

VCC Ag & Eco GHG Mitigation: Top 5 Priorities

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Presentation to: Ag & Eco Subcommittee
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- 1. Continue to invest in existing state ag & forestry programs that have climate mitigation co-benefits.**
- 2. Continue to invest in ag PES programs, develop a forestry PES program.**
- 3. Invest in climate change education, outreach, research, and technical assistance programs.**
- 4. Protect agricultural soils and forestland from development.**
- 5. If Vermont farmers and loggers are not economically viable, they cannot provide the above climate mitigation and resilience benefits.**

1. **Continue to invest in existing state ag & forestry programs that have climate mitigation co-benefits.**

(10, 23a) Increase funding, enhance, and adapt **existing State of Vermont programs** that support GHG emissions reductions, soil carbon sequestration, and/or climate adaptation and resiliency on working lands. Enhance and adapt programs to better incorporate climate mitigation, adaptation, resilience, nature-based solutions, and TEK/IK. Update the Vermont GHG Emission Inventory to account for both carbon sequestration and emission reduction benefits from agriculture. Example State programs include, but are not limited to:

- AAFM: Ag-CWIP, BMP, CEAP, CREP, FAP, GWFS, PSWF, VPFP, VFESP
- ANR:
- Coordinate with USDA NRCS-VT programming to accelerate implementation of federally funded climate mitigation & resilience practices in Vermont.

From 2016 – 2024, Vermont farmers have implemented:

500,000 acres of new conservation practices to cleanup Lake Champlain which include: cover crop, no-till, rotational grazing.

The implementation of these 500,000 acres of conservation practices by VT farmers has resulted in:

250,000 kilograms (kg) of phosphorus (P) have been sequestered on Vermont farmland and prevented from entering water.

92,000 metric tons (MT) of Carbon (CO₂-e) have been net sequestered in agricultural soils (88%) and riparian forest buffer biomass (12%).

The 92,000 MTs of CO₂-e net sequestered in agricultural soils and biomass represent:

The same climate cooling effect as removing 16,000 fossil-fuel powered passenger vehicles from the road.

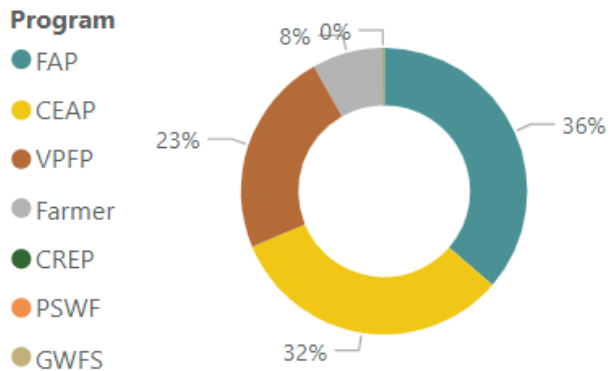
Vermonters have only registered 15,000 passenger BEVs during this same time period.

