**(15) Cross-cutting Pathways**

The recommendations found in this plan are intended to lay the foundation for the state to better adapt to and mitigate the effects of climate change, while also seeking economic opportunities. Many of the climate solutions put forward in the preceding sections, while organized around emission reductions, building resilience and adaptation, and sequestering and storing carbon, have co-benefits beyond their primary objective. As the legislature, state, regional entities, municipalities, non-governmental organizations, and others work to advance this multi-stakeholder plan, lifting up the recommendations that will help Vermont meet multiple objectives simultaneously will be important to prioritize. While many of the recommendations have co-benefits, several pathways are particularly impactful, and a coordinated approach will ensure that as implemented we are focused on maximizing climate action benefits in all areas. As such, the following pathways were pulled from their respective sections to be represented here.

**Compact Settlement**

**PATHWAY 1: Support compact settlement patterns that contribute to the reduction of GHG emissions, enhance community and built environment resilience, and help conserve natural and working lands.**

Compact settlement, sometimes referred to as “smart growth”, is a key strategy for addressing climate change. Vermont’s city, town and village centers, and other areas with the density and a mix of uses are characterized as “compact settlement” or “smart growth”, as described in Vermont planning law ((24 V.S.A. §4302) l: (1) To plan development so as to maintain the historic settlement pattern of compact village and urban centers separated by rural countryside.

Compact settlement has been at the core of Vermont’s land use goals as it provides numerous economic, health, quality of life, and environmental benefits. When thoughtfully planned, compact settlement can also support many of the State’s climate goals and actions, including energy efficiency, greenhouse gas emissions reductions, community climate resilience and adaptation, and preservation of the resilience and sequestration benefits provided by working lands and ecosystems.

By providing a critical alternative to sprawl, compact settlements do the following:

* facilitate mobility options that are more efficient and produce less GHG emissions than single occupancy vehicles, such as walking and bicycling, by making the most common places people to need to get to and from closer to one another;
* create densities necessary for providing reliable transit options that are more efficient and produce less GHG emissions
* enable a shared network of electric vehicle charging stations for home and destination charging;
* create densities necessary for more efficient and resilient energy supply systems, such as district heating and cooling and microgrids;
* enable development of housing at a scale that meets the needs of current and future Vermonters, including energy efficient multi-family housing options;
* protect and conserve natural and working lands, critical to ecosystem and public health, natural and community resilience, and Vermont’s economy;
* create opportunities to retain and expand commercial and social services that serve local customers that are in close proximity to the goods and services offered;
* reduce social isolation and provide more opportunity for neighbors to congregate.

In the absence of support for compact settlement, Vermont will continue to see rural sprawl that causes fragmentation of in-tact forests, loss of agricultural land, an increase in cars and trucks on Vermont roadways and an increase in traffic, congestion and emissions associated with vehicle travel, and a decline in community cohesion, among other negative impacts[[1]](#footnote-2)[[2]](#footnote-3).

Recognizing these negative trends, the Vermont Legislature has enacted several laws that aim to promote and enable compact settlement[[3]](#footnote-4). Similarly, three subcommittees of the Vermont Climate Council (Agriculture & Ecosystems, Cross-Sector Mitigation, and Rural Resilience & Adaptation) prioritized compact settlement as a key tool for comprehensively addressing climate change. In acknowledgement of this uniquely cross-cutting approach, actions from each of these subcommittees have been elevated into the strategies below, which highlight the importance and value of investing in compact settlement.

**Strategies**

**1: Increase investment in the infrastructure (sewer, water, stormwater, mixed-use development, housing, sidewalks, bike lanes, EV charging, broadband, energy supply) needed to support compact, walkable development.**

To function properly as part of the solution to climate change, compact settlement needs well designed infrastructure to create places that are desirable, in addition to reducing emissions and being more resilient to climate impacts.

Community drinking water and wastewater disposal is critical to enabling compact settlement. For existing compact settlements with existing community water and wastewater systems, those systems must be maintained and upgraded to meet health and water quality standards, and their capacity must grow as the settlement grows. Existing compact settlements that do not have community water supply and wastewater will require the establishment of such systems to enable compact growth of residential and commercial uses and manage the increase in localized water use and wastewater. In most villages, small lot sizes and existing well water and septic systems make it challenging to build a conventional wastewater collection system. In these instances, soil based wastewater treatment systems are an intermediate solution for wastewater management that can be integrated with existing use of private wells and septic systems.

Public drinking water systems should be designed to accommodate climate change impacts, such as more droughts and more wet periods. Wellhead protection areas should take these swings into account and can be integrated into land conservation and recreation objectives.

Because many compact settlements grew up along waterways, they should be protected against flooding and fluvial erosion. Stormwater infrastructure is needed to protect structures and property as well as water quality and can be integrated with public green spaces that provide benefits beyond stormwater management. Managing flooding in compact settlements has both upstream and downstream implications, and land use and land conservation policies should address floodwater attenuation and mitigation capacity that anticipates greater flood frequency and intensity.

New housing should frame public spaces, provide a diversity of housing options for different stages of life, be energy efficient, and safe and comfortable spaces as our climate changes. Connected bicycle, pedestrian and public transit infrastructure should be developed or improved to provide affordable, safe, and healthy ways of getting around that do not require a vehicle. Compact settlement-centered microgrids can facilitate renewable energy production, storage, and resilience against outages. Similarly, compact settlements can be internet connectivity hubs where both wired and wireless systems can serve a greater concentration of users.

