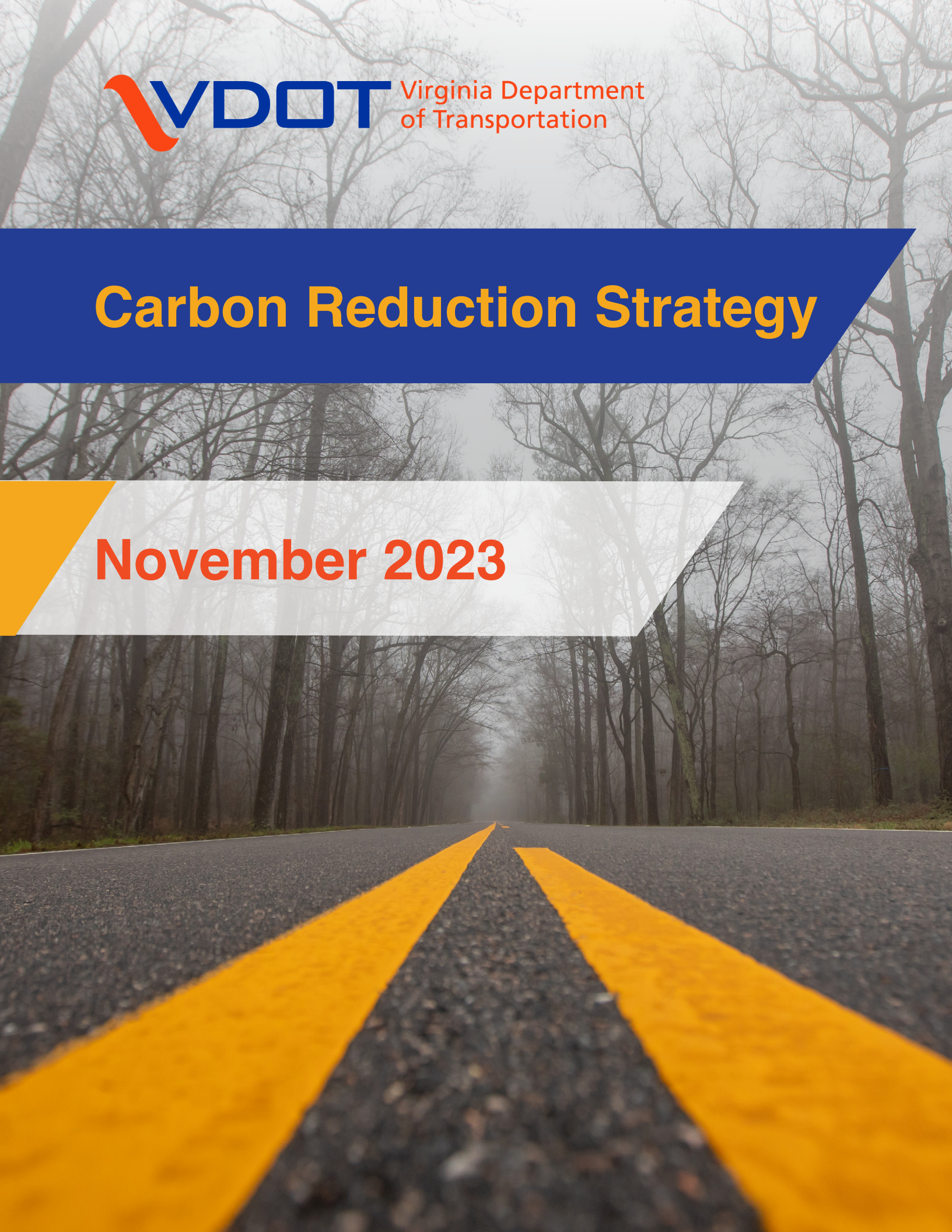

VDOT Virginia Department of Transportation

Carbon Reduction Strategy

November 2023

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PURPOSE AND ROLE OF THE CARBON REDUCTION STRATEGY

Introduction

The 2021 Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), created several new programs that support the reduction of transportation emissions, including the Carbon Reduction Program (CRP), codified in § 11403; 23 U.S.C. 175. The CRP provides funding to State Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs) to reduce transportation emissions through the development of State carbon reduction strategies and by funding projects designed to reduce transportation emissions. Example projects include:

- Bike lanes
- Sidewalks and crosswalks
- On-road and off-road trails
- Alternative fueling/charging infrastructure

The Virginia Department of Transportation (VDOT) developed this Carbon Reduction Strategy (CRS) document, required by law and in accordance with federal regulations and guidance and in consultation and coordination with Virginia's MPOs. VDOT and MPOs are encouraged to obligate CRP funding to projects that support the state's CRS. The document provides a comprehensive approach to CRP strategy options recognizing that VDOT and MPOs across the Commonwealth have diverse transportation needs.

This document was created to serve as a reference document for VDOT, MPOs, and other stakeholders with an overview of eligible CRP activities, potential tools for project evaluation, and projects that VDOT has supported with initial CRP funding. This document also captures a wide array of other state agency strategies and goals focused on carbon reduction in the transportation sector and beyond.

Carbon Reduction Program Funding Allocation

The Carbon Reduction Program is the only federal formula funding program focused on reducing carbon emissions from transportation. Virginia is expected to receive nearly $166 million in CRP funding from fiscal year (FY) 2022 to FY 2026. CRP Guidance states that 65% of funds apportioned to the State for the CRP shall be obligated, in proportion to their relative shares of the population in the State:

- Urbanized areas of the State with an urbanized area population of more than 200,000
- Urbanized areas of the State with an urbanized population of not less than 50,000 and not more than 200,000
- Urban areas of the State with a population of not less than 5,000 and not more than 49,999
- Other areas of the State with a population of less than 5,000

The remaining 35% of funds allocated to VDOT may be obligated in any area of the state.

Carbon Reduction Strategy

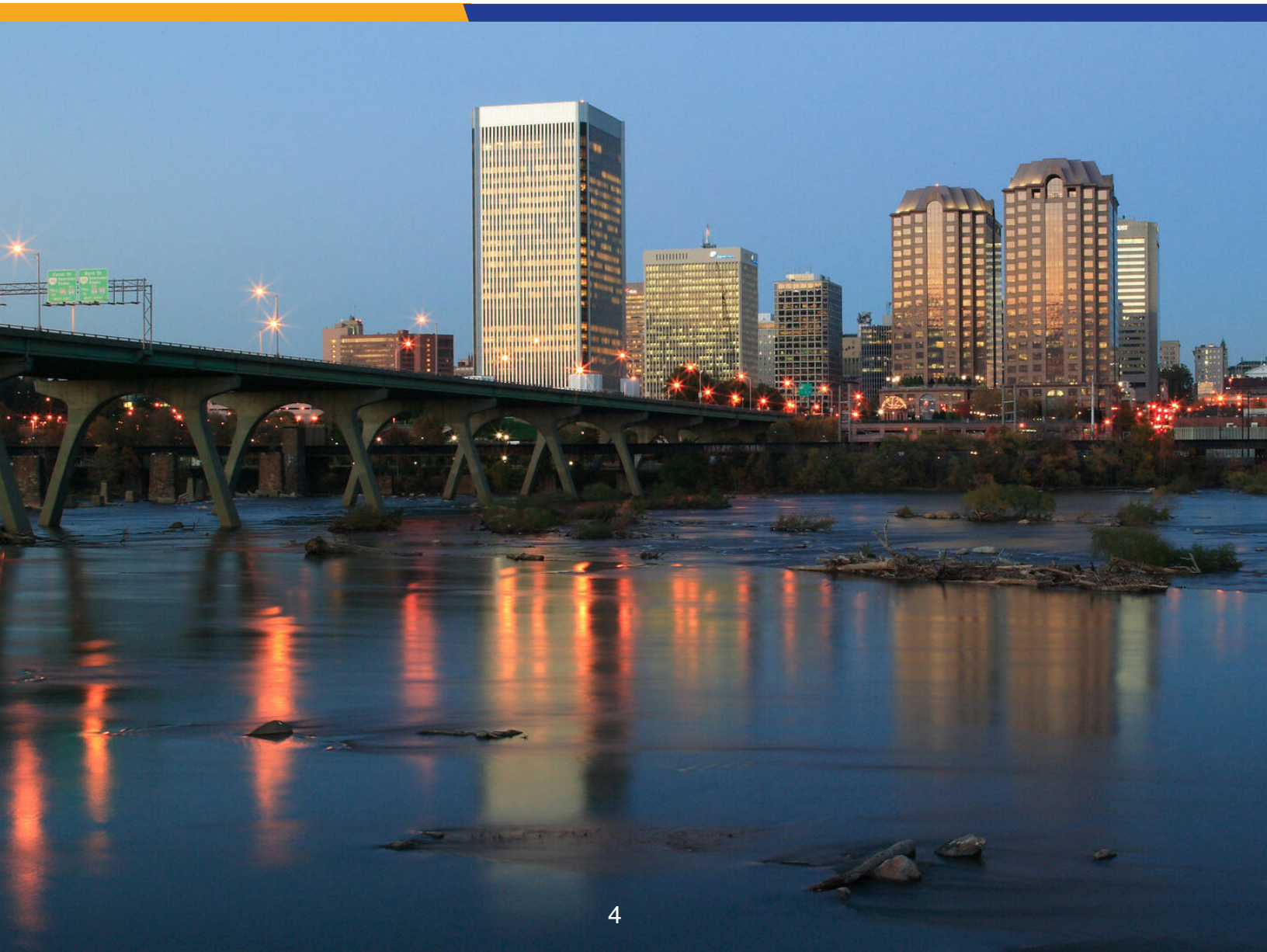
Under the CRP, states are required to develop a Carbon Reduction Strategy (CRS) by November 15, 2023, in consultation with any Metropolitan Planning Organizations (MPOs) designated within the state. The CRS must be appropriate to the population density and context of the state and is to be updated at least every four years.

The purpose of VDOT's CRS is to:

- Inventory sources of emissions (**Existing Conditions**)
- Consider and support state and local carbon reduction planning, goals, and policies (**Supporting Plans and Initiatives**)
- Seek out and effectively incorporate MPO feedback (**Coordination and Outreach**)
- Identify projects and strategies eligible for CRP funding (**Strategy Identification and Analysis**)

VDOT's CRS has been developed according to FHWA's CRP guidelines.

EXISTING CONDITIONS



Population and Geography

Virginia's population estimate as of July 1, 2022 is nearly 8.7 million people based on demographic modeling from the Weldon Cooper Center for Public Service at the University of Virginia. Population centers are found across the Commonwealth, which is made up of a mix of urban, suburban, and rural communities. According to the Virginia Department of Health, 54% of Virginia's land mass is urban but home to 88% of the population, while 46% of the land mass is rural and home to 12% of the population. The Northern Virginia area is home to more than 3 million residents, or more than 35% of Virginia's population. Fairfax County, in Northern Virginia, is the most populated jurisdiction with 1.1 million residents. The Hampton Roads region, situated in the coastal region of the state, is home to more than 1.7 million residents, or 20% of the population. The Richmond metropolitan area, including the state capital, includes 1.3 million residents. Additional metropolitan areas in Virginia include the Roanoke area with 313,734 residents, Lynchburg area with 263,698 residents, and Charlottesville area with 230,584 residents making up just over 9% of the statewide population. The Winchester (123,288), Harrisonburg (139,849), Staunton (126,068), Blacksburg (169,124), Danville (101,714), and Bristol (91,835) areas include 8.6% of the statewide population. The remaining population of the Commonwealth is distributed throughout rural Counties and Towns primarily in central and southwest Virginia.

