Carbon Reduction Strategy and Resilience Improvement Plan
(Section 31 H.479, 2023)

HOUSE TRANSPORTATION COMMITTEE - JANUARY 11, 2024

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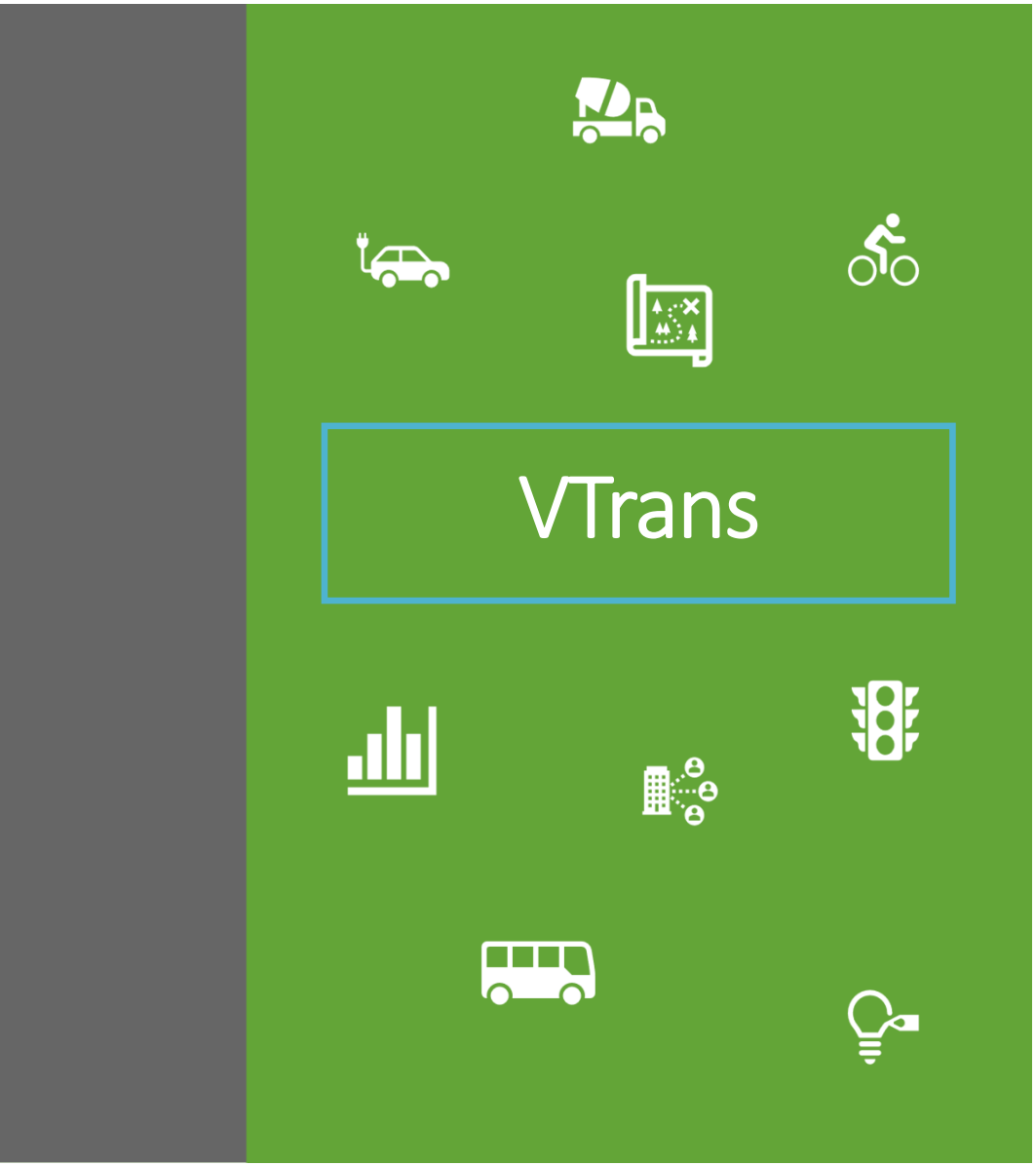


CARBON REDUCTION STRATEGY

https://vtrans.vermont.gov/climate/carbon-reduction-strategy

U.S. DOT Carbon Reduction Program

Infrastructure Investment and Jobs Act (IIJA)

$32 million

$6.3 million annually over 5 years

- Public Transit
- Transportation Alternatives
- Congestion Mitigation
- Efficient Street and Traffic Lighting
- Travel Demand Management Strategies
- Deployment of Alternative Fuel Vehicles and related Infrastructure
- Carbon Reduction Strategy

Project Objectives

Support Vermont's requirements for GHG emissions reduction

- Reduce emissions 40% below 1990 levels by 2030
- Reduce emissions 80% below 1990 levels by 2050
- Transportation sector contributes to 40% of reduction

Support U.S. DOT requirements for each State to develop a Carbon Reduction Strategy

- Describe how new Carbon Reduction Program funding will be used

Strategy Steps

Phase 1

Estimate VTrans' Capital Program Impact on GHG emissions

- Baseline projection
- Construction and maintenance
- Transportation system user emissions

Phase 2

Develop Carbon Reduction Strategy

- Gap analysis
- Stakeholder and public engagement
- Strategy and scenario development and evaluation
- Carbon Reduction Strategy