**Actions**

1. Increase investment to municipalities for new and expanded water and wastewater facilities to support compact development and reductions in inflow and infiltration into wastewater collection systems.
2. Make village centers permanently eligible for the downtown transportation fund that builds infrastructure needed to increase walking, biking and transit.
3. Increase Efficiency Vermont's and other weatherization investments, and incentives, for energy efficient projects in buildings located in energy cost-burdened communities and communities with greater concentrations of older buildings, rental property, and low and moderate incomes.
4. Expand the existing downtown and village tax credit program eligibility to offset the cost to elevate or flood proof existing buildings located in areas with increased flood risks.
5. Support public private partnerships to fund the design and construction of new infill housing in existing neighborhoods.
6. Expand the eligibility of the existing downtown and village center tax credit programs to revitalize neighborhood housing in state designated areas centers.
7. Increase Municipal Planning Grant (MPG) funds to support zoning modernization and bylaw adoption that creates housing growth opportunities and more housing choices.
8. Establish a rolling planning grant for communities in need of consulting assistance for Neighborhood Development Areas (NDAs) application preparation/work.

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| *Preliminary Assessment of Strategy against Criteria* |
| *Impact:* All growth and development has some impact, but compact development reduces climate change impacts, as well as other impacts such as those to natural resources and public expenditures. Impact of compact development on climate change goals should be assessed by comparing it to the climate change impacts of the alternative, which is dispersed, sprawling development. Compact development cannot be part of the climate solution without the infrastructure to support and make compact settlements a preferred and accessible choice for where people live, work, and meet their basic daily needs. While increasing investment for the infrastructure needed to support compact settlement is imperative, the processes that go into infrastructure projects have long lead times, meaning it can take years to bring a project from concept to completion. In addition to long lead times for infrastructure projects, impacts are often slow to accumulate or are indirect, making them difficult to measure and attribute progress towards climate goals to individual infrastructure projects. Further work is needed to ensure that the infrastructure itself is also resilient to climate impacts (see Section 12). |
| *Equity:* Investment in infrastructure should ensure that those most impacted by climate change and experience contextual, procedural, corrective, and distributive equity in the implementation of infrastructure investments to address climate change. Due to historic inequities black, indigenous, and low-income communities, people of color, and persons with disabilities are often more vulnerable to climate change. While compact development can improve resilience and equitable and affordable access to housing, transportation and amenities, investments in infrastructure have historically caused harm to these communities by siting infrastructure in a way that burdens them with negative environmental consequences and limits or excludes them from receiving the benefits[[4]](#footnote-5). Infrastructure projects should include the voices of those most impacted by climate change, and work towards correcting past inequity (e.g. lack of investment or representation in infrastructure development) while preventing the exacerbation of existing inequities (e.g. investment cannot lead to displacement). |
| *Cost-effectiveness*: Additional work is needed to identify a cost effectiveness metric for actions that have both emissions and resilience impacts across many sectors, and to establish a “business as usual” scenario baseline against which cost-effectiveness can be measured. |
| *Co-Benefits:   C*ompact development can reduce emissions and improve resilience. It also reduces development pressure on natural and working lands, increasing their ability to sequester carbon. It also creates communities that are more vibrant, diverse, walkable, and economically stable. Increased investment in the infrastructure that’s needed to support compact communities also has public health, economic prosperity, and workforce opportunity benefits. Further research and analysis is needed to identify and quantify specific benefits that are associated with specific patterns of compact settlement and specific types of infrastructure investments. |
| *Technical Feasibility:* Yes |

**2. Update state and local land-use governance, regulations, and practices to remove barriers to compact settlement and improve coordination on land use issues across agencies, departments, municipalities, boards, commissions, and authorities.**

For the past 50 years, Governors, state agencies, the General Assembly, non-profit advocacy groups, regional entities, and cities and towns have worked collectively and intentionally to strengthen Vermont’s downtowns and villages and the state’s historic settlement pattern of compact centers surrounded by farms and forest lands. The dramatic turnarounds of downtowns like St. Albans, Bennington, White River Junction, and St. Johnsbury and in villages like Newbury, Albany and Putney are the results of many years of thoughtful and incremental actions. These resulting partnerships, networks, and policy framework works creates a strong foundation to help communities adapt to a changing climate and become more sustainable, affordable, equitable, and prosperous. With thoughtful review and modest changes, policymakers can modernize the state’s existing framework of regulations and incentives to not only strengthen Vermont’s brand, economy, and communities -- but drive down emissions, expand equity and environmental justice, prepare communities for warmer and wetter weather, and remove the carbon already in the atmosphere.

**Actions**

1. Hire a consultant to review and assess the state designation programs that recognize and support Vermont’s compact settlement areas.
2. Hire a consultant to engage stakeholders and support the development of a state Land Use Plan that guides development to growth areas, town centers and appropriate rural locations and limits development within ecologically sensitive / risk-prone areas.
3. Create a State-wide redevelopment authority to bank land, underwrite acceptable risk, address blight, vacancy, and brownfields, improve building flood resilience in settled areas, and plan for new neighborhood development and infrastructure.
4. Prioritize public funding for mixed-use developments near transit hubs in regional and rural centers
5. Provide enhanced technical assistance and support to municipalities and regions, including outreach and education for landowners and community members, to develop and implement town plans intended to maintain forest blocks and connecting habitat as authorized by Act 171, and effective zoning and subdivision bylaws to maintain forest blocks and connecting habitat.
6. Update Act 250 to promote compact settlement by:
   1. waiving the mitigation fees for prime agricultural soils for alternative or community wastewater systems that will serve a state designated center.
   2. removing the population-based caps on the Act 250 exemption for priority housing projects
   3. including criteria that better address climate change, forest fragmentation and forest loss, to incentivize growth in the state’s designated centers and better address the specific challenges to working lands enterprises;
   4. updating its governance, staffing, public engagement, and the role of State Agency permits in the Act 250 process to create the enterprise capacity necessary to implement new climate related criteria and respond to future land use pressure from climate change and in-migration of climate refugees.
   5. encouraging housing development within certain state designated centers in order to incentivize compact, dense settlement in areas with adequate local land use laws and existing infrastructure, reducing development pressures on open spaces such as greenfields and forested locations.
7. Increase Municipal Planning Grant (MPG) funds to support zoning modernization and bylaw adoption that creates housing growth opportunities and more housing choices.
8. Establish a rolling planning grant for communities in need of consulting assistance for Neighborhood Development Areas (NDAs) application preparation/work.
9. Amend Neighborhood Development Area (NDA) enabling statute to allow the inclusion of river corridors upon local adoption of River Corridor bylaws.
10. Create an office of Strategic Investment and Coordination that supports achievement of land use planning goals by aligning and resolving conflicts in state and local regulations and funding and provides a permitting platform from both the customer and policy objective perspective.
11. Examine public/private partnerships and more flexible permitting to expand water/wastewater opportunities in compact centers.
12. Reduce regulation of development in downtowns and village centers to cluster development. Remove barriers to clustered development (i.e., Act 250, local zoning, aging infrastructure, etc.), provide statewide guidance, and incentivize housing in village centers and existing built areas to encourage development away from open fields and forests, and river corridors.