Surface Transportation

With 59,451 miles of roadways, VDOT has the third largest state-maintained highway system in the country behind only North Carolina and Texas. In addition to the major roads, VDOT is also responsible for nearly 12,000 bridges and 7,550 culverts, six underwater crossings and two mountain tunnels, three toll roads, and one toll bridge. VDOT also operates three ferry services and maintains 43 safety rest areas, four welcome centers, and over 100 commuter parking lots. The Department of Rail and Public Transportation (DRPT) supports rail, public transportation, and commuter services across the Commonwealth.

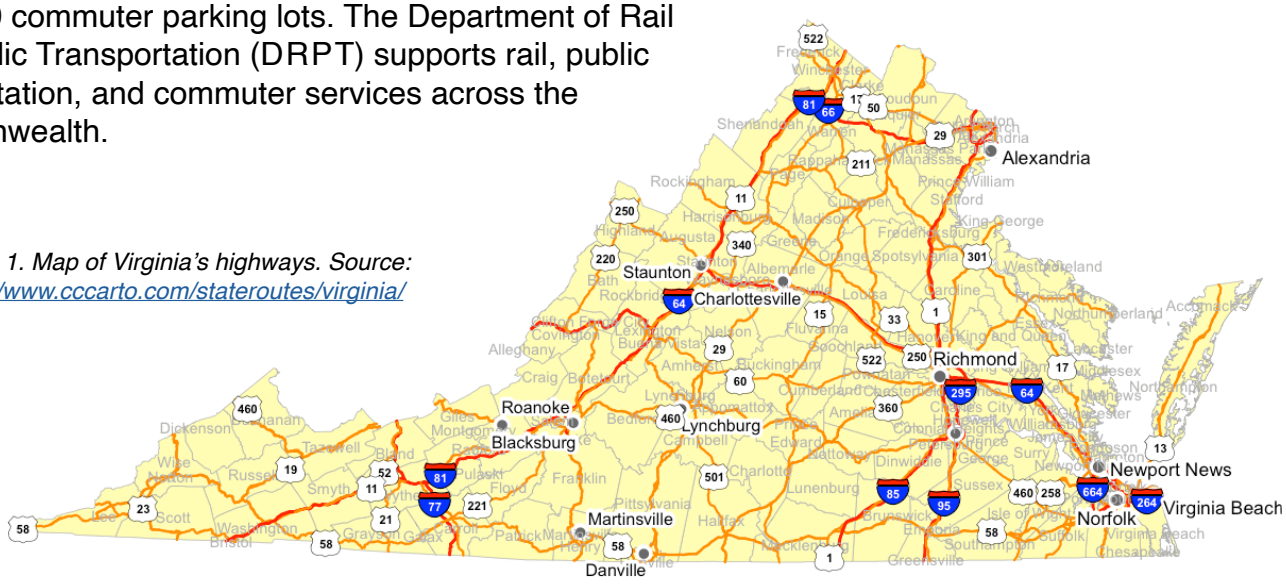


Figure 1. Map of Virginia's highways. Source: https://www.cccarto.com/stateroutes/virginia/

MPOs

Federal transportation law requires the creation of an MPO in every urbanized area with a population over 50,000. MPOs, in cooperation with the State and transportation operators, are responsible for carrying out metropolitan transportation planning processes within their jurisdictional areas. Virginia has 15 MPOs, shown in Figure 2 below. Of those, the National Capital Region, Bristol, and Kingsport MPOs are multi-jurisdictional.

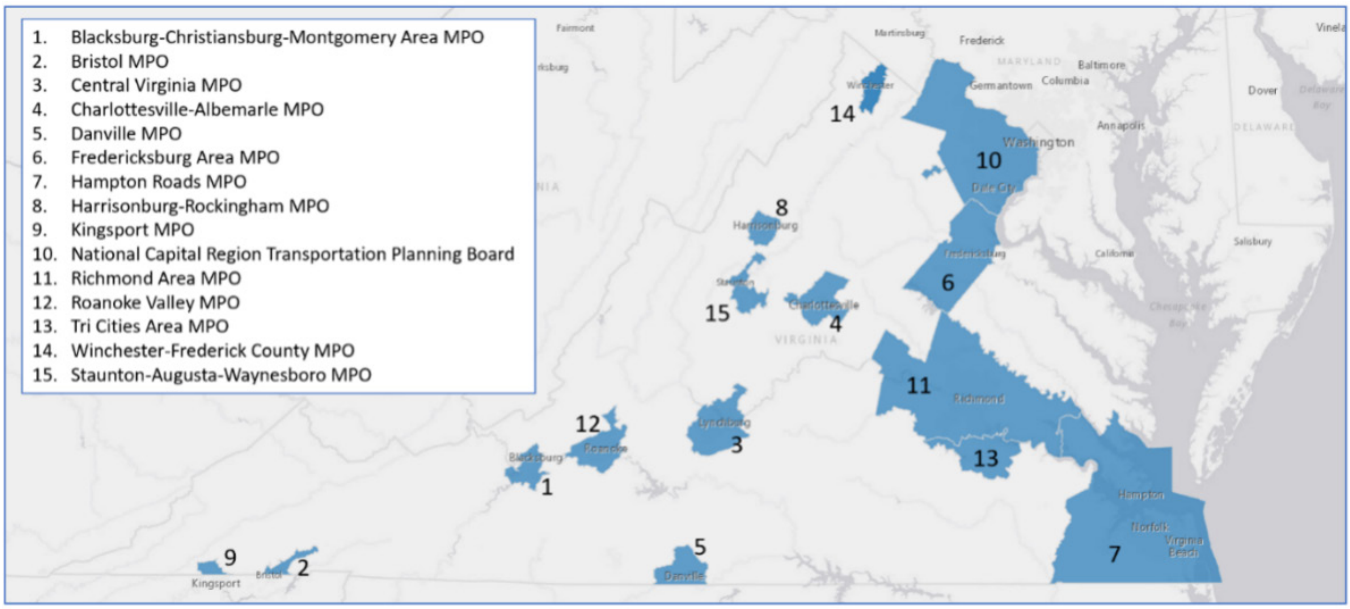


Figure 2. Map of Virginia's MPOs.

Current Emissions Inventory and Trends

Greenhouse Gas (GHG) emissions are measured in million metric tons of carbon dioxide equivalent ($MMTCO_2e$). The year 2005 is often used as a baseline for emissions comparisons. The U.S. EPA's Greenhouse Gas Inventory Data Explorer tool states that in 2019, Virginia's total GHG emissions (125.03 $MMTCO_2e$) had fallen by 18.2% since 2005 (152.85 $MMTCO_2e$). In comparison, national emissions (6,592.77 $MMTCO_2e$) had fallen by 11.1% (7,417.70 $MMTCO_2e$) over the same period.

This tool also illustrates that in 2019, Virginia's transportation sector was responsible for 42% (52.70 $MMTCO_2e$) of statewide emissions. In comparison, the transportation sector was responsible for 28% (1,874.27 $MMTCO_2e$) of nationwide emissions.

Figure 3. Virginia's 2019 Total GHG Emissions ($MMTCO_2e$).

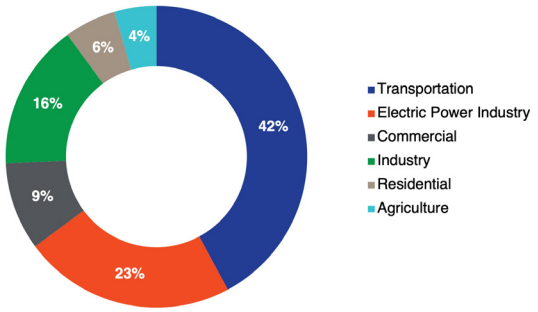
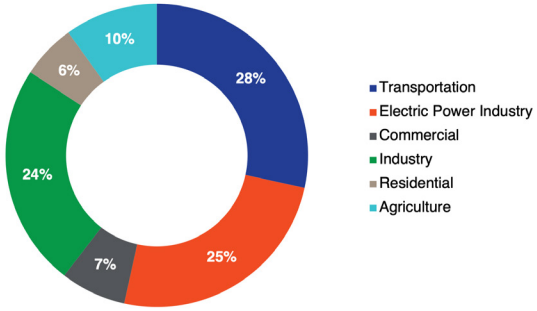


Figure 4. U.S. 2019 Total GHG Emissions ($MMTCO_2e$).



The Greenhouse Gas Inventory Data Explorer shows that compared to 2005, Virginia's 2019 transportation GHG emissions had fallen by 4.6%. Compared to 2005 levels, 2019 U.S. transportation GHG emissions had fallen by 4.7%.

To identify sources of emissions, identify reduction opportunities, and track reductions, and as required by law, Virginia Department of Environmental Quality (VDEQ) conducts economy-wide inventories of GHG emissions. VDEQ uses a baseline year of 2005, with the most recent inventory, conducted in 2022, evaluating emissions through 2019. Figure 5 breaks down Virginia's 2019 emissions inventory by vehicle type and compares it to emissions released in 2005, based on data sourced from VDEQ. Light-duty vehicles, such as cars, trucks, and SUVs, make up the bulk of Virginia's transportation emissions. Emissions from light-duty vehicles have declined in recent years, driven by increasing emissions standards and the adoption of electric vehicles, while emissions from heavy-duty vehicles have risen.

Figure 5. Virginia's CO_2 Transportation Emissions Inventory by Vehicle Type.

SUPPORTING POLICIES AND INITIATIVES

Virginia has a multitude of initiatives that have both broad and specific goals to reduce emissions from the transportation sector and the broader economy. Below are examples of statewide policies, plans, and initiatives as well as agency-specific and regional initiatives that are supporting efforts to reduce emissions across the Commonwealth. VDOT is tracking these efforts and coordinating with relevant stakeholders to ensure alignment, leverage co-benefits, and share lessons learned.

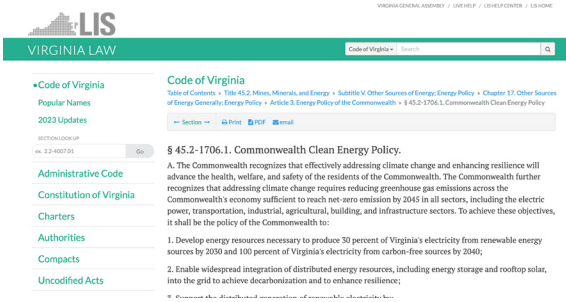
Statewide Policies

Virginia Clean Economy Act

2020 General Assembly Session, House Bill 1526 established a mandatory renewable energy portfolio standard program that requires the two investor owned utilities in the state, Dominion Energy Virginia and Appalachian Electric Power, produce 100 percent renewable electricity by 2045 and 2050, respectively.

Commonwealth Clean Energy Policy

Enacted in 2021, this policy in 45.2-1706.1 of the Code of Virginia sets the goal of achieving net-zero emissions by 2050 in all sectors across Virginia, including transportation. The policy directs the Commonwealth to support this policy by promoting zero-emission vehicles and infrastructure, including electrified transport, decreasing the carbon intensity of the transportation sector, encouraging alternative transportation options, and increasing the efficiency of motor vehicles operating on Virginia's roads.



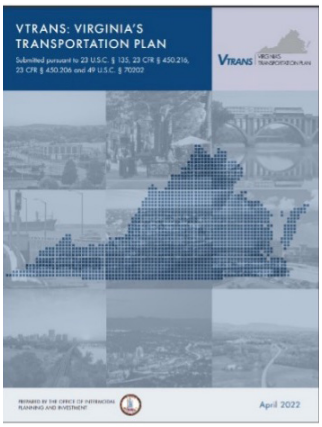
Advanced Clean Cars Rule

December 23, 2021, the State Air Pollution Control Board adopted regulations that incorporated certain California regulations by reference, 9VAC5-95. These regulations require manufacturers to ensure that an increasing proportion of the light- and medium- duty vehicles they sell to Virginia dealers are electric, fuel cell, or plug-in hybrid.

