for existing generation. Unfortunately, though hope was long held out, the Energy Action Dashboard was officially updated leaving aside the difficult task of updating and hosting the much-beloved and crowd-sourced Energy Atlas that is unfortunately 7+ years out of date. The Energy Action Network data (2019 and before), DG Export (2024 and subsequent) and GMP DER dataset are compared to ensure relative agreement; for non-GMP utilities there are no other resources to compare to for 2020 on.

Mapping Existing Generation: the table below includes a summary of data sets used to map existing generation

Table A22 Existing Generation Mapping Resources

Generation Type	Core Shapefile source	Notes	Status
Wind	EAN Dashboard 2019	Last data update 2019 but no projects known of to update. Checked against outdated list provided by Public Service Department.	Up to date with all DG inventories
Hydro	EAN Dashboard 2019	Last data update 2019 but no known changes to update. Checked again outdated list provided by Public Service Department.	
Community Scale Biomass (Woodheat)	EAN Dashboard 2019	Last data update 2019- likely changes- checked against outdated list provided by Public Service Department.	Updates in progress for 2027 plan.
Solar	EAN Dashboard 2019		Updated for GMP territory with Distributed Resources Online Mapping Data (2020 on) Updated for other Territories with PSD 7/25 Export (2020 on)
Storage (GMP only)	GMP DER		DG Inventories updated through 7/25

6. Mapping & Siting Analyses

This section provides additional detail, definitions, and resources to the following sections in the Energy Element (pages 125-145) and is not intended as a standalone narrative:

- Siting: Known & Possible Constraints, Preferred Site Types & Project Characteristics (pages 125-130)
- Local Siting and Regional Policy (pages 130-137)
- Technology Type and Scale (pages 137-139)
- New Regional Renewable Energy Generation Potential & Targets (pages 140-145)

The mapping analyses integrates CVRPC regional constraints with the state's known and possible constraints data, renewable wind and solar energy potential analyses, and rooftop solar analyses (associated with the 2022 Vermont's Comprehensive Energy Plan). Resulting resource potential areas, in addition to constraints and preferred sites, are considered in project review, and summary statistics also serve as inputs into creating the incremental renewable energy targets.

The mapping analyses underpinning this plan start with statewide layers (accessible on the following platforms), to which they customize for the region, and working with municipalities, customize further for municipal plans (and integration into the next regional planning cycle):

- VCGI: https://vcgi.vermont.gov/data-release/act-174-statewide-energy-planning-data-updated-known-and-possible-constraints
    - Prime and Base Resource Potential Layers take into account both state known and possible constraints as well as technical considerations dependent on technology type.
    - CVRPC divides this by town boundaries, addresses redundances between rooftop solar and building footprints broadly and the ground mount potential layer by removed the former from the latter; then additional considerations including regional possible constraints are integrated.
- The Act 174 tab of the Vermont Planning Atlas maintained by the Agency of Commerce and Community Development: https://maps.vermont.gov/ACCD/Html5Viewer/index.html?viewer=PlanningAtlas&_gl=1*3umr0*_ga*MTQ1NDExNjgzMy4xNzI1OTAyMjg4*_ga_V9WQH77KLW*MTczODE4MjA4Ni44MC4wLjE3MzgxODIxMzkuMC4wLjA.
- A very short summary of the technical considerations included in these raw resource potential areas (wind and solar) can be found on pages 28-29 of the Act 174 Guidance Document. https://publicservice.vermont.gov/sites/dps/files/documents/2024%20Guidance%20for%20Regional%20%26%20Municipal%20Enhanced%20Energy%20Planning%20Standards_0.pdf

Known and Possible Constraint Definitions and Descriptions

The following is a list of the state known and possible constraints, and the regional possible constraints that were used (see VCGI Act 174 data release above for original state layers). A definition of the constraint including source of

the data is provided, these stemmed from a coordinated effort by the Department of Public Service, VCGI, and ANR to aggregate these layers which are now available via the Act 174 tab of the DHCD Planning Atlas with support from the RPCs. CVRPC continues to advocate for regular updates to these layers as well as the integration of regional and local map products into the statewide ArcMap Viewer.

State Constraint Data

"The known constraints composite layer suggests where constraints are likely, though not absolute, and thus are unsuited for development based on statewide or local regulations or designated critical resources." (VCGI Act 174 Data Release)

"The possible constraints composite layer suggests where conditions would likely require mitigation, and thus which may prove a site unsuitable for development after site-specific study, based on statewide or regional/local policies that are currently adopted or in effect." (VCGI Act 174 Data Release)

Vernal Pools (confirmed and unconfirmed layers) –
Source: Vermont Fish and Wildlife, 2009 - present
Vernal pools are temporary pools of water that provide habitat for distinctive plants and animals. Data was collected remotely using color infrared aerial photo interpretation. "Potential" vernal pools were mapped and available for the purpose of confirming whether vernal pool habitat was present through site visits. This layer represents both those sites which have not yet been field-visited or verified as vernal pools, and those that have.

- Confirmed vernal pools are included as a **known constraint**;
- potential and probably vernal pools are included as **possible constraints.**

Department of Environmental Conservation (DEC) River Corridors –
Source: DEC Watershed Management District Rivers Program, January 2015, last updated 2023 **Known Constraint**
River corridors are delineated to provide for the least erosive meandering and floodplain geometry toward which a river will evolve over time. River corridor maps guide State actions to protect, restore and maintain naturally stable meanders and riparian areas to minimize erosion hazards. Land within and immediately abutting a river corridor may be at higher risk to fluvial erosion during floods.
River corridors encompass an area around and adjacent to the present channel where fluvial erosion, channel evolution and down-valley meander migration are most likely to occur. River corridor widths are calculated to represent the narrowest band of valley bottom and riparian land necessary to accommodate the least erosive channel and floodplain geometry that would be created and maintained naturally within a given valley setting.

Federal Emergency Management Agency (FEMA) Floodways – **Known Constraint**
Source: FEMA Floodway included in Zones AE – FEMA Map Service Center
These are areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. A "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

State-significant Natural Communities and Rare, Threatened, and Endangered Species- **Known Constraint**
Source: Vermont Fish and Wildlife, National Heritage Inventory
The Vermont Fish and Wildlife Department's Natural Heritage Inventory (NHI) maintains a database of rare, threatened and endangered species and natural (plant) communities in Vermont. The Element Occurrence (EO) records that form the core of the Natural Heritage Inventory database include information on the location, status, characteristics, numbers, condition, and distribution of elements of biological diversity using established Natural Heritage Methodology developed by NatureServe and The Nature Conservancy.
An Element Occurrence (EO) is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential (or historical) presence and/or regular recurrence at a given location. For species Elements, the EO often corresponds with the local population, but when appropriate may be a portion of a population or a group of nearby populations (e.g., metapopulation).

National Wilderness Areas – **Known Constraint**
Source: United States Department of Agriculture Forest Service
A parcel of Forest Service land congressionally designated as wilderness.

Class 1 and Class 2 Wetlands – **Known Constraint**

Source: Vermont Significant Wetland Inventory (VSWI) and advisory layers
The State of Vermont protects wetlands which provide significant functions and values and also protects a buffer zone directly adjacent to significant wetlands. Wetlands in Vermont are classified as Class I, II, or III based on the significance of the functions and values they provide. Class I and Class II wetlands provide significant functions and values and are protected by the Vermont Wetland Rules. Any activity within a Class I or II wetland or buffer zone which is not exempt or considered an "allowed use" under the Vermont Wetland Rules requires a permit.
Class I wetlands have been determined to be, based on their functions and values, exceptional or irreplaceable in its contribution to Vermont's natural heritage and, therefore, merits the highest level of protection. All wetlands contiguous to wetlands shown on the VSWI maps are presumed to be Class

II wetlands, unless identified as Class I or III wetlands, or unless determined otherwise by the Secretary or Panel pursuant to Section 8 of the Vermont Wetland Rules.

(Prime) Agricultural Soils – **Possible Constraint**
Source: Natural Resources Conservation Service (NRCS)
"Primary agricultural soils" are defined as "soil map units with the best combination of physical and chemical characteristics that have a potential for growing food, feed, and forage crops, have sufficient moisture and drainage, plant nutrients or responsiveness to fertilizers, few limitations for cultivation or limitations which may be easily overcome, and an average slope that does not exceed 15 percent. Present uses may be cropland, pasture, regenerating forests, forestland, or other agricultural or silvicultural uses.
The soils must be of a size and location, relative to adjoining land uses, so that those soils will be capable, following removal of any identified limitations, of supporting or contributing to an economic or commercial agricultural operation. Unless contradicted by the qualifications stated above, primary agricultural soils include important farmland soils map units with a rating of prime, statewide, or local importance as defined by the Natural Resources Conservation Service of the United States Department of Agriculture.