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| *Preliminary Assessment of Strategy against Criteria* |
| *Impact:*State and local land use regulations play a significant role in shaping growth patterns in Vermont. Removing barriers, reducing burdens, providing incentives can have significant impact in directing growth to compact settlement. |
| *Equity:* Any changes to land use governance, regulations and practices need to ensure that those most impacted by climate change and experience contextual, procedural, corrective, and distributive equity in the implementation of this strategy. Due to historic inequities black, indigenous, and low-income communities, people of color, and persons with disabilities are often more vulnerable to climate change. Governance structures, regulations and procedures have explicitly prevented black and indigenous communities and people from participating in wealth generating activities associated with land ownership and use of land and resources for economic growth. Changes to governance, regulations and procedures should include the voices of those most impacted by climate change, and work towards correcting inequity in ownership and use of land resources. |
| *Cost-effectiveness*: Administrative and regulatory changes do require staff time and effort, and occasionally require consultant support. However, these are one time, relatively low costs that unlock social, environmental and economic benefits and cost savings that are associated with compact development. Coordination across the stakeholders responsible for and engaged in land-use decisions requires regular and sustained human capacity (time, expertise and decision-making authority) to participate in, inform and build consensus around land use decisions. |
| *Co-Benefits:*Co-benefits of updating state and local land-use governance, regulations and practices include improved efficiency in government operations, an improved customer service experience for constituents, and better collaborative relationships between stakeholders involved in governance and regulatory processes*.* |
| *Technical Feasibility*:  Yes |

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

Land use choices play a foundational role in meeting the States climate goals, and can either enable or impede meeting our emissions reductions, carbon sequestration and climate resilience goals. The impacts of land-use decisions are often slow to accumulate and can be indirect, making them difficult to measure and attribute to specific land-use decisions over time. Research and data on land use in other states and jurisdictions is difficult to scale to Vermont with enough confidence to support decision making, as the rural nature of the State is assumed to have a significant impact on the outcomes of different land use decisions.

The lack of quantitative and Vermont specific data that demonstrates the value and tradeoffs of different land use decisions, particularly of compact development over dispersed land use patterns, and particularly related to meeting climate goals, presents a challenge to making sound land use decisions that are coordinated to balance multiple and sometimes competing objectives, and build consensus around land use decisions that achieves the greatest possible outcomes across multiple goals and objectives.

While land use planning can often serve complementary objectives, tensions between competing land uses inevitably arise. For example, Title 24 Chapter 117 calls for compact development in historic settlements, which relieves development pressure on natural and working lands and revitalizes and retains the character of Vermont’s historic settlement pattern. However, existing settlements are often along river corridors, raising concerns that focusing new development in these areas to advance compact settlement patterns will further compromise river resources. The tension between the goals to encourage growth in compact historic centers and protect natural resources requires objective information to facilitate negotiation and consensus building around land use decisions that can achieve the greatest possible outcome for multiple, and sometimes competing objectives.

**Actions**

1. Pilot a land value taxation study in five communities to evaluate grand list shifts and incentivize smart growth as taxes are levied based only on the value of the underlying land and not on the value of any buildings or other improvements to the site.
2. Fund a study that quantifies the vehicle miles traveled and GHGs for both compact and dispersed areas of development as well as the co-benefits of complect centers.

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| *Preliminary Assessment of Strategy against Criteria* |
| *Impact:*Robust data and analysis supports and ensures that actions to support compact development support the goals of the Climate Action Plan and deliver on co-benefits. This strategy will be particularly impactful in continued development and implementation of climate action, as research and analysis on the costs and climate benefits of compact development, particularly in Vermont and particularly in relation to climate resilience, is far less developed than that of emissions reductions actions in the transportation, buildings, and energy supply sectors. |
| *Equity:* While data and research are often considered to be objective and neutral, data collection processes and analysis methods can be inherently biased, leading to programs and policies that further exacerbate inequities[[5]](#footnote-6). Ensuring equity in this most basic first step of policy and program development is critical to ensuring more equitable policy and programs[[6]](#footnote-7). Data collection, research and analysis that can provide insights on the impacts that land use decisions can impact climate goals needs to ensure that those most impacted by climate change experience contextual, procedural, corrective, and distributive equity in its implementation. |
| *Cost-effectiveness*:  Data acquisition, research and analysis is likely to require both staff time and consultant support. A climate focused research agenda will likely need to be pursued over many years. Onetime costs for discreet projects to answer specific questions about climate action would be needed. Investment in robust data and analysis would ensure that climate actions are pursued in a cost-effective way. Partnerships could reduce the costs of ongoing research, help to build the collective knowledge of stakeholders, and enable consensus building around climate action. |
| *Co-Benefits:*The data, research and analysis needed to evaluate, develop and implement compact settlement actions in support of climate goals may also be useful to other community or State decision making processes*.* |
| *Technical Feasibility*:  Yes |

**Education**

**Pathway: Create accessible, equitable research, partnerships, and education; promote shared understanding; and invest in sustainable workforce development for the natural and working lands sector.**

Education and understanding, especially around our ecosystems and land in this state is a vital part of solving the climate crisis. This must include the risks and changes that will follow inaction with regard to the climate crisis as well as the strategies to address this crisis, to ensure equitable access to opportunities and a shared knowledge that will build our transition to a better future. Education of people around the state about the actions to slow climate change as well as an enabling set of actions that will allow for creating capacity for the future is critical to all ages, but especially for intergenerational equity.

