

## **Appendix 14**

### **Pathway, Strategy, and Action Matrices**

Appendix 14 contains the pathways, strategies, and actions discussed in the Agriculture & Ecosystems subcommittee during the development of the Initial Climate Action Plan (CAP). Actions were prioritized using the framework outlined in Appendix 5. Appendix 14 includes all the recommendations subcommittees discussed, regardless of whether they were included in the narrative of the Climate Action Plan.

All actions listed in the matrices not included in the final CAP narrative were discussed and important to be listed by the subcommittees but may not have full consent of all members of the Subcommittee. Specifically, actions that were not prioritized for inclusion in the CAP may or not enjoy consensus approval but were not advanced at this time due to the parameters imposed by the prioritization framework. See Appendix 5 for more details on the prioritization framework.

**Agriculture Pathways for Mitigation**

Pathway A - Mitigation: Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse			
ID	Strategy + Action	In Narrative	Notes
	Leverage, expand, and adapt existing State of Vermont programs that support the agricultural sector's mitigation of climate change through: <ul style="list-style-type: none"> <li>i. The prevention of emissions to the atmosphere by conserving existing carbon pools in soils or vegetation, or by reducing emissions of methane (CH4) and nitrous oxide (N2O);</li> <li>ii. Sequestration—by increasing the size of existing carbon pools, and thereby extracting carbon dioxide (CO2) from the atmosphere; and</li> <li>iii. Substitution—substituting biological products for fossil fuels or energy-intensive products, thereby reducing CO2 emissions.</li> </ul>		
a	Implement agronomic practices that reduce tillage and increase vegetative cover, e.g., no-till, cover crop.	X	
b	Expand Capital Equipment Assistance Program (CEAP) program to extend beyond water quality and incorporate climate change criteria	X	
c	Implement grazing practices that increase vegetative cover and forage quality, e.g. rotational grazing.	X	
d	Implement agroforestry and silvopasture practices that integrate woody vegetation in agricultural production.	X	
e	Implement edge-of-field practices that increase herbaceous and woody vegetation, e.g. riparian forest buffer (e.g. CREP).	X	
f	Implement natural resource restoration practices that support climate mitigation and resilience, including river corridor easements, wetland restoration, and afforestation practices with conservation to agricultural land loss.	X	
g	Implement Nutrient Management and Amendments (e.g., biochar, compost) on cropland and grazing land.	X	
h	Implement methane capture and energy generation on farms, e.g., anaerobic digesters and covers.	X	
i	Research and pilot improved manure management and storage programs.	X	
j	Research and develop a climate feed management program, including both feed amendments (e.g. seaweed, biochar) and feed quality (e.g. forage quality) to reduce enteric methane emissions; consider downstream impacts, sustainability and equity	X	
	Practices that create or enhance pollinator habit, wildlife habitat and biodiversity		
	Quantify the Required Agricultural Practices (RAPs) to climate change mitigation benefits		
	Coordinate with federal NRCS cost-share programs to elevate climate mitigation practices in Vermont, e.g. silvopasture, alley cropping, forest farming		
<b>Create a system for tracking and accounting metrics and indicators for natural and working lands</b>			
a	Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance Report. The Clean Water Initiative Performance Report “summarizes the State of Vermont’s clean water efforts and demonstrates how investments are making a difference through accountability measures.” As mentioned, most water quality conservation practices and programs also have climate mitigation, resilience, and adaptation benefits. Recommend using existing tracking systems and quantify the climate benefits from this existing implementation and data tracking. The data spans state and federal funding programs and regulatory programs that drive clean water efforts and coordinates across agencies to track these efforts and monitor progress.	X	
b	The Vermont Climate Council has recommended developing and issuing a Request for Proposals (RFP) that will review and analyze methodological gaps of emission inventory tools currently used by the State of Vermont to quantify greenhouse gas emissions for evaluating changes in the Agriculture, Forestry and Other Land Use (AFOLU) sector and the tools’ alignment with the Intergovernmental Panel on Climate Change (IPCC), Environmental Protection Agency (EPA), and peer state methodologies and approaches. The specific recommendations for this RFP can be found in the Carbon Budget Report memo found in Appendix 10.	X	
c	Based on the findings of the technical RFP mentioned in action step (b) of this strategy, the VCC should consider recommending that the State of Vermont GHG emissions inventory protocol established in 10 V.S.A. § 582 be amended to include an inventory of GHG emissions that align with the intent and standards of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories that will include a net GHG emission accounting for the agriculture, forestry and other land use (AFOLU) sector.	X	
<b>Implement a Payment for Ecosystem Services (PES) program for natural and working lands</b>			
a	Develop and implement a PES program for healthy soils and soil carbon sequestration on farms. Act 83 of 2019 convened the Payment for Ecosystems Services Working Group whose purpose is to recommend financial incentives designed to encourage farmers in Vermont to implement agricultural practices that improve soil health, enhance crop resilience, increase carbon storage and stormwater storage capacity, and reduce agricultural runoff to waters. Final program recommendations from the PES Working Group are due in January 2023.	X	
b	Develop and implement a PES program for forestland owners including water filtration/cycling, carbon sequestration, etc.	X	
c	Incentivize management for ecosystem services through a tax credit system that compensates landowners/managers for maintaining or restoring ecosystem services.	X	
	Develop dedicated funding to support climate-smart whole farm water resource management changes		
<b>Address upstream waste and downstream emissions from food waste and synthetic fossil-fuel based inputs</b>			
a	Develop program for tracking and limiting the use of chemicals, substances, or products that contribute to climate change in Vermont and leverage existing legislative activity on this topic <ul style="list-style-type: none"> <li>i. VAAFM currently tracks statewide commercial pesticide use as well as statewide fertilizer use. This data is currently used to establish trends in the use of these inputs as our agricultural systems evolve.</li> <li>ii. Programs to track these agricultural inputs already exist at VAAFM but have not been assessed through the lens of contributions to climate change. VAAFM or the new newly established Agricultural Innovation Board (AIB) established by Act 49 of 2021 can prioritize an assessment of the impacts and benefits our agronomic management systems have on offsetting climate change.</li> <li>iii. An assessment of Vermont’s different agronomic practices and management, such as, conventional, organic, no-till, and cover cropping, should be weighted for impacts on climate change based on agricultural inputs, fuel consumption, carbon sequestration and other measurable factors</li> </ul>	X	
b	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). <ul style="list-style-type: none"> <li>i. 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</li> </ul>	X	
<b>Develop and implement programs which incentivize management practices which maintain or increase forest carbon storage</b>			
a	Create or adopt existing certification standards where management activities account for principles of Improved Forest Management towards increased carbon storage, as well as maintaining and creating resiliency (as described in existing state guidance such as <i>Maintaining and Creating Resilient Forests in Vermont: Adapting Forests to Climate Change</i> , VTFFPR 2015, or as modeled in existing programs such as the <i>American Forest Foundation’s Family Forest Carbon Program</i> ).	X	
b	Apply these certification standards to the procurement of forest products utilized in energy or thermal generation facilities subject to PUC oversight (parallel to the existing review for state mapped deer winter yard, etc.) through potential revisions to the renewable energy standard.	X	
c	Explore additional market opportunities for certified products, expanding the potential revenue base to support Improved Forest Management (parallel FSC, SFI, etc.)	X	
<b>Leverage market-based solutions, such as existing or new regional carbon market opportunities, to incentivize forest management</b>			
a	Work to develop a new Vermont-Based or regional (modeled on RGGI) Carbon Credit marketplace with necessary research and standards which address concerns around the efficacy of baseline establishment, accounting for additionality, the potential for leakage, and address equity for the diversity of wood lot owners across the state	X	
b	Incentivize in-state purchase of carbon credits developed by Vermont-based or regional carbon projects through a system which addresses concerns of accounting (i.e. additionality and leakage)	X	
	Allow inflation adjustment on the original cost of timber through legislative change to income tax policies which allow adjustments for inflation in the basis (original cost) of timber owned by forest landowners. This would tax landowners on the real gain (not inflationary gain) from selling timber, thereby recognizing the long-term nature of forest land investments. This recommendation refers to timber revenue only, not timber land revenue. The inflation rate should be chosen through one of the existing mechanisms (Consumer Price Index, Treasury bill rate, or similar means).		
<b>Increase tree coverage</b>			
a	Expand tree and other planting efforts on private land to promote restoration efforts to reforest riparian areas, wetland buffers, and degraded lands	X	
b	Expand funding and support to the Vermont Community Canopy Program	X	

c	Provide incentives for restoration and expansion of floodplain forests	X	
d	Increase funding to tree planting via Renewable Energy Standard (RES).	X	
e	Increase support, funding, and education for increased urban tree planting efforts expansion to increase access to natural spaces and improve carbon sequestration/storage in the urban environment	X	
f	Promote planting of future climate adapted tree species		
g	Start fund with small trees and shrubs that can be given out on Green up day or Earth day to be planted in riparian areas		
h	Create a state tree nursery program and support a network of regional, publicly supported nurseries, that are well sited		
i	Increase tree cover along road corridors through reduced mowing (allows for woody plant growth, reduces fossil fuel use and reduces spread of invasive species) while attending to safety considerations for driving		

