# Driving Emissions Reduction through Project Prioritization: Insights for State Departments of Transportation

**March** 2025
White Paper

ACEEE

# About ACEEE

The **American Council for an Energy-Efficient Economy** (ACEEE), a nonprofit research organization, develops policies to reduce energy waste and combat climate change. Its independent analysis advances investments, programs, and behaviors that use energy more effectively and help build an equitable clean energy future.

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# Acknowledgments

This report was made possible through the generous support of The Summit Foundation. The author gratefully acknowledges external reviewers, internal reviewers, colleagues, and sponsors who supported this report. External expert reviewers included Anna Pierce from Minnesota Department of Transportation, Chris LaPlante from Colorado Department of Transportation, Derek Krevat from Massachusetts Department of Transportation, and Alvan-Bidal Sanchez from Denver Regional Council of Governments. Internal reviewers included Rachel Aland and Steve Nadel, with additional internal support for this project from Daivie Ghosh. The author is also especially grateful for the assistance of Percy Curtis, whose work compiling the resource list at the end of this report was instrumental to this effort. External review and support do not imply affiliation or endorsement. Last, we would like to thank Mariel Wolfson and Kate Doughty of ACEEE for editing and design.

# Suggested citation

Daigle, Caroline. 2025. *Driving Emissions Reduction through Project Prioritization: Insights for State Departments of Transportation.* Washington, DC: ACEEE. https://www.aceee.org/white-paper/2025/03/driving-emissions-reduction-through-project-prioritization-insights-state.

# Data and licensing information

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# Executive summary

Representing nearly 30% of all greenhouse gas emissions across the country, the transportation sector is a crucial focus for climate action. State departments of transportation (DOTs) play a central role in determining the future of transportation infrastructure by allocating billions of dollars of federal funding annually to roadways, bridges, public transit, and other types of major transportation projects across the country. The majority of federal funds distributed to states for transportation projects are allocated through a set formula and are available for use on a wide variety of projects. To move the needle on emissions reduction goals, the focus must be on changing how these funds are used.

State DOTs have broad decision-making authority for how to spend federal formula program funds, and they are called to collaborate with local and regional partners to generate a prioritized list of investments in support of different goals for the transportation system. This prioritization process involves weighting different evaluation criteria for proposed investments.

Many states' project prioritization processes place insufficient weight on those that reward points to projects that advance sustainable modes of travel. This document provides several recommendations on the project prioritization process for state DOTs and highlights a range of noteworthy approaches to state-level project prioritization that help yield cleaner transportation investments in support of emissions reduction goals.

## Key findings

- To meet clean transportation goals, the focus must be on how state departments of transportation (DOTs) allocate dollars from traditional formula funding streams. Effective investments from large funding programs like the Surface Transportation Block Grant (STBG) program and the National Highway Performance Program (NHPP) can meaningfully move the needle on emissions reduction goals.
- State DOTs should capture the true scale of costs for projects that are expected to increase vehicle miles traveled (VMT), such as major highway-widening projects, by applying more scrutiny to these investments in the project prioritization process—the Minnesota DOT's cost/benefit analysis tool offers a good framework for thinking about this.
- Across both state DOTs and metropolitan planning organizations (MPOs), there is an abundance of knowledge about creative and innovative approaches to the project prioritization process required by federal transportation law. Agencies should look to learn from their peer network instead of reinventing the wheel. Moreover, MPOs more familiar with on-the-ground challenges and priorities from their communities can be valuable partners in identifying cleaner transportation investments, as seen in Massachusetts and Colorado.

# Introduction

Over the past decade, the transportation sector has become the largest source of greenhouse gas emissions in the United States, accounting for roughly a third of all emissions generated across the country. Federal policy enacted through the 2021 Infrastructure Investment and Jobs Act (IIJA) aimed to accelerate the move toward cleaner transportation through substantial investments across existing federal infrastructure funding streams as well as new, targeted programs. The massive increase in investment from IIJA, funded with some $643 billion for surface transportation programs, represented more than double the federal funding levels for transportation programs from the 2015 Fixing America's Surface Transportation (FAST) Act[1] ($299 billion) and prompted a new look at how funding flows from large federal programs down to specific projects in local communities.