Virginia Department of Transportation

Virginia's Transportation Plan (VTrans)

VTrans is Virginia's multimodal plan to advance the Commonwealth Transportation Board's (CTB) vision for transportation in Virginia. The most recent version, dated April 2022, includes VTrans Goal E: Healthy Communities and Sustainable Transportation Communities includes objectives to reduce per-capita vehicle miles traveled; reduce transportation-related emissions; and increase the number of trips traveled by active transportation.

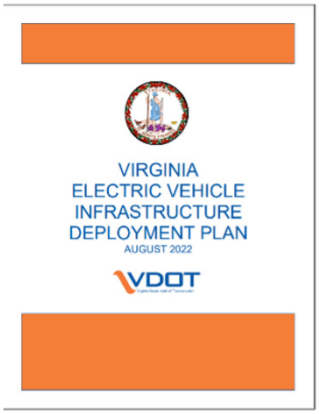


Office of Transportation Sustainability

Established in 2022, VDOT's Office of Transportation Sustainability (OTS) is focused on addressing emerging environmental challenges such as climate change, working across the Department and the Commonwealth to build a more sustainable transportation system. OTS includes VDOT's Decarbonization Program, which supports planning and implementation for CRP, the National Electric Vehicle Infrastructure Program (NEVI), and other efforts to reduce transportation emissions. OTS also houses VDOT's Resilience Program, which is working across the Department's business units providing a framework to consider and incorporate resilience strategies into transportation programs and projects.

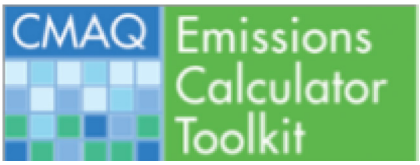
Virginia Electric Vehicle Infrastructure Deployment Plan

Light-duty vehicles are the largest source of transportation CO_2 emissions in Virginia. Virginia's EV Infrastructure Deployment Plan, required under the NEVI Formula Program, was first approved by the FHWA in September 2022 and updated in October 2023. The plan aims to facilitate convenient, reliable, and equitable access to fast electric vehicle charging station infrastructure throughout Virginia. VDOT is projected to receive over $106M in NEVI funding over the five-year program.



Congestion Mitigation and Air Quality (CMAQ)

The CMAQ program provides federal funding for transportation projects and programs that help improve air quality and reduce traffic congestion, such as carpooling, bike and pedestrian paths, and transit enhancements. Funding is available for current and former nonattainment and maintenance areas for ozone, carbon monoxide, and fine particulate matter.

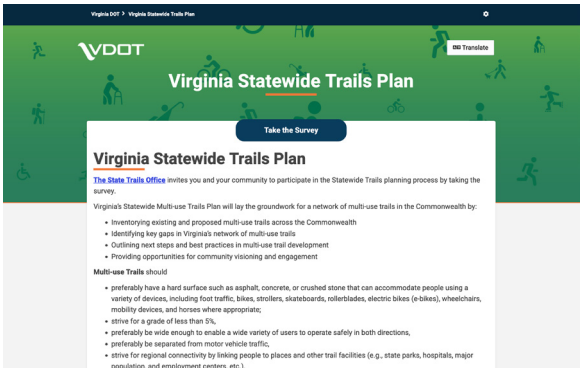


Statewide and Project-Level GHG Analysis

VDOT and DRPT collaboratively conducted a state-wide analysis to assess how best to address GHG emissions and climate change impacts during National Environmental Policy Act (NEPA) reviews to meet federal requirements. The study evaluated baseline and future-year build/no-build GHG operating (tailpipe), construction and maintenance, and fuel cycle emissions. Based on these findings, recommendations were developed outlining when and how to conduct GHG analyses for transportation projects, which received FHWA concurrence and are now in effect.

Virginia Statewide Multi-Use Trails Plan

This plan, in development by VDOT's State Trails Office, will lay the groundwork for a network of multi-use trails in the Commonwealth by inventorying existing and proposed multi-use trails across the Commonwealth, identifying key gaps in Virginia's network of multi-use trails, outlining next steps and best practices in multi-use trail development, and providing opportunities for community visioning and engagement.



Fleet Electrification

With support from the Virginia Transportation Research Council (VTRC), VDOT's Maintenance Division has purchased several electric trucks as part of a pilot project to evaluate the feasibility of electrifying VDOT's fleet. VTRC has conducted analysis of VDOT's existing fleet, including vehicle types, location, usage, and other factors, and identified potential job roles and locations that could be supported by electric vehicles. The pilot will see electric trucks deployed in locations throughout the state to evaluate performance, charging, and other data points to inform the potential for more widespread electrification.

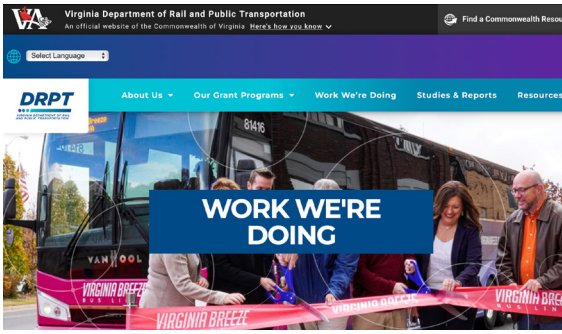
Virginia Transportation Research Council (VTRC)

The VTRC specializes in basic and applied research to support VDOT. VTRC is currently conducting several research efforts to support potential VDOT decarbonization efforts, including fleet electrification, renewable energy deployment, and low carbon pavement. In 2023 VTRC was awarded a grant under the FHWA Climate Challenge, a program to quantify GHG emissions from construction pavement materials and encourage the use of sustainable pavement practices. The grant will allow VTRC to educate agencies on pavement emissions quantification methods, collect production and construction data, and conduct pilot quantification efforts.

Virginia Department of Rail & Public Transportation

Modernizing Transit Fleets

This project, led by the Virginia Department of Rail & Public Transportation, aims to create a comprehensive resource guide and toolkit for Virginia's transit agencies that wish to transition their fleets to low- and zero-emission vehicles. The Department of Rail and Public Transportation administers funding and planning for 40 bus providers across the Commonwealth in addition to other rail and commuter programs.



2022 Virginia Statewide Rail Plan

This plan gives an overview of Virginia's existing rail system and identifies opportunities for its continued expansion while adhering to the VTrans goals. Diverting road traffic to rail can reduce congestion, reduce emissions, and improve air quality.

Port of Virginia

Net-Zero by 2040: 2022 Environmental Sustainability Report

This report details the progress the Port of Virginia has made towards achieving its goal of net zero emissions by 2040. It also gives insight into future initiatives which will be taken to help the port reduce its contribution to climate change and protect ocean and marine resources. One of the transportation emissions reduction programs led by the Port of Virginia is the Virginia Green Operator program, a public-private, voluntary truck rebate program that aims to reduce the amount of air pollution from drayage trucks in the Commonwealth by supporting the acquisition of zero- or near-zero emission trucks.

Virginia Department of Environmental Quality (VDEQ)

Clean Vehicles Program

The Virginia Department of Environmental Quality operates several programs to monitor and reduce vehicle emissions. These include:

- Air Check Virginia
- Volkswagen Mitigation
- Diesel Emissions Reduction Act
- Clean Cars, LEV and ZEV

Climate Pollution Reduction Grant

The Virginia Department of Environmental Quality received this grant from the U.S. EPA to support climate action planning. The planning process will cover all of Virginia and include ways to reduce GHGs and other air pollutants in two phases:

- Development of a Priority Climate Action Plan to identify near-term and high impact projects to reduce GHG and other air pollutant emissions.
- Development of a Comprehensive Climate Action Plan to implement a longer-term statewide plan to reduce GHG and other air pollutant emissions.

Virginia Department of Energy

Clean Energy Virginia

This initiative was established by the Virginia Department of Energy and aims to expand access to clean energy and growing the clean energy jobs of the future across the Commonwealth. The Clean Energy Virginia Dashboard was created to measure progress towards achieving the clean energy goals established in the Virginia Clean Economy Act of 2020. Additionally, the Clean Energy Advisory Board was created to establish a pilot program for disbursing loans or rebates for the installation of solar energy. The installations will be specific to low- and moderate-income households through the Low to Moderate Income Solar Loan and Rebate Fund.

VA Clean Cities Partnership

VA Clean Cities is a program sponsored by the Department of Energy in accordance with the Energy Policy Act of 1992. This legislation's intent is to ensure national energy security by reducing dependence on imported petroleum products. The Clean Cities program was chartered to help achieve this objective by promoting alternative fuel use in the transportation sector. Virginia Clean Cities has long been a leader in facilitating electric vehicle infrastructure installation across the Commonwealth.

Regional Plans and Strategies

Long-Range Transportation Plans (LRTPs) are an integral aspect of the transportation planning process. They outline transportation goals, objectives, and planned investments that will take place over an extended timeframe, normally 20-30 years. LRTPs are used to guide decision-making and prioritize future funding to efficiently and effectively fulfill transportation needs. All MPOs across the Commonwealth have developed LRTPs, linked below. More detailed information regarding MPO's LRTPs and carbon reduction-related planning efforts can be found in **Appendix E: Long-Range Transportation Plans and Supporting Documents.**

- Blacksburg-Christiansburg-Montgomery Area MPO
- Bristol MPO
- Central Virginia TPO
- Charlottesville-Albemarle MPO
- Danville MPO
- Fredericksburg Area MPO
- Hampton Roads TPO
- Harrisonburg-Rockingham MPO
- Kingsport MPO
- National Capital Region Transportation Planning Board
- Richmond Area MPO
- Roanoke Valley MPO
- Tri Cities Area MPO
- Winchester-Frederick County MPO
- Staunton-Augusta-Waynesboro MPO

COORDINATION AND OUTREACH

Federal CRP guidance states that CRS must be developed in coordination with all MPOs designated in the state. Development of the strategy document involved coordination and outreach to MPOs, state agencies, and the public through surveys, informational presentations, meetings, and correspondence. Figure 6 gives additional insight into the timeline for key coordination events conducted to inform CRS development.

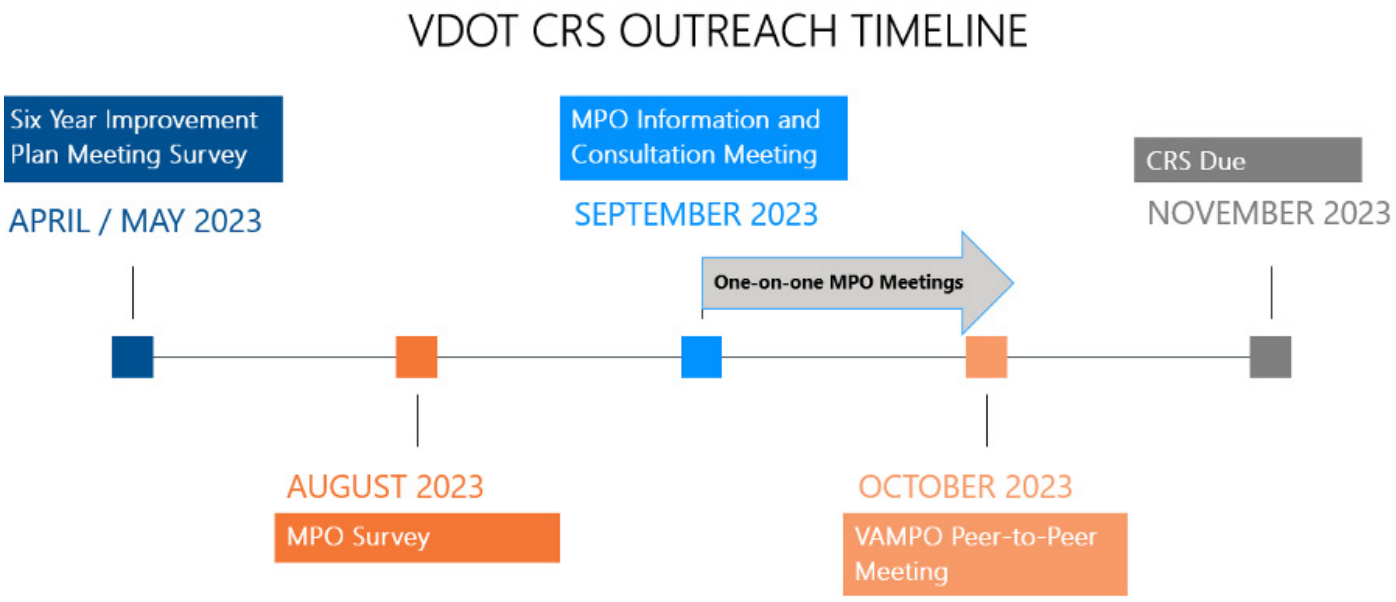


Figure 6. Timeline and milestones for the development of the CRS.