Education also strengthens the success of every other pathway towards resilient climate adaptation. Agricultural, forestry and natural resource landowners and managers need education to implement natural based practices that will mitigate and sequester greenhouse gases, that will positively affect their viability, and help them, and future land managers to adapt to a changing climate in a positive and vibrant manner.

**STRATEGIES AND ACTIONS**

1. **Provide funding for climate-related education at all levels, outreach, research, and technical assistance programs**: Investment in climate related education through various programs will create the capacity our state needs to implement climate mitigation, resilience, and adaptation actions. Education to land owners, practitioners, students, and teachers about climate change, its impacts and steps that can be taken now, are necessary to influence personal and systemic action and build workforce capacity and general knowledge with regard to the impacts of climate change and the strategies necessary to prevent it.
2. Enhance education, outreach, and technical assistance programming to support farmer learning and adoption of climate smart agricultural practices and ensure equitable access through the creation of two full time UVM Extension staff and part time staff for each National Resource Conservation District.
   1. Grow the capacity of additional VT academic institutions and indigenous-led & BIPOC organizations to offer technical support to farmers and foresters, such as Middlebury College perennial program with TEK.
3. Establish and fund an educational program that explains the role that Vermont farmers and foragers and their high-quality, local food products play in maintaining a low climate impact
4. Create a climate curriculum teachers fellowship program to engage teachers in leading and sharing their climate curriculum ideas with other teachers
5. Amend the Vermont State Board of Education's Education Quality Standards to incorporate environmental and climate change education at all grade levels (consider folding under "Science" and "Social Studies" curricula)
6. Redesign the state education funding model so that Career and Technical Education centers have independent funding streams and budgets. Create and fund legislation to support other educational programs that strengthen the workforce pipeline, including a range of accessible postsecondary educational models (e.g. apprenticeships, concurrent enrollment, and stackable credentials)
7. Support increased investment in healthy soil education through educational mini-grants for teachers to all audiences (including agriculture, homeowner, forestry, publications, K-12 schools and institutions of higher learning) and implementation of practices through funding of Best Management Practices challenges, technical assistance programs, and cost shares.
8. Develop and make available accessible outreach and educational materials that communicate the issue of climate change and local impacts to the general public, which include and highlight the role that Vermont's natural and working lands play in providing solutions to climate change.

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| *Preliminary Assessment of Strategy against Criteria* |
| *Impact:* Education of our current land managers is the most critical enabling action to create immediate and long-term impacts on greenhouse gas reduction or mitigation and adaptation. Additionally, the impact of the given strategies will result in a proactive approach to climate issues through increased education of future generations who will sustain these actions over time. |
| *Equity:* This strategy will advance equity by providing opportunities for all and increased opportunities. A focus on accessibility and funding will ensure that this strategy and these actions have the potential to create progress towards environmental justice and equity. |
| *Cost-effectiveness*: This strategy is very cost effective given the many co-benefits and huge cost of inaction. Though there is not an ability to have cost per outcome at this time, investment in education, especially climate education is a no regrets policy. |
| *Co-Benefits:* Educational strategies by design have many co-benifits simply by increasing the amount of climate mitigation practices, future management that will proactively address climate and a society with a better understanding of its role in climate action. These actions will have numerous co-benefits to the land and people, thereby improving the wellbeing of communities. Increased education about the issues facing our community will develop understanding of additional ways to solve them. |
| *Technical Feasibility*: Yes |

1. **Develop and promote climate-related educational materials for private landowners to empower them to make climate-informed decisions about their land:** The majority of Vermont land is privately owned. Therefore, it is important that we are creating educational programs to encourage more climate friendly practices and learning. We will education around the impacts of climate change so that everyone in the state can work towards common goals.
2. Create and deploy river corridor and floodplain buffer extension-type program, that provides educational material and technical assistance for private landowners
3. Identify and explain practices that create and enhance pollinator habit, wildlife habitat and biodiversity
4. Promote the values of planting future climate adapted tree species and crops in an effort to expand tree planting efforts on private land. Thereby promoting restoration efforts to reforest riparian areas, wetland buffers, and unhealthy soil.
5. Create infrastructure and educational programs around community and backyard composting and recycling
6. Minimize lawn mowing frequency, and amount of mowed lawns to increase biodiversity and ecosystem health, and ultimately reduce emissions.