Pathways for Adaptation and Building Resilience in Natural and Working Lands

**Pathway 1 - Adaptation: Sustain, restore, and enhance the health and function of Vermont's natural and working lands to help both natural and human communities adapt to**

ID	Strategy + Action	In Narrative	Notes
<b>Increase technical assistance, capacity, education, and resources to support private and municipal forestland owners, planners and managers for climate change adaptation</b>			
a	Enhance and support funding for technical assistance to farmers (e.g. fully fund UVM Extension to support climate adaptation training for agriculture and support other institutions of higher education in this endeavor), landowners (e.g. fund climate adaptation training through FPR's Forests & Climate program), and municipalities (e.g. fully implement Act 171).	X	
b	Increase funding to Regional Planning Commissions (RPCs) to hire and support natural resource staff, potentially through Natural Resource Conservation districts.	X	
c	Develop & fund climate adaptation planning and training for all farmers and foresters.	X	
<b>Promote and incentivize Climate-Adaptation forest management practices</b>			
a	Develop education/outreach materials and training regarding climate adaptation forestry specific for Vermont forest types and conditions.	X	
b	Where appropriate, promote planting future climate adapted tree and crop species	X	
c	Make the state guide to maintaining and creating resilient forests more usable	X	
d	Develop a 'pay-for-practice' incentive program and explore state tax policy incentives for forest landowners and farmers to adopt climate adaptive management practices	X	
e	Evaluate opportunities to reduce fluvial erosion and degraded headwater storage by either supporting forest road restoration efforts via expansion of funding to programs to fix old logging/forest roads (e.g. NRCS) or seeking opportunities for strategic abandonment/retirement.		
f	Provide permanent long-term funding to FPR's Forests and Climate program		
<b>Promote funding for nature-based solutions and traditional ecological knowledge efforts and incorporate into state funding and planning efforts</b>			
a	Complete a statewide audit of technical assistance, funding, and regulatory programs to review support for NBS and TEK and assess the degree to which they support or hinder climate adaptation, and use the findings to create planning and/or funding prioritization criteria that better align state programs	X	
b	Develop financial mechanisms (e.g. a revolving loan fund, green bank, loan guarantees, pension fund investments, etc.) to de-risk capital investment in and support for NBS and TEK projects	X	
c	Elevate the role traditional ecological knowledge (TEK) plays in climate adaptation and resilience and incorporate TEK into state-led climate assessments, planning efforts, and prioritization frameworks	X	
d	Incentivize nature-based solutions and traditional ecological knowledge (TEK) in state regulatory processes and funding programs	X	
e	Include Tribal members, traditional ecological knowledge traditional ecological knowledge (TEK), youth in state, regional and municipal resource management planning	X	
<b>Manage natural and working lands-for biodiversity, forest health and climate resilience</b>			
a	Fund increased investment in healthy soils education and implementation of practices	X	
b	Enhance resilience funds to support the financial capacity of land managers to respond and adapt to natural hazard and climate impacts	X	
c	Fund support for local academic institutions, researchers, and applied research to evaluate best climate management practices for our lands	X	
d	Support research efforts to better understand forest ecosystems, local climate change and impacts to forests and ecosystem services	X	
e	Incentivize and provide appropriate support for invasive species control efforts, specifically where populations threaten the perpetuation of forest cover	X	
f	Through direction to VT Fish & Wildlife and VT Forests, Parks and Recreation, establish primary land management objectives of protecting and improving forest health and biodiversity on state lands, and private lands enrolled in UVA; and promote adoption of these objectives through outreach to regional and municipal planners.	X	
<b>Plan and regulate for climate resilience and adaptation</b>			
a	Establish "climate resilience zones" informed by existing data, bolstered with new research/science, to identify locations that have high resilience potential for both the natural and built environments and use to inform land use development and regulations	X	
b	Per the formula in statute, fully fund Regional Planning Commissions (RPCs) to ensure sufficient capacity necessary to address climate change in regional and municipal plans	X	
c	Support a lakes and ponds climate mitigation & adaptation fund to mitigate climate change impacts on and in these water bodies		
d	Invest transportation funding in improving flood resilience and aquatic & terrestrial connectivity		
e	Support further development of flood mapping/modeling tools for state and municipal use/planning		
f	Incentivize water storage in natural areas to promote flood resilience and biodiversity through expansion of wetland easements to better compensate landowners/managers		
g	Ensure opportunities for floodplain reconnection and nature-based solutions are considered a high priority in the Statewide Conservation & Buyout Program through incorporation of multi-stakeholder developed prioritization criteria		
h	In future versions of the Vermont Climate Plan, develop specific indicators and metrics (targets) for the following: X% reduction in total VT food waste; Net gain in X in ag lands by Y date; Net gain of X in forest cover by Y date; X% reduction in annual blue green algae blooms; X% of wood used in Vermont is grown in VT forests; and sustainability goals for on-timber forest products (i.e. fiddleheads, other).		
i	Create a mechanism, position, or body within the Executive Branch to ensure coordinated climate action across state government with just transitions and environmental justice expertise. This interagency body or mechanism is intended to connect actions both within and beyond the scope of the GWSA-required Climate Action Plan, with a goal of ensuring effective communication across agencies that work together to promote climate change mitigation/adaptation/resilience, and adding a consistent climate lens to the myriad of regulatory and funding programs.	X	MOVED TO CROSS-CUTTING ISSUES, STATE GOVERNMENT, COMMUNITY, AND PARTNER CAPACITY SECTION
j	Encourage the Legislature to authorize the creation a multi-stakeholder committee process with funding to support the development of a statewide land use planning policy and implementation plan that guides development to growth areas, town centers, and appropriate rural locations, and limits the development within ecologically sensitive/risk-prone areas. The Legislature should clarify how and if this plan informs or directs land use planning, policy and regulation at the local, regional, and state level.	X	MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
k	If a statewide land use planning policy and implementation plan is authorized, explore creation of a State Planning Office and/or other potential structures within the executive branch to implement the Plan at the state level.	X	MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
<b>Increase flood resilience of the natural and built environments</b>			
a	Incentivize water storage in natural areas to promote flood resilience and biodiversity through expansion of wetland, floodplain, and/or river corridor easements that better compensate landowners/managers	X	
b	Ensure opportunities for floodplain reconnection and nature-based solutions are considered a high priority in the Statewide Conservation & Buyout Program through incorporation of multi-stakeholder developed prioritization criteria	X	
c	Invest transportation funding in improving flood resilience and aquatic and terrestrial connectivity	X	
d	Incentivize "no mow" buffer along water bodies, including such actions as riparian forest buffer plantings		
<b>Promote healthy, connected river corridors, floodplains and wetlands</b>			
a	Support and fund research and design to strategically invest in floodplain and river corridor reforestation efforts. Specifically, develop an inventory of priority/critical headwater and floodplain storage areas, prioritize investments for restoration and protection in these areas, and use to inform Compact Settlement planning efforts	X	
b	Expand support for riparian buffer enhancements to easements with a goal of increasing the amount of vegetation and biodiversity in riparian areas	X	
c	Increase support for wetland restoration and protection	X	
d	Invest in reconnecting floodplains (e.g. removal of berms)		These are in part captured in the three actions above
e	Upgrade VT Wetlands Maps and map vernal pools to more accurately inform planning efforts		These are in part captured in the three actions above
f	Support research to measure the value(s) of wetland buffers and use findings to identify opportunities to increase wetland buffers, with a focus on increased incentives for Class II wetlands and vernal pools		These are in part captured in the three actions above
g	Increase funding for wetland tree/shrub planting		These are in part captured in the three actions above
h	Decrease tile drainage in wetland restoration potential areas		
<b>Support research efforts to better understand forest ecosystems, local climate change and impacts to forests and ecosystem services</b>			
a	Research the connections between forest mortality, deadwood and litter on fire, and use findings to identify wildfire-vulnerable areas		
b	Use remote sensing to track forest loss (conversion), forest disturbance, tree mortality, fire, carbon stocks, and forest gain each year		
c	Provide long term funding to plot-based forest monitoring efforts		