Strategy Development Input

Advisory Committee

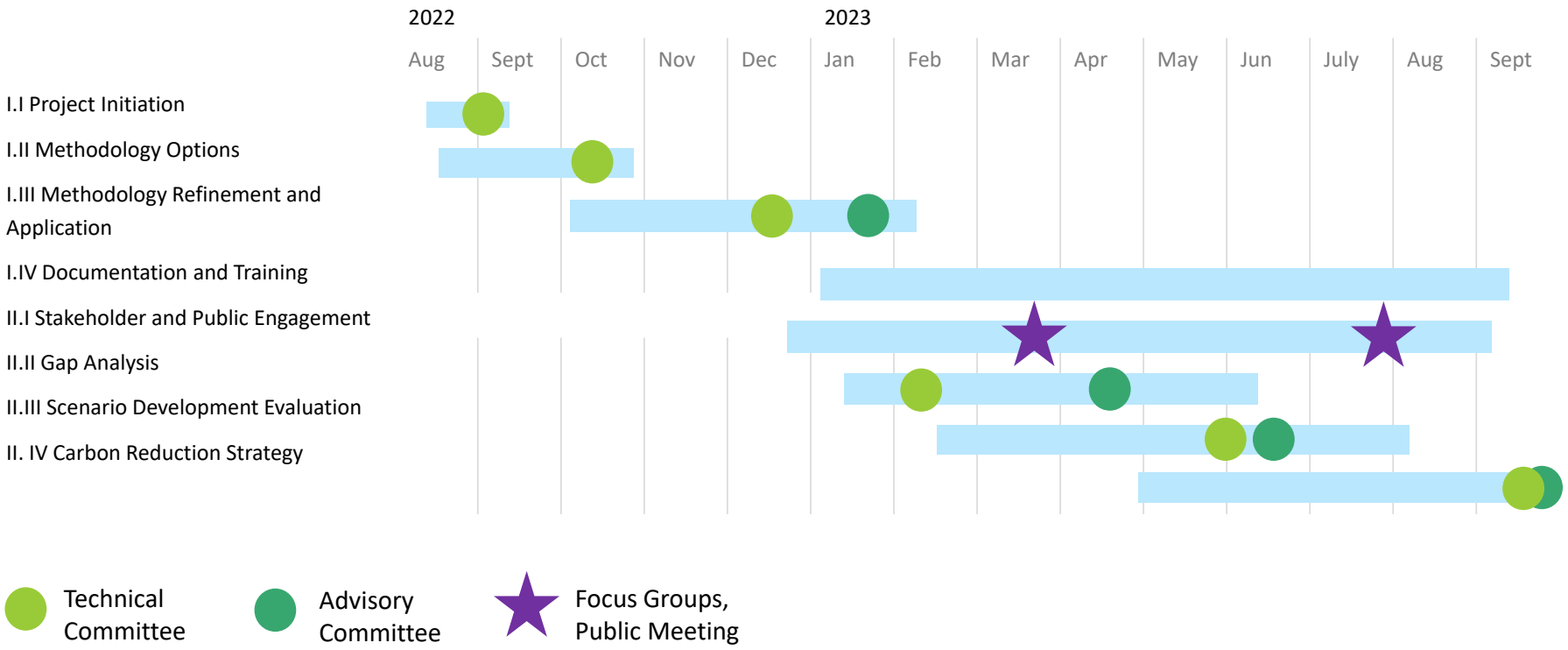
- VT Natural Resources Council
- VT Public Transportation Assoc.
- VT Agency of Natural Resources
- VT Agency of Transportation – PPAID & HWY
- VT Department of Health
- VT Agency of Commerce and Community Development
- VAPDA Transportation Chair
- Chittenden County Regional Planning Commission
- VT Federal Highway Admin

Technical Committee

- Chittenden County Regional Planning Commission
- Energy Action Network
- UVM Transportation Research Center
- VT Climate Council Cross-Sector Mitigation Subcommittee
- VT Agency of Natural Resources
- VT Agency of Transportation HWY AMB, CMB & PPAID EPS

- Two sets of virtual public meetings
- Two rounds of focus groups
  - Community-based organizations, including equity/environmental justice groups
  - Business community
  - Transportation and freight industry
  - Environmental groups
  - Regional planning and public transportation
  - Elected officials
- Online Survey

Project Timeline



Technical Analysis

A **baseline forecast** of the state's transportation emissions through 2050, considering current adopted policies.

An assessment of the **GHG impacts of AOT's current Capital Program**, related to project construction, mode shift, efficient traffic operations, and clean vehicles funded by the program.

An assessment of the **gap** between projected baseline emissions and emission levels required under the GWSA in years 2025, 2030, and 2050.

Development and evaluation of potential **strategies** to close the gap, including evaluation of potential benefits, costs, and co-benefits.