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| *Preliminary Assessment of Strategy against Criteria* |
| *Impact:* Although some of these actions may appear to some as having a low impact the suite of actions in this strategy is important. These enabling actions create capacity for future plans, build awareness and create collateral to harness the power of the majority of the state land. |
| *Equity:* There are extreme equity issues with regards to land ownership in this state. The state should create strategies and programs that decrease the barriers of impacted communities to access land. This recommendation promotes equity, through education that prioritizes engaging all citizens, and attempts to engage everyone in the necessary transition as to not to leave people behind. This strategy has a high propensity for unjust action and therefore should center equity in implementation*.* |
| *Cost-effectiveness*: Investment in education is extremely cost effective. These actions are small investments that go into creating materials and programs will have wide reaching impacts. They will increase mitigation adaptation and resilience around the state both immediate and long term. |
| *Co-Benefits:* This strategy will have an extremely high number of co-benefits. Education in all capacities is important, but these actions will lead to increased climate resilience, healthier environments, increased cultural capital, more understanding and many other co-benefits. |
| *Technical Feasibility*: Yes |

1. [PLACEHOLDER:  strategy and actions around history of conservation, injustice and inequities, and training for agencies — in development by the Agriculture & Ecosystems subcommittee]

**Personal Action That Individual Vermonters Can Take**

Vermont’s Climate Action Plan sets Vermont on a path to making the transformative change needed to realize a resilient future. While large-scale, systemic changes are needed at the international, national, and state level regarding public policy and market transformation, Vermonters have an individual role to play as well. As of 2018, statewide greenhouse gas emissions totaled 8.64 million metric tons of CO2 equivalent (CO2e).[[7]](#footnote-8) With an estimated 2018 Vermont population of 626,299 people,[[8]](#footnote-9) per capita emissions were approximately *13.8 tons of climate pollution* – higher than the per person average of any other New England state.[[9]](#footnote-10)

The primary reasons for our relatively high per capita GHG emissions are our significant use of fossil fuels for transportation and heating. Together, those two sectors make up 74% of Vermont’s total in state climate pollution.[[10]](#footnote-11) Specifically, the largest sources of Vermont’s GHG emissions are the use of fossil fuels like gasoline and diesel for transportation, and of fuel oil, propane, and natural gas for home and building heating. While individual circumstances vary[[11]](#footnote-12), for most Vermonters,[[12]](#footnote-13) the single highest impact personal decision they can make is to commit, whenever practicable, to never again purchase new pieces of fossil-fuel dependent equipment. This is especially true of vehicles and space heating systems, but is also relevant for water heaters and smaller pieces of equipment like lawn mowers and snow blowers. Today there are the technologies available to do nearly all of the things fossil fuel dependent equipment has done in the past, but now with less pollution and often at lower cost thanks to modern electric options or sustainable use of renewable fuels such as wood heat or B100 biodiesel.

Purchasing new fossil-fuel dependent equipment not only often locks in decades or more of climate pollution that we can no longer afford if we are to meet our emissions reduction commitments: it also often locks in dependence on higher-cost, more price-volatile fossil fuels that strain the budgets of Vermont consumers and create a drain on the Vermont economy. In contrast, efficient electric and renewable alternatives significantly cut climate pollution; often cost less over their lifetime, with lower and more stable energy prices; and do more to strengthen the Vermont economy and support local jobs because they help keep more of our energy dollars recirculating locally.[[13]](#footnote-14) With existing and future incentives and increasing market adoption, clean and efficient options to fossil-fuel dependent equipment are not only becoming more available, they are becoming more affordable as well.

A. Transportation

On average, more vehicle miles per person per year are traveled in Vermont (11,773 in 2019[[14]](#footnote-15)) than in any other New England state.[[15]](#footnote-16) The vast majority of these miles are currently driven in fossil fueled vehicles. Per person, the largest single source of climate pollution created by most Vermonters comes from their transportation, specifically the use of gasoline and diesel fueled

vehicles. On average, of the 13.8 tons of GHG pollution that Vermonters emit, per capita per year, around 5 tons per year comes from fossil-fueled transportation.[[16]](#footnote-17)

The most effective ways for Vermonters to reduce emissions from transportation include:

* Use of electric vehicles instead of fossil fueled vehicles, whenever practicable. For the full array of electric vehicle models available in Vermont, see <https://www.driveelectricvt.com/find-your-ev/compare-models>
  + Note that, with Federal, State, utility, manufacturer, and/or other incentives combined, EVs (whether new or used) are often less expensive up front than fossil fuel alternatives. EV’s are also less expensive to operate over their lifetimes, due to fuel and maintenance savings. The Union of Concerned Scientists, for instance, estimates that EV drivers in rural Vermont can average over $1,500 a year in combined fuel and maintenance savings compared to fossil fuel drivers.

![Chart, line chart

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* Reducing vehicle miles traveled when practicable, including utilization of transit services (taking the bus), carpooling, vanpooling, biking, or walking.
* When electric vehicles, transit, or other mentioned options are not available, it is better (both from a pollution and cost reduction standpoint) to use more fuel efficient rather than less efficient fossil fuel vehicles. More fuel efficient options include: plug-in hybrids (PHEVs), hybrids, or otherwise more fuel efficient models.
* Minimizing unnecessary air travel.

*Resources:*

Drive Electric Vermont: <https://www.driveelectricvt.com>

MileageSmart: <https://www.mileagesmartvt.org>

Go! Vermont: <https://www.connectingcommuters.org>

Fuel Economy: <https://www.fueleconomy.gov>

B. Heating

After transportation, the second largest source of per capita GHG emissions in Vermont comes from fossil fueled heating systems. 72% of Vermont’s heating energy sources come from fossil fuel (primarily fuel oil, natural gas, and propane).[[17]](#footnote-18) On average, of the 13.8 tons of GHG pollution that individual Vermonters emit per capita, per year, over 4 tons per year come from fossil-fueled heating (including space and water heating).

The most effective ways for individual Vermonters to reduce their emissions from heating (often while saving money and improving health[[18]](#footnote-19)) include:

* Home weatherization
* When possible, switching from fossil-fuel dependent heating systems to cleaner and more efficient systems, including: heat pumps, advanced wood heating options, and/or B-100 biodiesel.

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* Note: Net savings or costs related to heating changes vary considerably based on a number of variables, including what the prior heating source(s) was and what the new source(s) becomes. Generally speaking, the greatest cost-savings will be available to homeowners and renters who are able to move away from heating with old resistance electric systems, propane, and/or fuel oil, especially when moving toward efficiently used heat pumps in electric territories with lower rates, and/or heating with efficient pellet and wood stoves. In contrast, moving from natural gas (historically the lowest cost and most price stable fossil heating option for Vermont consumers) to an electric or renewable alternative could increase heating costs.