Six-Year Improvement Plan Meeting Survey

An initial survey was provided to attendees at VDOT's Six-Year Improvement Program public meetings held around the Commonwealth in April-May 2023, which was completed by 46 participants. As Figure 7 shows, most participants were members of the public. The survey asked participants' opinions on a variety of topics related to the CRP such as which CRP-eligible activities are of interest to them and any questions or feedback they had regarding VDOT's implementation of the CRP. Survey participants indicated that bike lanes, sidewalks and crosswalks, as well as bus rapid transit and zero-emission vehicle infrastructure were areas of interest.

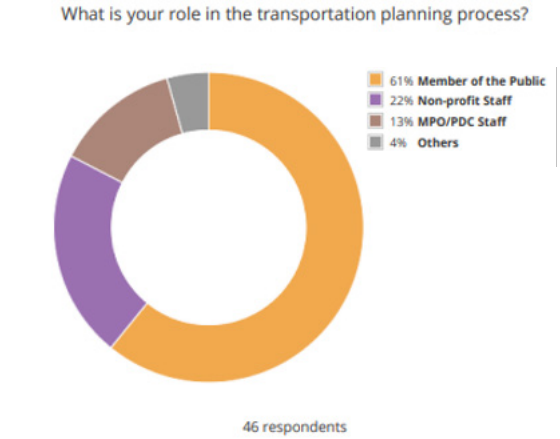


Figure 7. Example of Survey Responses.

MPO Survey

Beginning August 25, 2023, and open through September 6, 2023, MPOs were solicited for their input on their familiarity with, the importance of, and their efforts to define carbon reduction policies, goals, and strategies for their respective MPO. Ten out of 15 MPOs submitted input, which was used to inform the development of the CRS. See **Appendix B: Stakeholder Engagement** for more information.

MPO Information & Workgroup Session

An information/workgroup session was held by VDOT on September 8, 2023, with all Virginia MPOs invited to participate. VDOT staff presented an overview of the CRP and CRS, VDOT's CRS development, and relevant planning tools. Throughout the workgroup session, attendees were asked a series of questions related to carbon reduction policies, strategies, and projects, in addition to potential co-benefits, challenges, and success stories. Information drawn from these responses informed the development of VDOT's CRS.

MPO One-on-One Meetings

VDOT provided the opportunity for all MPOs to engage in one-on-one meetings in addition to the survey and group meetings. These meetings were informal with the intent to capture nuanced information about specific MPO policies, strategies, and projects aimed at reducing transportation emissions. At a high level, VDOT learned that MPOs are tailoring their policies and goals to closely match the needs, priorities, and opportunities of their respective jurisdictions to reduce transportation emissions. For instance, MPOs that are more rural geographically focused on trails, greenways, and microtransit, while MPOs that are more urban and suburban focused on public transportation, bike and pedestrian trails, and commuter programs to reduce single-occupancy vehicle use.

STRATEGY IDENTIFICATION AND ANALYSIS

Eligible Strategies

Tables 1 to 4 below provide insight into the strategies that are eligible for CRP funding, as outlined in the FHWA CRP Guidance. Within each strategy, sub-categories have been identified to provide examples of the types of projects that fall under the strategy. While this list is not exhaustive, these strategies will be used as guidelines for how Virginia's transportation sector may implement the Carbon Reduction Program.

Table 1. Transportation Choice

Strategies that promote the use of active transportation modes.	
Public transportation	Infrastructure and policies to encourage the use of public transportation. These can help increase ridership and efficiency.
Bike lanes	Initiatives to ensure that infrastructure is safe and comfortable for riders use. These include landscaping, signage, and buffers.
Sidewalks and crosswalks	Strategies to promote the use of sidewalks and crosswalks. These include signalized pedestrian crossings, mid-block crossing, and pedestrian-scale lighting.
On-road and off-road trails	Strategies to promote the use of safe and comfortable use of these routes.

Table 2. Efficiency and Alternative Fuels

Strategies to increase efficiency and the adoption and usage of alternative fuels.	
Alternative fueling/charging infrastructure	Strategies that support the use of alternative fuels. For example, electricity, hydrogen and biofuels, and help to ensure that there is adequate associated charging and fueling infrastructure.
Truck stop electrification (TSE)	Projects that support the use of off-board power to meet the needs of truck drivers during rest periods. TSE allows truck drivers to access electricity from a pedestal or gantry located at truck stops or truck terminals. This reduces idling by providing services, such as HVAC, that are otherwise powered by engine idling.
Diesel engine retrofits	Projects to modernize and upgrade existing diesel engines to reduce emissions.
Energy efficient street lighting and traffic control devices	Projects to reduce the energy usage of street lighting and traffic control devices, such as installing more energy-efficient bulbs and motion sensors.

Table 3. Congestion Management

Strategies to reduce congestion and mitigate its negative effects.	
Advanced transportation and congestion management technologies	Projects that help reduce congestion and improve the safety and efficiency of the Commonwealth's transportation system.
Intelligent transportation systems	Projects to enhance transportation safety, mobility, and productivity by integrating advanced communication technologies into vehicles and infrastructure.
Traffic flow improvements	Projects to enable roadways to operate more efficiently e.g., by replacing aging infrastructure and improving signalization.
Congestion pricing	Projects to reduce congestion by using market-based principles to manage demand e.g., tolls and parking pricing.

Table 4. Low Emissions Construction Practices

Strategies to incorporate energy-efficient and environmentally friendly practices in construction processes.	
Zero-emission construction equipment and vehicles	Projects to acquire zero-emission construction equipment and vehicles.
Sustainable pavements and construction materials	Projects to reduce the environmental impact of these materials e.g., using recycled asphalt and concrete and porous pavement.

To evaluate potential CRP projects, the Department and MPOs may consider a number of factors, including projected emissions reduction benefits, cost-effectiveness, and co-benefits such as economic development, improved safety, accessibility, and air quality. One potential tool to support this analysis is FHWA's Congestion Mitigation and Air Quality Improvement (CMAQ) Toolkit. The CMAQ toolkit was initially developed to be a resource for DOTs, MPOs, and project sponsors in the CMAQ project justification process, but includes many of the project types that are also eligible for CRP funding.

In evaluating potential strategies and projects, it is also important to consider all available funding sources and evaluate which may be most appropriate. While CRP represents a significant new source of funding, there are a number of other new and existing programs that can fund carbon reduction activities. Please see **Appendix D: Additional Funding Sources** for an overview of federal and state funding sources for which carbon reduction projects may be eligible.

The Commonwealth currently has approximately 34 projects that have received funding via the CRP. Currently, 76% (26) fall under the Transportation Choice category and 24% (8) are Congestion Management projects. Below are examples of projects that have already received a portion of their funding through the CRP. A comprehensive list of projects that have received CRP funding as of September, 2023 is available in **Appendix C: Existing Projects with CRP Funding**.

Existing Project Examples

Transportation Choice

Henrico - West Broad Street (Route 250) Pedestrian and Transit Improvements - Forest Avenue to Willow Lawn Drive

District: Richmond *Jurisdiction: Henrico County* *MPO: Richmond Regional TPO*

This project will provide sidewalks and improvements to bus stops between Forest Avenue and Willow Lawn Drive. Existing sidewalks lack connectivity in several areas so the project will involve infilling these gaps. Improvements to bus stops include the addition of amenities such as landing pads, benches, and shelters. This project will increase accessibility and encourage transportation mode choice in these areas.

Amtrak Multimodal Station Newport News

District: Hampton Roads *Jurisdiction: Newport News* *MPO: Hampton Roads Transportation Planning Organization*

Figure 8. Amtrak Mulitmodal Station Project. Source: Hampton Roads TPO 2022

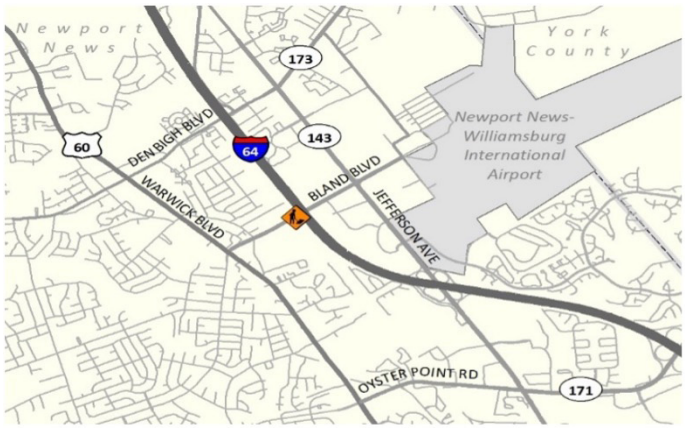


Figure 9. Location of the Amtrak Multimodal Station Project. Source: Hampton Roads TPO 2022

This project will construct a new 8,066 square foot multimodal station to replace the existing station. Its proximity to the Newport News/Williamsburg International Airport will help ensure that the new station is a hub for Hampton Roads Transit (HRT) vehicles, such as buses, taxis, and shuttles servicing the airport.

The station will include modern and ADA-compliant amenities to increase passenger comfort and convenience. These include a passenger waiting area with information displays and an ADA-compliant level boarding platform. The Amtrak Multimodal Station Newport News project will help to promote connectivity, accessibility, and encourage transportation mode choice.

Roanoke River Greenway through Explore Park

District: Salem *Jurisdiction: Roanoke County* *MPO: Roanoke Valley Area Metropolitan Planning Organization (MPO)*

This project will construct an additional segment (1.4 miles) of the Roanoke River Greenway through Explore Park. The new segment of the greenway will be ten feet in width and paved. According to the 2018 Roanoke Valley Greenway Plan, the Roanoke Valley Greenway is the longest, most popular, and most used greenway in Roanoke Valley. The expansion of this greenway will help to improve connectivity in the region by helping to facilitate safe non-motorized travel.