Field Practices

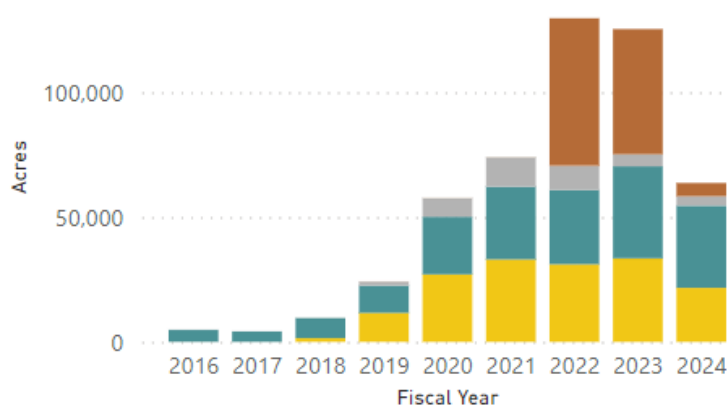
493,160

Acres of Conservation Practices Implemented

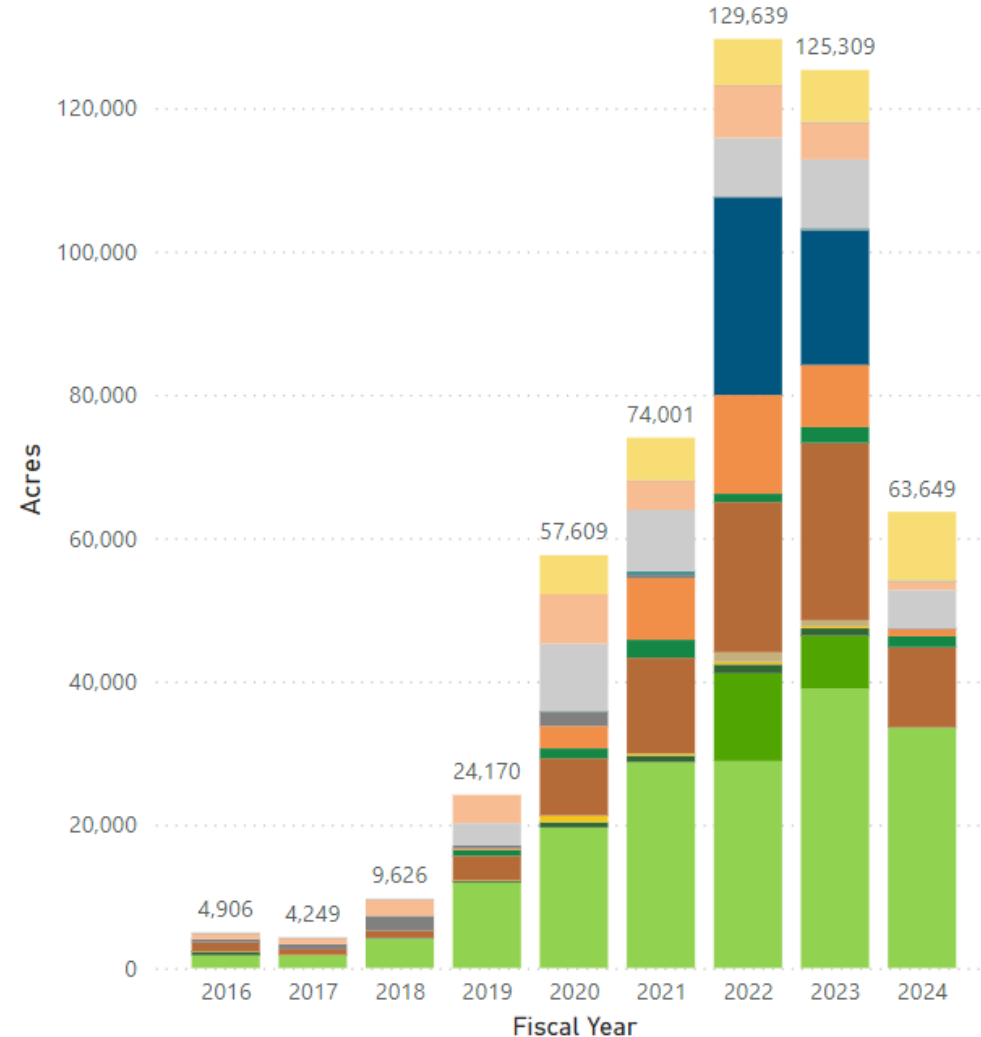
Acres by Program



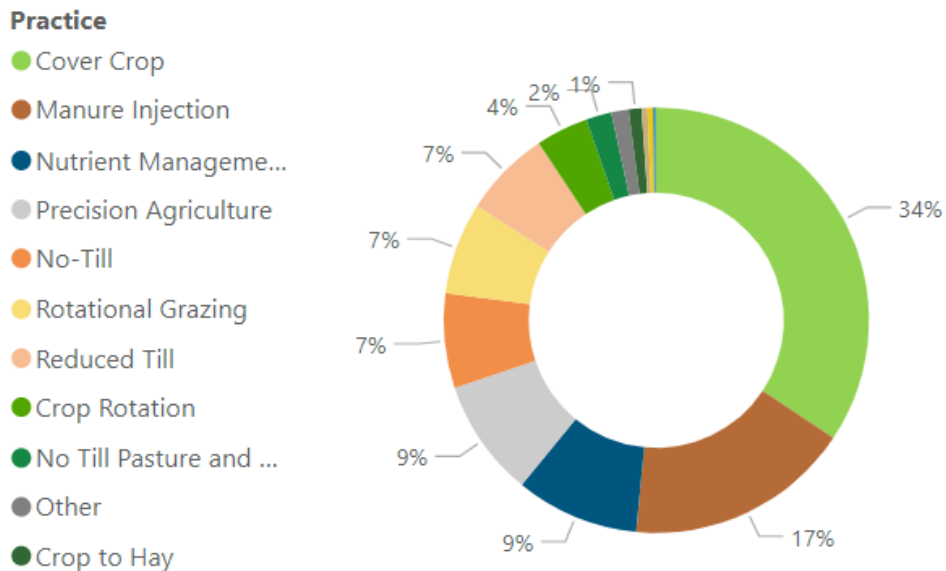
Acres by Fiscal Year and Program



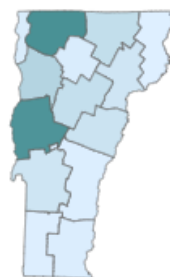
Acres by Fiscal Year and Practice



Acres by Practice



Acres by County



Acres by Basin



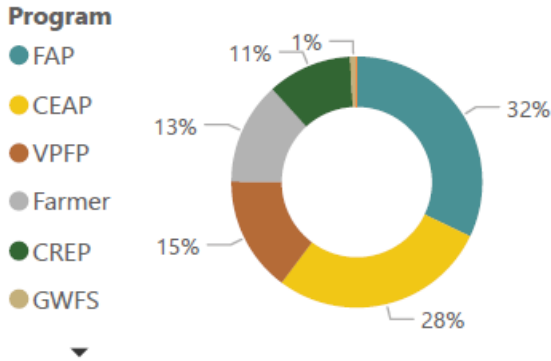
Due to ongoing projects, data reported in the most recent fiscal year is not complete until the following fiscal year, i.e. fiscal year 2024 data is not complete.

Emissions Reductions

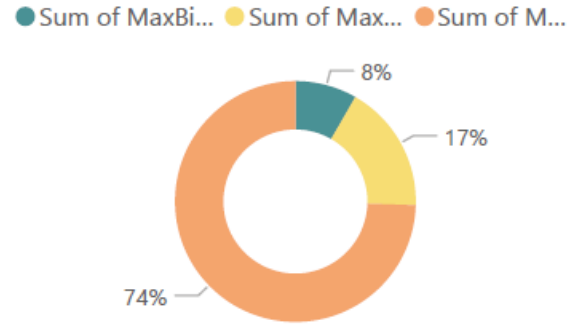
Net emissions (balance of emissions released & removed from atmosphere) based on acres of practices implemented by VAAFM funding programs. Estimated using USDA COMET-Planner model. **Net sequestration removes more carbon than greenhouse gases (GHG) emitted.**