FEMA Special Flood Hazard Areas - **Possible Constraint**
The land area covered by the floodwaters of the base flood is the Special Flood Hazard Area (SFHA) on National Flood Insurance Program (NFIP) maps. The SFHA is the area where the NFIP's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

Protected Lands – **Possible Constraint**
State fee land and private conservation lands are considered protected lands. Other state level, non-profit and regional entities also contribute to this dataset. The Vermont Protected Lands Database is based on an updated version of the original Protected Lands Coding Scheme reflecting decisions made by the Protected Lands Database Work Group to plan for a sustainable update process for this important geospatial data layer.

Act 250 Agricultural Soil Mitigation Parcels – **Possible Constraint**
Source: Vermont Department of Agriculture
All projects reducing the potential of primary agricultural soils on a project tract are required to provide "suitable mitigation," either "onsite or offsite," which is dependent on the location of the project. This constraint layer includes all parcels in the Act 250 Agricultural Soil Mitigation Program.

Deer Wintering Areas (DWA) – **Possible Constraint**
Source: Vermont Department of Fish and Wildlife

Deer winter habitat is critical to the long-term survival of white-tailed deer (Odocoileus virginianus) in Vermont. Being near the northern extreme of the white-tailed deer's range, functional winter habitats are essential to maintain stable populations of deer in many years when and where yarding conditions occur. Consequently, deer wintering areas are considered under Act 250 and other local, state, and federal regulations that require the protection of important wildlife habitats. DWAs are generally characterized by rather dense softwood (conifer) cover, such as hemlock, balsam fir, red spruce, or white pine. Occasionally DWAs are found in mixed forest with a strong softwood component or even on found west facing hardwood slopes in conjunction with softwood cover. The DWA were mapped on mylar overlays on topographic maps and based on small scale aerial photos.

Vermont Conservation Design include the following Highest Priority Forest Blocks: Connectivity, Interior, and Physical Landscape Diversity – **Possible Constraints**
Source: Vermont Department of Fish and Wildlife
The lands and waters identified in this constraint are the areas of the state that are of highest priority for maintaining ecological integrity. Together, these lands comprise a connected landscape of large and intact forested habitat, healthy aquatic and riparian systems, and a full range of physical features (bedrock, soils, elevation, slope, and aspect) on which plant and animal natural communities depend.

Hydric Soils – **Possible Constraint**
Source: Natural Resources Conservation Service
A hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. This constraint layer includes soils that have hydric named components in the map unit.

Regional Constraints

Elevations About 2500ft – and Slopes Greater than 25% –
Both high elevation areas and steep slopes are described on page 42 in the Natural Resources and Working Lands Element in the Resource Protection section. Derived simply from USGS contours over 2500ft and a slope analysis using a 10-meter Digital Elevation Model, these constraints are consistent with existing statewide definitions and thresholds. Slopes between 15-25% grade are typically considered "steep" and elevations above 2,500 feet are regulated at the State level (though some communities, including in our region, have lower thresholds). Furthermore, elevations over 2,500 feet as shown on USGS topographic maps are included in the definition of Critical Resource Areas (page 42), as scarce and sensitive ecological areas. Both high elevation and steep areas also have soils

that tend to be more sensitive to erosion and soil disturbance tends to have greater impacts on water quality.
Note, existing rooftops and development within these areas with mitigation to minimize any additional impact could be reasonable exceptions.

250ft Lake Shore Protection Buffers – excluding rooftops and existing hydroelectric facilities. For this constraint, CVRPC selected Vermont Hydrologic Dataset lakes and ponds greater than 10 acres and then buffered those by 250 feet and used the Town of Calais Land Use Regulations for shore lands in Calais.

Next Steps in Mapping: Preferred Sites and Local Identified Resources

Collaborative planning is already well underway to map preferred sites (state, regional, and local) as well as principally work with municipalities to ensure existing and updated town plan language regarding unsuitable and preferred sites as well as local constraints have corresponding map layers for integration into local and regional plans. 2027/2028 Regional Plan update will include the first round of these efforts.

CVRPC is in the process of developing a tool for municipalities to use during their own Enhanced Energy Planning processes to determine the potential impact of adding additional constraints or better yet, preferred sites to the maps. CVRPC is furthermore, committed to integrating mapping tools into the project review process and the project development process to support quick evaluations for discussions including highlighting areas with different numbers of possible constraints, working to identify preferred sites, mapping existing preferred site types and project characteristics, etc.

CVRPC has developed an internal resource overtime to ensure local municipal plan preferences, policies, and locally identified resources (as constraints or preferred sites) are easily referenced during project review, the provision of technical assistance, neighboring plan review, etc. A dynamic version with live links to municipal plans will be added to the CVRPC website and updated as municipalities continue to update their own plans, pursue determinations of energy compliance, collaborate with CVRPC on energy siting, etc. Many of the existing plans do not necessarily identify or map local constraints or preferences with enough specificity to integrate into regional and state mapping resources, CVRPC is working with municipalities to review and address this to ensure there are authoritative and clear resources to support project review (local and 248) and development in line with our communities.

Resource Potential Areas

Table A23 Resource Potential Areas (Acres) by Town and Technology

	RPC Base Solar (Acres)	**RPC Prime Solar** (Acres)	**RPC Base Wind (Acres)**	**RPC Prime Wind** (Acres)	Rooftop Solar (Acres)	Potential Hydro (kW)
Barre City	239	**156**	320	**133**	**26**	**72**
Barre Town	3054	**787**	8683	**4084**	**34**	**176**
Berlin	2196	**432**	2664	**450**	**23**	**32**
Cabot	3466	**350**	16474	**1977**	**7**	**4**
Calais	2815	**462**	612	**18**	**5**	**47**
Duxbury	846	**189**	2808	**72**	**4**	**0**
East Montpelier	5020	**1001**	30	**0**	**13**	**238**
Fayston	748	**229**	1307	**1227**	**5**	**0**
Marshfield	3461	**620**	5713	**196**	**6**	**16**
Middlesex	2953	**678**	419	**46**	**7**	**0**
Montpelier	753	**310**	0	**0**	**24**	**833**
Moretown	1738	**98**	4042	**66**	**5**	**3**
Northfield	2296	**614**	5043	**1194**	**15**	**19**
Orange	2501	**232**	12571	**754**	**4**	**89**
Plainfield	1397	**334**	5996	**1052**	**5**	**125**
Roxbury	1263	**677**	4758	**5395**	**3**	**0**
Waitsfield	1533	**99**	1384	**178**	**8**	**0**
Warren	1402	**379**	3895	**2029**	**9**	**80**
Washington	2030	**428**	17812	**5841**	**4**	**17**
Waterbury	2669	**663**	774	**26**	**19**	**76**
Williamstown	2694	**1250**	12709	**9750**	**13**	**7**
Woodbury	2880	**183**	8037	**205**	**3**	**21**
Worcester	1792	**331**	842	**10**	**2**	**54**
Regional Total	49,744	**10,503**	**116,892**	**34,705**	**244**	**1909kW**
Notes	Mapping Analyses Output	Mapping Analyses Output Input to Generation Scenarios Tool	Mapping Analyses Output	Mapping Analyses Output Input to Generation Scenarios Tool	1/3 of Mapping Analyses Output Input to Generation Scenarios Tool	Summarized from statewide inventory on undeveloped hydroelectric sites Input to Generation Scenarios Tool

Table A24 Output Resources Available (MW) from Land Available (Acres)