Figure 10. Image of Roanoke River through Explore Park. Source: Roanoke County, VA

Congestion Management

RideFinders - Carpool and Vanpool Encouragement Program

District: Richmond *Jurisdiction: Petersburg* *MPO: Tri-Cities Area Metropolitan Planning Organization (Crater MPO)*

RideFinders, a division of Greater Richmond Transit Company (GRTC) Transit System, is a non-profit ridesharing and transportation demand management agency that works to reduce the number of single-occupant vehicle trips in Central Virginia. These efforts help to protect air quality and increase the efficiency of the region's transportation network. RideFinders offers a variety of programs and services which help to support:

- Carpooling
- Vanpooling
- Transit
- Teleworking
- Walking
- Biking

Figure 11. Image of Vanpoolers in Central Virginia. Source: RideFinders' August 2023 Monthly Recap

#SMART24 - I-64 Gap Widening Segment C - Park and Ride

District: Hampton Roads *Jurisdiction: York County* *MPO: Hampton Roads Transportation Planning Organization*

The I-64 Gap Segment C Widening Project includes improvements and capacity additions to the existing Lightfoot Park & Ride located near the intersection of Rochambeau Boulevard and Route 768/Oaktree Road. These improvements include expanding car parking and increasing bicycle spaces. This Park & Ride has a bike lane and shared-use path connection in York County along a heavily traveled corridor.

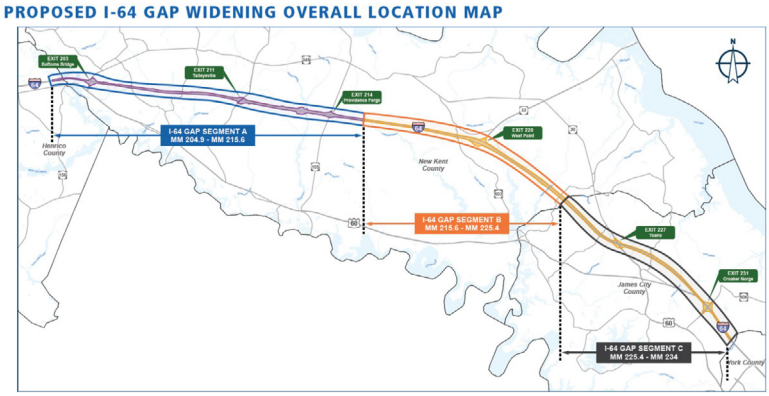


Figure 12. Location of Proposed I-64 Gap Widening Project. Source: VDOT 2023

CONCLUSION

VDOT's Carbon Reduction Strategy will support existing and future initiatives across the state to achieve the Commonwealth's goal of reducing emissions from the transportation sector. This document was developed through coordination and input from MPOs, state agencies and other stakeholders, and presents a range of strategies and tools to aid in the selection of projects to fund with available CRP funding that meet the local needs of Virginia's communities. Continued coordination is integral to the success of reducing the level of emissions produced by Virginia's transportation sector. To realize the Commonwealth's carbon reduction goals, on-going and periodic stakeholder outreach to MPOs, PDCs, partnering state agencies, and other stakeholders is critical to the success of the program. VDOT will continue to evaluate potential CRP strategies, monitor the implementation of funded projects, and quantify the projected emissions reductions and co-benefits delivered through the CRP. The CRS will be updated at least every four years in accordance with the needs of the Commonwealth and as required by FHWA.

APPENDICES

Appendix A: CRS Alignment with Federal Requirements

Requirement	Detail	Reference Section
Prepare CRS in consultation with MPOs	MPOs were sent a survey to gather feedback related to their knowledge and progress on the CRP. MPOs were invited to multiple stakeholder meetings. Feedback was received through open discussion, Mentimeter polls, and Q/A sessions.	Coordination and Outreach
Support efforts – and identify projects and strategies – to support the reduction of transportation emissions		Supporting Policies and Initiatives
Be appropriate to population density and context of the state		Existing Conditions
Develop CRS no later than 2 years after enactment of BIL	Strategy developed and finalized in 2023.	Report date on cover.

Appendix B: Stakeholder Engagement

VDOT CRP MPO Outreach Survey

Beginning August 25, 2023, and open through September 6, 2023, MPOs were solicited for their input on their familiarity with, the importance of, and their efforts to define carbon reduction policies, goals, and strategies for their respective MPO. Ten out of 15 MPOs provided detailed responses, several of which provided web links to their carbon reduction or climate-related planning documents and six of the ten respondents indicated they would like a One-on-One meeting with VDOT. Four One-on-Ones were scheduled based on MPO interest. Survey participants were a part of the following MPOs:

1. Winchester-Frederick County MPO
2. Tri Cities Area MPO/Crater PDC,
3. Roanoke Valley-Alleghany Regional Commission/MPO,
4. Richmond Area TPO,
5. Kingsport TN/VA MPO,
6. Hampton Roads TPO,
7. Harrisonburg-Rockingham MPO,
8. Charlottesville-Albemarle MPO,
9. Central Virginia TPO (also affiliated with CVPDC), and
10. Bristol TN/VA MPO.

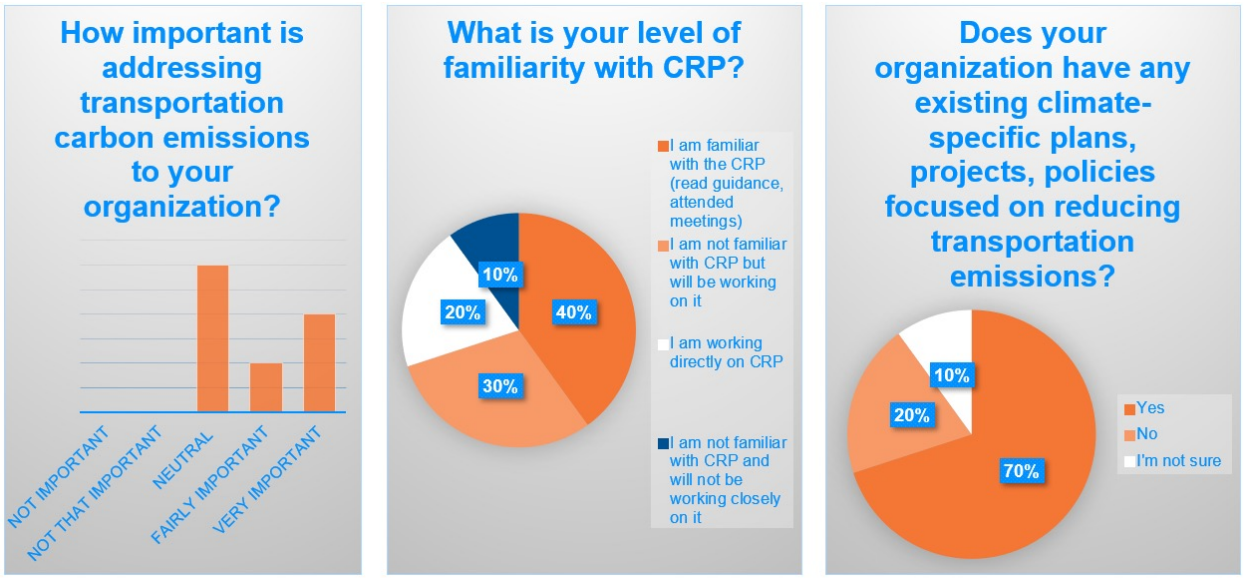


Figure 13. MPO CRP Survey Results, September 2023.

Survey Participants were also asked about their preferred methods for receiving additional information about the CRP, and for providing input on the development of the CRS, if they would be willing to take part in an informational session about the CRP to cover at a high level the overall program, a workgroup session about the Carbon Reduction to focus on strategies, or a combination of the two. Overwhelmingly, the survey results indicated that a combined session to cover the CRP at a high level and then discuss more in-depth strategy topics was favored and subsequently held on September 8, 2023. As part MPO CRP Survey question regarding these meeting options, participants were also asked the following: "*What do you hope to learn or discuss during the meetings mentioned above?*" The following feedback was received, which informed the information provided by VDOT:

- An understanding of the potential implications of the CRS for planning and funding, particularly to the extent that this plan applies to other funding programs beyond CRP.
- Statewide, what is VDOT's view on congestion and the impact of carbon reduction strategy?
- Opportunities appropriate to the smaller/more rural MPOs
- What metrics may be used to measure the potential carbon reduction impacts of a transportation improvement?
- An understanding of the expectations for CRP integration within MPOs. Does this program coordinate with DRPT Commuter Assistance Program activities? How will this program support Complete Streets, trail, and bike/ped programming?
- An understanding of the strategies identified by the Commonwealth as well as other MPOs that are more expansive than our MPO's current planning work.

MPO/VDOT Information & Workgroup Session

Based on MPO responses, VDOT provided MPO staff with both information about the CRP and facilitate detailed discussions about carbon reduction strategies, challenges, opportunities, and other information.

Stakeholder List:

- Virginia Department of Transportation
- Hampton Roads Transportation Planning Organization (HRTPO)
- Harrisonburg-Rockingham MPO
- Crater Planning District Commission (Crater PDC)
- Staunton-Augusta-Waynesboro MPO
- West Piedmont Planning District Commission (WPPDC)
- Central Virginia Planning District Commission (CVPDC)
- Metropolitan Washington Council of Governments (MWCOG)
- Northern Shenandoah Valley Regional Commission (NSVRC)
- Thomas Jefferson Planning District Commission (TJPDC)
- Roanoke Valley-Alleghany Regional Commission (RVARC)

Mentimeter Summary:
Throughout the MPO informational workgroup session, attendees were asked a series of questions which they could answer through the online survey platform Mentimeter. The platform allowed participants to see the responses of their peers, ask questions, and engage as a group on topics of concern, strategies of importance, and regional emission variables that may differ from one MPO to another. Information drawn from these responses, which informed the development of the CRS and continued implementation of the CRP, is summarized below.

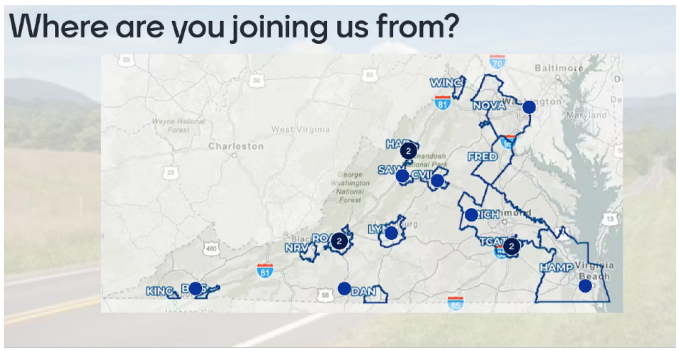


Figure 14. Participant geographical locations.

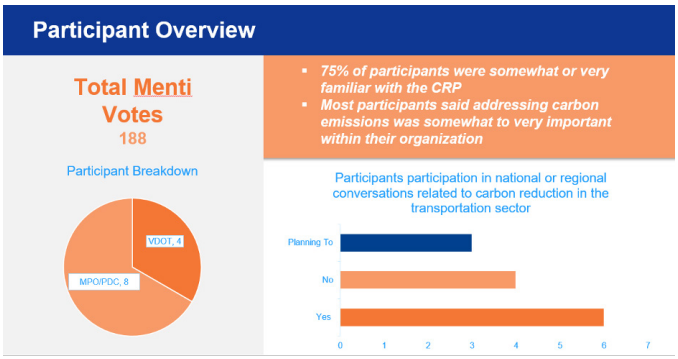


Figure 15. Participant breakdown, familiarity, opinions, and participation.

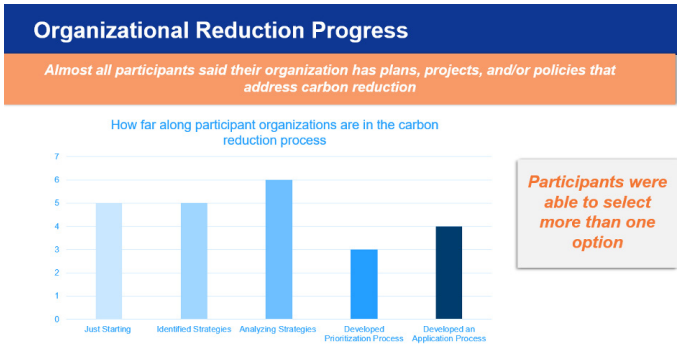


Figure 16. Participant organizational progress on their carbon reduction process.