Pathways for Adaptation and Building Resilience in Natural and Working Lands

Pathway 2 - Viability: Support and empower Vermont's natural and working lands owners, managers, and caretakers to enhance farm and forest viability and to make informed decisions to increase			
ID	Strategy + Action	In Narrative	Notes
	Support and enhance local food markets for greater viability, mitigation, and resilience benefits.	X	
	Foster partnerships at all levels (state, federal, nonprofit, and private sector): essential to recognizing, capacitating, and building strategies for farmers to address climate change and enhance community resilience.		
a	Dedicate funds to support Vermont Natural Resources Conservation Districts and farmer watershed organizations with the specific objective of allowing them to reach other farmers and do farmer-to-farmer education about improved soil and manure management.	X	
b	Maintain Ag & Ecosystems Subcommittee through development and implementation of GWSA and CAP to cultivate, build and reinforce state, federal, nonprofit, and private sector collaborations	X	While this is in our recommendations, the intensity and effort required of subcommittee members has been extensive and unanticipated. The degree to which current members can continue is not known at this time.
c	Fund a research project to fully understand household food insecurity in Vermont and how to invest in its elimination. The design and implementation of the research project should engage academics, advocacy groups, and impacted individuals, and include research on geographic spread, root causes, and costs to the health care, educational, and emergency response systems (as written in the 2021-2030 F2P Strategic Plan pg. 158). (collaborate with Hunger Free Vermont, Vermont Foodbank, VT Releaf Collective)	X	
d	Work closely with USDA NRCS's 2021 Action Plan for Climate Adaptation and Resilience to leverage resources and increase efficiencies of practice education and implementation	X	
e	Workforce support organizations and trade associations should develop a model for sharing services between food system businesses of different sizes (as written in the 2021-2030 F2P Strategic Plan pg. 166).		
f	Train farm and food business advisors to assist their clients with evaluating the cost of turnover and labor shortages and budgeting for the level of compensation needed to attract and retain workers (as written in the 2021-2030 F2P Strategic Plan pg. 166).		
g	One additional full-time business and technical assistance advisor specializing in small animal livestock production is needed at UVM Extension. The advisor would provide production assistance for poultry operations and other agribusinesses on breeds, nutrition, animal health, incubation rates, biosecurity practices, and regional and national market access. Cost: \$100,000 annually		
h	Create an education and outreach program to improve pork production and land management across production systems. In order to staff an outreach effort, UVM Extension would need an additional 0.5-1.0 FTE, with the balance of time used to build partnerships between producers, producer organizations, and additional swine resource personnel. Cost: \$50,000-\$100,000		
i	Invest in sample business plans, market analyses, and financial benchmarking tools for emerging business models such as grass-fed beef, hemp/CBD, pork, and value-added dairy products. Cost: \$250,000 over three years.		
j	Increase development of cost-benefit analyses for climate smart agricultural practices to incentivize implementation		
k	Provide funding to support 2 additional FTEs with the Farm and Forest Viability Program. Provide training to ensure adequate knowledge of all options for natural land management that can increase farm sustainability (e.g. land conservation and restoration programs for low productivity acreage)		
l	Fund a program that will help farmers try new practices without fear of economic loss (e.g. BMP challenge concept from 2018 VT climate action plan)		
	Expand funding for existing programs dedicated to farmland access, forestland ownership, and conservation, and leverage this funding to increase land access through flexible and new ownership financing mechanisms, policies, and models		
a	Investigate innovative funding mechanisms for assisting with implementation of climate smart agriculture practices, crop insurance for diversified Vermont-scale farms, and emergency recovery following extreme weather events, to better respond when climate change related events occur	X	
b	Assist food and farm businesses with navigation of municipal and state permit requirements and regulations. This will create a more supportive environment for business growth and diversification, especially as it relates to on-farm accessory businesses, farm employee housing, and development of off-farm processing, distribution, and storage infrastructure (as written in the 2021-2030 F2P Strategic Plan pg. 33).	X	
c	Research "land grabs" and identify what are potential policy options to prohibit or reduce them. Ensure that our funding of VHCB/VLT/VT Releaf Collective allows for them to be more nimble to counteract this trend. Land Grabs are defined as major purchases of farm land, forests, or water by non-farming or non-forestry interests for the purposes of speculation, investment, or other activities not focused on working land activities.		
d	Agricultural lending incentives (e.g., concessional loans with adjusted interest rates) through ag-specific lenders (VACC, FSA) and traditional lending institutions (banks, credit unions) for agricultural enterprises adopting climate smart practices		

Pathways for Adaptation and Building Resilience in Natural and Working Lands

**Pathway 3 - Economies: Grow and connect local, sustainable natural and working lands economies, markets, and food systems, while ensuring and providing equitable access to said economies, markets, and food systems for Vermont's people.**

ID		In Narrative	Notes
Develop, expand, and sustain local markets specifically for food, agricultural, and forest products in ways that ensure the alleviation of food insecurity and local food access.			
a	Support robust funding for Working Lands Enterprise Initiative and prioritize funding to businesses that have climate/low carbon goals	X	
b	Develop a strategic plan for the forest economy, modeled on the Farm-to-Plate strategic plan but improved to better incorporate impacted stakeholders and principles of equity, as well as examining our current language and approach to forest management.	X	
c	Develop supply chain substitutions which better support local products	X	
d	Support research and development efforts, and expansion of new markets and opportunities for local wood products processing and manufacturing in Vermont	X	
e	Develop alternative markets for residue, by-products and otherwise not used wood, focusing on cellulose insulation, bioplastic composites, or biofuels	X	
f	Research the efficacy of food hubs as public infrastructure (e.g libraries and public infrastructure)	X	
g	Map Vermont's agricultural land base and production capacity, including geographic data about predicted climate change impacts, aggregation and distribution infrastructure, and regional dietary needs (as written in the 2021-2030 F2P Strategic Plan pg. 32)	X	
h	Provide additional support for critical programs that help Vermont's agricultural sustainability and ability to address climate issues including: <ul style="list-style-type: none"> <li>• Support the growth of VAAFM Meat Inspection and Agricultural Development programs, which will help expand Vermont products into the regional marketplace and develop consumer education and public awareness campaigns around the steps involved in getting meat products from farm to table;</li> <li>• Fund a pilot aggregation and sales system that effectively serves both the charitable food system and institutional and other market channels, through a structured partnership among established processors, aggregators, and gleaners. The pilot would include data collection on specific marketable surplus food products;</li> <li>• Support the Vermont Farm to School Network;</li> <li>• Support organizations in the charitable food system to source food directly from Vermont farmers;</li> <li>• Create a Local Food Access Funding Program;</li> <li>• Develop a distribution and logistics infrastructure investment plan to guide strategic transportation investments with the express purpose of improving the efficiency and cost-effectiveness of in-state and regional food distribution. Include a business plan analysis for a public/private Vermont wholesale terminal market that would provide cross-docking, cold storage, and logistical service between Vermont producers and regional wholesale buyers;</li> <li>• Using the infrastructure study as a guide, increase public-private investment in intermediated market distributors to improve operational efficiencies and overall sales through improved marketing, infrastructure, route optimization and shared transportation-management software, and access to logistics professional development and consulting.</li> </ul>	X	
i	Develop, expand, and sustain local markets specifically for food, agricultural, and forest products in ways that ensure food sovereignty and security and provide for all Vermont's peoples		
j	Coordinate with NRCS to include climate planning as part of Land treatment planning and Nutrient management plans. Develop and fund a CAP (NRCS conservation action plan) for climate that will suggest climate smart practices and address ways to improve resiliency.		
	The Vermont Legislature should fund an appropriation of \$500,000 a year to enable organizations in the charitable food system to source food directly from Vermont farmers (e.g., Vermonters Feeding Vermonters).		
	Using the infrastructure study as a guide, increase public-private investment in intermediated market distributors to improve operational efficiencies and overall sales through improved marketing, infrastructure, route optimization and shared transportation-management software, and access to logistics professional development and consulting. Cost: \$500,000-\$1,000,000 over three years.		
<b>Promote workforce development in all working lands sector along all points of the supply chain</b>			
a	Develop, endorse and implement fair trade and equitable labor practices and just livelihoods for the natural and working lands sector	X	
b	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	X	
<b>Strengthen all aspects of working lands' supply chains and the associated infrastructure to support them.</b>			
a	Make significant investment in storage, processing, and distribution infrastructure in order to enhance product innovation and quality across all Vermont food and forest products.	X	
b	Support product-specific value chain development through facilitation of producer, distributor and buyer matchups and supporting producer-driven aggregation, distribution, and marketing enterprises.	X	
<b>Ensure equitable access to local foods, culturally relevant foods, land, funds, grants, and technical assistance for people who have</b>			
a	Build out and utilize TEK to build out connections to our Tribal and Indigenous communities in the development and utilization of traditional products, e.g. birch syrup, sumac spices, etc.	X	
b	Uplift and resource the work of the Vermont Releaf Collective and other BIPOC led organizations	X	
c	Improve funding opportunities and create equitable access for BIPOC organizations and BIPOC owned businesses by developing multi-year, unrestricted BIPOC centered grants and loan programs.	X	
<b>Develop a Vermont food security plan, centered around a thriving food system, and inspired by community-based responses to food</b>			
a	Involve food insecure individuals as well as farmers in the planning, and investigate questions including, but not limited to, affordable housing, health care, transportation, siting of retail grocery stores, food distribution, and ensuring the continued production of food in Vermont.	X	
b	Work to adopt state and regional level policies, procedures, and plans to ensure that the Vermont food supply is sufficient to withstand global or national food supply chain disruptions caused by climate change and other disasters (as written in the 2021-2030 F2P Strategic Plan pg. 32).	X	
<b>Provide greater support and capacity for energy transformation on working lands enterprises for greater efficiency and increased</b>			