	Resource Available (MW) (Prime)					Land Available (Prime Acres)			
	Total Available	Ground Mount Solar	Rooftop Solar	Wind	Hydro	Total Available	Ground Mount Solar	Rooftop Solar	Wind
Barre City	42.7	22.3	17	3.3	0.072	289	156.1	25.5	133.3
Barre Town	237.3	112.4	22.5	102.1	0.176	4,871	787.1	33.8	4084.4
Berlin	88.6	61.7	15.6	11.3	0.032	882	432	23.3	450.4
Cabot	104.2	49.9	4.8	49.4	0.004	2,327	349.5	7.3	1977.3
Calais	69.9	66	3.4	0.5	0.022	480	462.2	5.2	18.2
Duxbury	31.5	27	2.7	1.8	0	261	188.7	4.1	72.3
East Montpelier	152.2	143	9	0	0.238	1,001	1001.1	13.5	0
Fayston	66.6	32.7	3.2	30.7	0	1,456	229	4.8	1226.8
Marshfield	97.3	88.5	3.8	4.9	0.016	816	619.8	5.7	196.3
Middlesex	102.5	96.8	4.5	1.2	0	724	677.8	6.7	46.4
Montpelier	61.5	44.3	16.3	0	0.917	310	310.1	24.4	
Moretown	19.1	14	3.4	1.6	0.003	164	98.2	5.2	65.8
Northfield	127.7	87.8	10.1	29.8	0.007	1,808	614.3	15.1	1193.8
Orange	54.6	33.1	2.6	18.8	0.089	986	231.6	3.8	753.9
Plainfield	77.3	47.8	3.1	26.3	0.125	1,386	334.3	4.7	1052.1
Roxbury	233.4	96.7	1.8	134.9	0	6,072	677.1	2.7	5395
Waitsfield	24.1	14.2	5.4	4.5	0	278	99.3	8.1	178.4
Warren	111.1	54.1	6.2	50.7	0	2,408	378.9	9.3	2028.8
Washington	210.1	61.2	2.9	146	0.017	6,269	428.1	4.4	5841.1
Waterbury	107.9	94.8	12.4	0.7	0.076	690	663.5	18.6	26.1
Williamstown	430.9	178.6	8.6	243.8	0.007	11,000	1250	12.8	9750.4
Woodbury	33	26.2	1.7	5.1	0.021	388	183.3	2.5	204.8
Worcester	49.2	47.3	1.6	0.2	0.054	341	331.1	2.4	9.8
Regional Total	**2532.7**	**1500.4**	**162.7**	**867.6**	**1.9**	**45,452**	**10,503**	**244**	**34,705**

Ground-Mounted Solar Energy Potential

The state's underlying solar potential layer is based on a 2010 Renewable Energy Atlas of Vermont solar dataset which incorporated statewide solar radiation estimates with topographic data to account for latitude, day length, atmospheric conditions, elevation, slope, and aspect (and thus potential shading). This base layer was further processed to account for the state and known possible constraints described above. CVRPC uses this resulting Ground Mount Resource Potential layer and further accounts for regional constraints, building footprints, and town boundaries. The state data set provides annual solar irradiance values that could be used directly to calculate ground mount solar potential, however CVRPC summaries the base and prime acres by town because prime acres serve

as the input to the Generation Scenarios Tool which then uses the constants established by the Public Service Department for statewide energy planning to convert into resources available (MW) (7acres/MW and a capacity factor of 15% for ground mount solar) and from there establish a generation target (see below). Future improvements to CVRPC's approach could account for fragmentation of base and prime layers and proximity to known and regional constraints, as well as proximity to demand and infrastructure.

Calculating Rooftop Solar Energy Potential

Rooftop solar potential data is sourced from the Vermont Center for Geographic Information (VCGI) dataset named Town Rooftop Solar Potential – Act 174 2022. As explained in the release notes, these estimates use a geographic information system (GIS) model of building footprints to determine the total surface area of rooftops suitable for solar photovoltaic panels (accounting for amount of solar radiation, slope, aspect, shading of nearby objects, and minimum size of rooftop viable for solar panels). Using published data for solar radiation, the VCGI data also estimates an annual solar energy production potential for each suitable rooftop, summarized by municipality, applying a capacity factor of 14.5% as published by the U.S. Environmental Protection Agency.
Act 174 Statewide Energy Planning Data Updated: Known and Possible Constraints, Renewable Energy Potential | Vermont Center for Geographic Information.

In order to be internally consistent to the constants used by the Department of Public Service in the Generation Scenarios Tool (which takes map outputs in acres for potential resource areas), CVRPC calculated the sum of suitable rooftops in acres and then used the constants provided by DPS including 1.5 acres per MW, and a capacity factor of 14.5% (*8760 hours per year= 1270) calculate the rooftop solar potential in MW by Town and the regional total provided. This enabled the use of acres as the input available across all resource potential area types (solar, wind, and rooftop) from the VCGI Act 174 Statewide Energy Planning Data Update (see above). Note that CVRPC used 1/3 of available rooftop acres as the input to provide a conservative estimate as roof type and condition had not been yet integrated into these analyses at the state level. Regionally, approximately 12% of units are seasonal, 30% are built before 1940 (used in the Municipal Consumption Tool from PSD as a threshold to indicate

likely using more thermal energy than average; here used as a conservative indicator of historic preservation, roof condition, or other potential challenges re rooftop solar); over 50% built before 1980 see Housing Element, and the 2025 Housing Needs Assessment found that 14% of Central Vermont Housing has significant issues in 2022 (see Housing Element page 241). In addition to this cursory and conservative look at housing stock and condition, there are also challenges and costs with interconnection for some properties/distribution areas to be considered and the lack of three-phase penetration throughout many of our communities (see Energy Element). This approach yielded results that came out to approximately 70% of the Electric Production (MWh) if summed from the roof top potential dataset directly (see table below) and thus a less conservative estimate than appears.

Table A25 Housing Units Built Pre-1940 By Town

Municipality	Housing Units Built Pre-1940	Total Housing Units	% Units pre-1940
Barre City	2012	4,335	46%
Barre Town	634	3,630	17%
Berlin	168	1,274	13%
Cabot	232	718	32%
Calais	264	833	32%
Duxbury	624	716	87%
East Montpelier	214	1,250	17%
Fayston	81	1,050	8%
Marsfhfield	302	805	38%
Middlesex	106	785	14%
Montpelier	1487	3,921	38%
Moretown	119	656	18%
Northfield	959	2,418	40%
Orange	76	455	17%
Plainfield	278	612	45%
Roxbury	141	445	32%
Waitsfield	178	1,090	16%
Warren	214	2,481	9%
Washington	62	619	10%
Waterbury	686	2,656	26%
Williamstown	247	1,418	17%
Woodbury	213	700	30%
Worcester	111	488	23%

Regional Total	**9408**	**33,355**	**28%**

Source: Based on 2024 ACS 5- year Table DP04 also used in the Municipal Consumption Tool Current Heat Tabs

Table A26 Roof Top Solar Values by Town Comparison

Municipality	CVRPC Approach: Map Outputs as Generation Scenarios Tool Inputs		CVRPC Approach: Generation Scenarios Tool Outputs		Comparison
Municipality	SUM Roof to Acres	One Third Acres	Resource Available (MW)	Resource Available (MWh)	VCGI Totals (Electric Prod MWh)
Barre City	77	25.5425	17.0	32438.978	45298
Barre Town	101	33.81014	22.5	42938.88	60444
Berlin	70	23.32515	15.6	29622.937	41888
Cabot	22	7.268017	4.8	9230.3816	13147
Calais	15	5.161117	3.4	6554.6191	9023
Duxbury	12	4.103261	2.7	5211.1413	7124
East Montpelier	40	13.48164	9.0	17121.679	23982
Fayston	15	4.844164	3.2	6152.0883	8421
Marshfield	17	5.684898	3.8	7219.82	10082
Middlesex	20	6.725622	4.5	8541.5393	11775
Montpelier	73	24.41669	16.3	31009.199	42844
Moretown	15	5.163588	3.4	6557.7573	8870
Northfield	45	15.13049	10.1	19215.718	26457
Orange	12	3.849814	2.6	4889.2632	6884
Plainfield	14	4.650269	3.1	5905.8416	8203
Roxbury	8	2.747066	1.8	3488.7742	4785
Waitsfield	24	8.127613	5.4	10322.068	14056
Warren	28	9.332003	6.2	11851.643	16386
Washington	13	4.408353	2.9	5598.6086	7889
Waterbury	56	18.55306	12.4	23562.38	32323
Williamstown	38	12.8292	8.6	16293.081	22838
Woodbury	8	2.515035	1.7	3194.0941	4352
Worcester	7	2.43382	1.6	3090.9508	4251

Calculating Wind Energy Potential

The statewide wind potential layer is also based on a 2010 Renewable Energy Atlas of Vermont dataset which stems from three combined wind resource layers combing potential wind areas for 3 scales of project: residential, small and large commercial (30m, 50m, and 70m hub heights respectively). These took into considerations wind speed at different hub heights, distance to existing transmission lines and roads, and more. This base layer was further processed to account for the state and known possible constraints described above (Act 174 2022). CVRPC uses this resulting Wind Resources Potential layer and further

accounted for regional constraints, building footprints, and town boundaries. Prime acres were then used as an input for the Generation Scenarios Tool to yield Resources Available in MW using the constants established by the Public Service Department for statewide energy planning (40 acres/MW and a capacity factor of 22.5% for smaller scale wind vs. the constants for large wind due to regional policies which would have been 10 acres/MW and a capacity factor of 30%).