Figure 17. Top three strategies participants selected that reduce emissions.

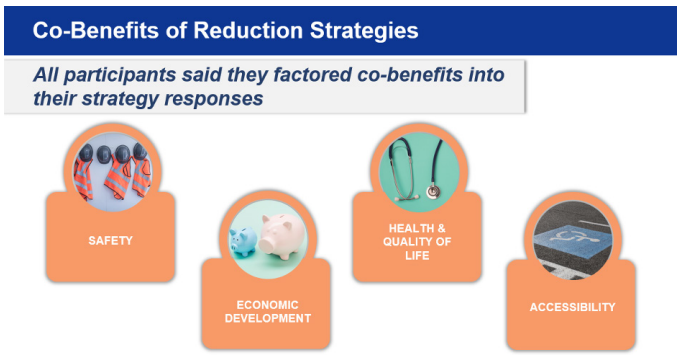


Figure 18. Top co-benefits associated with reduction strategies.

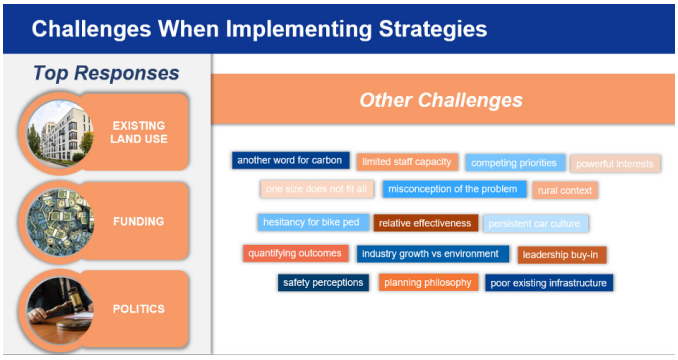


Figure 19. Challenges associated with reduction strategies.

Figure 20. Proven/successful factors to reduce emissions.

Appendix C: Existing Projects with CRP Funding

District	Jurisdiction	MPO	Description
Culpeper	Multi-jurisdictional	Charlottesville-Albemarle Metropolitan Planning Organization (MPO)	Fifth Street Hub And Trails
Culpeper	Albemarle County	Charlottesville-Albemarle Metropolitan Planning Organization (MPO)	Route 29 Shared Use Path
Culpeper	Albemarle County	Charlottesville-Albemarle Metropolitan Planning Organization (MPO)	Exit 107 Park And Ride Lot
Fredericksburg	Stafford County	Fredericksburg Area MPO (FAMPO)	Route 1/Enon Road Intersection And Roadway Imp
Fredericksburg	Fredericksburg	Fredericksburg Area MPO (FAMPO)	Twin Lake-Kensington Bike/Ped Connector
Fredericksburg	Fredericksburg	Fredericksburg Area MPO (FAMPO)	Route 3 Stars And I-95 Off-Ramp Improvements
Hampton Roads	Newport News	Hampton Roads Transportation Planning Organization	Amtrak Multimodal Station - Station, Platform, Parking Lot
Hampton Roads	Virginia Beach	Hampton Roads Transportation Planning Organization	Dam Neck Road/Holland Road Intersection Improvements
Hampton Roads	Norfolk	Hampton Roads Transportation Planning Organization	Emergency Vehicle Preemption - Norfolk
Hampton Roads	York County	Hampton Roads Transportation Planning Organization	I-64 Gap Widening - Segment C - Park And Ride
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Rte 1 (Whitehouse Rd - Harrowgate Rd) Sidewalk/Ped Crossing
Richmond	Richmond	Richmond Regional TPO	Csx Bridge Replacement Lombardy Street
Richmond	Colonial Heights	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	North Es - Sidewalks

District	Jurisdiction	MPO	Description
Richmond	Henrico County	Richmond Regional TPO	Broad St Pedestrian & Transit Stop Improvements
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Route 1 (Marina Dr. To Merriewood Rd.) SW #FLT
Richmond	Henrico County	Richmond Regional TPO	Patterson Avenue Sidewalks
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Rt 1 (Falling Ck. Wayside - Fl) Bike/Ped #FLT
Richmond	Henrico County	Richmond Regional TPO	W Broad St Pedestrian And Transit Improvements
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Meadowdale Blvd (Dalebrook Drive To Beulah Rd) Ped-Bike Imps
Richmond	Richmond	Richmond Regional TPO	Richmond Signal System – Phase Iv
Richmond	Henrico County	Richmond Regional TPO	Williamsburg Rd Pedestrian & Transit Improvements
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Enon Church Road At Bermuda Orchard Road - Ped Improvements
Richmond	Petersburg	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	RideFinders - Carpool And Vanpool Encouragement Program
Richmond	Chesterfield County	Tri-Cities Area Metropolitan Planning Organization (Crater MPO)	Enon Church Rd (Dodd Park-Riverview Dr) Bike/ Ped Improvement
Salem	Vinton	Roanoke Valley Area Metropolitan Planning Organization (MPO)	Walnut Ave Bike/Ped Accommodations (5th St To Town Limit)
Salem	Vinton	Roanoke Valley Area Metropolitan Planning Organization (MPO)	Walnut Avenue Bicycle And Pedestrian Accommodations

District	Jurisdiction	MPO	Description
Salem	Roanoke County	Roanoke Valley Area Metropolitan Planning Organization (MPO)	Roanoke River Greenway Through Explore Park
Statewide	Statewide		Carbon Reduction Strategy
Staunton	Shenandoah County	Staunton-Augusta-Waynesboro MPO	Oranda Road Park And Ride Expansion
Staunton	Rockingham County	Staunton-Augusta-Waynesboro MPO	Mount Crawford Park And Ride Lot Improvements
Staunton	Staunton	Staunton-Augusta-Waynesboro MPO	Richmond Ave And Crossing Way Shared Use Path
Staunton	Augusta County	Staunton-Augusta-Waynesboro MPO	Brite Pedestrian Improvements
Staunton	Staunton	Staunton-Augusta-Waynesboro MPO	Commerce Rd/Lewis Creek Greenway
Staunton	Harrisonburg	Harrisonburg-Rockingham Metropolitan Planning Organization (HRMPO)	N. Main Street Sidewalk
Staunton	Frederick County	Winchester-Frederick County (WinFred) MPO	Pedestrian Safety Improvement

Appendix D: Additional Funding Sources

While CRP represents a significant new source of funding, there are several other new and existing programs that can fund carbon reduction activities. The information below includes a wide range of federal and state funding sources for which carbon reduction projects may be eligible.

Links to Other Funding Resources:

- Bipartisan Infrastructure Law Guidebook
- American Cities Climate Challenge Funding Guidance
- A Guide to Transportation Funding Options Available to Virginia Jurisdictions
- VDOT's Local Assistance Division
- Grants.gov
- DOT Discretionary Grants Dashboard
- Inflation Reduction Act Guidebook

Click here to view State Resources.

Federal Resources

Grant	Description	Agency
Reduction of Truck Emissions at Port Facilities (RTEPF) Grant Program	Studies and provides grants to reduce idling at port facilities, including through the electrification of port operations.	FHWA
Reconnecting Communities Pilot Program (Capital Construction Grants)	Provides grants for projects to restore community connectivity by removing, retrofitting, or mitigating highways or other transportation facilities that create barriers to community connectivity, including to mobility, access, or economic development.	U.S. Department of Transportation (US DOT)
Charging and Fueling Infrastructure Grants Program (Corridor Charging)	Deploys publicly accessible EV charging infrastructure and hydrogen, propane, and natural gas fueling infrastructure along designated Alternative Fuel Corridors.	FHWA
Charging and Fueling Infrastructure Grants Program (Community Charging)	Provides grants for projects to develop electric vehicle charging and hydrogen, propane, and natural gas fueling infrastructure access along alternative fuel corridors throughout the country, including in rural areas, low- and moderate-income neighborhoods, and communities with a low ratio of private parking spaces to households or a high ratio of multiunit dwellings to single family homes.	FHWA

Grant	Description	Agency
Congestion Relief Program	Provides grants to advance innovative, integrated, and multimodal solutions to reduce congestion and the related economic and environmental costs in the most congested metropolitan areas with an urbanized area population of at least 1 million.	USDOT
Climate Pollution Reduction Grants	The Climate Pollution Reduction Grants (CPRG) program provides $5 billion in grants to states, local governments, tribes, and territories to develop and implement ambitious plans for reducing greenhouse gas emissions and other harmful air pollution.	EPA
Clean School Bus Program Grants	The program solicited applications nationwide for a grant competition to fund the replacement of existing school buses with clean and zero-emission (ZE) school buses.	EPA
Low or No Emission Vehicle Program – 5339c	The Low or No Emission competitive program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities.	Federal Transit Administration (FTA)
Energy Efficiency and Conservation Block Grant Program	To assist States, local governments, and Tribes in implementing strategies to reduce energy use, reduce fossil fuel emissions, and improve energy efficiency.	DOE
Pilot Program for Transit-Oriented Development Planning	To provide funding to local communities to integrate land use and transportation planning with a new fixed guideway or core capacity transit capital investment.	FTA
Electric or Low-Emitting Ferry Pilot Program - IIJA § 71102	To provide competitive funding for projects that support the purchase of electric or low-emitting ferries and the electrification of or other reduction of emissions from existing ferries.	FTA

Grant	Description	Agency
Voluntary Airport Low Emissions Program (VALE)	To improve airport air quality and provide air quality credits for future airport development. VALE helps airport sponsors meet their state-related air quality responsibilities under the Clean Air Act. Through VALE, airport sponsors can use Airport Improvement Program (AIP) funds and Passenger Facility Charges (PFCs) to finance low emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements.	Federal Aviation Administration (FAA)
Airport Zero Emissions Vehicle and Infrastructure Pilot Program	To improve airport air quality and facilitate use of zero emissions technologies at airports. The program allows airport sponsors to use Airport Improvement Program (AIP) funds to purchase ZEVs and to construct or modify infrastructure needed to use ZEVs.	FAA
Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program	To fund projects that improve the safety, efficiency, and reliability of intercity passenger and freight rail.	Federal Railroad Administration (FRA)
Federal-State Partnership for Intercity Passenger Rail Grant Program	To provide funding for capital projects that reduce the state of good repair backlog, improve performance, or expand or establish new intercity passenger rail service.	FRA
Fueling Aviation's Sustainable Transition (FAST) Grant Program (FAST-SAF)	To provide $244.5 million in grants to support the build out of infrastructure projects related to sustainable aviation fuels (SAF) production, transportation, blending, and storage.	FAA
Fueling Aviation's Sustainable Transition (FAST) Grant Program (FAST-Tech)	To provide $46.5 million in grants to develop and demonstrate new aviation technologies to improve fuel efficiency and reduce emissions.	FAA
Electric Vehicle Charger Reliability and Accessibility Accelerator	To provide up to $100 million in funding to repair and replace existing, but non-operational, electric vehicle (EV) charging infrastructure.	FHWA

Grant	Description	Agency
Domestic Manufacturing Conversion Grants	To provide funding to accelerate the growth of domestic production capability of electric vehicles and components to meet anticipated increased demand for clean energy technologies as the economy transitions to net-zero emissions.	DOE
Clean School Bus Program Rebates	To offer rebates to replace existing school buses with clean and zero-emission (ZE) models.	EPA
Congestion Mitigation and Air Quality Improvement (CMAQ) Program	To provide a funding source for State and local governments to fund transportation projects and programs to help meet the requirements of the Clean Air Act (CAA) and its amendments and is codified at 23 USC Sec 149. CMAQ funds support transportation projects that reduce mobile source emissions in both current and former areas designated by the U.S. Environmental Protection Agency (EPA) to be in nonattainment or maintenance of the national ambient air quality standards for ozone, carbon monoxide, and/or particulate matter.	FHWA
Federal Lands Access Program (FLAP)	To improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands. It supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators.	FHWA
Diesel Emissions Reduction Act (DERA) Funding	To fund grants and rebates that protect human health and improve air quality by reducing harmful emissions from diesel engines.	EPA