Pathways for Adaptation and Building Resilience in Natural and Working Lands

**Pathway 4 - Landuse: Shape land use and development that support carbon sequestration and storage, climate resilience and adaptation, and natural and human communities for a sustainable and equitable future**

ID	Strategy + Action	In Narrative	Notes
<b>Promote and incentivize compact settlement and reduce forest fragmentation.</b>			
a	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.	X	
	Develop required climate-based framework and/or criteria for state grant and regulatory programs.	X	This is addressed in part in the Cross-Cutting in the final VCC report (Page 220) where it talks about compact settlements in waterways and the need to improve resilience, manage flooding and erosion, etc. Also on Page 223-223 has recommendation: "Provide statewide guidance and incentivize housing in built up areas to encourage development away from open fields, forest and river corridors"
	Update Act 250 to include 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; and revise Act 250 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 immigration of climate refugees.		MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
	Amend Act 250 to exempt certain state designated centers in order incentivize compact, dense settlement in areas with adequate local land use laws and existing infrastructure, taking pressure off greenfield and forested locations.		MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
	Reduce regulation of development in downtowns and village centers to cluster development. Remove barriers to (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 greenfields and river corridors.		MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
	Incentivize, prioritize, and/or require development in growth areas and town centers to achieve Compact Settlement (must include investment in water/wastewater infrastructure planning and siting).		MOVED TO CROSS-CUTTING ISSUES, COMPACT SETTLEMENT SECTION
	Support town and cities through technical assistance, incentives, and other means seeking to separate stormwater and sewage systems through MS4 permits and other means to ensure that wastewater is not discharged into water bodies during increased precipitation and more intensive storm events expected from climate change.		
	Tailor smart growth and compact settlement incentives and regulations, including reducing minimum lot sizes, for downtown areas and other dense development, to account for these areas that are under or will be soon under threat of repeat flooding and damage (e.g., Brandon, Wilmington)		
<b>Include biodiversity and resilience goals in the planning and management of natural and working lands (both public and private).</b>			
a	Improve statewide forest planning efforts on State and Federal Lands, including development of an action plan by ANR for how State Lands will help accomplish Vermont Conservation Design targets by 2030 and 2050, and collaborate with the U.S. Forest Service (Green Mountain National Forest) planners for more unified forest planning across the state.	X	
b	Support efforts to research, educate about, and implement practices informed by traditional ecological knowledge such as using fire to promote regeneration and coppicing, where appropriate for Vermont's forests and ecosystems	X	
c	Examine the implications and consider establishing a state policy of no net-loss of natural and working lands (including active and passively managed forests, agricultural lands, and wetlands) accounting for the transitions of lands within and between these conditions, with aspiration for a net gain. (1) As part of this effort, track land use trends to quantify degree of no net-loss, including aggregating data on subdivision, land transfers, and the loss and/or fragmentation of forests, agricultural lands and wetlands to inform progress and state policy. (2) Develop a strategy to increase the area of land in functioning wetlands, with an initial focus on protecting and recovering the highest quality wetlands ("Class 1 Wetlands" in ANR's wetlands rules), consistent with the goal of ensuring no net loss of other categories of natural and working lands.	X	
d	Recommend amending the Use Value Appraisal (UVA) program to allow for (1) greater development of old forest structure as articulated in the targets of Vermont Conservation Design; (2) the enrollment of wildland reserves under the existing forestland category where conditions and eligibility criteria are met as defined by Forest Parks and Recreation, facilitating the development of old forest conditions through active restoration and/or passive management as a means of enrollment in the Old Forest ESTA (ecologically significant treatment area) category; (3) privately held parcels with 'Forever Wild' easements on them, held by a qualified 501c(3), to be enrolled in the UVA Program in the Conservation Category; and (4) the potential for, and implications of, developing a new category of enrollment for land in UVA which allows for passive management modeled on the 'open-space' designation included in similar programs elsewhere in New England.	X	
e	Identify lands needing conservation because they are in or adjacent to the built environment that have large impact to human health, wellbeing, and equity	X	
f	Adopt legislation to authorize ANR to revise the Flood Hazard Area & River Corridor (FHARC) rule to incorporate statewide jurisdiction and permitting authority for river corridors for all kinds of development.	X	
	Create statewide groundwater resource maps, water use and water level data for use in water budgets for local areas to prepare for moisture variability conditions.		
	Promote strategic dam removals through increased project funding and bolstering programmatic capacity to manage removal projects statewide for improved ecosystem health and community resilience and create multi-stakeholder Dam Removal Program.		
<b>Invest in strategic conservation in order to increase the pace of permanent conservation towards 30x30 targets (described in federal report "Conserving and Restoring America the Beautiful"), with Vermont Conservation Design acting as the guiding plan for prioritization of efforts.</b>			
a	Expand use of the Water Infrastructure Sponsorship Program (WISPr) to improve accessibility and use for restoration projects.	X	
b	Promote statewide landscape connectivity and forest blocks conservation planning through robust support of the Staying Connective Initiative and use of Vermont Conservation Design and TNC's Resilient and Connected Landscape in state program prioritization frameworks.	X	
c	Through permanent conservation coupled with both active and passive restoration efforts on both public and private lands, allow approximately 9% of Vermont's forest to become (or be maintained as) old forest, specifically targeting 15% of the matrix forest within the highest priority forest blocks identified in Vermont Conservation Design to achieve this condition.	X	
d	Create statewide environmental justice policy.	X	

e	Per the formula in statute, fully fund the Vermont Housing & Conservation Board (VHCB); including \$3M for the Farm & Forest Viability Program, and increase annual VHCB funding above the statutory amount by 15%, targeting those funds for implementation of conservation actions recommended in CAP, especially those related to forests.	X	
f	Identify and protect climate refugia.	X	
g	Use best available data and mapping to analyze existing portfolio of conserved agricultural lands to identify forest, wetland or natural community restoration opportunities and prioritize funding for these projects	X	
h	Maintain a suite of Farmland Conservation & Protection tool ranging from voluntary, regulatory and planning (e.g. easements, Act 250, planning, zoning).	X	
i	Provide funding for municipalities, public entities, and Tribes to obtain and conserve forestland.		
j	Downscale the Nature Conservancy overarching Natural Climate Solutions (quantifying the mitigation value of our working and natural lands) approach/tool to Vermont.		
Increase technical assistance, capacity, education, and resources to support private farm and forest land owners in addressing the trends relating to intergenerational transfer.			
a	Support forestland succession/estate planning efforts to reduce forest parcelization and fragmentation through implementation of the Act 171 'Intergenerational Transfer of Forestland Working Group Recommendations' of 2017.	X	
b	Develop and implement a farmer retirement program to facilitate the transfer of intact farmland.	X	
	Enhance and expand technical assistance at ANR and through RPCS to support municipal implementation of forest integrity planning and bylaws as authorized in Act 171.		
Avoid, minimize, and mitigate the negative impacts of renewable energy generation on natural and working lands.			
a	Evaluate the effectiveness of the program of Regional Enhanced Energy Plans and the application of these plans to decisions by the PUC in terms of their ability to direct the siting of renewable energy projects in a manner that avoids the conversion of working and natural lands and the loss of the carbon storage and sequestration, climate resilience, and other co-benefits that are associated with those lands. If the process of developing and implementing the system of Regional Enhanced Energy Plans is not achieving this goal, then adjust the laws and regulations applicable to renewable energy siting to ensure the effectiveness of the plans.	X	
b	Incentivize or carefully consider mandating solar and wind capacity on new buildings as well as in previously-disturbed/developed areas and avoid and minimize forest clearing for renewables through incentives and other siting policies, rules, and regulations	X	
c	Consider the need for incentives to site new renewable energy generation on parking lots, rooftops, and already altered locations. And discourage and penalize siting of new renewable energy generation on intact ecosystems, forests, and natural land	X	
	Reduce the amount of human consumption and waste of energy use.		
	Incentivize/fund/promote pollinator planting for existing or new solar and wind fields (see existing program: <a href="https://www.uvm.edu/extension/agriculture/pollinator-friendly-solar">https://www.uvm.edu/extension/agriculture/pollinator-friendly-solar</a> )		
	Require independent scientific studies for new wind turbine impacts acts to birds, bats, wildlife and water.		