Notably Montpelier had no prime wind resources available and East Montpelier essentially none.

Hydroelectric Potential

The state of Vermont has conducted various students on feasible hydroelectric sites and projects including both dams and damless diversions:

- The Undeveloped Hydroelectric Potential of Vermont Report 2007 by Lori Barg Community Hydro Public Service Department
- The Development of Small Hydroelectric Projects in Vermont 2008 Report to the Vermont General Assembly by Agency of Natural Resources

CVRPC used these datasets to identify sites and their potential (kW) in the region- these reports used existing datasets established by the New England River Basins Commission in collaboration with the U.S. Army Corps of Engineers (1980). These potential kW by Town were used as inputs to the Generation Scenarios Tool (capacity factor of 50%).

Notably Duxbury, Fayston, Middlesex, Roxbury, Waitsfield, and Warren had no sites in these potential datasets. Due to the age of the datasets, advances in hydro technologies, and lack of further exploration, it is possible new opportunities may be identified in these locations should community or other interest arise.

Capacity Factor is the ratio of actual electrical energy output over a given period of time to the theoretical maximum over that same period (the theoretical maximum energy output of a given installation being continuous operation at full nameplate capacity over the relevant time period).

Table A27 Renewable Energy Generation Technology Type Constants & Capacity Factors

Resource	Constants Acres/MW	Capacity Factor	Annual MWh output per installed MW
Ground Mount Solar	7	15%	1,314
Rooftop Solar	1.5	14.5%	1,270
Wind	40	22.5%	1,971
Utility Scale Wind	10	30%	2,628
Hydroelectric	1	50%	4,380

Natural Gas	0.343	75%	6,570
Biomass	6.375	70%	6,132

Source: Central Vermont Regional Planning Commission & Department of Public Service (Generations Scenarios Tool)

The Public Service Department's constants for acres/MW for the technology types were used for consistency. These constants may over estimate the acres needed for ground solar given the availability of higher watt panels althought set backs remain relatively conservative. Recommendations to amend these using Vermont specific data have been made and well-received. For ground mount this typically includes the array footprints plus the temporary staging area, buffer for shade management, etc.

Generation Scenarios: Incremental New Renewable Energy Generation Targets

Assumptions and Background:

- Generation targets for renewable energy sources were derived from the Generation Scenarios Tool and based on an assumption of 25% in-state generation
- We confirm that we have more than enough resource potential to meet these targets- this is estimated in, and converted to MW from, resource potential areas in acres which are updated in the Generation Scenarios Tool based on the most recent CVRPC mapping exercise.
- The mapping analyses integrates CVRPC regional constraints with the state's known and possible constraints data, renewable wind and solar energy potential analyses, and rooftop solar analyses.
- Uses constants, capacity factors, grid headroom & upgrade costs values from the Generation Scenarios Tools (Public Service Department) which in some cases are less up to date than other CVRPC analyses including references to the 2021 Long Range Tranmission Plan (instead of the 2024 update), and other 2021 data inputs (although population and some such inputs have not significantly changed so as to impact the results)- regardless these are coarse guide posts and will be updated with the current Comprehensive Energy Plan update (2027/8).
- CVRPC did not use the Public Service Department default values for existing generation which were based on a 2023 Distributed Generation Survey which misattributed generation across towns including significant amounts in Barre Town to Barre City. Corrected updates were included the 2024 DG Survey. Furthermore, it does not appear that the Public Service Department removed storage from the totals by town nor accounted for much of the existing hydroelectric in our regions (gathered separately from Distribution Utility Integrated Resource Plans and Low Impact Hydro Certification Program).

- Lastly, CVRPC and other RPCs have encouraged the Public Service Department to allow for storage and community-scale decarbonization strategies (like thermal energy networks) to be added to reduce the amount of new renewable energy generation we need to address projected demand as load and peak growth reduction alternatives.

Different technology types (and project scales) have different land use and grid impacts as well as different capacity factors; municipal customization (see below) may slightly shift these values over time. Furthermore, since the last plan CVRPC has both adjusted the incremental renewable target in line with state policy (25% local production from the previous plan which was ambitiously set to 50% and significantly exceeded transmission and exceed distribution capacity) and the distribution across technology types. While there is a regional preference to minimize land use impacts of ground-mount solar (and electric infrastructure in general), the general building condition and age across our region limits the feasibility of wide-spread roof-top solar without significant cost directly to residents (especially impacting the accessibility of renewables to low-income residents and residents with deferred home/building maintenance and/or limited-income). Additionally, roof-top and small-scale projects are less cost effective and can hasten costly grid infrastructure investment. Shifting to 50% ground-mount and 25% roof-top in this plan resulted in a small (1MW) overall reduction in the target from the alternative scenario considered with the inverse.

Calculating Renewable Energy Generation Targets

Generations Scenarios Tool

The incremental renewable energy target is how much additional renewable energy generation is needed to meet our regional share of 25% of the State's energy use produced in-state.

Table A28 Incremental Renewable Energy Generation Target

Incremental Renewable Energy Generation Target			
	2025	2035	2050
Updated Targets	26,957MWh (18.8MW)	97,196 MWh (67.7 MW)	163,094 MWh (113.6MW)

Generations Scenario Tool was set to meeting the Region's incremental regional energy target via 50% Ground Mount Solar, 25% Rooftop Solar, 20% Wind, and 5% Hydro. Natural Gas is set to 0% as there is no natural gas infrastructure in the region nor would expansion into the region be consistent with current or future orderly development in the region (although Vermont's primary supplier, VGS (Vermont Gas Systems) workforce development in geothermal (GSHP) and other technologies would be welcome). Furthermore, Biomass (for electricity generation) was set to 0% as after the Moretown Landfill closed it seems there is little appetite for a project in the region. Note that landfills are included as

preferred sites though, and this could change in future analyses if a project is developed. Distribution by technology type is discussed in more detail in Table 18 of the Energy Element. The table below identifies regional targets for new renewable electric energy generation; in addition to the target for 2050, the table includes intermediate years to help track progress towards that goal.

Municipal Disaggregation:
The regional incremental renewable energy generation target is disaggregated by the Generation Scenarios Tool based on the following multipliers: Existing Demand (Electricity Use) 50%, Population (demand) 20%, Land Area 20%, and Existing Generation 10%.

Some municipal enhanced energy plans may select a higher target, at least one in progress does so, custom targets that exceed the default will be integrated into the Generation Scenarios Tool once the municipal plan has been duly adopted, regionally approved, and receive an affirmative determination of energy compliance. To this end an updated Generation Scenarios Tool will be available on the CVRPC website which will include tracking updates since this plan.

Table A29 Municipal Incremental New Renewable Energy Generation (MWh and MW)

Municipality	Incremental Targets by Year (MWh)			Incremental Capacity Target (MW)		
	2025	2035	2050	2025	2035	2050
Barre City	3561	12838	21542	2.5	8.9	14.9
Barre Town	1861	6709	11259	1.3	4.6	7.8
Berlin	1559	5620	9431	1.1	3.9	6.5
Cabot	1303	4697	7886	0.9	3.3	5.5
Calais	388	1397	2345	0.3	1.0	1.6
Duxbury	949	3420	5747	0.6	2.3	3.9
East Montpelier	798	2879	4832	0.6	2.0	3.3
Fayston	536	1931	3241	0.4	1.3	2.2
Marshfield	400	1441	2418	0.3	1.0	1.7
Middlesex	518	1869	3137	0.4	1.3	2.1
Montpelier	2837	10228	17165	2.0	7.1	11.9
Moretown	702	2530	4249	0.5	1.8	2.9
Northfield	1676	6041	10138	1.2	4.2	7.0
Orange	351	1264	2122	0.2	0.9	1.5
Plainfield	461	1662	2789	0.3	1.2	1.9
Roxbury	896	3232	5423	0.6	2.2	3.7
Waitsfield	704	2540	4263	0.5	1.7	2.9
Warren	1363	4915	8248	0.9	3.3	5.6
Washington	960	3461	5807	0.7	2.4	4.0

Waterbury	2437	8786	14748	1.7	6.1	10.2
Williamstown	2254	8127	13640	1.6	5.6	9.5
Woodbury	218	785	1318	0.2	0.5	0.9
Worcester	228	823	1346	0.2	0.6	0.9
Regional Total	**26957**	**97196**	**163094**	**18.6**	**67.1**	**112.6**

Municipal Customization:

Technology distribution of the incremental renewable energy target is customizable by towns. Scenarios are run for municipalities and individual preferences are input and checked to flag any issues regarding infrastructure capacity and/or with meeting the overall regional target. This ensures compatibility between the municipal and regional plans and ensures the next regional plan update is informed directly via ground-up, locally-specific considerations (the same goes for other targets).