Grant	Description	Agency
Low-Carbon Transportation Materials Grants	To reimburse or provide incentives to eligible recipients for the use, in projects, of construction materials and products that have substantially lower levels of embodied greenhouse gas emissions associated with all relevant stages of production, use, and disposal as compared to estimated industry averages of similar materials or products as determined by the Administrator of the EPA.	FHWA
Communities LEAP (Local Energy Action Program)	To match selected communities with technical assistance providers who assist them with bringing their clean energy planning and economic development vision to life. Funding of up to $50,000 is also provided to selected communities for services rendered as part of the technical assistance delivery.	DOE
Infrastructure for Rebuilding America (INFRA) (the Nationally Significant Multimodal Freight & Highway Projects program)	To award competitive grants for multimodal freight and highway projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people in and across rural and urban areas	DOT
Port Infrastructure Development Program	To provide competitive funding for projects that improve the safety, efficiency, or reliability of the movement of goods into, out of, around, or within a port.	DOT Maritime Administration
Public Transportation Innovation Program	To provide funding for research, demonstration, and deployment projects involving low or zero emission public transportation vehicles. Eligible vehicles must be designated for public transportation use and significantly reduce energy consumption or harmful emissions compared to a comparable standard or low emission vehicle.	FTA

Grant	Description	Agency
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant	To provide federal financial assistance to eligible surface transportation infrastructure projects. Eligible projects include, but are not limited to, supporting connected, electric, and automated vehicles, a modal shift in freight or passenger movement to reduce greenhouse gas emissions, and the installation of zero-emission vehicle infrastructure.	DOT
Clean Heavy-Duty Vehicle Program	To provide funding to replace dirty heavy-duty vehicles with clean, zero-emission vehicles, support zero-emission vehicle infrastructure, and to train and develop workers.	EPA
Rail Vehicle Replacement Grant Program (RAIL)	To provide funding to assist in the funding of capital projects to replace rail rolling stock. For the purposes of this program, rail rolling stock is defined as revenue service, passenger carrying vehicles, or propulsion (locomotives) vehicles necessary for the provision of rail public transportation.	FTA
Thriving Communities Program	To provide funding to organizations ("Capacity Builders") to provide technical assistance, planning, and capacity building support to disadvantaged and under-resourced communities, enabling them to advance transportation projects that support community-driven economic development, health, environment, mobility, and access goals.	DOT
Innovative Finance and Asset Concessions Grant Program [NOT YET RELEASED]	To provide funding to assist eligible public entities in facilitating and evaluating public-private partnerships and exploring opportunities for innovative financing and delivery for eligible transportation infrastructure projects, including highway, transit, passenger rail, certain freight facilities, certain port projects, rural infrastructure projects, airports, and transit-oriented development projects.	DOT Build America Bureau

Grant	Description	Agency
Clean Ports Program	To provide funding for zero-emission port equipment and technology and to help ports develop climate action plans to reduce air pollutants at U.S. ports.	EPA
Higher Blends Infrastructure Incentive Program (HBIIP)	To provide funding to increase significantly the sales and use of higher blends of ethanol and biodiesel by expanding the infrastructure for renewable fuels derived from U.S. agricultural products. The program is also intended to encourage a more comprehensive approach to market higher blends by sharing the costs related to building out biofuel-related infrastructure.	U.S. Department of Agriculture (USDA) Rural Development
Advanced Transportation and Congestion Management Technologies Deployment Program (ATCMTD)	To provide competitive funding for the development of model deployment sites for large scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment.	FHWA
Carbon Dioxide Transportation Infrastructure Finance and Innovation Program	To provide secured loans or loan guarantee to projects involving common carrier carbon dioxide transportation infrastructure or associated equipment, including pipeline, shipping, rail, or other transportation infrastructure and associated equipment, that will transport or handle carbon dioxide captured from anthropogenic sources or ambient air.	DOE
Rural Surface Transportation Grant Program	To provide funding to projects that improve and expand the surface transportation infrastructure in rural areas to increase connectivity, improve the safety and reliability of the movement of people and freight, and generate regional economic growth and improve quality of life. This helps to reduce congestion and decrease carbon emissions.	DOT

State Resources

Grant	Description	Agency
Revenue Sharing Program	To provide additional funding for use by a county, city, or town to construct or improve its highway systems, with statutory limitations on the amount of state funds authorized per locality.	VDOT
Making Efficient + Responsible Investments in Transit (MERIT)	To provide funding for capital improvement projects, including the purchase or lease of new electric, hybrid electric, or propane vehicles. In addition, as part of the MERIT program, the Clean Transportation Voucher Program) offers grants of up to 100% of the incremental cost for transit agencies to replace model year 2009 or older Class 7 and Class 8 diesel transit buses with all-electric buses and up to 100% of the purchase cost of associated charging infrastructure.	Virginia Department of Rail and Public Transit (DRPT)
Transportation Alternatives Program	To provide funding to help local sponsors fund community-based projects that expand non-motorized travel choices and enhance the transportation experience by improving the cultural, historical, and environmental aspects of the transportation infrastructure.	VDOT
Ready, Set, Go! Transportation Alternatives Readiness Program	To support local partners with smaller populations in refining projects for future Transportation Alternatives (TA) applications. This program is provided with 100% funding and requires no local match from selected applicants.	VDOT
State of Good Repair (SGR) Program	To provide funding for deteriorated pavements and structurally deficient bridges owned or maintained by the Virginia Department of Transportation (VDOT) and or localities, as approved by the Commonwealth Transportation Board (CTB).	VDOT

Grant	Description	Agency
Virginia Community Development Block Grant Program	To provide funding for community improvement activities in Virginia.	Virginia Department of Housing and Community Development (DHCD)
Virginia Tobacco Region Revitalization Commission	To promote economic growth and development in tobacco-dependent communities using proceeds of the national tobacco settlement. Road projects that support regional economic diversification for formerly tobacco-depended jurisdictions are eligible for funding.	Virginia Tobacco Region Revitalization Commission

Appendix E: Long-Range Transportation Plans and Supporting Documents

Blacksburg-Christiansburg-Montgomery Area/New River Valley MPO

Blacksburg-Christiansburg-Montgomery Area/New River Valley Metropolitan Planning Organization's (MPO's) 2045 Long-Range Transportation Plan (LRTP) identifies environmental sustainability in the transportation sector as a key strategy and performance-based planning goal. The objectives outlined in Goal E of the VTrans-Transportation Plan will be used as guidelines for achieving environmental sustainability in transportation.

Unified Planning Work Programs (UPWPs) are developed annually to identify transportation activities that will be carried out for the following year by an MPO. (pg. 3). In its FY 2023-2024 UPWP, the Blacksburg-Christiansburg-Montgomery Area MPO identifies alternative transportation as a primary topic for MPO consideration. The MPO states that it will "work with VDOT, VDRPT, and local governments to assure that alternative transportation modes are considered in addressing transportation needs" (pg. 9). The UPWP highlights work that the MPO is doing and has done to further its alternative transportation goals. This includes:

- "[serving] on the regional Bikeway/Walkway Committee of the NRV Regional Commission that is supporting a regional link between Montgomery County and Pulaski County through the City of Radford.
- [conducting] a feasibility study for transit, bike, and pedestrian infrastructure improvements along the South Main Street/US Route 460 Business corridor, from Industrial Park Road to Peppers Ferry Road.
- [developing] a commute cost calculator which would enhance the Rideshare program within the New River Valley" (pg. 9).

Bristol MPO

The 2045 Bristol MPO LRTP establishes a goal for "Healthy and Sustainable Communities" (pg. 2-1). This goal outlines Bristol MPO's intentions to "develop a transportation system to preserve and enhance the natural environment and improve quality of life" (pg. 2-1). The objectives that were developed to achieve this goal are:

- "Minimize adverse environmental impacts of the urban transportation system.
- Reduce vehicle emissions and promote activities that reduce greenhouse gases.
- Coordinate the provision of transportation facilities with land use activities to promote active transportation and healthy multimodal lifestyles that minimize single-occupancy vehicle travel" (pg. 2-1).

Bristol MPO's FY 2024-2025 UPWP describes the initiatives that the MPO has taken to address federal planning factors. It explains that one way in which this is done is by "[coordinating] with local and state planning agencies to promote [the] development of bicycle and pedestrian facilities

and multimodal transportation improvements, including opportunities for public transportation's role in livable communities" (pg. 6).

The UPWP also outlines the Bristol MPO's initiatives that align with Federal Planning Emphasis Areas. Regarding 'Tackling the Climate Crisis-Transition to a Clean Energy, Resilient Future', the UPWP explains that "[the] MPO has engaged its local jurisdiction partners and transit agencies in conversations regarding active transportation infrastructure and services to identify opportunities to increase its availability and viability for all users. This work will culminate in the development of a multimodal transportation plan to be developed by the MPO in Fiscal Years 2024 and 2025. The multimodal transportation plan is expected to address major planning efforts that will increase the resiliency of the region and reduce greenhouse gas emissions by identifying priority sidewalk, multi-use path, and transit investments for each agency" (pg. 8).

Central Virginia Transportation Planning Organization (TPO)

According to Central Virginia Transportation Planning Organization (CVTPO)'s 2045 LRTP, one of the region's five transportation goals is improving quality of life and protecting the environment. Project performance measures that considered emissions reduction included "Mobility and Accessibility," which determined a project's congestion reduction and active transportation benefits, and "Community and Nature: Environmental Resources," which "considered [a] project's impact on important environmental features in the region" (pg. 92-93).

In its Fiscal Year (FY) 2023-2024 UPWP, CVTPO identifies initiatives which will be taken to support the development of active transportation in Central Virginia. CVTPO states "staff will assist localities and area program partners in support of pedestrian, bicycle and other active-transportation planning, project integration, and implementation initiatives" (pg. 10). The products that will be developed include:

- "User-friendly and maintained multimodal and active transportation component of the CVTPO/CVPDC website and social media channels.
- Support and increased application development and submittal of pedestrian, bicycle, transit, and other multi-modal transportation applications.
- Better pedestrian, bicycle, transit, and multimodal integration within land use, transportation, housing, and community development program, planning, and implementation initiatives.
- Grant administration and guidance to multimodal and safe streets, complete street grant and program initiatives.
- Summary of participation activities, results, liaison activities presented to TTC, CVTPO, and other area agencies, organizations, and stakeholders.
- Webinar and other public engagement efforts
- Current and planned resource data and stakeholder foundation that will serve as the Phase 1 completion for the future completion of the CVPDC Greenways, Blueways, and Trails Plan update.
- A year-end active transportation summary document" (pg. 11).

Charlottesville-Albemarle MPO
The Charlottesville/Albemarle MPO's 2045 LRTP acknowledges that "the region's transportation system is a notable source of greenhouse gas emissions." One established goal is to "[promote] sustainable transportation improvements that avoid impacts on the environment and ensure nondiscriminatory planning in our region" (pg. 43). The LRTP outlines objectives for achieving this goal. These include:

"Promote use of alternative transportation modes and alternative fuel vehicles.
Incorporate environmentally/context-sensitive design into roadway, bicycle/pedestrian facilities and transit improvements to improve or maintain the aesthetic values for the surrounding environment.
Promote the inclusion of minority, low income, and other underrepresented groups in the planning process" (pg. 43).