State departments of transportation (DOTs) facilitate the flow of federal funds to projects in local communities in support of nationally established goals. While they are required to demonstrate how investments tie into federal funding priorities, these agencies are given a lot of freedom in how they prioritize projects.[2] Methods for prioritizing transportation investments for Statewide Transportation Improvement Programs (STIPs) vary widely across jurisdictions and can be dependent on available resources. This report provides several recommended improvements to the project prioritization process for state DOTs and highlights a range of noteworthy approaches to state-level project prioritization that help yield cleaner transportation investments in support of emissions reduction goals.

To that end, this document covers four different areas:

1. **The project prioritization process**: A high-level overview of the framework that guides how transportation funds are allocated and prioritized
2. **Putting policy into action:** Case studies of state project prioritization processes to illustrate the range of approaches and shed light on emissions reduction strategies that can be adapted to different contexts
3. **Insights and lessons learned:** Key insights for state DOTs on how to approach the overall project prioritization process in a way that furthers emissions reduction goals
4. **A library of additional resources:** A collection of references and resources on emissions reduction estimation methods, project prioritization, and supporting tools for practitioners

# Improving project prioritization

## Federal formula funding and state-level decision making

Federal formula programs administer funds to states for different categories of transportation investments. Formula funds make up $446.2 billion of the transportation funding over the five-year IIJA authorization as compared to $195 billion in discretionary grants (U.S. DOT Bureau of Transportation Statistics 2023). Of this $446.2 billion, three core Federal Highway Administration (FHWA) formula funding programs—the Surface Transportation Block Grant (STBG) program, the National Highway

[1] See chart "FAST Act vs. the 2021 infrastructure bill" available at https://t4america.org/iija/.
[2] See 23 USC 145, available at https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title23-section145&num=0&edition=prelim.

Performance Program (NHPP), and the Highway Safety Improvement Program (HSIP)—translate to $235.6 billion, more than 10 times the $19.6 billion dedicated to formula programs focused on emissions reduction, the Congestion Mitigation and Air Quality (CMAQ) program, and Carbon Reduction Program (CRP). Given this funding breakdown, reassessing how dollars from traditional formula funding are allocated offers the biggest area of potential impact for state DOTs looking to change the outcomes of their investments.

State DOTs and regional partners from metropolitan planning organizations (MPOs) are both required to prioritize projects receiving federal funding in a data-driven way that seeks to balance needs across the seven national goal areas of safety, infrastructure condition, congestion reduction, system reliability, freight movement and economic vitality, environmental sustainability, and reduced project delivery delays (U.S. FHWA 2025). To show compliance with national goal areas, most agencies use project evaluation frameworks that closely align with the same seven categories, making clear the connection between a set of investments and the federally established priority areas that those funds are meant to support.

State-developed project prioritization frameworks rank investment priorities based on the expected outcomes of projects as captured through agency-developed evaluation criteria measures. But some measures can be hard to quantify, leading to uncertainty around the amount of progress made toward achieving systemwide goals. Incorporating local and regional priorities can also be inconsistent. While some states place a lot of emphasis on regional prioritization processes led by MPOs (such as in Massachusetts and Colorado), other states maintain relatively obscure processes for how projects are selected for funding and do not publish their evaluation outcomes or decision-making rationale. A recent report from Brookings Metro found that only 18 states carry out "public-facing project selection systems that allow stakeholders—including the public—to understand why specific projects were chosen to receive funding," and that states maintain a great deal of influence over the types of projects that are funded and built despite MPO priorities (Tomer and Swedberg 2024).[3]

# Putting policy into action

## Project prioritization strategies to support clean transportation goals

As outlined above, state DOTs exercise broad discretion for how to allocate points and weight criteria in the transportation project evaluation process, and their decision making guides how federal resources are funneled to projects in local communities. As articulated by the Georgetown Climate Center, "the percentage of funding invested in highway expansion relative to other strategies is the main driver of emissions outcomes" (Georgetown Climate Center 2021). The primary ways in which state transportation investments can support decarbonization goals are to expand access to walking, biking, and public transit and to support electrification efforts (U.S. DOE 2023).