More nuanced work is needed to balance conflicting priorities regarding cost (and to whom), land use impacts, historic and aesthetic considerations, technical conditions, and constraints presented by our existing infrastructure gaps. Ongoing energy planning at the municipal level will help us develop a clearer sense of where preferences and potential resource areas align, as well as the potential land use impacts of different scenarios. CVRPC is working with municipalities undertaking enhanced energy planning to identify preferred sites to the parcel level and ensure potential additional constraints are represented by a mapping layer so that both can be integrated into the regional plan. As municipalities customize their own targets, a future update of this plan may shift regional distributions to reflect community planning.

NOTE: while energy targets are provided in MWh, capacity targets are provided in MW- default outputs are provided here for consistency and comparison across the region. Values in light red exceed resources available although hydroelectric potentials are not yet well integrated into state planning tools and merit further consideration. Values in bold yellow exceed distribution headroom capacity. As Municipalities customize their own distribution across technology types CVRPC will advise them to minimize these instances although several may be addressed with current substation and line upgrades (e.g. Jackson Corners). Note Distribution Headroom Capacity is not provided for Northfield, Roxbury, nor Woodbury- CVRPC will continue to work with Distribution Utilities, VELCO, and the Public Service Department to update distribution and transmission limitations and data.

Tables A29 Municipal Incremental Renewable Capacity Targets (MW)

Municipality	Distribution Headroom (MW)	**2025 Target** Split by Technology Type (MW)					Resource Available (MW) (Prime)				
		Total Capacity Target	Ground Mount Solar	Rooftop Solar	Wind	Hydro	Total Available	Ground Mount Solar	Rooftop Solar	Wind	Hydro
Barre City	53.5	2.5	1.4	0.7	0.4	0.0	42.7	22.3	17.0	3.3	0.072
Barre Town	40.2	1.3	0.7	0.4	0.2	0.0	237.3	112.4	22.5	102.1	0.176
Berlin	41.9	1.1	0.6	0.3	0.2	0.0	88.6	61.7	15.6	11.3	0.032
Cabot	5.0	0.9	0.5	0.3	0.1	0.0	104.2	49.9	4.8	49.4	0.004
Calais	0.5	0.3	0.1	0.1	0.0	0.0	69.9	66.0	3.4	0.5	0.022
Duxbury	18.5	0.6	0.4	0.2	0.1	0.0	31.5	27.0	2.7	1.8	0
East Montpelier	7.8	0.6	0.3	0.2	0.1	0.0	152.2	143.0	9.0	0.0	0.238
Fayston	27.0	0.4	0.2	0.1	0.1	0.0	66.6	32.7	3.2	30.7	0
Marshfield	2.2	0.3	0.2	0.1	0.0	0.0	97.3	88.5	3.8	4.9	0.016
Middlesex	8.6	0.4	0.2	0.1	0.1	0.0	102.5	96.8	4.5	1.2	0
Montpelier	34.2	2.0	1.1	0.6	0.3	0.0	61.5	44.3	16.3	0.0	0.917
Moretown	27.8	0.5	0.3	0.1	0.1	0.0	19.1	14.0	3.4	1.6	0.003
Northfield		1.2	0.6	0.3	0.2	0.0	127.7	87.8	10.1	29.8	0.007
Orange	0.3	0.2	0.1	0.1	0.0	0.0	54.6	33.1	2.6	18.8	0.089
Plainfield	0.9	0.3	0.2	0.1	0.0	0.0	77.3	47.8	3.1	26.3	0.125
Roxbury		0.6	0.3	0.2	0.1	0.0	233.4	96.7	1.8	134.9	0
Waitsfield	6.6	0.5	0.3	0.1	0.1	0.0	24.1	14.2	5.4	4.5	0
Warren	56.4	0.9	0.5	0.3	0.1	0.0	111.1	54.1	6.2	50.7	0
Washington	1.1	0.7	0.4	0.2	0.1	0.0	210.1	61.2	2.9	146.0	0.017
Waterbury	60.6	1.7	0.9	0.5	0.2	0.0	107.9	94.8	12.4	0.7	0.076
Williamstown	4.2	1.6	0.9	0.4	0.2	0.0	430.9	178.6	8.6	243.8	0.007
Woodbury		0.2	0.1	0.0	0.0	0.0	33.0	26.2	1.7	5.1	0.021
Worcester	6.0	0.2	0.1	0.0	0.0	0.0	49.2	47.3	1.6	0.2	0.054
Regional Total	**267.5**	**18.6**	**10.3**	**5.3**	**2.7**	**0.3**	**2532.7**	**1500.4**	**162.7**	**867.6**	**1.9**

Municipality	Distribution Headroom (MW)	**2035 Target** Split by Technology Type (MW)					Resource Available (MW) (Prime)				
		Total Capacity Target	Ground Mount Solar	Rooftop Solar	Wind	Hydro	Total Available	Ground Mount Solar	Rooftop Solar	Wind	Hydro
Barre City	53.5	8.9	4.9	2.5	1.3	0.2	42.7	22.3	17.0	3.3	0.072
Barre Town	40.2	4.6	2.6	1.3	0.7	0.1	237.3	112.4	22.5	102.1	0.176
Berlin	41.9	3.9	2.1	1.1	0.6	0.1	88.6	61.7	15.6	11.3	0.032
Cabot	5.0	3.3	1.8	0.9	0.5	0.1	104.2	49.9	4.8	49.4	0.004
Calais	0.5	1.0	0.5	0.3	0.1	0.0	69.9	66.0	3.4	0.5	0.022
Duxbury	18.5	2.3	1.3	0.7	0.3	0.0	31.5	27.0	2.7	1.8	0
East Montpelier	7.8	2.0	1.1	0.6	0.3	0.0	152.2	143.0	9.0	0.0	0.238
Fayston	27.0	1.3	0.7	0.4	0.2	0.0	66.6	32.7	3.2	30.7	0
Marshfield	2.2	1.0	0.5	0.3	0.1	0.0	97.3	88.5	3.8	4.9	0.016
Middlesex	8.6	1.3	0.7	0.4	0.2	0.0	102.5	96.8	4.5	1.2	0
Montpelier	34.2	7.1	3.9	2.0	1.0	0.1	61.5	44.3	16.3	0.0	0.917

Moretown	27.8	1.8	1.0	0.5	0.3	0.0	19.1	14.0	3.4	1.6	0.003
Northfield		4.2	2.3	1.2	0.6	0.1	127.7	87.8	10.1	29.8	0.007
Orange	0.3	0.9	0.5	0.2	0.1	0.0	54.6	33.1	2.6	18.8	0.089
Plainfield	0.9	1.2	0.6	0.3	0.2	0.0	77.3	47.8	3.1	26.3	0.125
Roxbury		2.2	1.2	0.6	0.3	0.0	233.4	96.7	1.8	134.9	0
Waitsfield	6.6	1.7	1.0	0.5	0.3	0.0	24.1	14.2	5.4	4.5	0
Warren	56.4	3.3	1.9	1.0	0.5	0.0	111.1	54.1	6.2	50.7	0
Washington	1.1	2.4	1.3	0.7	0.4	0.1	210.1	61.2	2.9	146.0	0.017
Waterbury	60.6	6.1	3.3	1.7	0.9	0.1	107.9	94.8	12.4	0.7	0.076
Williamstown	4.2	5.6	3.1	1.6	0.8	0.1	430.9	178.6	8.6	243.8	0.007
Woodbury		0.5	0.3	0.2	0.1	0.0	33.0	26.2	1.7	5.1	0.021
Worcester	6.0	0.6	0.3	0.2	0.1	0.0	49.2	47.3	1.6	0.2	0.054
Regional Total	**267.5**	**67.1**	**37.0**	**19.1**	**9.9**	**1.1**	**2532.7**	**1500.4**	**162.7**	**867.6**	**1.9**