Transportation Emissions Baseline Forecast (MT CO2e)

Source Category	2022	2025	2030	2050
Onroad Vehicles	2,650,367	2,546,692	2,146,801	508,778
Public Transit	15,781	15,781	15,781	15,781
Rail (passenger and freight)	63,453	64,221	65,120	65,171
Aviation	99,502	100,702	102,104	102,188
Marine (navigation)	33,555	33,961	34,434	34,465
Other	29,128	29,480	29,892	29,916
Construction and Maintenance	7,390	7,095	6,686	6,179
Total	2,899,177	2,797,933	2,400,818	762,477

VTrans Capital Program Evaluation

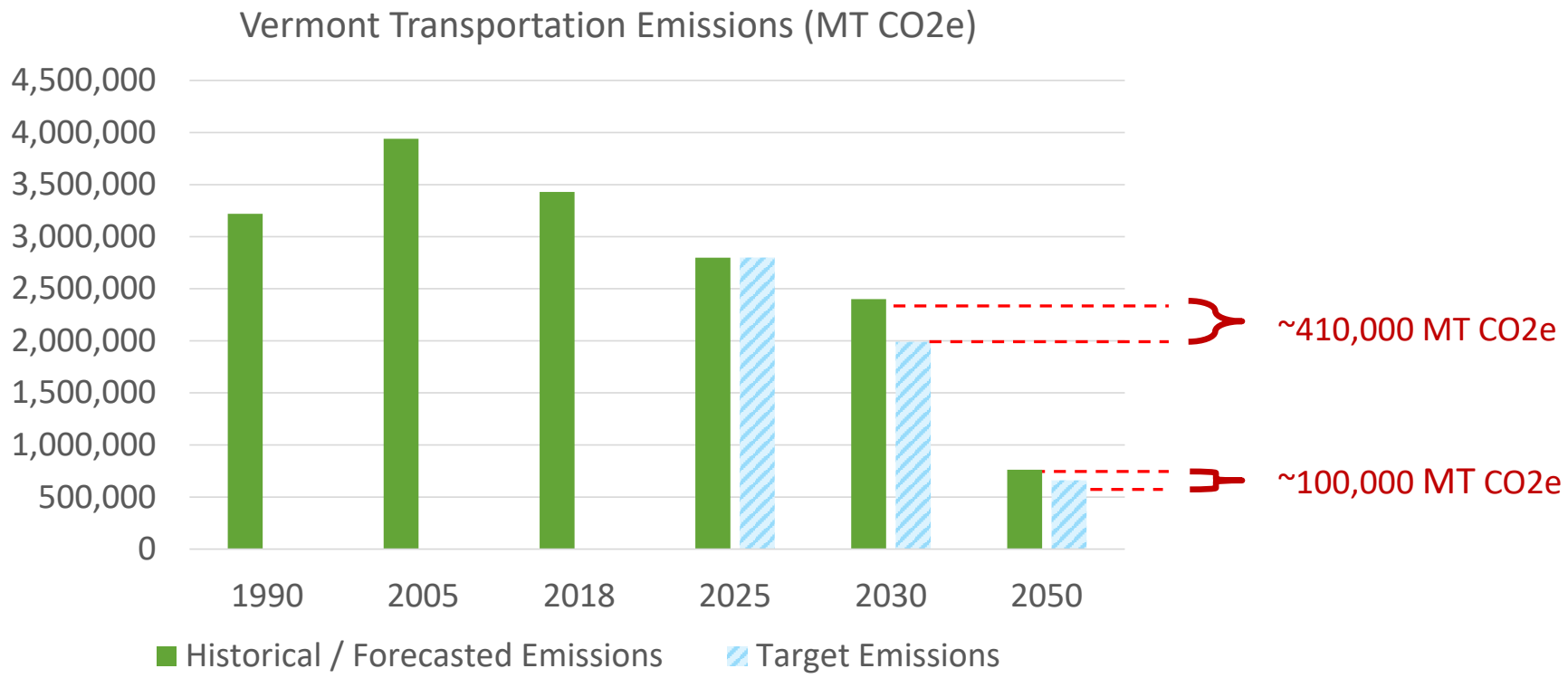
Count of Capital Program Database Projects

Project Type	Count
Aviation	9
Bike & Pedestrian Facilities	29
Interstate Bridges	15
Maintenance	3
Municipal Mitigation	16
Other	1
Park & Ride Lots	3
Paving	76
Rail	55
Rest Areas	6
Roadway Projects	71
State Highway Bridges	56
Town Highway Bridges	24
Traffic & Safety	28
Transportation Alternatives[a]	37
Total	429

GHG Emissions Impact of AOT Capital Program (MT CO2e)

Project Type	2025	2030	2050
Bicycle and Pedestrian[a]	-560	-425	-68
Roadway Expansion	0	0	0
Traffic Operations	-1,925	-1552	-564
Transit	-19	-23	-4
Travel Demand Management	0	0	0
Park and Ride	-141	-107	-17
Total	-2,654	-2,115	-654

Gap Analysis



Possible Strategies to Close Gap

Mode Shift 

- Bicycle and pedestrian network expansion, Transit service expansion, Micromobility subsidies, Expanded travel demand management programs to encourage less carbon-intensive means of travel and non-single occupancy vehicles.

Land Use & Tele-Travel Strategies 

- Compact land use/smart growth.
- Broadband expansion to serve the entire state.