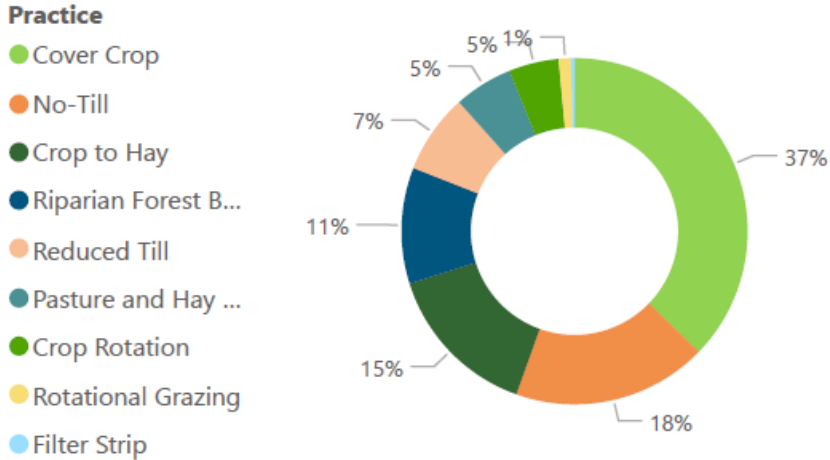
Net Sequestration by Program



Net Sequestration by Type



Net Sequestration by Practice



- Min/Max values vary based on possible management scenarios of practice implementation.
- Units are metric tons (MT) of carbon dioxide equivalents (CO₂e) per year, which allow different greenhouses to be compared.

Max Values (MT CO₂e)