Municipality	Distribution Headroom (MW)	**2050 Target** Split by Technology Type (MW)					Resource Available (MW) (Prime)				
		Total Capacity Target	Ground Mount Solar	Rooftop Solar	Wind	Hydro	Total Available	Ground Mount Solar	Rooftop Solar	Wind	Hydro
Barre City	53.5	14.9	8.2	4.2	2.2	0.3	42.7	22.3	17.0	3.3	0.072
Barre Town	40.2	7.8	4.3	2.2	1.1	0.2	237.3	112.4	22.5	102.1	0.176
Berlin	41.9	6.5	3.6	1.9	1.0	0.1	88.6	61.7	15.6	11.3	0.032
Cabot	5.0	5.5	3.0	1.6	0.8	0.1	104.2	49.9	4.8	49.4	0.004
Calais	0.5	1.6	0.9	0.5	0.2	0.0	69.9	66.0	3.4	0.5	0.022
Duxbury	18.5	3.9	2.2	1.1	0.6	0.0	31.5	27.0	2.7	1.8	0
East Montpelier	7.8	3.3	1.8	1.0	0.5	0.1	152.2	143.0	9.0	0.0	0.238
Fayston	27.0	2.2	1.2	0.6	0.3	0.0	66.6	32.7	3.2	30.7	0
Marshfield	2.2	1.7	0.9	0.5	0.2	0.0	97.3	88.5	3.8	4.9	0.016
Middlesex	8.6	2.1	1.2	0.6	0.3	0.0	102.5	96.8	4.5	1.2	0
Montpelier	34.2	11.9	6.5	3.4	1.7	0.2	61.5	44.3	16.3	0.0	0.917
Moretown	27.8	2.9	1.6	0.8	0.4	0.1	19.1	14.0	3.4	1.6	0.003
Northfield		7.0	3.9	2.0	1.0	0.1	127.7	87.8	10.1	29.8	0.007
Orange	0.3	1.5	0.8	0.4	0.2	0.0	54.6	33.1	2.6	18.8	0.089
Plainfield	0.9	1.9	1.1	0.5	0.3	0.0	77.3	47.8	3.1	26.3	0.125
Roxbury		3.7	2.1	1.1	0.6	0.0	233.4	96.7	1.8	134.9	0
Waitsfield	6.6	2.9	1.6	0.8	0.4	0.0	24.1	14.2	5.4	4.5	0
Warren	56.4	5.6	3.1	1.6	0.8	0.0	111.1	54.1	6.2	50.7	0
Washington	1.1	4.0	2.2	1.1	0.6	0.1	210.1	61.2	2.9	146.0	0.017
Waterbury	60.6	10.2	5.6	2.9	1.5	0.2	107.9	94.8	12.4	0.7	0.076
Williamstown	4.2	9.5	5.2	2.7	1.4	0.2	430.9	178.6	8.6	243.8	0.007
Woodbury		0.9	0.5	0.3	0.1	0.0	33.0	26.2	1.7	5.1	0.021
Worcester	6.0	0.9	0.5	0.3	0.1	0.0	49.2	47.3	1.6	0.2	0.054
Regional Total	**267.5**	**112.6**	**62.1**	**32.1**	**16.5**	**1.9**	**2532.7**	**1500.4**	**162.7**	**867.6**	**1.9**

Potential Vs Targets:

Table A30 Acres Need to Meet 2050 Targets and % of Town Area

	Acres Needed to Meet 2050 Targets				Target Acres % Total Town Acres		
	Total Acres Needed for Target	Ground Mount Solar	Rooftop Solar	Wind	Total Available	Ground Mount Solar	Wind
Barre City	152	57	6	88	5.90%	2.23%	3.41%
Barre Town	78	30	3	44	0.39%	0.15%	0.22%
Berlin	68	25	3	40	0.29%	0.11%	0.17%
Cabot	55	21	2	32	0.23%	0.09%	0.13%
Calais	15	6	1	8	0.06%	0.03%	0.03%
Duxbury	41	15	2	24	0.15%	0.06%	0.09%
East Montpelier	34	13	1	20	0.17%	0.06%	0.10%
Fayston	22	9	1	12	0.09%	0.04%	0.05%
Marshfield	15	6	1	8	0.05%	0.02%	0.03%
Middlesex	21	8	1	12	0.08%	0.03%	0.05%
Montpelier	119	46	5	68	1.81%	0.70%	1.04%
Moretown	29	11	1	16	0.11%	0.04%	0.06%
Northfield	70	27	3	40	0.24%	0.09%	0.14%
Orange	14	6	1	8	0.06%	0.02%	0.03%
Plainfield	20	7	1	12	0.15%	0.06%	0.09%
Roxbury	40	14	2	24	0.15%	0.05%	0.09%
Waitsfield	29	11	1	16	0.17%	0.07%	0.10%
Warren	56	22	2	32	0.22%	0.09%	0.12%
Washington	41	15	2	24	0.17%	0.06%	0.10%
Waterbury	104	39	4	60	0.33%	0.12%	0.19%
Williamstown	97	36	4	56	0.37%	0.14%	0.22%
Woodbury	8	4	0	4	0.03%	0.01%	0.02%
Worcester	8	4	0	4	0.03%	0.01%	0.02%

Note acres needed to meet 2050 targets represent a very small overall % of town acres; however when looking at these target acres compared to % of prime by town some towns exceed available prime resource. As towns adjust their targets and distribution across technology types, as well as add local constraints and preferred sites, CVRPC will provide technical assistance to help address these instances where targets exceed available acres. In most cases, towns have already done so in current enhanced energy planning processes- once these plans are approved these tables will be updated on the CVRPC website to reflect this progress.

Table A31 Acres Need to Meet 2050 Targets and % of Prime Area by Town

	Acres Needed to Meet 2050 Targets	Target Acres % Total Town Acres

	Total Acres Needed for Target	Ground Mount Solar	Rooftop Solar	Wind	Total % of Prime	Ground Mount Solar	Rooftop Solar	Wind
Barre City	152	57	6	88	53%	37%	25%	66.0%
Barre Town	78	30	3	44	2%	4%	10%	1.1%
Berlin	68	25	3	40	8%	6%	12%	8.9%
Cabot	55	21	2	32	2%	6%	32%	1.6%
Calais	15	6	1	8	3%	1%	13%	44.0%
Duxbury	41	15	2	24	16%	8%	41%	33.2%
East Montpelier	34	13	1	20	3%	1%	11%	100.0%
Fayston	22	9	1	12	1%	4%	20%	1.0%
Marshfield	15	6	1	8	2%	1%	13%	4.1%
Middlesex	21	8	1	12	3%	1%	14%	25.8%
Montpelier	119	46	5	68	38%	15%	21%	100.0%
Moretown	29	11	1	16	17%	12%	24%	24.3%
Northfield	70	27	3	40	4%	4%	20%	3.4%
Orange	14	6	1	8	1%	2%	16%	1.1%
Plainfield	20	7	1	12	1%	2%	18%	1.1%
Roxbury	40	14	2	24	1%	2%	58%	0.4%
Waitsfield	29	11	1	16	10%	11%	15%	9.0%
Warren	56	22	2	32	2%	6%	26%	1.6%
Washington	41	15	2	24	1%	4%	39%	0.4%
Waterbury	104	39	4	60	15%	6%	23%	100.0%
Williamstown	97	36	4	56	1%	3%	31%	0.6%
Woodbury	8	4	0	4	2%	2%	15%	2.0%
Worcester	8	4	0	4	2%	1%	16%	40.8%

In practice there are also issues related to fragmentation and proximity to users that practically restricts our resources. The following makes maps more useful for siting renewable energy generation and will be considered for inclusion in the next plan update:

- Locate investment in proximity to demand and to existing infrastructure (proximity to intentional growth areas and distribution and transmission lines);
- Removing parcels that cannot support distributed energy generation at scale to consider location of 500kW+ sized projects for further discussion with communities.

Approaching resources through these filters links scale and demand is a manner that is currently inadequately addressed. The above recommendation is intended to provide a framework for identifying where this scale of projects could go

preemptively so they are right-sized and appropriate for our communities, and we draw down some of that investment into our energy infrastructure where it is needed and supported. Only 23 projects out of the region's 2463 and counting renewable energy generation projects are 500kW and more, yet these 23 projects contribute 1/3 of our region's total nameplate generation. CVRPC anticipates that as the state continues to electrify and move towards 25% of demand produced by in-state renewable energy generation, it is important to consider and direct where these larger-scale projects may be located and how they fit into local and regional visioning of our communities.