**Pathways for Sequestration and Storing Carbon**

Pathway 1 - Maintain and expand Vermont's natural and working lands' role in the mitigation of climate change through human interventions to reduce the sources and enhance the sinks of greenhouse gases.			
ID	Strategy + Action	In Narrative	Notes
	Leverage, expand, and adapt existing State of Vermont programs that support the agricultural sector's mitigation of climate change through: <ul style="list-style-type: none"> <li>i. The prevention of emissions to the atmosphere by conserving existing carbon pools in soils or vegetation, or by reducing emissions of methane (CH4) and nitrous oxide (N2O);</li> <li>ii. Sequestration—by increasing the size of existing carbon pools, and thereby extracting carbon dioxide (CO2) from the atmosphere; and</li> <li>iii. Substitution—substituting biological products for fossil fuels or energy-intensive products, thereby reducing CO2 emissions.</li> </ul>		
a	Implement agronomic practices that reduce tillage and increase vegetative cover, e.g., no-till, cover crop.	X	
b	Expand Capital Equipment Assistance Program (CEAP) program to extend beyond water quality and incorporate climate change criteria	X	
c	Implement grazing practices that increase vegetative cover and forage quality, e.g. rotational grazing.	X	
d	Implement agroforestry and silvopasture practices that integrate woody vegetation in agricultural production.	X	
e	Implement edge-of-field practices that increase herbaceous and woody vegetation, e.g. riparian forest buffer (e.g. CREP).	X	
f	Implement natural resource restoration practices that support climate mitigation and resilience, including river corridor easements, wetland restoration, and afforestation practices with consideration to agricultural land loss.	X	
g	Implement Nutrient Management and Amendments (e.g., biochar, compost) on cropland and grazing land.	X	
h	Implement methane capture and energy generation on farms, e.g., anaerobic digesters and covers.	X	
i	Research and pilot improved manure management and storage programs.	X	
j	Research and develop a climate feed management program, including both feed amendments (e.g. seaweed, biochar) and feed quality (e.g. forage quality) to reduce enteric methane emissions; consider downstream impacts, sustainability and equity	X	
	Practices that create or enhance pollinator habit, wildlife habitat and biodiversity		
	Quantify the Required Agricultural Practices (RAPs) to climate change mitigation benefits		
	Coordinate with federal NRCS cost-share programs to elevate climate mitigation practices in Vermont, e.g. silvopasture, alley cropping, forest farming		
<b>Create a system for tracking and accounting metrics and indicators for natural and working lands</b>			
a	Develop a methodology and protocol for quantifying climate mitigation, resilience, and adaptation impacts of existing state and federal water quality implementation programs as reported through the annual Clean Water Initiative Performance Report. The Clean Water Initiative Performance Report “summarizes the State of Vermont’s clean water efforts and demonstrates how investments are making a difference through accountability measures.” As mentioned, most water quality conservation practices and programs also have climate mitigation, resilience, and adaptation benefits. Recommend using existing tracking systems and quantify the climate benefits from this existing implementation and data tracking. The data spans state and federal funding programs and regulatory programs that drive clean water efforts and coordinates across agencies to track these efforts and monitor progress.	X	
b	The Vermont Climate Council has recommended developing and issuing a Request for Proposals (RFP) that will review and analyze methodological gaps of emission inventory tools currently used by the State of Vermont to quantify greenhouse gas emissions for evaluating changes in the Agriculture, Forestry and Other Land Use (AFOLU) sector and the tools’ alignment with the Intergovernmental Panel on Climate Change (IPCC), Environmental Protection Agency (EPA), and peer state methodologies and approaches. The specific recommendations for this RFP can be found in the Carbon Budget Report memo found in Appendix 10.	X	
c	Based on the findings of the technical RFP mentioned in action step (b) of this strategy, the VCC should consider recommending that the State of Vermont GHG emissions inventory protocol established in 10 V.S.A. § 582 be amended to include an inventory of GHG emissions that align with the intent and standards of the 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories that will include a net GHG emission accounting for the agriculture, forestry and other land use (AFOLU) sector.	X	
<b>Implement a Payment for Ecosystem Services (PES) program for natural and working lands</b>			
a	Develop and implement a PES program for healthy soils and soil carbon sequestration on farms. Act 83 of 2019 convened the Payment for Ecosystems Services Working Group whose purpose is to recommend financial incentives designed to encourage farmers in Vermont to implement agricultural practices that improve soil health, enhance crop resilience, increase carbon storage and stormwater storage capacity, and reduce agricultural runoff to waters. Final program recommendations from the PES Working Group are due in January 2023.	X	
b	Develop and implement a PES program for forestland owners including water filtration/cycling, carbon sequestration, etc.	X	
c	Incentivize management for ecosystem services through a tax credit system that compensates landowners/managers for maintaining or restoring ecosystem services.	X	
	Develop dedicated funding to support climate-smart whole farm water resource management changes		
<b>Address upstream waste and downstream emissions from food waste and synthetic fossil-fuel based inputs</b>			
a	Develop program for tracking and limiting the use of chemicals, substances, or products that contribute to climate change in Vermont and leverage existing legislative activity on this topic <ul style="list-style-type: none"> <li>i. VAAFM currently tracks statewide commercial pesticide use as well as statewide fertilizer use. This data is currently used to establish trends in the use of these inputs as our agricultural systems evolve.</li> <li>ii. Programs to track these agricultural inputs already exist at VAAFM but have not been assessed through the lens of contributions to climate change. VAAFM or the new newly established Agricultural Innovation Board (AIB) established by Act 49 of 2021 can prioritize an assessment of the impacts and benefits our agronomic management systems have on offsetting climate change.</li> <li>iii. An assessment of Vermont’s different agronomic practices and management, such as, conventional, organic, no-till, and cover cropping, should be weighted for impacts on climate change based on agricultural inputs, fuel consumption, carbon sequestration and other measurable factors</li> </ul>	X	
b	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). <ul style="list-style-type: none"> <li>i. 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</li> </ul>	X	
<b>Develop and implement programs which incentivize management practices which maintain or increase forest carbon storage</b>			
a	Create or adopt existing certification standards where management activities account for principles of Improved Forest Management towards increased carbon storage, as well as maintaining and creating resiliency (as described in existing state guidance such as <i>Maintaining and Creating Resilient Forests in Vermont: Adapting Forests to Climate Change</i> , VTFFPR 2015, or as modeled in existing programs such as the <i>American Forest Foundation’s Family Forest Carbon Program</i> ).	X	
b	Apply these certification standards to the procurement of forest products utilized in energy or thermal generation facilities subject to PUC oversight (parallel to the existing review for state mapped deer winter yard, etc.) through potential revisions to the renewable energy standard.	X	
c	Explore additional market opportunities for certified products, expanding the potential revenue base to support Improved Forest Management (parallel FSC, SFI, etc.)	X	
<b>Leverage market-based solutions, such as existing or new regional carbon market opportunities, to incentivize forest management</b>			
a	Work to develop a new Vermont-Based or regional (modeled on RGGI) Carbon Credit marketplace with necessary research and standards which address concerns around the efficacy of baseline establishment, accounting for additionality, the potential for leakage, and address equity for the diversity of wood lot owners across the state	X	
b	Incentivize in-state purchase of carbon credits developed by Vermont-based or regional carbon projects through a system which addresses concerns of accounting (i.e. additionality and leakage)	X	
	Allow inflation adjustment on the original cost of timber through legislative change to income tax policies which allow adjustments for inflation in the basis (original cost) of timber owned by forest landowners. This would tax landowners on the real gain (not inflationary gain) from selling timber, thereby recognizing the long-term nature of forest land investments. This recommendation refers to timber revenue only, not timber land revenue. The inflation rate should be chosen through one of the existing mechanisms (Consumer Price Index, Treasury bill rate, or similar means).		
<b>Increase tree coverage</b>			
a	Expand tree and other planting efforts on private land to promote restoration efforts to reforest riparian areas, wetland buffers, and degraded lands	X	
b	Expand funding and support to the Vermont Community Canopy Program	X	

c	Provide incentives for restoration and expansion of floodplain forests	X	
d	Increase funding to tree planting via Renewable Energy Standard (RES).	X	
e	Increase support, funding, and education for increased urban tree planting efforts expansion to increase access to natural spaces and improve carbon sequestration/storage in the urban environment	X	
f	Promote planting of future climate adapted tree species		
g	Start fund with small trees and shrubs that can be given out on Green up day or Earth day to be planted in riparian areas		
h	Create a state tree nursery program and support a network of regional, publicly supported nurseries, that are well sited		
i	Increase tree cover along road corridors through reduced mowing (allows for woody plant growth, reduces fossil fuel use and reduces spread of invasive species) while attending to safety considerations for driving		