Traffic and Roadway Strategies 

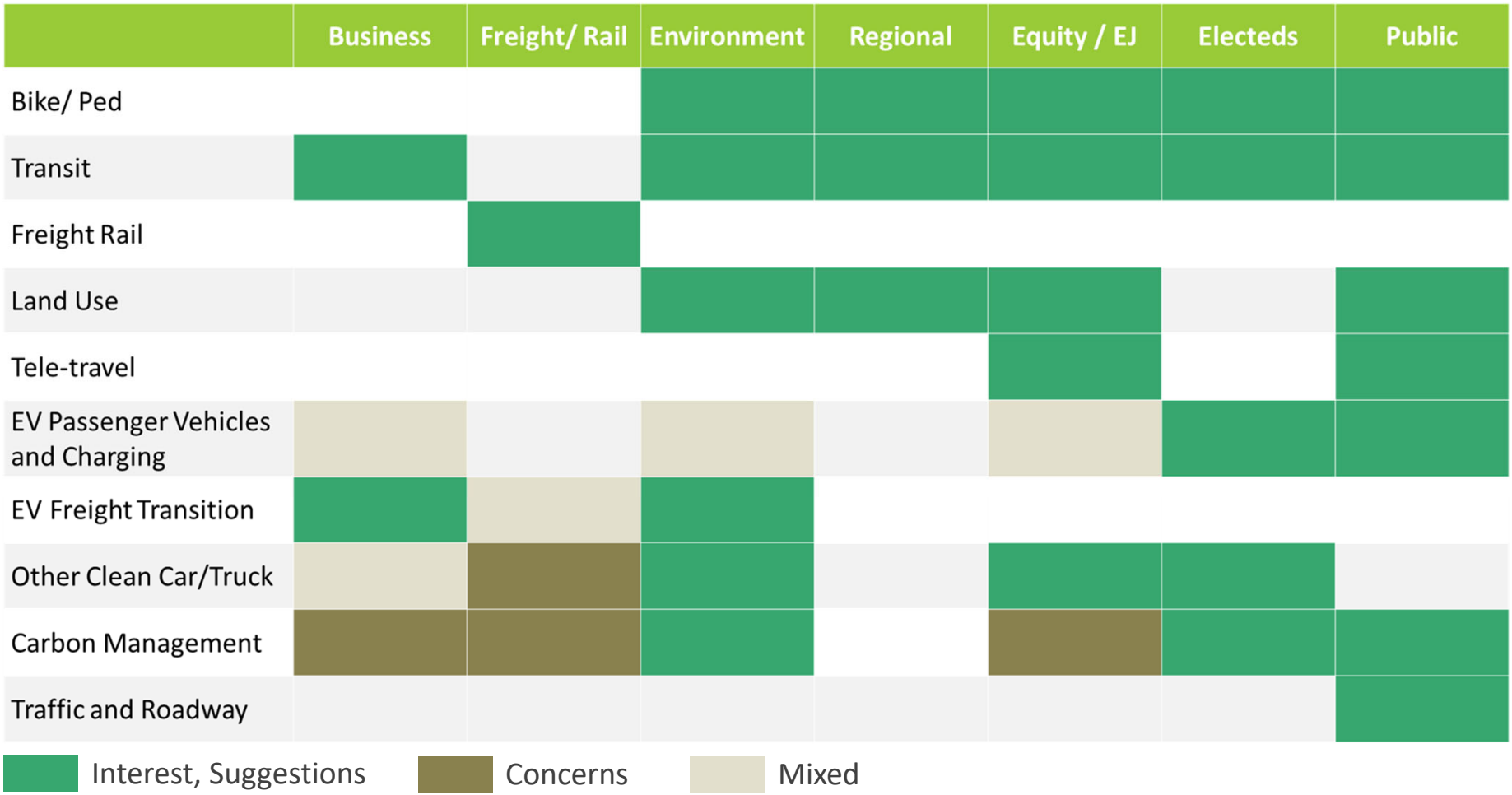
- Transit vehicle electrification.
- Advanced Clean Fleets to further electrify truck fleets in the state.

Clean Car/Truck Incentives and Requirements 

- Feebates to further incentivize clean vehicles.
- Clean Transportation Standard
- Cap and Invest

Carbon Management Strategies 

Stakeholder Focus Groups



Strategy	CO_2 Reduction (2030 metric tons)	% of 2030 Gap Closed	Estimated Cost Through 2030 ($M)
Bicycle and pedestrian network expansion	220	0.1%	55.7
Transit service expansion	690	0.1%	44.0
Micromobility	1,420	0.3%	7.9
Travel demand management	80	0.0%	2.8
Transit vehicle electrification	4,260	1.0%	31.5
Land use	5,660	1.4%	NA[a]
Broadband expansion	5,300	1.3%	191.7
Advanced Clean Fleets	35,700	7.7%	79.3
Feebates	19,800	4.8%	NA[b]
Combined Effects			
Transportation investment and services	6,500	1.6%	141.8
Transportation + land use + broadband	17,600	4.3%	333.5
Transportation + land use + broadband + ACF + feebates	73,000	17.8%	412.8

GHG Reduction Strategies: 2030 Effects

Strategy	CO_2 Reduction (2050 metric tons)	% of 2050 Gap Closed	Estimated Cost Through 2050 ($M)
Bicycle and pedestrian network expansion	70	0.1%	231.3
Transit service expansion	90	0.1%	60.0
Micromobility	870	0.9%	30.4
Travel demand management	10	0.0%	10.7
Transit vehicle electrification	17,000	17.0%	110.3
Land use	900	0.9%	0
Broadband expansion	850	0.8%	191.7
Advanced Clean Fleets	112,000	112%	461.8
Feebates	2,800	2.8%	0
Combined Effects			
Transportation investment and services	18,400	18%	443
Transportation + land use + broadband	20,600	21%	634
Transportation + land use + broadband + ACF + feebates	147,300	135%	1,091