Appendix B: Housing Target Methodology

Recognizing that future growth will likely reflect current growth, despite regional planning efforts, the municipality disaggregation included a weighted balance of both the Future Land Use Area Map-derived percentages of targeted Regional high-density development areas and current populations. 40% of the Regional Targets were allocated according to the relative Downtown Center and Planned Growth Areas, 20% was allocated based on the relative Village Centers and Village Areas, and the remaining 40% was allocated based on the proportion of the Regional population.

Notes on Population and Household Size

Population was calculated by using the 2024 US Census American Community Survey data. We chose population rather than housing units, as it more accurately reflects the number of people residing in the community and the level of need. This method helped control for the high number of seasonal and short-term rentals in some towns.

Notes on FLUA Calculation

FLUA categories were determined using the standardized, state-wide VAPDA methodology, with public input through an interactive online map. See Chapter 3. Future Land Use Element for more details on the criteria for each category.

CVRPC's calculations using FLUA percentages have the following limitations. CVRPC did not subtract Tier 1 ineligible areas from within higher-density FLUA, such as parcels in a higher-density FLUA in a municipality without flood hazard or river corridor regulations, or parcels awaiting a FEMA buyout. Due to the application of mapping standards, some municipalities will see a larger high-density FLU than is practical on the ground. The FLU portion of the housing target calculation does not include infill analysis. For these reasons, a Future Land Use classification is not necessarily a measure of capacity, but provides a useful, consistent starting place to identify development patterns and possibilities across the state.

Municipal Future Land Use Area acreage totals for the Region, each municipality and each FLU classification can be found in Appendix C.

Notes on Growth, Housing Type and Size

One factor not incorporated in the housing target calculations was the rate of new housing development in each city and town. Obtaining accurate data on growth in Central Vermont municipalities is challenging because of the limitations of state-level data collection and a high margin of error in census reporting for municipalities with small sample sizes. CVRPC will conduct research to better understand new development in our member municipalities in 2027. With more accurate data on new construction or conversions to residential use, housing-type targets may be revised.

More information is needed about the effects of recent legislation requiring municipal zoning to allow ADUs and duplexes, and to reduce minimum lot size to 0.2 acres in areas served by water and sewer. In addition, the impact of Tier 1 exemptions and CHIP programs to encourage development in higher-density FLU areas. An increase in smaller single-family homes in cottage courts, more condominiums, and more mobile homes would increase affordable homeownership opportunities.

Notes on Affordability

A household size of three was used to compare area median income with HUD affordability levels for two reasons: 1) to avoid inflating the number of households with lower than area median incomes when comparing the HUD thresholds for affordability, and 2) because the average regional household size is 2.2 people. Area median incomes were taken from Washington County and the 3 Orange County Towns individually in the 2024 US Census American Community Survey.

According to 2024 data, 2% of Orange County homeowners and 25% of Washington County homeowners were cost-burdened, i.e., paying more than 30% of their income on housing expenses. For these housing targets, the anticipated additional Central Vermont households making less than 50% AMI (very low-income) were included in the number of new very low-income rental units needed. Programs to assist existing very low-income homeowners stay in their homes will be important to help these households maintain their housing stability and sustainability.

Appendix C: Future Land Use Area Acreage by Municipality

Municipality	Downtown Centers	Village Centers	Planned Growth Areas	Village Areas	Transition	Resource-Based Recreation	Enterprise	Rural General	Rural Ag & Forestry	Rural Conservation	Special Use
Barre City	134.16	-	1,112.18	0.00	113.89	167.58	-	364.56	346.10	327.93	-
Barre Town	-	203.66	-	1,060.15	208.14	1,138.85	-	5,137.75	9,036.85	2,920.10	-
Berlin	312.11	76.97	-	227.67	686.97	693.32	-	3,126.61	13,476.34	5,027.04	-
Cabot	-	237.36	-	-	-	-	-	3,885.37	14,930.37	5,527.59	-
Calais	-	51.07	-	-	145.06	-	-	3,303.00	15,891.03	5,287.80	-
Duxbury	-	-	-	-	-	39.18	-	3,210.88	11,658.02	12,744.95	-
East Montpelier	-	109.60	-	533.21	8.15	166.66	-	3,996.55	9,085.07	6,632.98	-
Fayston	-	-	-	-	-	17.55	3,050.30	4,367.19	10,013.52	6,014.45	-
Marshfield	-	43.88	-	193.15	26.34	31.23	-	1,900.86	15,094.13	10,703.85	-
Middlesex	-	37.74	-	-	184.75	19.46	-	3,732.10	15,197.27	6,319.16	-
Montpelier	231.96	-	2,150.73	-	343.05	165.77	-	986.43	1,500.97	1,190.53	-
Moretown	-	24.98	-	140.67	30.57	0.00	-	2,362.12	18,474.93	4,401.97	228.36
Northfield	100.20	38.75	299.63	99.01	31.22	14.64	-	3,839.65	20,456.10	3,801.82	-
Orange	-	114.51	-	-	-	51.82	-	2,317.59	15,612.26	6,842.37	-
Plainfield	-	60.52	-	293.25	-	-	-	1,995.97	8,134.53	3,013.81	-
Roxbury	-	88.62	-	-	-	96.69	-	2,469.20	17,610.57	6,554.47	-
Waitsfield	-	56.94	-	229.49	9.04	164.64	-	3,803.34	8,347.61	4,051.21	-
Warren	-	33.92	-	144.51	15.35	110.17	3,994.52	4,550.32	8,768.13	8,104.72	-
Washington	-	88.13	-	-	35.31	-	-	2,257.57	16,865.61	5,725.37	-
Waterbury	85.73	18.71	66.06	332.98	131.27	329.38	-	5,686.37	9,462.02	15,642.50	-
Williamstown	-	108.57	-	-	-	314.05	-	6,359.45	14,922.83	4,173.20	-
Woodbury		45.74	-	-	9.90	478.22	-	3,409.89	14,626.18	6,638.33	-
Worcester		131.32	-	-	-	-	-	2,154.91	8,163.78	16,850.23	-
Total acres each FLUA	864.16	1,571.00	3,628.59	3,254.10	1,979.02	3,999.22	7,044.82	75,217.68	277,674.23	148,496.37	228.36

Appendix D: Environmental Benefits and Burdens Analysis

Environmental Benefits and Burdens Analysis

CVRPC adapted the methodology used by Northwest Regional Planning Commission (NRPC). Specifically, CVRPC drew from the impact analysis strategy, which grouped related environmental benefits and burdens that could be affected by the Regional Plan and identified representative data indicators. For some of the benefits and burdens, there was no data available which could be spatially represented.

CVRPC evaluated if EJFPs, as mapped above, faced disproportionate impacts when compared to the Region as a whole. To determine if there was a significant burden, CVRPC looked at the proportional relationship between the Region and EJFP levels and qualitatively assessed the impact on EJFPs. Notably, EJFPs face a disproportionate burden in accessing green space and nutritious food, as well as face increased risk of flooding or stormwater flows. CVRPC reviewed its policies to identify how the Plan seeks to address potential environmental burdens and encourage actions that would increase environmental benefits for all residents. The table below summarizes the results of this analysis.

Limitations of Analysis

Although mapping environmental benefits and burdens is an important step to visualize the distribution across the region, it does not allow for a granular analysis which can encompass the lived experience of all residents. The data underpinning many of the indexes and mapping tools relies on data from the American Community Survey, which has relatively high standards of error for small communities. As well, the regional mapping analysis conducted represents a distinct snapshot in time; understanding how EJFPs continue to be impacted by benefits and burdens will be an iterative process. CVRPC recognizes that mapping is a starting point and continued community engagement is vital.