**Pathways for Sequestration and Storing Carbon**

<b>Pathway 2 - Support and empower Vermont's farmers, foresters, and land workers to capacitate renewable energy and building product transitions</b>			
<b>ID</b>	<b>Strategy + Action</b>	<b>In Narrative</b>	<b>Notes</b>
<b>Educate, track, and appropriately reward on-farm renewable energy</b>			
a	Reward and support renewables on farms on rooftops, barns, storage facilities, and minimize or avoid loss of working and natural lands to renewables development by siting solar in areas that retain some agricultural use, such as grazing, or in locations that do not meaningfully diminish the agricultural viability of a farm.	X	
b	Increase outreach and incentives to on-farm solar installation on existing built infrastructure.	X	
c	Collect data to understand complexities of net metering's impact on farms and research opportunities to further advance on appropriate on farm renewables.		
d	Educate TA and state staff about REAP grant programs and assist farmers in pursuing on farm renewable energy generation and efficiency.		
e	Collect and share data regarding on farm energy generation to establish current baseline (Energy atlas).		
<b>Promote and incentivize use of local wood and agricultural products to reduce embodied carbon footprint.</b>			
a	Promote and incentivize use of agricultural and sustainably harvested wood -based construction materials (subject to existing certification criteria or procurement standards to be developed) over imported wood and/or non-wood materials with high carbon footprints (such as steel, concrete, etc.) Continue to research life-cycle accounting of these products for greatest impact.	X	
b	Through state procurement standards, require that publicly funded building projects use chain of custody certified wood products (MASS timber, cellulose insulation, etc.) that have been harvested under sustainable procurement standards over materials with a higher carbon footprint (such as steel, concrete, etc.), prioritize locally sourced wood products when possible.	X	
c	Develop a regional certification standard for forestry to validate carbon storage values for forest building products (methodologies supporting supply chain validation for carbon storage are frequently using FSC as a proxy; regional-scale certification standards focused around net carbon benefit are needed for product transparency)	X	
d	Develop alternative markets for non-timber wood, focusing on cellulose insulation, bioplastic composites, or biofuels	X	
e	Promote and incentivize the use of purpose-grown and agricultural products and by-products for building materials, such as sheeps' wool, straw and hemp for building insulation products		
<b>Transition fuel sources for the forestry and maple sector.</b>			
a	Provide funding to incentivize sugar makers to switch evaporators from fossil fuels to wood pellets and incentivize elimination of diesel generators for sap vacuum pumps.	X	
b	Incentivize alternative fuels such as biofuels or offsets for logging equipment.	X	
c	Ensure "backyard" burning is properly regulated, monitoring, and enforcement and is not contributing to additional emissions.		
<b>Sustainably source renewable energy products and materials</b>			
a	Fund competitive research to track and innovate on the sustainability and ethical implications of renewable energy materials and products being consumed to meet the CAP	X	
b	Sustainably and ethically source renewable energy materials and products		
c	Make transparent through disclosure as well as reduce or eliminate purchase of solar panels, batteries, lithium and other rare earth mineral materials by those involved in purchase of (consumers or utilities) or supporting such purchases (the State) that are mined from and destroying Indigenous sacred lands, water, and way of life. Mechanisms could include requiring certification before connecting to the grid or state-eligibility requirements for state-based incentives or programs.		
d	Reduce or eliminate purchase of solar panels, batteries, lithium and other rare earth mineral materials used in the making of solar panels, wind turbines and car batteries from countries (China) that harvest materials using children or other illegal or unethical methods.		
e	Encourage additional research to capture solar energy, make batteries, and recycle these materials in a sustainable way.		
f	Develop extender producer responsibility for solar panels, wind turbines and batteries.		
<b>Address the use of biomass for appropriately scaled institutional and residential thermal heat generation for climate mitigation, co benefits, and impacts while preventing the expansion of biomass for industrial-scale commercial electricity production.</b>			
a	Prohibit the expansion of current, and/or construction of any new, large-scale, industrial electric generation biomass facilities in the State of Vermont. Existing facilities shall:		The VCC did not adopt these recommendations. While the Ag and Eco Subcommittee did not reach full consensus on these, the group worked hard to develop these recommendations and <b>chose to leave them in this matrix</b> . They can at least serve as a basis for the VCC recommendation to continue this discussion.
b	a. Set GHG emissions reduction targets, to be incorporated into operations license(s).		
c	b. Remediate negative impacts to surrounding communities, cultural/historical/archeological sites and/or resources, and to the State of the Vermont's residents, air quality, and natural resources.		
d	c. Source material from within the state of Vermont, ensuring appropriate oversight of harvest activities for all wood products procured for use.		
e	d. If such facilities operations cannot be sufficiently improved to address the above, then the facilities be closed should and job transition assistance provided to employees.		
f	e. Expansion is defined as an increase in the physical footprint, emissions, or any increased impact on adjacent communities and natural and cultural resources. Improvements without expansion may include changes that result in increased efficiency with no increase in footprint, reductions in GHG emissions, other air pollutants or impacts to the community.		
g	Utilize existing research (such as Buchholz, T., Gunn, J.S. and Saah, D.S., 2017. Greenhouse gas emissions of local wood pellet heat from northeastern US forests. Energy, 141, pp.483-491) to inform if and under what conditions biomass in institutional or residential applications for thermal or combined heat/power applications could provide for a transition away from fossil fuel use, reduce GHG emissions, and have not net impact on Vermont's forests for storage and sequestration.		
h	The following GHG impacts should be accounted for when developing policy and/or associated regulations for biomass: a. all greenhouse gas emissions associated with producing the fuel (including extraction or harvesting, manufacturing, or processing, transportation) b. greenhouse gases emitted by the fuel when used c. efficiency of the heat generation system being used d. carbon stocks in the forest		
i	The following considerations should be accounted for if permitting any new pellet producing facility(s) in the state: a. Pellet production must be from combined sawmill residue (i.e., sawdust) or other byproducts of forest product manufacturing (i.e., cants, bark, etc.) and biomass—generally produced as a byproduct of harvesting associated forest products. Sourcing criteria should be established restricting biomass to a maximum percentage that is effectively monitored and enforced [see Buchholz, Gunn, Saah in Energy, December 2017]. b. Monitoring and enforcement must ensure that harvest levels are maintained, with no net increase resulting in an increased demand for pellet fiber (increased demand in pellet fiber is offset by reductions in other markets); shifting existing harvest of pulpwood volume to pellets. Procurement standards ensuring sustainable forest management which protect ecosystem integrity should be developed, applied, and monitored		

j	Regulate, including preventing, if necessary, flow of wood pellets or similar commercial scale wood-derived energy products based on research in "b" above to ensure sustainable harvesting of "net GHG-reducing" pellets (i.e., composition, source wood, etc.)		
k	In addition, develop a program of education and outreach, as well as technical assistance, to encourage appropriate methods and practices when using wood heat, while also ensuring oversight and regulation of those appropriate methods and practices (including backyard boilers).		

Cross-Cutting Issues - Education

Pathway 1 - Education: Create accessible, equitable research, partnerships, and education; promote shared understanding; and invest in sustainable workforce development for the natural and working lands sector

ID	Strategy + Action	In Narrative	Notes
<b>Provide funding for climate-related education at all levels, outreach, research, and technical assistance programs</b>			
a	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. • 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.	X	
b	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	X	
c	Create a climate curriculum teachers fellowship program to engage teachers in leading and sharing their climate curriculum ideas with other teachers	X	
d	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)	X	
e	Redesign the state education funding model so that Career and Technical Education centers have independent funding streams and budgets, and create and fund legislation to support other educational programs that strengthen the workforce pipeline, including a range of accessible postsecondary educational models (e.g. apprenticeships, concurrent enrollment, and stackable credentials)	X	
f	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.	X	
g	Develop and make available accessible outreach and educational materials that communicate climate change science and local impacts to the general public, which include and highlight the role that Vermont's natural and working lands play in providing solutions to climate change.	X	
h	Establish stronger relationships between state agencies and regional planning 289 commissions, and faculty at Vermont and adjacent state institutes of higher learning, 290 creating opportunities for state and regional research needs to become an aspect of 291 faculty research agendas.	X	Added in final draft narrative to Climate Council.
<b>Develop and promote climate-related educational materials for private landowners to empower them to make climate-informed decisions about their land and waters:</b>			
a	Create and deploy a river corridor and floodplain buffers extension-type program that provides educational material and technical assistance for private landowners	X	
b	Identify and explain practices that create and enhance pollinator habit, wildlife habitat and biodiversity		
c	Promote the values of planting of future climate adapted tree species and crops in an effort to expand tree planting efforts on private land. Thereby promoting restoration efforts to 304 reforest riparian areas, wetland buffers, and unhealthy soil.	X	
d	Expand infrastructure and educational programs around community and backyard composting and recycling	X	
e	Further educate Vermont landowners about the benefits of reducing lawn mowing frequency, and amount of mowed lawns to increase biodiversity and ecosystem health, and ultimately reduce emissions.	X	
<b>The language in Vermont agencies must be reviewed and updated to be more equitable.</b>			
a	Educate state staff on the history of Vermont, the harm that has been done in the name of conservation, the history of state involvement in the eugenics movement, and the role that language plays in the continuation of oppression and misunderstandings.	X	
b	Identify and develop alternative terms and words to those that are rooted in historical injustices, and invest in community outreach to create broad understanding of de-colonized words.	X	
c	Recommend that the legislature create a board to systematically review state government institutions to ensure that language intrinsically tied to historical injustices is removed from all active documents and policies.	X	
d	Leadership in all levels of state government must make this a top priority.	X	
	Train the staff and leadership about the history of Vermont including the harm that has been done in the name of conservation in Vermont. These recommendations seek to better reflect and align with Climate Council's 2021 proposal for today and desire for and commitment to equity. In addition, this will help the people working in these areas to obtain cultural humility.		