GHG Reduction Strategies: 2050 Effects

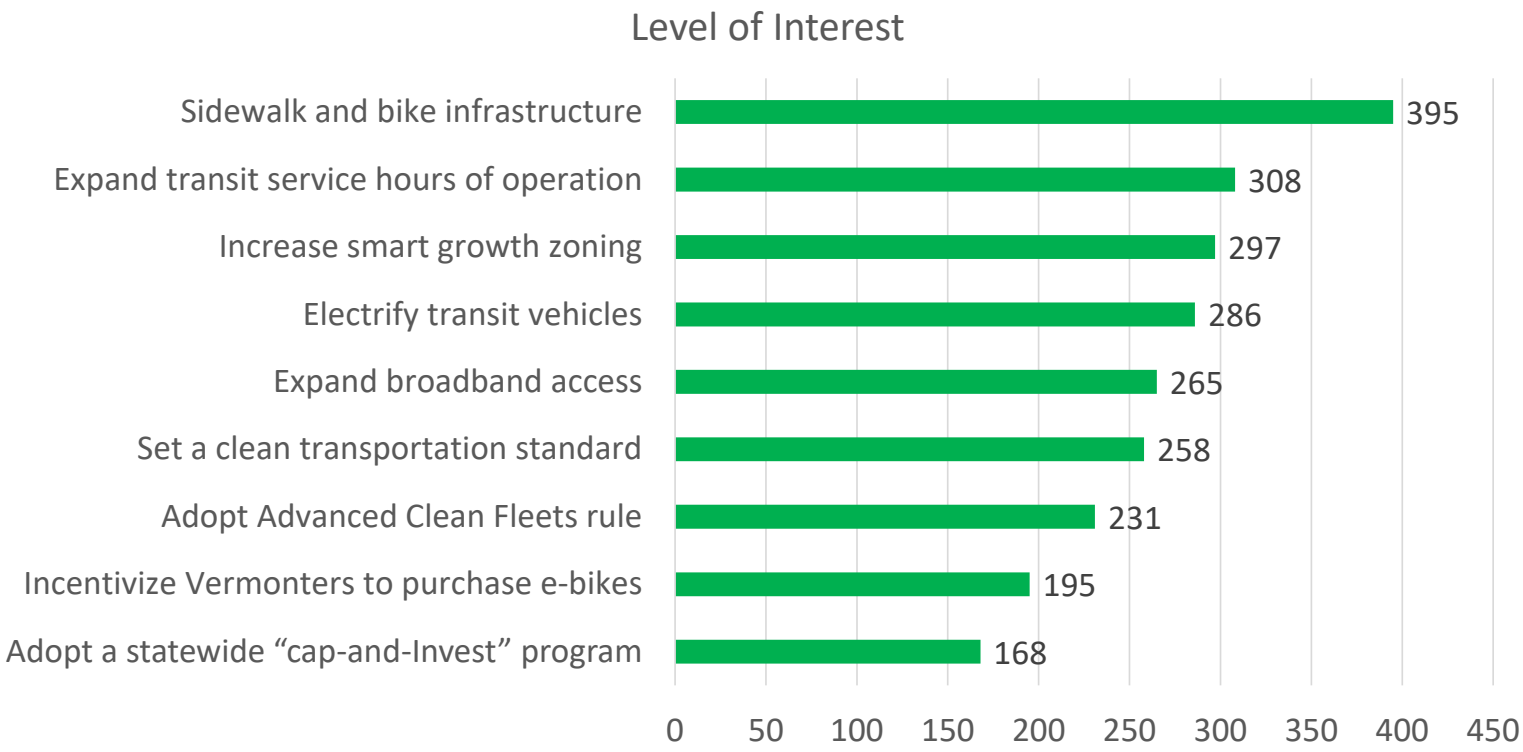
Carbon Reduction Strategies Not Quantified

Strategy	Implementation Assumptions	Reason for Not Modeling
Electric or zero-emission vehicle and infrastructure incentives	Expand incentives for purchasing new or used zero-emission vehicles and/or charging equipment beyond those currently offered.	Assumed to be a supporting strategy for Advanced Clean Car and Truck rules, not providing additional benefits beyond those rules (which are included in the baseline emissions projection).
ZEV charging/ refueling infrastructure	Expand public ZEV charging/refueling network beyond existing funding levels.	Assumed to be a supporting strategy for Advanced Clean Car and Truck rules.
Clean Transportation Standard[a]	Adopt a policy to require fuel suppliers to decrease the life-cycle carbon intensity of transportation fuels by 20 percent by the early 2030s.	More detailed program design and analysis required to model benefits.
Cap-and-invest [a]	Adopt a cap-and-invest program that would establish a declining emissions cap and direct revenue from the auction of emissions allowances towards carbon reduction strategies, including mitigation of costs for low to moderate income households.	More detailed program design and analysis required to model benefits.