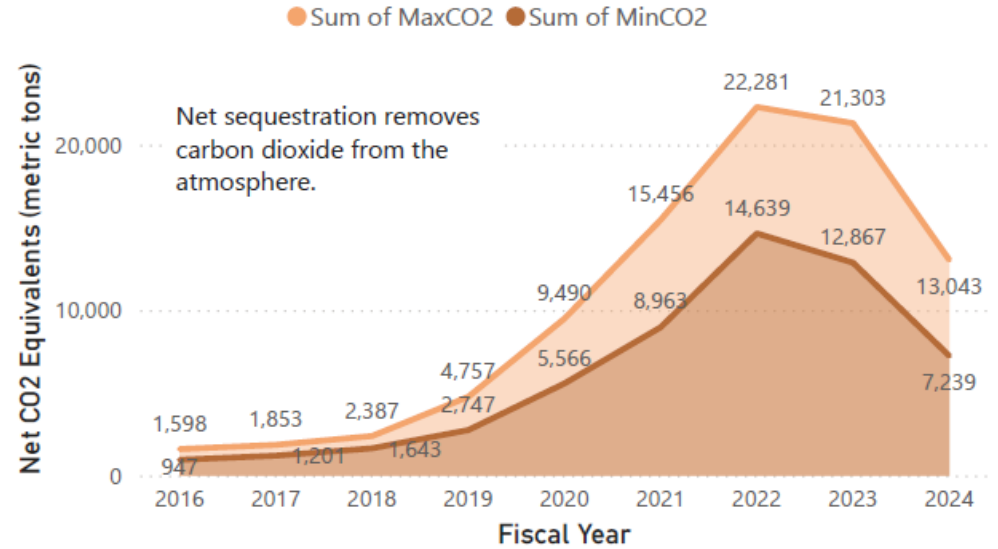
Net Sequestration
92,168

Soil Carbon Sequestered
81,184

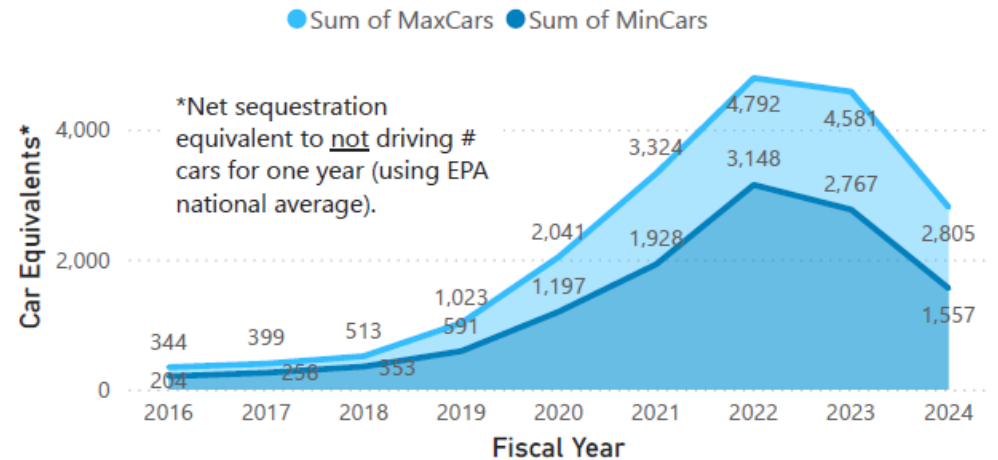
Biomass Carbon Sequestered
9,065

N₂O Emissions Reduced
18,729

Net Sequestration (MT CO₂e) by Fiscal Year



Car Equivalents (cars/year) by Fiscal Year



2. Continue to invest in ag PES programs, develop a forestry PES program.

(23c) Fund and implement Payment for Ecosystem Services (PES) program(s) for natural and working lands to encourage landowners/managers to implement practices that improve soil health, crop and forest resilience, increase carbon storage, increase stormwater storage capacity, and reduce runoff. Fund existing agricultural PES programs (AAFV VFESP and VPFP) and expand to include or develop new programs for forestry.

The carbon (CO₂-e) and phosphorus net sequestered by farmers participating in these State programs cost **\$80 per MT CO₂-e and **\$43** per kg of P to sequester.**

**Total Mean Ag Net C
Sequestration: 15,912.5 ICE-e**

Table 2: Summary of Ecosystem Services Valuation of Soil-Health Improvements for two Scenarios and 4 Services.

| <i>Service</i> | <i>Valuations (\$/ac/yr)</i> | | | <i>Physical Quantities</i> | | |
|--------------------------------|------------------------------|-------------|---------------------------------|----------------------------|-------------|----------------------------|
| | <i>Good</i> | <i>Best</i> | <i>Valuation Rate (\$/unit)</i> | <i>Good</i> | <i>Best</i> | <i>Units</i> |
| <i>Carbon Storage</i> | \$9.42 | \$18.84 | \$1.44 | 13.1 | 6.5 | Tons (US) of carbon /acre. |
| <i>Flood-Runoff Mitigation</i> | \$1.10 | \$2.37 | \$8.40 | 0.28 | 0.13 | Inches / large storm |
| <i>Erosion Reduction</i> | \$2.29 | \$4.56 | \$11.20 | 0.20 | 0.41 | Tons (US) /acre/year |
| <i>Phosphorus Retention</i> | \$7.87 | \$4.12 | \$56.82 | 0.07 | 0.14 | Lbs / acre /year |

Average Cost of Reducing Phosphorus (\$/kg P)

43

Average Cost of Reducing Carbon (\$/net mt CO2e)

80

Only calculated for practices with costs and reductions (C or P)

Source: <https://scholarworks.uvm.edu/cgi/viewcontent.cgi?article=1035&context=extfac>

Source: <https://dec.vermont.gov/sites/dec/files/WID/CWIP/Clean%20Water%20Initiative%202023%20Performance%20Report.pdf>

3. Invest in climate change education, outreach, research, and technical assistance programs.

(22, 26) Enhance **education**, outreach, research, and **technical assistance** programming to encourage adoption of strategies that increase climate mitigation, adaptation, and resilience on natural and working lands. Education should target farmers and loggers and those providing technical assistance and should incorporate nature-based solutions and TEK/IK.

94% of Vermont farmers believe they have the knowledge and technical skill to enhance soil health on their farm, yet only **58%** of farmers have the financial capacity to do so.

4. Protect agricultural soils and forestland from development.

(22) Protect farmland and managed forestlands from development through **land conservation and protection programs** so these land uses can continue to provide climate mitigation, adaptation and resilience benefits. Enhance existing State land use protection programs - such as the Vermont Farmland Conservation Program and Forest Conservation Easements - to improve farmland access and protection of agricultural soils and working forests.