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
Access to Healthy Air	EPA EJ Screen	% of population with 80th percentile PM 2.5 concentration in their census tract	0%	0%	Particles less than 2.5 micrometers in diameter, also known as fine particles or PM 2.5, pose the greatest risk to health. Thus, higher concentrations of such small particles are an indicator of air pollution. Because the regional level and EJFP level are the same, there is currently no disproportionate burden on EJFPs.	Energy: Goal 4; Goal 5 Transportation: Goal 5, Policy 1 Utilities, Facilities and Services: Outdoor Recreation Goal, Policy 14, Healthy Communities Goal
Access to Green Spaces	VT Outdoor Recreation Sites Inventory	Number of public recreational sites per 1,000 population	3.70	3.49	Access to green space is important both for individual well-being and health and in providing numerous ecosystem services, such as air filtration and reducing heat island effect. EJFPs had fewer recreational sites, trails, and acres of conserved land compared to the regional level, meaning that they do not have equitable access to green space. Because EJFPs encompass more urban areas in the region, there is likely reduced access to trails and conserved land compared to more rural places.	Utilities, Facilities and Services: Outdoor Recreation Goal, Healthy Communities Goal Economy: Goal 5, Policy 17 C and D
	Trails data	Miles of trails per 1,000 population	11.62	6.72		
	VT Protected Lands Database	% of land area publicly conserved	22.38%	2.97%		
Transportation Access	GMTA Transit Data	% of population with transit stop in census block group	0.47%	0.55%	Public transit is a key mode of transportation for connecting residents to services and providing alternatives to single-occupancy vehicles. EJFPs have higher access	Future Land Use: Centers Policy 10. Energy: Goal 4; Goal 6 Transportation: Goal

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
					to public transit, but the levels for both the region and EJFPs are very low, indicating a need to increase access across the board.	1, Policy 6; Goal 3, Policy 5 and Policy 6; Goal 4
Healthy Ecosystems	VT Land Cover Database	% change in forest land cover (2005 – 2025)	1.68%	1.53%	Forests provide ecosystem services such as carbon sequestration, air filtration, water retention and purification, biodiversity and wildlife habitat. Access and proximity to healthy ecosystems can also contribute to recreational, health, cultural and spiritual benefits. EJFPs have seen a smaller increase in forest coverage, but the rate of change is similar between the two.	Future Land Use: Rural Policies 1, 2, and 6; Rural Conservation Policies Natural Resources and Working Lands: Goal 1: Policy 6; Goal 2, Policy 3; Goal 3
Access to Health Care	CVRPC Healthcare Data	% of population with federally qualified health center w/in 30-minute drive	92.58%	97.36%	Access to healthcare includes having timely, affordable and geographically accessible medical services. Further distances to medical care can lead to worsened health outcomes and increase health disparities. The EJFP level is greater than the regional level, so there does not appear to be a disproportionate burden in terms of physical proximity, but components like affordability were not evaluated in this analysis.	Utilities, Facilities and Services: Emergency/Health Services Goal; Healthy Communities Goal

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
Climate Change Impacts	Expected Building Loss Rate - Climate and EJ Screening Tool	% of population that's in an area >75th percentile nationwide for building loss	42.84%	41.81%	Climate change impacts manifest in a myriad of different ways, including more intense storms, increasing flood risk, ecological degradation, and drought. The expected building loss rate looks at the economic loss to building value resulting from natural hazards each year. The EJFP level is slightly below the regional level.	Utilities, Facilities and Services: Emergency Management Goals 1 and 2
Increased Flooding or Stormwater Flows	FEMA 100-year Floodplain, UVM LIDAR 500-year floodplain	% increase in floodplain land acres from 100-year to 500-year	0.30%	0.07%	Vermont is particularly susceptible to flooding and has seen more intense and frequent storm events. To spatially represent this risk, CVRPC looked at the distance between the 100-year floodplains and 500-year floodplains. A smaller distance between the two floodplains indicates that the river is more constrained and has less space to capture and retain water during a flood. EJFPs are disproportionately burdened by flooding based on this data.	Future Land Use: Centers Policy 10; Goal 4 Natural Resources and Working Lands: Goal 1: Policy 5, 6 Utilities, Facilities and Services: Emergency Management Goals 1 and 2 Economy: Goal 4, Policy 15
Erosion Risk	DEC River Corridors	% of land acreage in river corridors	2.91%	0.68%	Fluvial erosion and slope instability both contribute to erosion risk in the region. Soil loss, more intense storms, and flooding accelerate erosion risk, threatening land, infrastructure, and property. While	Future Land Use: Goal 4, Policy 1a
	USGS Slope Data	Acres of >15% slope per total land acres	54.84%	57.05%		

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
					EJFPs have less acreage in river corridors than the region, they do have slightly more land with steep slopes.	
Water Pollution	303(d) map in Tactical Basin Plans	% of total stream length listed as 303d	1.06%	1.14%	Under the Clean Water Act section 303(d), states may identify impaired waterways that do not meet water quality standards. Water pollution threatens the ecological health of the region and impacts recreation activities as well as public health. EJFPs do not currently face a disproportionate burden in this regard.	Future Land Use: Centers Policy 3; Goal 4 Natural Resources and Working Lands: Goal 1, Policy 3; Goal 3, Policy 6 Transportation: Goal 5, Policy 1 Utilities Facilities and Services: Wastewater Treatment Goal, Policy 3
	303(d) map in Tactical Basin Plans	% of land acreage in impaired watersheds	66.91%	10.82%		
	303(d) map in Tactical Basin Plans	% of land acreage in impaired lakes/ponds	0.17%	0%		
Damage to Inland Waterways and Waterbodies and Wetlands	National Land Cover Dataset	% change in impervious land cover (2005 – 2025)	0.11%	0.11%	Intact and healthy waterways, waterbodies, and wetlands are necessary for water quality, flood control, biodiversity and recreation. There are currently no differences between the EJFP and regional level.	Natural Resources and Working Lands: Goal 1: Policy 3, Strategy 5d; Goal 3, Policy 8
	National Land Cover Dataset	% change in wetland land cover (2005 – 2025)	0.01%	0.01%		
Access to Nutritious Food	CVRPC Grocery Store Inventory	% of Block Group Within 1 mile (walking distance)	0.85%	0.24%	Food is accessible when it is affordable, and community members can readily grow or raise it; find it; obtain it; transport it; prepare it; and eat it. Poor	Economy: Goal 5, Policy 18 Utilities, Facilities and Services: Health Communities Goal,
		% of Block Group Withing 10 miles	42.02%	10.95%		

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
		(driving distance)			nutrition can lead to health conditions, higher health care costs, and health inequities. Currently, EJFPs face a disproportionate burden in accessing food.	Policy 10
Access to Clean Water	EPA EJ Screen	People living in areas with greater than the 80th percentile drinking water non-compliance	5.78%	0%	Access to clean water, besides the ecological and recreational benefits described above, is necessary for proper health and sanitation. The regional level for drinking water non-compliance is higher than the EJFP level, indicating no disproportionate burden on EJFPs.	Natural Resources and Working Lands: Goal 1: Policy 2, Strategy 2a, Policy 3; Goal 3, Policy 6 Utilities, Facilities and Services: Wastewater Treatment Goal, Policy 8; Water System Goal, Policy 2
Inadequate Remediation of Pollution						Future Land Use: Centers Policy 3, Goal 1, Policy 1k Natural Resources and Working Lands: Goal 3, Policy 7.
Excessive Noise						Future Land Use: Goal 2, Policy 12 Transportation: Goal 5, Policy 1 Utilities, Facilities and Services:

	Data Sources	Metric for Environmental Benefit/Burden	Regional Level	EJ Focus Population Level	Disproportionate Benefit/Burden?	Relevant Policies
						Healthy communities Goal
Healthy Homes and Buildings						Energy: Goal 1, Strategy b.; Goal 2 Housing: Goal 1, Goal 2
Affordable and Clean Renewable Energy Sources						Energy: Goal 1; Goal 2
Fulfilling and Dignified Jobs						Economy: Goal 1; Goal 2, Policy 2; Goal 3; Goal 6
Access/Lack of Access to Cultural Resources						Utilities, Facilities and Services: Cultural Resources Goal; Healthy Communities Goal

Appendix E: Substantial Regional Impact Definition

Development projects of Substantial Regional Impact are those that will have substantial and ongoing impact on two or more municipalities, including the host municipality. Among the development projects of substantial Regional impact are those that:

- Will likely impact on a resource within the Region which is widely used or appreciated by people outside of the locality in which it is located.
- Which may affect settlement patterns to the extent that the character or identity of the Region (or its sub-Regions) is significantly affected.
- Are likely to alter the cost of living, availability of choices, access to traditional way of life or resources widely used or appreciated by Regional residents.

In addition, because CVRPC has defined housing as a critical need for the Region, CVRPC will participate in the Act 250 review for any project which proposes to:

- Increase the total number of year round housing units (according to the most recent U.S. Census) in its host municipality by more than 2%; or create more than 30 housing units of any type; or create more than 5 "affordable" housing units, as defined by VSA Chapter 117 Section 4303