Public Survey

~700 responses

Average 353 responses per question



Cost-Effectiveness and Co-Benefits of Carbon Reduction Strategies

Strategy	GHG Emissions	Air Quality (particulate emissions)	Mobility (new non-SOV trips)	Health (cost savings)
Bicycle and Pedestrian Network	++	++	+++	+++
Transit: Service Expansion	+	-	+++	+
Micromobility	++	++	+++	++
Travel Demand Management	++	++	+++	++
Transit: Vehicle Electrification	+++	+++	-	++
Telework	++	+++	-	-
Land Use	+++	++	-	+++
Advanced Clean Fleets	+++	+++	-	++
Feebates	+++	-	-	-

Carbon Reduction Strategy Outline

Main Body

- Executive Summary
- Purpose of the Strategy
- Strategy Development Process
- Evaluation of Strategies and Scenarios
  - Baseline forecast
  - Capital Program Impacts
  - Gap Analysis
  - Additional strategies & combined effects
  - Uncertainties & co-benefits
- Additional Strategies
- Funding Allocation

Appendices

- Committee and Focus Group Participants
- Greenhouse Gas Inventory and Forecast
- Capital Program Analysis
- Strategies Analysis
- 2050 Modeling Results
- CRP Eligible Activities

Strategy Categories

Expand **transportation capital program investment and services**, as feasible consistent with available funding.

Expand programs and incentives to encourage **compact land use and teletravel.**

Support maximum conversion of Vermont's vehicle fleet to **zero-emission vehicles.**

Undertake a process with the public and stakeholders to **further evaluate, develop, and implement additional programs**

Center **equity** in carbon reduction.

Measure and report **progress.**

Transportation Capital Program

Current Activities

- $13M/yr bike/ped facilities
- $40M/yr transit support
- $150k/yr e-bike subsidies
- $800k/yr TDM program

Additional Opportunities

- Expand and enhance pedestrian and bicycle infrastructure
- Support micromobility
- Expand transit service
- Expand TDM
- Electrify bus fleet
- Support efficient traffic operations
- Low-carbon material specs

Considerations

- Need sustainable funding
- Need innovative service for rural/ small communities
- Seasonality
- Coordination with land use

Land Use & Tele-Travel

Current Activities

- Downtown and Village Center tax credits
- Sales tax reallocations
- Broadband expansion

Additional Opportunities

- Expand tax credits & sales reallocations
- Smart Growth zoning incentives
- Expanded broadband
- Support for zoning/ subdivision updates
- Adopt Multimodal Highway Guidance
- Act 250/state designation reform

Considerations

- Caution re: regulation of private land
- Support affordable housing/ increase in housing supply
- Transportation priorities and design standards to support walkable communities
- Teletravel impacts uncertain

Zero-Emission Vehicles

Current Activities

- ACC2 and ACT rules
- Drive Electric Vermont/ EV incentives
- Federal infrastructure & incentives funding
- Utility incentives & EV rates

Additional Opportunities

- Build out public charging network to serve growing EV population
- Additional ZEV and charging incentives/ support
- Explore super-user incentives

Considerations

- Affordability – need income-targeted incentives
- Availability – truck technology not there yet, supply chain issues
- Life-cycle emissions and environmental impacts

Additional Strategies for Further Evaluation and Development

Strategies

- Advanced Clean Fleets
- Clean Transportation Standard
- Cap-and-Invest
- Feebates

Considerations

- Potential impact on economic and business climate
  - Need regional approach
  - Mitigate negative household and industry impacts
- Detailed program design and/or further impact evaluation needed

Next Steps

- Understand NY's Program
- Initiate additional technical analyses and modeling specific to potentially joining existing programs vs. implementing unilaterally
- Adopt a program 3 - 4 years ahead of required target year emissions levels

Additional Recommendations

Center Equity in Carbon Reduction

- Coordinate with implementation of the Transportation Equity Framework Report
- Provide transportation services that help meet basic mobility needs
- Provide incentives that recognize the full set of costs to consumers
- Consider recycling potential revenue into low-income relief

Measure and Report Progress

- Annual updates reporting on key drivers of emissions
- Post-implementation surveys of projects and programs

Implementation

	Agency of Transportation	Other State Agencies	Legislature	Municipalities & RPCs
Transportation investments & services	✓		✓	
Land use & teletravel		✓	✓	✓
Zero-emission vehicles	✓	✓	✓	✓
Additional programs		✓	✓	

Proposed Use of Carbon Reduction Program Funds

Project Type	Target % of state-directed funding
Bicycle and pedestrian projects, including Complete Streets, shared-use paths, bike lanes, and sidewalks, prioritized within designated smart growth locations (town and village centers)	33%
Transit and micromobility services and incentives (e.g., microtransit, shuttles, e-bike incentives)	33%
Fleet conversion, including conversion of transit buses and/or AOT heavy equipment to electric and/or other zero emission technology, and supporting infrastructure	33%

Considerations:

- Cost-effectiveness
- Co-benefits
- Stakeholder/public support
- Alignment with CAP and LRTP
- Immediate need/ opportunity