When evaluating and prioritizing projects, states should maximize investments in these areas while of course attending to basic system maintenance needs. States should balance detail-oriented estimation exercises that aim to track specific emissions targets with regular assessments of the degree to which

[3] As described in "Finding 3" of *Connecting the DOTs: A survey of state transportation planning investment and accountability practices* (Tomer and Swedberg, Brookings Metro, 2024) "... interviews found multiple instances in which state DOTs forced MPOs to update their long-range plans so the state could develop a capital project that was not in original alignment with those plans. This is consistent with academic findings reported across several decades."

the overall direction of STIP investments flows toward highway expansion versus other mobility strategies and basic maintenance.

At all stages of the project prioritization and assessment process, it is worth revisiting the emphasis placed on congestion mitigation measures in state DOT project evaluation frameworks. Many of the most expensive projects state DOTs fund, which aim to address congestion through added highway capacity, end up increasing vehicle miles traveled (VMT) without solving congestion because of the well-documented phenomenon of induced demand (Handy 2015).[4] Research from the University of California at Davis Institute for Transportation Studies has found that for every 10% increase in highway capacity, VMT will increase by close to 10% within 5 to 10 years (Volker and Sintetos 2021). Recognizing this, states should look beyond short-term gains of congestion reduction from additional highway capacity.

## How are emissions reduction goals measured?

Federal agencies have produced several commonly used tools for assessing the impacts of proposed projects on greenhouse gas (GHG) emissions, most notably the CMAQ Toolkit and EPA MOVES. The end of this document contains a resource library describing these existing tools, along with other relevant resources for DOT professionals working in this area. Many state DOTs leverage these resources to estimate emissions impacts from proposed projects, but some states have also developed their own versions of emissions calculators as described in the case studies below. In assessing how specific projects either contribute to or reduce GHG emissions, DOT professionals should leverage both quantitative and qualitative measures to best capture total impact. Agencies should also maintain realistic understandings of organizational capacity in designing their approach to evaluation.

Finally, state DOTs looking to refine their approaches to estimating emissions can also leverage insights from their MPO partners. In a 2019 survey conducted by the Association of Metropolitan Planning Organizations regarding the CMAQ program, of 62 MPO respondents in 32 states, 43% used an MPO-developed process and only 15% used a methodology developed and required by the state's DOT to estimate emissions in line with CMAQ program requirements (AMPO 2019). This shows that MPOs may be on the forefront of developing custom tools for measuring progress toward GHG reduction goals.

While precise methods for measuring project-level emissions impacts are useful in tracking progress toward goals, state DOTs should maintain focus on how their project prioritization frameworks support the implementation of projects known to reduce VMT and associated GHG emissions. Below are descriptions of existing practices from five states (Colorado, Massachusetts, Virginia, California, and Minnesota) that offer insight into how DOTs are pursuing clean transportation goals.

4 See additional research and summaries on the concept of induced demand from Hymel (2019); State Smart Transportation Initiative (2022); and Yale Climate Connections (2024)

## Case study: Colorado

***In Colorado, state leadership has been instrumental in changing the direction of DOT investments, and bold targets have helped redirect funds from traditional highway projects.***

Colorado recently established strict GHG goals for the transportation sector through 2 CCR 601-22. The GHG reduction goals established in this regulation will support Colorado's efforts to reduce statewide GHG emissions across all sectors by 26% by 2025, 50% by 2030, and 90% by 2045, relative to 2005 levels (§ 25-7-102(2)(g), C.R.S). This policy action required the Colorado Department of Transportation (CDOT) to operationalize GHG assessments across investment decisions that relate to the transportation sector's contributions toward these statewide targets. To this end, in the 2024–2025 organizational performance plan for CDOT, *Clean Transportation* is listed as one of three "Wildly Important Goals" for the department (CDOT 2024).