*Resources*:

* Vermont Energy Saver website: <https://energysaver.vermont.gov/>
* A Vermonter’s Guide to Residential Clean Heating and Cooling[[19]](#footnote-20)
* Vermont Home Energy Profile: <https://www.clearlyenergy.com/vermont>
* Efficiency Vermont: <https://www.efficiencyvermont.com/services>

C. Refrigerants and Consumption-Based Emissions

While vehicles, heating systems, and other equipment purchases are usually the single most consequential climate-related decisions that most individual Vermont consumers make, such purchases are infrequent, sometimes only happening once every decade or more. And it is not just the time of purchase that matters: when and how these pieces of equipment are disposed of also matters. Specifically, it is very important to dispose of any items containing refrigerant (refrigerators, freezers, air conditioners, vehicles, heat pumps, etc.) correctly, as they contain very potent greenhouse gases.[[20]](#footnote-21)

Other more frequent consumer decisions and actions, while less significant on their own, can add up over time to make a difference as well. Climate-conscious purchasing decisions can include being aware of and taking into account the “carbon footprint” of consumer products and choosing climate friendly options, purchasing goods locally, and minimizing purchases of carbon-intensive products.[[21]](#footnote-22) It is important to note that many of the “upstream” or “lifecycle” emissions related to Vermonters’ consumption do not show up in Vermont’s Greenhouse Gas Emissions Inventory, because such emissions often occur in other states or countries. However, regardless of location, if our demand for and consumption of such products and services is leading to emissions, we can be at least partially understood to be responsible for them.[[22]](#footnote-23)

*Resources*:

Carbon Footprint Calculator: <https://coolclimate.org/calculator>

**Cross-cutting Themes**

Throughout the development of the Climate Action Plan, several themes were identified which do not have a direct impact on reducing emissions, resilience to climate impacts, and sequestering carbon, but are nonetheless foundational in supporting the implementation and efficacy of the actions that are being recommended in this plan. This section highlights those cross-cutting themes that the Council recognizes are foundational to the work of climate action, but giving the timeline to develop this Climate Action Plan, need additional discussion and work from the Council to ensure recommendations support the full scope of actions included in this plan.

Three of the four themes below outline a limited suite of actions relevant to those themes. Those actions were developed in subcommittee discussions and were identified as relating to the broader cross-cutting bodies of work that are needed to enable transformative climate action. The theme of State Government, Community, and Partner Capacity does not identify specific actions, but rather speaks to the broader theme of capacity that is referenced in many actions throughout this plan. As noted earlier in this section, further work will be needed after the adoption of this initial Climate Action Plan to ensure the scope of the recommendations below capture the importance of these recommendations in supporting and enabling climate solutions.

**Environmental Justice Policy**

Environmental justice is the equitable access to environmental benefits, proportionate distribution of environmental burdens, fair and equitable treatment and meaningful involvement in decision making, and recognition of the unique needs of people of all racial and ethnic groups, cultures, socioeconomic statuses, and national origins. It works to redress structural and institutional racism, colonialism, and other systems of oppression and harm done to Black, Indigenous and People of Color (BIPOC) and other communities and ecosystems that have experienced marginalization and degradation. Environmental Justice (EJ) also seeks to address insufficient governmental responses at the local, state and federal level to environmental crises due to the racial/ethnic demographics, national origin, or socioeconomic status of highly-impacted communities.

Unlike many states, Vermont does not yet have its own Environmental Justice policy. This is a glaring omission in state policy that has been recognized by the U.S. Environmental Protection Agency and Vermont Department of Environmental Conservation. Lack of a clear state EJ policy results in a piece-meal, radically insufficient approach to understanding and addressing – with clear definitions, metrics and essential procedural and language-access strategies – environmental justice. It also potentially puts Vermont at a distinct disadvantage, likely limiting the state’s ability to access federal transportation funds and potentially other federal funding sources.

Vermont must take a comprehensive approach to supporting efforts within communities across the state to alleviate environmental burdens and enhance environmental benefits while sharing responsibility for that work in a just and transparent way. Issues of poor water and indoor air quality, energy cost burdens, lack of transportation, food insecurity, vulnerability to natural disasters, and associated health risks disproportionately affect low-income and BIPOC populations in the state.

The Just Transitions Subcommittee developed the *Guiding Principles for a Just Transition,* which were used to evaluate and prioritize the recommendations presented in this Climate Action Plan. Additional detail on the Guiding Principles and their creation can be found in section 7 – Building Equity into the CAP. The Guiding Principles will continue to be used to guide and evaluate the work of the Climate Council, but the Council recognized that additional work is needed to ensure that environmental justice is incorporated into state policy and program development and evaluation.

The state needs a comprehensive policy for identifying and addressing these disproportionate impacts. That is why the Vermont Climate Council supports the adoption of a statewide Environmental Justice policy to be incorporated into the work of agencies and departments across state government. Such a policy should support the delivery of environmental benefits to disproportionately burdened communities in the form of access to clean air and water, affordable clean energy and transportation options, healthy food, climate resilience, and local green jobs. An EJ policy is important to pursue and should also be approached as an iterative process that centers the needs of most impacted communities and offers real, community-based solutions to environmental problems.

**Workforce**

From 2019-2020, clean energy jobs[[23]](#footnote-24) grew by 0.1 percent, which is just under the overall statewide employment growth rate of 0.2 percent over the same time frame. Like Vermont’s overall statewide labor market, the growth in clean energy jobs has remained steady over the past three years.[[24]](#footnote-25) While clean energy jobs account for only some of the sectors referenced in the Climate Action Plan, this stagnant trend reflects the broader need for additional funding, support, and training to grow the workforce that is needed to implement the climate change solutions identified in the Climate Action Plan.