From 2016 – 2024, Vermont agriculture has lost:

350 dairy farms

14,000 dairy cows

72,000 acres of cropland and pasture

69% of all roads, infrastructure, and housing in Chittenden County, Vermont have been constructed on Prime and Statewide soils of agricultural importance that can never be recovered for agriculture.

New England today produces enough food to satisfy **21% of regional demand.**

To produce enough food to satisfy **30% of regional demand, 590,000 new acres of cropland are needed in New England – a doubling of the size of Vermont agriculture, for perspective.**

Only 2% [127,744 acres] of Vermont's terrestrial land area is conserved in perpetuity for Agriculture.

Only 9% of Vermont's terrestrial land area is used for growing food & crops. Vermont has lost over 50% of its agricultural landbase since Act 250 was passed in 1970.

5. If Vermont farmers and loggers are not economically viable, they cannot provide the above named climate mitigation and resilience benefits.

(20) Invest in Vermont's natural and working lands owners, managers, and caretakers to **enhance farm and forest viability** and to support their informed decisions to increase their operation's resilience and adaptation to climate change.

In 2022, 57% of all Vermont farms were unprofitable and lost a combined \$85 million

For the first time in the modern census (since 1900), Vermont farmers manage more forestland (50.1%; 551,271 acres) than they do cropland and pasture (49.9%; 543,096 acres).