In Charlottesville-Albemarle MPO's FY 2024 UPWP, the MPO outlines work that will be done to support efforts regarding travel demand management (TDM), the regional transit partnership, and bicycle/pedestrian initiatives. The MPO intends to:
"Continue efforts to improve carpooling and alternative modes of transportation in MPO;
Staff Regional Transit Partnership meetings;
Address immediate transit coordination needs;
Formalize transit agreements;
Improve communication between transit providers, localities and stakeholders;
Explore shared facilities and operations for transit providers;
Provide continued support to coordinating bike/ped planning activities between the City of Charlottesville, Albemarle County, UVA and with the rural localities;
Continue to assess the need for a Regional Transit Authority; and
Per the Strategic Plan, integrate TDM into all MPO recommendations and projects" (pg. 17).
The MPO also intends to undertake additional efforts to improve transit and passenger rail within its jurisdiction.

Danville MPO
The 2045 Danville MPO LRTP "is a blueprint for creating a more efficient, connected, and environmentally-sensitive transportation system in the Danville region over the next 25 years" (pg. 15). The LRTP states that one of the region's official transportation goals which guided the project selection process is to "[improve] the quality of life and protect the environment" (pg. 15).

Danville MPO's FY 2024 UPWP describes its commitment to supporting environmental justice in transportation planning.

Fredericksburg Area MPO
Fredericksburg Area MPO's (FAMPO's) 2050 LRTP establishes a goal to "[protect] and improve the environment, promote energy conservation and sustainability, and improve the overall quality of life" (pg. 3). The objectives which were established to achieve this goal include:
"Prioritize and increase active transportation routes that get people to meaningful and desired destinations.
Expand and promote affordable bus and rail service.
Financially support and promote attractive carpooling and vanpooling options.
Collaborate with environmental agencies and entities and incorporate environmentally sensitive designs to minimize environmental impacts and maintain aesthetic value.
Develop a multimodal transportation system to reduce dependency on single-occupancy vehicles.
Plan for and support the use of electric, autonomous, and connected vehicles where appropriate.
Reduce or mitigate flooding and other climate change impacts to bridges, roadways, railways, and active transportation surfaces.
Protect the well-being of vulnerable organisms including, people, animals, and plants" (pg. 3).
The LRTP also establishes objectives to increase the connectivity of the transit and active transportation systems, reduce congestion, and increase the transportation system's reliability.

FAMPO's FY 2024 UPWP outlines congestion management measures which will be undertaken for FY 2024. FAMPO intends to:
"[Maintain] the updated [Congestion Management Process' (CMP)] safety, ITS, and congestion mitigation strategies, the FAMPO CMP Performance Monitoring Program Tool which includes updated travel time indices, safety, and congestion hotspots, and development of recommendations for specific multimodal corridor improvements.
Continue to review transportation impacts as a result of the COVID-19 pandemic. Staff will monitor traffic and congestion data and report their analyses to committees on an ongoing basis.
Use transportation tools to reduce emissions, including through promoting the use of renewable energy in highway rights-of-way to tackle the Climate Crisis.
Consider projects and strategies that will:
Support the economic vitality of the metropolitan area.
Increase the safety of the transportation system for motorized and nonmotorized users.
Increase the accessibility and mobility of and for freight.
Protect and enhance the environment.
Promote energy conservation.
Improve the quality of life.
Promote consistency between transportation improvements and planned growth, housing, and economic development patterns" (pg. 38).
FAMPO also intends to take TDM measures, such as considering strategies and projects that will enhance the integration and connectivity of the transportation system.

Hampton Roads TPO

Hampton Roads TPO's (HRTPO's) 2045 LRTP establishes a goal of "Sustainability-The Environment, Community, and Equity" (LRTP StoryMap). The objectives created to achieve this goal include:

- "Protect and enhance the environment, promote energy conservation, and improve the quality of life
- Minimize the environmental impact of…transportation
- Improve the sustainability of communities through increased housing choice and reduced auto-dependency
- Ensure that mobility benefits positively affect [low-income residents]" (LRTP StoryMap).

The HRTPO's FY 2024 UPWP details measures that HRTPO will take to support active transportation in the region. HRTPO plans to:

- "HRTPO staff will conduct…analyses to help improve the planning and development of bicycle and pedestrian facilities that better suit the surrounding environment and users.
- Continue efforts to develop/maintain a regional Active Transportation Hub – a resource intended to promote active transportation by being the go-to website for planners and citizens regionally, state-wide, and nationally.
- Maintain regional active transportation GIS data.
- Under guidance from the Active Transportation Subcommittee (ATS), prepare documents/ conduct analysis to help localities implement and/or improve aspects of the AT system. This includes monitoring the status of recommended projects in the 2045 LRTP and also maintaining a list of prioritized projects.
- Prepare newsletter articles highlighting trails in the region on an ongoing basis" (pg. 61).

The UPWP also outlines the measures the HRTPO intends to take to improve access to alternative modes of transportation, such as facilitating the adoption of electric vehicles. Additionally, the HRTPO will implement initiatives to improve regional public transit planning, such as by maximizing efficiency and reliability. The HRTPO is responsible for the oversight and allocation of funds to the TRAFFIX program, the regional TDM initiative.

National Capital Region Transportation Planning Board

In June 2022, the National Capital Region Transportation Planning Board (TPB) adopted Resolution R18-2022 detailing new GHG reduction goals and strategies specific to the on-road transportation sector as detailed below. This decision was informed by the TPB Climate Change Mitigation Study of 2021, TPB member considerations of the feasibility of each strategy, a TPB member survey, and discussions during two climate change mitigation work sessions in 2022. The TPB adopted seven greenhouse gas reduction strategies that have the potential to reduce on-road transportation GHG emissions:

- Improve walk/bike access to all TPB identified high-capacity transit stations.
- Increase walk/bike modes of travel - Complete the TPB's National Capital Trail Network by 2030.

- Convert private and public sector light, medium and heavy-duty vehicles, and public transit buses to clean fuels by 2030.
- Deploy a region-wide robust electric vehicle charging network (or refueling stations for alternate fuels).
- Add additional housing units near TPB-identified high-capacity transit stations and in COG's Regional Activity Centers.
- Reduce travel times on all public transportation bus services.
- Implement transportation system management and operations (TSMO) improvement measures at all eligible locations by 2030.

Richmond Area MPO

Connect RVA 2045 is the Richmond Area MPO's Long Range Transportation Plan. Action items for the RRTPO and local government agencies to consider for the life of ConnectRVA 2045 include both immediate steps and long-term support. One of the proposed actions is to Strongly consider policies and actions that support Virginia greenhouse gas reduction goals to achieve net zero emissions across all sectors of the economy—including transportation. (Pg. 98)
VGO is the vision, guiding principles, goals, and objectives that was formulated using the input from the online public surveys and shaped through discussions with the LRTP Advisory Committee. The following VGO goal relates to reducing GHG emissions. (Pg.77)

Environmental/Land Use. Reduce the negative impact the transportation system has on the natural and built environment. Address roadways prone to flooding and consider climate impacts in the transportation planning prioritization and funding decisions. Reduce transportation related pollutants, including decarbonizing transportation. Reduce VMT per capita. Increase number and share of tris taken by shared and active transportation modes. Tie in land use planning to transportation investments through encouragement of walkable and transit-oriented communities. Minimize impacts of transportation system on natural resources and communities with a particular emphasis on Environmental Justice populations. (Pg. 78)

Richmond Area MPO's FY 2024 UPWP also outlines intended and ongoing emissions reduction measures such as planning for all modes of travel and increasing transit connectivity.

Roanoke Valley MPO

One of the Roanoke Valley Transportation Plan (RVTP) goals is to foster environmental sustainability. Objectives that fall under that include minimize emissions from motorized on-road transportation. (Pg. 27) The RVTP looks to the future to help understand how the region's population, economy, travel preferences, and environment might change, and how these changes might impact transportation needs and overall management of the transportation system. One of the plans future factor's is sustainability which is described below. (pg. 21)

Environmental quality and climate change will impact the lives of residents in the Roanoke Valley in the coming decades. The Commonwealth is taking steps to advance the electrification of the transportation system and manage a more resilient system that can reduce emissions and keep the economy moving as events occur.

- More attention placed on electrifying the transportation system within agency fleets (including transit) and providing the infrastructure to ensure reliable use of electric vehicles.
- New design, construction, and maintenance strategies and materials to mitigate environmental impacts of transportation and better protect infrastructure from severe weather events.
- Enhanced priority on the protection of natural lands and farmlands and new technologies to better manage all infrastructure systems collaboratively, including utilities. (Pg. 23)

Roanoke Valley MPO's FY 2024 UPWP explains the congestion management and public transportation planning initiatives the MPO plans to implement. These include vanpool planning and the increased integration of land-use and transportation planning.

Tri Cities Area MPO

The Tri Cities Area MPO Plan 2045 has a section dedicated to environmental quality and public health. A subsection includes the promotion of energy conservation.

The reasons to conserve energy are simple:

- Money used to purchase fuel is not available for other purposes,
- The demand for energy contributes to the need to iMPOrt energy,
- Wasted Energy Contributes to a large greenhouse gas footprint.

Transportation is the second largest energy user in the United States. Only the Electric Power Sector uses more energy than transportation. Despite advances in battery technology, the transportation sector depends upon liquid fuel. Because most transportation is fossil fuel based this means that transportation is a big oil user and a big contributor to greenhouse gas emissions. (Pg. 57)

The 'Metropolitan Transportation (MTP)' section of the Tri-Cities Area MPO's Draft FY 2024 UPWP explains that the MPO intends to implement projects, strategies, and services that will:

- "Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- Promote efficient system management and operation;
- Increase the safety of the transportation system for motorized and non-motorized users;
- Increase the security of the transportation system for motorized and non-motorized users;
- Increase accessibility and mobility of people and freight;
- Emphasize the preservation of the existing transportation system;
- Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation;" (pg. 20).

Winchester-Frederick County (WinFred) MPO
One of the goals of the WinFred MPO 2045 Metropolitan Transportation Plan is healthy communities and sustainable transportation communities. This goal lists three objectives:

- Reduce per-capita vehicle miles traveled
- Reduce transportation-related emissions
- Increase the number of bicycling and walking trips (Pg. 42)

WinFred MPO's FY 2024 UPWP identifies activities the MPO will take to support transit and bicycle and pedestrian planning. These include a transit feasibility study and the implementation and management of a bikeshare program.

Staunton-Augusta-Waynesboro MPO (SAWMPO)
'Quality of Life' (Goal 7) of the 2045 SAWMPO LRTP strives to "[improve] quality of life by protecting and enhancing historic and natural resources, promoting energy conservation, maintaining air quality, and expanding regional recreation networks" (pg. 92). 'Accessibility' (Goal 6) aims to "[provide] an efficient, reliable transportation system for pedestrians, bicyclists and transit users, including traditionally underserved populations" (pg. 92). 'Land use coordination' (Goal 4) of the Plan seeks to "[encourage] the coordination of land use and transportation planning for transportation improvements to support future growth" (pg. 92).

SAWMPO's FY 2024 UPWP also states that studies conducted by the MPO "may also include opportunities to reduce greenhouse gas emissions by reducing single occupancy vehicle trips and increasing access to public transportation, advance alternative fueling and charging infrastructure, identify transportation system vulnerabilities to climate change impacts and evaluate potential solutions, increase public transportation service in underserved communities, and encourage interagency relationships to minimize impacts on human and natural resources" (pg.15). The UPWP also discusses the MPO's intentions for the coordination of regional transit planning.

VDOT Virginia Department of Transportation