Total anticipated funding: ~$31M

Tracking and Reporting

Continued strategy evaluation and progress tracking and reporting

Annual updates reporting on key drivers of emissions

Post-implementation reviews

VTrans Climate Dashboard

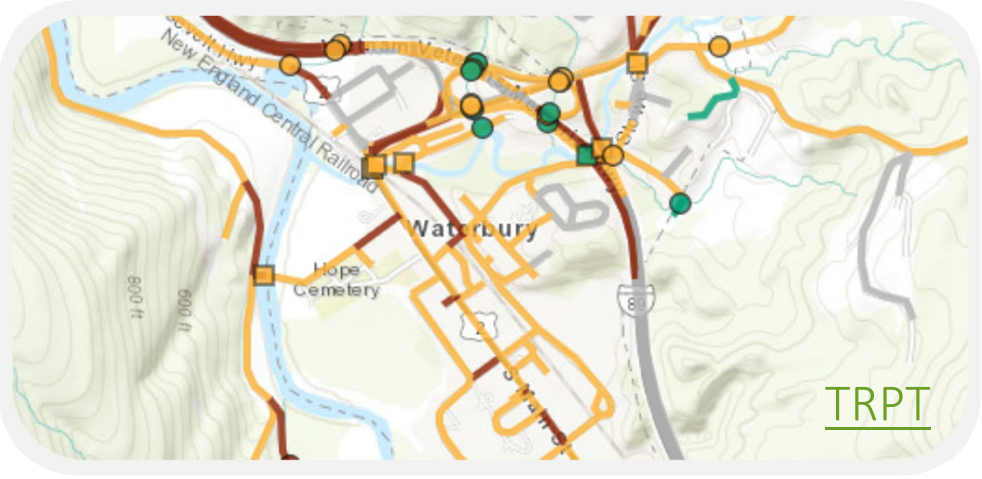
FHWA GHG Performance Measure

VTrans Resilience Improvement Plan

Vermont Agency of Transportation Resilience Improvement Plan (arcgis.com)

Resilience Planning

-Tools -



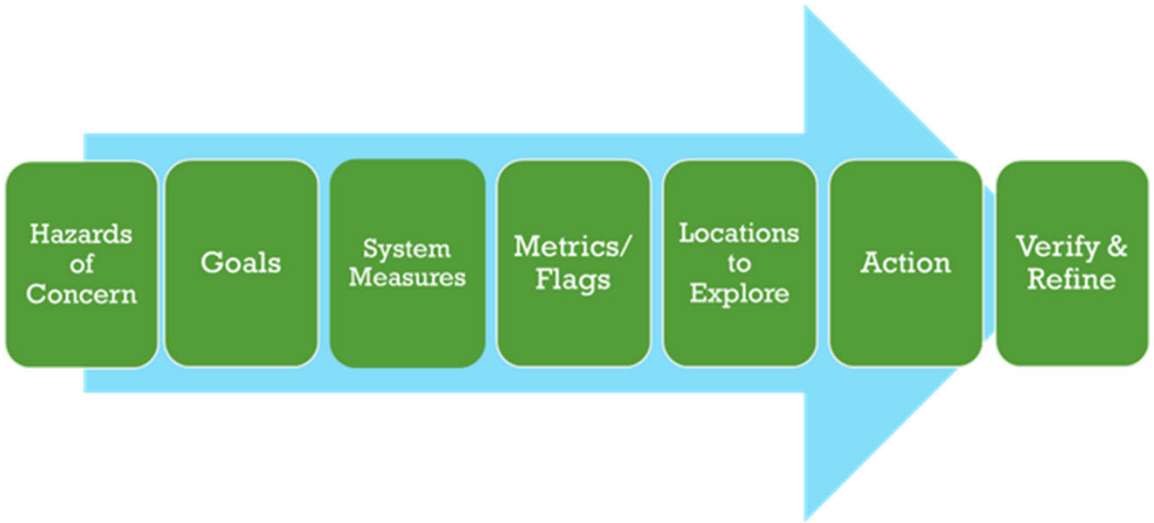
TRPT

Reducing Repeat Damage Tool

Resilience Planning

VT PROTECT
Formula - $37 million
Discretionary Grants

Resilience Improvement Plan (RIP)



Resilience Planning RIP Project Prioritization

GOALS

1. Less damage in the future.
2. Systems return to normal quickly.
3. Vermont is Resilient for all people.
4. Essential Freight moves.
5. Resilience efforts are coordinated.

Explore the VTrans RIP!

MEASURES


High Risk & Repeat Damage


Transit Resilience


Social Vulnerability Index (SVI) & TRPT


Resilience for Commodities Distribution


Coordination with Other Plans

METRICS


Each measure has a metric—a definition of what counts as “high”


Locations where the measure is high get a point (or "flag")


Flags can then be viewed or summarized by road segment or structure

Goal

Less damage
in the future.

Major natural events result in *less damage* to the transportation system in the future than in the past.

System Measure: High risk locations are known and have been made more resilient

What is it: Locations damaged in three major events identified from DDIR analysis for Part 667 Reducing Repeat Damage

Metric: Repeat Damages = 3 (2 flags)