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| # Pathway | # Strategy | Pathway | Strategy | Detail | Measure / Method |
|-----------|------------|--|--|--|---|
| | | A sectoral pathway is a high level means of achieve GHG emissions reduction | Description of the specific policy or program that will achieve the desired outcome | | Below the sectoral pathway, what are the specific outcomes needed to achieve emissions reductions |
| 1 | 1 | <p>Amend the Vermont Greenhouse Gas (GHG) Emissions Inventory & Forecast for the agricultural sector to represent its role in GHG emissions and removals as an Agriculture, Forestry, and Other Land Use (AFOLU) sector.</p> <p>(SIT Module 7 [Ag Emissions]) + (SIT Modlue 9 [LULUCF] + (COMET-Planner ERCs) = Agricultural Emisisions</p> | Refine Module 7 of SIT to reflect Vermont-specific data and management. | Amend Module 7 [Ag Emissions] of the EPA State Inventory Tool (SIT) to incorporate State-specific data on agricultural management to improve accuracy of the Inventory. | ICF: "ICF recommend that SIT is the best-suited available tool for Vermont to develop a state level [GHG] inventory." |
| | | | Incorporate Module 8 of SIT into the Agricultural Emissions equation. | Incorporate Module 8 [LULUCF] of the EPA State Inventory Tool (SIT) alongside Module 7 into the VT GHG Emission Inventory & Forecast to reflect removals of GHG emissions from the atmosphere and their sequestration in agricultural lands. | ICF: "To report a complete Agricultural GHG inventory, ICF recommend that ANR report soil carbon emissions and removals from agricultural lands as estimated by the SIT LULUCF module alongside GHG estimates from the SIT Agriculture module." |
| | | | Incorporate COMET-Planner Emission Reduction Coefficients (ERCs) into the Agricultural Emissions equation to reflect cropland practice GHG mitigation benefits. | Apply Vermont-specific COMET-Planner Emission Reduction Coefficients (ERC) to farmer conservation practice implementation rates and incorporate into Module 7 of SIT to account for mitigation estimates from cropland management practices. | ICF: "COMET-Planner is recommended for use to account for implementation of management practices in combination with the SIT agriculture and LULUCF modules." |
| 2 | 2 | Expand, enhance and adapt existing State of Vermont programs that support agricultural GHG emissions reductions and/or agricultural soil carbon sequestration. | <p>Agronomic and grazing practices on farms such as no-till, cover crop, and rotational grazing.</p> | <p>Agronomic practices that reduce tillage and increase vegetative cover, e.g. no-till, cover crop</p> | AAFM WQ practice tracking / COMET-Planner ERCs |
| | | | | <p>Grazing practices that increase vegetative cover and forage quality, e.g. rotational grazing</p> | AAFM WQ practice tracking / COMET-Planner ERCs |
| | | | | <p>Agroforestry / Silvopasture</p> | AAFM WQ practice tracking / COMET-Planner ERCs |
| | | | | <p>Edge-of-field practices that increase herbaceous and woody vegetation, e.g. riparian forest buffer</p> | AAFM WQ practice tracking / COMET-Planner ERCs |
| | | | | <p>Nutrient Management and Amendments on agronomic and grazing land, e.g. biochar</p> | AAFM WQ practice tracking / COMET-Planner ERCs |
| | 3 | | <p>Biogas capture and energy generation on farms.</p> | E.g. anaerobic digestors, roofs and covers | VT § 248 Energy Siting Permit / EPA Livestock Anaerobic Digester Database |
| 4 | 4 | | <p>Continued funding for the development of a climate feed management program.</p> | Feed Amendments, e.g. seaweed, biochar | AAFM Ag-CWIP Research Funding |
| | | | | Feed Quality, e.g. forage quality | AAFM Ag-CWIP Research Funding |
| 5 | | | <p>Voluntary adoption of natural resource restoration practices that support climate mitigation and resilience, including river corridor easements, wetland restoration, and afforestation practices.</p> | River corridor easements, wetland reserve enhancement program, CREP | AAFM WQ practice tracking / COMET-Planner ERCs |
| 3 | 6 | Continue implementing a PES Program for Healthy Soils and Soil Carbon Sequestration. | Continue implementing a State of Vermont PES Program that supports the development of healthy soils and carbon sequestration in soils. CSP+ is a joint program administered by USDA NRCS-VT & VAAFM. | Same mitigation methods as existing state programs, but expansion via a proactive payment for a performance metric(s) that rewards or incentives farmers for healthy soils and carbon sequestration in ag soils. | AAFM WQ practice tracking / COMET-Planner ERCs |
| 4 | 7 | <p>Protect agricultural farmland (and associated natural and working lands) from development.</p> | <p>Farm Conservation</p> | E.g. Agricultural Conservation Easements, Act 250; "development" to include siting of renewables | VHCB annual reporting |
| | 8 | | <p>Farm Viability</p> | E.g. Current Use, Farm Viability Programming, farm succession | VHCB / SoV annual reporting |
| | | | New farmer training, outreach, and support | AAFM WQ practice tracking / COMET-Planner ERCs | |
| 5 | 9 | <p>Enhance education, outreach, research, and technical assistance programming to support farmer learning and adoption of climate smart agricultural practices.</p> <p>encourage farmer participation and adoption of Climate Smart Agricultural strategies.</p> | <p>Enhance education, outreach, and technical assistance programming to support farmer learning and adoption of climate smart agricultural practices.</p> | Training for all agricultural service providers on Climate Smart Agriculture. | AAFM Partner / Practice tracking |
| | 10 | | <p>Fund and learn from local university and applied research to support.</p> | Coordination with local research institutions and using existing communication and education channels to share with government, farmers, stakeholders. | AAFM Partner / Practice tracking |
| 6 | 11 | <p>Partnerships</p> | <p>Maintain Ag & Ecosystems Subcommittee through development and implementation of GWSA and CAP to cultivate, build and reinforce state, federal, nonprofit, and private sector collaborations</p> | Maintain Ag & Ecosystems Subcommittee through development and implementation of GWSA and CAP to cultivate, build and reinforce state, federal, nonprofit, and private sector collaborations | |
| | 12 | | <p>Coordination with federal NRCS cost-share programs to elevate climate mitigation practices in Vermont, e.g. silvopasture, digestion</p> | Coordination with federal NRCS cost-share programs to elevate climate mitigation practices in Vermont, e.g. silvopasture, digestion | |