Throughout the Climate Action Plan, actions identify the need for training and resources for workforce development in sectors that cross GHG mitigation, climate adaptation, resilience, and carbon sequestration work. While actions focused on workforce development cannot be tied directly to measurable GHG emissions, they are nonetheless important to supporting climate change solutions and as such, have been identified as a cross-cutting theme in Vermont’s Climate Action Plan.

The Climate Council recognizes the importance of workforce development and acknowledges the need to further expand upon recommendations in this Plan. The actions listed below are those directly related to workforce development and represent the areas where the Climate Council has specifically identified the need for additional workforce development programs. As this Plan is further refined and implemented, a greater emphasis will be placed on the study and implementation of workforce development programs, to include a focus on programs that support historically marginalized communities. Programs will support sectors both impacted by the implementation of climate change policies, and sectors focused on GHG mitigation, climate adaptation and resilience, and carbon sequestration, to ensure current and future generations are equipped to deal with climate change.

**Actions**

* Appoint an Executive-level member of the Administration to coordinate weatherization workforce development efforts to: ensure the scaling up of workforce that will be needed to achieve GWSA requirements; to increase coordination among the wide variety of public and private entities involved in worker recruitment, training, placement, and retention; and to avoid duplication of effort across state government.
* The state should identify simple, low- and no-cost mechanisms to increase organics diversion and provide incentives and business and workforce development to private organics haulers and composters (including farms). Act 41 of 2021 created an Agricultural Residuals Management Program to be administered by VAAFM. The purpose of this new chapter of law is to establish a program for the management of residual wastes generated, imported to, or managed on a farm for farming in Vermont.

Strategy: Support workforce development in trades and skills that are needed to implement the climate action plan.

* Provide workforce training and professional development to cultivate expertise in resilient and energy efficient building practices.
* Create an apprentice program to support more Vermont-based builders with expertise in resilient and energy efficient building practices.

Strategy: Promote workforce development in all working lands sector along all points of the supply chain

* Develop, endorse, and implement fair trade and equitable labor practices and just livelihoods for the natural and working lands sector.
* Better resource state programs to support landowners’ personal and professional development, and where needed, develop additional affordable and accessible training programs such as apprenticeships, certificates, stackable credentials, and concurrent degrees. Provide training to natural land managers in securing, retaining and supporting employees.

Strategy: Address biomass for thermal heat regarding climate mitigation, co-benefits, and its impacts

* If such facilities operations cannot be sufficiently improved to address their negative footprint on adjacent neighborhoods and communities and ensure that they are producing net GHG emission reductions, then such facilities should be closed and sufficient training for employees to transition to forestry and renewable energy jobs should be provided.

**State Government, Community, and Partner Capacity**

Many actions throughout this Climate Action Plan identify the need for new programs and policies without explicitly calling out how those new requirements would impact the existing capacity of the organizations that would support those efforts. Achieving our emissions requirements and adaptation, resilience, and sequestration targets in a way that is equitable, affordable, cost effective and sustainable will require that we to pursue every available opportunity to dramatically reduce greenhouse gas emissions. The challenge is immense, and the Council acknowledges that the existing capacity of state government, and partner organizations such as the Community Action Agencies, Regional Planning Commissions, watershed groups, etc. will need to be adequately resourced to tackle the challenge.

The steps and action needed to implement this plan and to impact climate action will take significant work and coordination across state agencies, private and non-profit partners, municipalities, and impacted communities. To that end, the Council recommends the following actions:

1. Create a climate director position in the executive branch to lead an interagency entity charged with:

* Collecting and analyzing data
* Planning and overseeing program implementation over time in assistance to the Council.

1. Expand state government's capacity - in coordination with RPCs and municipalities to support integrated climate action planning and implementation.

As this Plan is implemented, implementors should ensure that the existing capacity of organizations to take on actions identified within this Plan is considered when policies and programs are developed. In addition, the Council has identified the need to further build out the recommendations around state government, community, and partner capacity, to ensure careful thought is put into how, and at what level, actions are assigned and implemented.

**Building Codes**

Throughout the Climate Action Plan, recommendations regarding building codes and standards can be found in GHG mitigation, and climate adaptation and resilience sections, highlighting building codes as a cross cutting theme in this Climate Action Plan. Whether it be for energy efficiency, ability to handle increased electrification demands, renewable energy siting, or for increased resilience to the impacts of climate change, building codes and standards stand out as an important tool to address climate change.

Outside of larger municipalities, many Vermont towns do not have buildings codes, or lack the ability to enforce them. The actions listed below reflect the initial recommendations from the Climate Council regarding building codes and standards. The Council however acknowledges that additional work will need to be done to develop a set of recommendation regarding building codes that wholistically recognize the importance of codes and standards to impact emissions reduction and resilience to climate change impacts.

**Actions**

* Authorize the adoption of efficiency standards for rental properties, beginning with expanding the definition of “fit for human habitation” in 9 V.S.A. § 4457(a) by developing and passing legislation requiring owners of [a TBD minimum number of units] of rental housing to ensure that the efficiency of their rental units meets minimum standards [TBD efficiency code level] by December 31, 2030.
* Regularly update the statewide residential building energy code, resulting in achieving a net zero building energy code by 2030.
* Develop and fund a state-level Energy Code Circuit Rider initiative that provides code training and enforcement assistance to municipalities throughout Vermont to ensure awareness of and compliance with existing and future building energy codes.
* Audit existing residential building codes to ensure that standards account for anticipated climate change impacts to Vermont, including but not limited to increased temperatures extremes and precipitation.
* Develop sample building standards for resilient design and construction.
* Revise state building energy codes and standards to require a minimum 200 Amp service for new construction as electrification expands.
* Incentivize or mandate solar and wind capacity on new buildings as well as in previously disturbed/developed areas and avoid and minimize forest clearing for renewables through incentives and other siting polices, rules, and regulations.