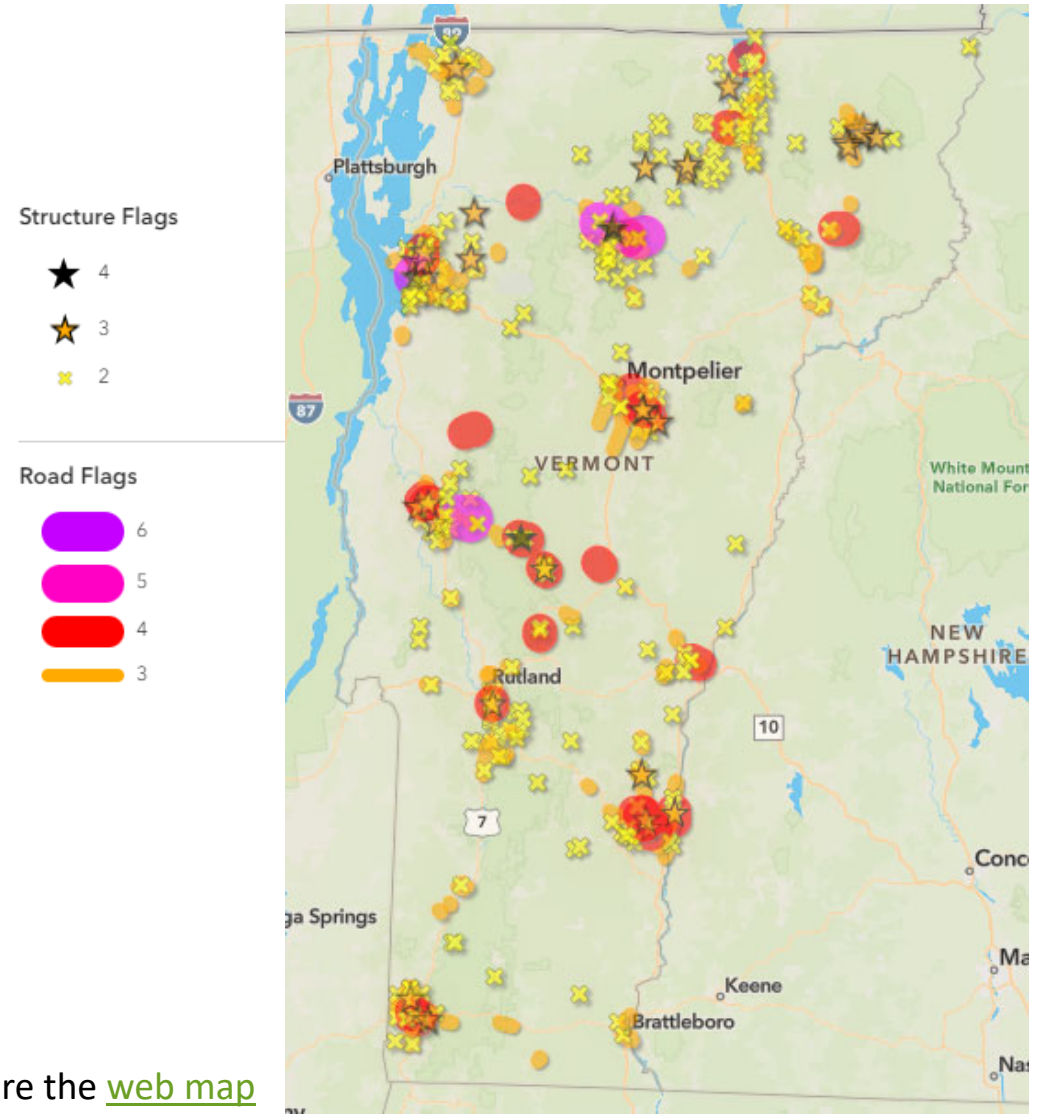
Repeat Damages =2 (1 flag)

Notes: This gives 64 segments out of 76,120 with flag of 2.

RIP Priority Locations

4.6% of state road miles and
1.2% of state structures

0.4% of local road miles and
0.7% of local structures



Explore the web map

Next Steps

- Position for PROTECT and FEMA implementation funding (grants) for priority RIP locations
- Establish metrics and track progress
- Incorporation of resilience in Agency plans and processes
- Interagency coordination

VTrans Carbon Reduction and Resilience

INTEGRATION INTO PROJECT PRIORITIZATION

VTrans Project Selection and Prioritization Process VPSP2

FIVE MODES

EIGHT CRITERIA

- SAFETY Max points = 20
- ASSET CONDITION Max points = 20
- MOBILITY / CONNECTIVITY Max points = 15
- COMMUNITY Max points = 10
- ECONOMIC ACCESS Max points = 10
- ENVIRONMENT Max points = 10
- RESILIENCY Max points = 10
- HEALTH ACCESS Max points = 5

Environment: reducing the negative impacts of travel (e.g., reducing greenhouse gas [GHG] emissions, improving air quality, enhancing safe wildlife passage, and/or improving water quality).

- *Impacts to wildlife, air quality, water quality, cultural resources (look at required vs. voluntary mitigation in project scope).*

VTrans Project Selection and Prioritization Process VPSP2

FIVE MODES

EIGHT CRITERIA

- SAFETY Max points = 20
- ASSET CONDITION Max points = 20
- MOBILITY / CONNECTIVITY Max points = 15
- COMMUNITY Max points = 10
- ECONOMIC ACCESS Max points = 10
- ENVIRONMENT Max points = 10
- RESILIENCY Max points = 10
- HEALTH ACCESS Max points = 5

Resiliency: minimizing the impacts of planned and unplanned events (e.g., work zones, floods and extreme weather).

- *Uses the Transportation Resilience Planning Tool (TRPT) to determine a project's resilience score (combo of vulnerability and criticality scores)*

Discussion / Questions

VERMONT
AGENCY OF TRANSPORTATION