December 14, 2021

Dear Members of the Vermont Legislation,

My name is Judy Dow. I am a member of the Agriculture and Ecosystems subcommittee for the Climate Council. As an Indigenous person, I have found many differing opinions throughout this process. Please accept this Minority Report with my dissenting opinion.

As I'm sure you are aware, there was an unrealistic amount of time given to us for the completion of the majority report. Unfortunately, due to the lack of time, there was little effort given to opinions of dissent and a follow up discussion. There was also no scheduled time to communicate between subcommittees, which created great disparities at times. I would like to bring to your attention a few of the things there was not sufficient time to discuss, and consequently, there was not a consensus. Often, due to a lack of time, these things were completely left out of the majority report. It's imperative that many of these issues are considered by you for the future.

### **Tourism**

During discussion on reducing emissions, there was disagreement around using hospitality and tourism to reduce emissions. The reason for no discussion I was told was "we can't go down that path, the legislation and the governor will not go for it." stated an ANR staff member, so no further discussion occurred. I strongly believe it should be considered. Tourism has a hefty carbon footprint. Travel, lodging, services, agriculture, food and beverage, and material goods make up 8% of the world's carbon emissions. U.S. travelers are at the top of the list of visitors emitting carbon.<sup>1</sup> Vermont's "cash cow" is tourism, so we must figure out how to have a balance reducing emissions in this sector. Hotels and organizations like the Chamber of commerce need to also participate in emissions reduction since they are profiting from the tourism. Travel buses, trolleys or trains, or other forms of public transportation to and from ski areas and other places of interest need to be provided by hotels that house 25 or more visitors a night.<sup>2</sup> Incentivize travelers coming to this state to carpool by offering discounted hotel rates. Hotels can also offer discounts to have bed linens used for more than one day to reduce electricity use and save water. Transportation is tourism's main source of greenhouse gas emissions. It would take an acre of forest a year to absorb the same amount of CO2 emission of a one-way flight from London to New York City.<sup>3</sup> Tourism in Vermont should encourage more sustainable ways of travel, purchase local and seasonal foods to eliminate emissions for deliveries and to support local farmers. The majority of emissions from tourism comes from the wealthy on vacation. Having low-income and poor Vermonters pay for this in today's economy is inequitable, and needs to be addressed.

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<sup>1</sup> [https://sustainabletravel.org/issues/carbon-footprint-tourism/?gclid=EAIalQobChMIkvjG7Ynm9AIV3PHjBx1\\_QQDiEAAyAAEgKAlvD\\_BwE](https://sustainabletravel.org/issues/carbon-footprint-tourism/?gclid=EAIalQobChMIkvjG7Ynm9AIV3PHjBx1_QQDiEAAyAAEgKAlvD_BwE)

<sup>2</sup> <https://oceanfdn.org/how-to-reduce-your-carbon-footprint-when-you-travel/>

<sup>3</sup> <https://sustainabletravel.org/issues/carbon-footprint-tourism/>

Emissions from lodging tend to be highest in resorts and hotels that offer modern services, while smaller lodgings such as homestays and guest houses have lower emissions for the most part. To counter that, incentivize Airbnb and individual house stays.

In addition, we should require hotels and leisure places to have education and monitoring. I frequently see this not enforced simply because folks don't know what is recyclable and what is trash.

### **Actions**

1. Encourage hotels with 25 or more visitors to provide public transportation to and from ski areas and other areas of tourism.
2. Incentivize house stays and Airbnb.
3. Encourage hotels to incentivize visitors to use their sheets their entire stay.

### **Invasive Plants**

Historically, 12,000 years ago when the glacier receded, there was no top soil in Vermont.<sup>4</sup> Slowly seeds came, plants grew and decomposed and created soil, then new plants came. The same occurred with the fish, birds and animals, each one quietly moved in when the food was there and the time was right. Consequently, everything was introduced to this land. These things are not called invasive, rather folks call them native or naturalized. Collectively, they created Vermont as it looks today. Vermont still changes and adapts on a regular basis as new plants, animals, birds, humans and fish are introduced to this land. In the Abenaki cosmology, there will be a coming together of all these plants, animals, birds and fish and human, and when the time is right for this, there will be harmony and unity. To call these things invasive is wrong and interferes with the progress of our lives. If we are to look at equality, you would not call a human that is different that enters Vermont invasive. So you should not of the other things either. If there is to be true equity where all things are created equal, as our guiding principles tell us the environment should be treated the same way as people.

### **Action**

1. As the guiding principles reflect there should be fairness to all living things. Develop a policy that show this.

### **Biomass**

"There was a rush to develop the biomass energy sector maybe five or ten years ago, but now there is a slowing down and pulling back as people have understood some of the pros and cons." said Bill Keeton. UVM professor of forest ecology and forest ecology and director of its Carbon Dynamics Lab.<sup>5</sup> Biomass here in Vermont means one thing: wood. Vermont's energy plan commits 90 % of its energy from renewable sources by 2050, and to do this, they will be doubling the amount of wood used for heat by 2025. There is a growing body of evidence that

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<sup>4</sup> <https://nsidc.org/cryosphere/glaciers/questions/land.html> This is a very slow process taking over thousands of years.

<sup>5</sup> <https://www.sevendaysvt.com/vermont/in-a-warming-world-new-thinking-imperils-vermonts-wood-fueled-energy-market/Content?oid=28671780>

suggests planting new forests, better management of existing forests and designating more lands off-limits to logging can play a major role in moderating climate change. Allowing a forest to just be there and grow older and more complex becomes an incredibly effective way to store carbon.<sup>6</sup> McNeil uses 76 tons of woodchips every hour working at full capacity. Burning this wood releases the carbon back into the atmosphere. Bill McKibben penned an article in New Yorker titled. *“Don’t burn Trees to Fight climate change: Let them Grow.* Without even reading the article, the title tells you what must be done. To continue to support biomass burning as “clean energy” will break the back of any climate change initiative this committee can create. McNeil and Ryegate biomass plants need to be on a plan for shut down and the creation of any new wood burning electric plants stopped immediately. We need to eliminate major polluters in this state and stop cutting down forests that mitigate climate change by sequestering and storing carbon.

### **Action**

1. Recognize that large scale biomass burning is a polluter not clean energy.
2. Recognize that large amounts of trees are being cut to provide the biomass for these plants to burn woodchips. This disrupts the carbon storage in our forest. Stop the cutting go trees for this purpose.
3. Develop plans to close large scale operations like McNeil and Ryegate.
4. Replace this energy with a true clean energy.

### **Electric Cars**

On page 232 of the Initial Vermont Climate Action plan, it is suggested that the “most effective way of reducing emission is to purchase an electric car.” The issue here is that this is not equitable, as the suggested place to get the electricity is “from Hydro Quebec,” which has relocated 11 Native American Nations that control most of this continent’s diverse plants. There is also no environmental justice given to the land. These people have lost their gathering and hunting lands, in some cases they live next door to the plant, have no electricity and no drinking water, and have not been able to eat the fish. Because of the amount of mercury released from the land into the water when damming the watersheds, the water has become undrinkable and has forced Native people to change their eating habits because the fish are so high in mercury.

As of 2013 Hydro Quebec owned and operated 61 hydro plants creating 26 major reservoirs by flooding 13 complete watersheds, the very watershed that are filled with the plant and animal diversity this planet needs to store carbon. The creation of new reservoirs has raised the mercury levels in lakes and rivers and slowly works its way up the food chain. The first 30 years of studies in the James Bay area have confirmed that mercury levels in fish increase by 3 to 6 times over the first 5 to 10 years after the flooding of a reservoir, but then gradually revert to their initial values after 20 to 30 years.<sup>7</sup> It temporarily raises greenhouse gas emission and

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<sup>6</sup> <https://www.sevendaysvt.com/vermont/in-a-warming-world-new-thinking-imperils-vermonts-wood-fueled-energy-market/Content?oid=28671780>

<sup>7</sup> <https://en.wikipedia.org/wiki/Hydro-Qu%C3%A9bec>



contributes to shoreline erosion. Reports have shown that it takes 30 to 40 years for the water to return to its initial levels of mercury, and the greenhouse gases begin to stabilize after 10 years.

In a VT Digger Feb., 17, 2021 article called *Is Vermont's use of Hydro Quebec power 'greenwashing'?*<sup>8</sup> This article points out that Vermont's Annual Energy Report states that currently 50% of Vermont's power comes from Hydro Quebec. Consequently, 3.8 million acres of Native land has been destroyed by Vermont's use of Hydro Quebec power. The damage to ecosystems has been catastrophic and the release of carbon emission into the atmosphere has been significant. By this recommendation of getting more electricity from Hydro Quebec, we will add to the destruction. We must start thinking globally, not just for ourselves, and this cannot be considered "clean energy" as the Climate Council and the Vermont Legislative body has insisted in the past. Hydro Quebec is preparing an increase knowing we will be asking for more power. Hydro Quebec has an ambition to earn \$5.2 billion net income or more in 2030.<sup>9</sup> Their growth will be at the expense of total destruction of many more thousands of acres of land, and the relocation of more Indigenous nations.