1. <https://fpr.vermont.gov/sites/fpr/files/About_the_Department/News/Library/FOREST%20FRAGMENTATION_FINAL_rev06-03-15.pdf> [↑](#footnote-ref-2)
2. <https://www.vtrural.org/sites/default/files/content/futureofvermont/documents/VTTransitions_Ch3.pdf> [↑](#footnote-ref-3)
3. 24 V.S.A. § 4302, 10 V.S.A. § 6086, 24 V.S.A. § 2793c, 24 V.S.A. § 2791, 10 V.S.A. § 6301, 10 V.S.A. § 6604c, Act 183, Act 171 [↑](#footnote-ref-4)
4. https://ejatlas.org/# [↑](#footnote-ref-5)
5. Richardson, Rashida and Schultz, Jason and Crawford, Kate, Dirty Data, Bad Predictions: How Civil Rights Violations Impact Police Data, Predictive Policing Systems, and Justice (February 13, 2019). 94 N.Y.U. L. REV. ONLINE 192 (2019), Available at SSRN: <https://ssrn.com/abstract=3333423> [↑](#footnote-ref-6)
6. https://www.adalovelaceinstitute.org/blog/structural-racism-impact-data-ai/ [↑](#footnote-ref-7)
7. See Table 10 on page 36. <https://dec.vermont.gov/sites/dec/files/aqc/climate-change/documents/_Vermont_Greenhouse_Gas_Emissions_Inventory_Update_1990-2017_Final.pdf> [↑](#footnote-ref-8)
8. <https://www.healthvermont.gov/sites/default/files/documents/pdf/HS_STAT_2018_Population_Estimates_Bulletin.pdf> [↑](#footnote-ref-9)
9. See page 10, <https://www.eanvt.org/tracking-progress/annual-progress-report/2019-progress-report/> [↑](#footnote-ref-10)
10. Vermonter’s consumption of goods that are produced elsewhere are not accounted for in Vermont’s in-boundary emissions inventory but also play a role in global climate pollution. Therefore, being aware of the carbon footprints of consumer purchases and opting for more climate friendly alternatives can play a role as well. [↑](#footnote-ref-11)
11. It is important to note that wealthier households, on average, create much more climate pollution than lower-income households. See: <https://www.pbs.org/newshour/science/5-charts-show-how-your-household-drives-up-global-greenhouse-gas-emissions> [↑](#footnote-ref-12)
12. While individual Vermonters may have specific and important opportunities to reduce climate pollution and/or preserve carbon sinks by virtue of individual circumstances, for instance their profession (such as farming) and/ or other factors (like being a forest-land owner), this section focuses on actions that are available to the vast majority of Vermonters. [↑](#footnote-ref-13)
13. See page 8, <https://www.eanvt.org/tracking-progress/annual-progress-report/2021-annual-progress-report/> [↑](#footnote-ref-14)
14. Federal Highway Authority: Highway Statistics, 2019. [↑](#footnote-ref-15)
15. See page 16, <https://www.eanvt.org/tracking-progress/annual-progress-report/2021-annual-progress-report/>

    Here again, wealthier households are responsible for more pollution, with Northeastern US households earning over $100,000/ year driving about 50% more miles/year than households earning under $25,000/year. See slide 21 here: <https://legislature.vermont.gov/Documents/2022/WorkGroups/Senate%20Natural%20Resources/Energy/W~Jared%20Duval~Energy,%20Emissions,%20Economy,%20Equity~2-3-2021.pdf> [↑](#footnote-ref-16)
16. The data bear this rough estimate out whether you divide statewide transportation emissions by total population (top-down estimate) or whether you add up transportation emissions using, for instance, total VMT and average fleet fuel efficiency (bottom-up). [↑](#footnote-ref-17)
17. Page 22, <https://www.eanvt.org/tracking-progress/annual-progress-report/2021-annual-progress-report/> [↑](#footnote-ref-18)
18. For example, on the health benefits of weatherization: <https://www.healthvermont.gov/sites/default/files/documents/pdf/ENV_CH_WxHealth.pdf> [↑](#footnote-ref-19)
19. <https://publicservice.vermont.gov/sites/dps/files/documents/A%20Vermonter%27s%20Guide%20to%20Residential%20Clean%20Heating%20and%20Cooling%20%282021%29.pdf> [↑](#footnote-ref-20)
20. For proper safe and proper disposal of equipment containing refrigerant, see: <https://www.efficiencyvermont.com/news-blog/news/no-cost-curbside-appliance-recycling-helps-free-up-space-bring-in-cash> and <https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/SWRule.final_.pdf> [↑](#footnote-ref-21)
21. See: <https://www.pbs.org/newshour/science/5-charts-show-how-your-household-drives-up-global-greenhouse-gas-emissions> [↑](#footnote-ref-22)
22. For more on the difference between in-boundary emissions vs. consumption-based emissions, see Appendix … (EFG paper on the GHG Inventory and Supplemental Analysis). [↑](#footnote-ref-23)
23. A clean energy job is defined as any worker that is directly involved with the research, development,

    production, manufacture, distribution, sales, implementation, installation, or repair of components,

    goods, or services related to the following sectors: Renewable Energy Generation; Clean Grid and Storage;

    Energy Efficiency; Clean Fuels; and Clean Transportation. These jobs also include supporting services such

    as consulting, finance, tax, and legal services related to energy. <https://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/2020%20VCEIR%20Final.pdf> [↑](#footnote-ref-24)
24. <https://publicservice.vermont.gov/sites/dps/files/documents/Renewable_Energy/CEDF/Reports/2020%20VCEIR%20Final.pdf> [↑](#footnote-ref-25)