As of July 6, 2021 a coalition of Native Wabanaki people have banded together to sue Quebec to stop the growth of Hydro Quebec.<sup>10</sup> Hydro Quebec's plan is to build 145 miles of transition line on the Quebec side of the border, with an additional 64 miles of transition line to connect the new transition lines to the main Hydro Quebec system. This places pressure on ecosystems currently being used for hunting, fishing and gathering by Indigenous folks. The lines are not scheduled to cross Indigenous land, but neither was 1/3 of the hydro system which ended up being stolen and built on unceded land. Trust is not there anymore; people know better. People are forced to give up a way of life that has provided for them since the beginning of time. There is no equity in this. Vermont's Global Warming Plan actually asks for equity. It doesn't ask to put the needs of one cultural group over another cultural group. To continue to get electricity from Hydro Quebec is detrimental to the diversity of plants, animals and people in Northern Quebec and across the world. 11 Native communities located in 55 different villages have been impacted by Hydro Quebec. Just because the USA has the money to buy from Hydro Quebec, the poorest of the poor shouldn't suffer, and also, the environmental destruction that has occurred and continues to this day, should not be continued and not be increased.

The average house in Vermont today has a service that is between 100 and 200 AMP. Today, electricians are installing 400 AMP service panels to accommodate chargers for cars. Some electric car chargers use up to 90 AMPS to recharge, but most use 30 to 50 AMPS. How are we going to provide for this electricity in individual homes? How is this expense going to be equitable? I realize each year the price of an electric car goes down, but at what cost to the

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<sup>8</sup> <https://vtdigger.org/2021/02/17/is-vermonts-use-of-hydroquebec-po>

<sup>9</sup> <https://www.hydroquebec.com/data/documents-donnees/pdf/strategic-plan.pdf?v=2020-02-24>

<sup>10</sup> <https://www.mainepublic.org/environment-and-outdoors/2021-07-06/coalition-of-indigenous-tribes-in-quebec-are-suing-to-stop-hydro-quebec-powerline-construction>

land and her people. Another form of clean energy must be realized. An additional issue is that the average age of an electrician in Vermont is 60 years old. How will this new needed electrical support happen with most of the electricians considering retirement.

### **Action**

1. Develop a plan to locate and educate new electricians to fill the hole in Vermont's workforce.
2. Reduce dependence on Hydro Quebec.
3. Set guidelines, permits or license procedures to limit personal electrical charging stations.
4. Consider the inequities in electric cars. Compensate for this.

### **Heat Pumps and pellet stoves**

On page 242 in the Initial Vermont Climate Action plan is the recommended to use "clean energy" such as heat pumps, and to heat with efficient pellet stoves. Again, there is an equity issue here. Poor and low-income Vermonters cannot afford to install a \$4,000 to \$6,000 heat pump when they don't know where their next meal is coming from. According to the 2019 census for Vermont, 29.12% of Vermonters rent.<sup>11</sup> These folks will certainly not be purchasing a heat pump. Again, the electricity will come from Hydro Quebec to run these heat pumps. This, is another counterproductive and inequitable recommendation.

Efficient pellet stoves are fine, but it's the pellets that are burned in these stoves that are the concerns. If the pellets are not harvested in a sustainable way, they will not be "clean." Again, you must consider the definition of what is "clean energy". Monitoring must be in place to maintain a harvesting system that is sustainable. Currently we import pellets from Canada, which is not monitored, and from the Southeastern part of the US where 168,000 acres of wetlands are being clear cut for the production of pellets. The creation of wood pellets must contain more than 50% saw mill residue to be "cleaner" than burning fossil fuels.<sup>12</sup> This must be monitored and incentivized if people are going to buy the higher priced pellets. I again refer to my biomass comments on page 2 and 3 of this dissent. Biomass burning is not carbon neutral, it is not "clean" and it is not equitable, whether it is large scale or small scale, home pellet stoves.

### **Action**

1. Create a system that is equitable to all for purchasing heat pumps.
2. Create and monitor a sustainable system for harvesting and creating wood pellets.
3. Enforce the systems that are created.

### **Solar Panels**

On page 240, the initial Vermont climate Action Plan states: "Meanwhile, solar PV is free of GHG emissions at the point of generation and has the ability to reduce our reliance on fossil

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<sup>11</sup> <https://www.deptofnumbers.com/rent/vermont/>

<sup>12</sup> <https://www.sciencedirect.com/science/article/abs/pii/S0360544217315451>

fuels for electricity generation regionally and create greater resilience locally, but requires the use of several industrial materials and rare earth minerals to create the panels far from Vermont. Hydroelectric power, particularly large reservoir systems such as deployed by Hydro Quebec, is created by damming rivers and flooding forestland that also can displace Indigenous people and harm their cultural resources; yet it produces abundance baseload power at times that the sun does not shine and the wind does not blow.”

This is true, however, it does not only displace Indigenous peoples. As an example, for the Cree communities of Eastmain and Wemindji, the flooding caused a loss of 8.9% of their hunting grounds.<sup>13</sup> Two major road ways were created over 388 miles, removing a vital diversity of plants and animals and creating obstacles for migrations patterns. The creation of large reservoirs have drastically changed the lives of the Cree, disappearing large areas of hunting grounds and releasing once again mercury into the drinking water and fish<sup>14</sup>. In addition, the roads have reduced the quantity of wildlife resources that could be harvested at established traplines. This story is about two communities of the 55 villages that have been impacted. Once again, economy has been placed over equity and the quality of life for Indigenous folks living in this area. Little to no considerations has been given to the health and well-being of the plant and animal life in these areas that provides the diversity we need to improve carbon sequestration and storage. Using Hydro Quebec is not a good transitional method of getting electricity. As with anything that gets to large, there are problems, and they no longer can be considered “clean energy.” In addition, the harvesting of toxic materials for solar panels are primarily done by children in China or on the soil of US Indian Reservations. There should only be permits given for solar panels that show that the materials in their solar panel were harvested in an ethical way. Furthermore, there should be a plan to show how these panels will be recycled, considering that they contain toxic materials. We need to address this now instead of waiting until later. A recycling plan needs to be written immediately.<sup>15</sup>

## **Action**

1. Create a recycle plan for the toxic materials within the solar panels.
2. Create a permit system that only allows panels in which the toxic materials have been harvested ethically and sustainably.
3. Reduce the dependency of Hydro Quebec, use another clean energy.
4. As written in the majority report this is not equitable. Create an equitable format for using solar panels.

## **Backyard Boilers**

In our subcommittee, we heard from the public and shared our own experiences about backyard boilers. People are burning trash, food, junk mail and pampers in their home boilers

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<sup>13</sup> <https://www.tandfonline.com/doi/pdf/10.3152/147154699781767648> Page 322

<sup>14</sup> <https://www.tandfonline.com/doi/pdf/10.3152/147154699781767648> Page 328

<sup>15</sup> <https://dec.vermont.gov/air-quality/compliance/open-burning/backyard-burning> This quote come directly from Dept. of Environmental Conservation yet nothing is happening to enforce this.

to heat their house. The pollution from these boilers needs to be stopped rather than continued as happens now, while police cannot enforce a violation. We need guidance, regulations, and enforcement rules to eliminate these boilers from being improperly used. Open burning of trash is never allowed, however, there are still reports of illegal burning across the state. The burning of garbage, tires, rubber, plastic, waste oil, asphalt materials, asbestos, pressure treated wood, and plywood are all prohibited,<sup>16</sup> yet this and more is being burned in these boilers. Encourage and incentivize local towns to create laws that will enforce illegal burning.

#### **Action**

1. incentivize local towns to create laws that will enforce illegal burning.

#### **Tightly Packed village centers**

We also had some wonderful discussion around encouraging tightly packed city and village centers and In-town living. We all seem to agree on this, but where we disagree is some town centers that are regularly flooded need to be relocated first, before we increase density. Smart planning must include preparing these communities for flooding. To increase the size of a city or village center before correcting the flooding issue will cost lives.

#### **Action**

1. Relocate town centers that flood before you increase the density.
2. Reduce the lot sizes in towns to allow for fill ins where space is available.

#### **Non-Timber Forest Products**

Understand, monitor and educate about using non-timber forest products in a sustainable way. Currently, the lack of controlling harvest of fiddle heads, berries, bark etc. has created a disappearance by over harvesting of these plants in many places. Best practices need to be established and towns encouraged to monitor and establish good sustainable practices.

#### **Action**

1. Establish best practices for harvesting.
2. Set up educational programs to teach how to harvest in a sustainable way.

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<sup>16</sup> <https://dec.vermont.gov/air-quality/compliance/open-burning/backyard-burning>