*A light rail vehicle from RTD is shown in downtown Denver. Image credit: Wally Gobetz (wallyg) via Flickr https://www.flickr.com/photos/wallyg/6174198144/in/photostream/ licensed under CC BY-NC-ND 2.0*

In 2021, CDOT also published a useful cost/benefit analysis of VMT reduction strategies that assigns an estimated economic value to various mitigation measures in order to inform state transportation investments in line with the goals of 2 CCR 601-22 (CDOT 2021). This analysis found that through 2050, Coloradans could save over $40 billion by reducing VMT to levels proposed in the statewide GHG rule. Furthermore, these calculations found that "most substantial benefits are from reduced crashes and reduced vehicle operating costs, resulting from reduced VMT," illustrating how goals for emissions reduction directly tie into safety and economic prosperity goals (CDOT 2021, Table 2, p. 3–4).

CDOT requires MPOs to use a travel demand model (TDM) alongside the EPA MOVES tool to show progress toward goals when prioritizing projects at the regional level. While CDOT's overall STIP project prioritization framework uses a more traditional process (i.e., MPOs rank and identify priorities through their own processes and this information flows up to the state) rather than a uniform statewide ranking process like the ones used in Virginia and Illinois, it seems that *outcomes* in Colorado are yielding more sustainable transportation investments as evidenced by recent decisions in the Denver region that include a rescoping of a $1 billion widening of central I-25 to focus on transit, safety, and operational improvements; the removal of a widening of C-470 in the southwest metro; the acceleration of multiple bus rapid transit projects; and increased investments in active transportation projects (Minor 2022).

What is more, Colorado's deference to MPO priorities articulated in regional long-range plans can be seen as a model for how states can elevate local and regional perspectives on transportation priorities despite holding broad decision-making authority (Tomer and Swedberg 2024). Colorado Governor Jared Polis' recently released 2035 Transportation Vision, which calls for an 83% increase in bus and train service miles as well as a doubling of Colorado's non-automobile transportation trips from 9.6% to 19.2%, further emphasizes the importance of multiagency coordination in order to advance progress on emissions reduction goals (Minor 2024).

## Case study: Massachusetts

***In Massachusetts, communities are thinking creatively about how to align clean transportation priorities with FHWA's national goal areas.***

A noteworthy practice from the Boston MPO, a large influence in the overall project prioritization process for MassDOT's STIP, is that its project evaluation framework ties the national goal area of economic development/vitality to investments in both freight networks as well as passenger rail and public transit services (Boston Region Metropolitan Planning Organization 2019). Rewarding public transit projects for their benefits to economic vitality helps ensure that project evaluation frameworks are not overly skewed to favor highway expansion projects based on traditional *freight movement and economic vitality* metrics that award points for reduced travel time indices.

*Pedestrians are shown in Harvard Square in Cambridge, Massachusetts. Image credit: chensiyuan, CC BY-SA 4.0, via Wikimedia Commons*

Putting this into practice, the most recent MassDOT STIP invests over $5.4 billion in public transit programs, or nearly 74% of the $7.3 billion invested in highway programs, which also includes both maintenance funds as well as CMAQ and Transportation Alternatives Program (TAP) funds that are categorized as "highway programs" but fund many bike and pedestrian projects (Massachusetts Department of Transportation 2024). This shows that MassDOT is shifting its investment focus to the types of projects that are known to promote VMT reduction in support of climate goals, as articulated in the 2050 Long Range Transportation Plan, *Beyond Mobility*.

MassDOT also requires that MPOs assess the qualitative impacts on GHG emissions (increase, decrease, or no/negligible impact) of projects not covered by quantitative assessments, such as transit customer experience improvements and intelligent transportation systems (ITS) improvements, like signal priority for transit vehicles. The agency developed a set of spreadsheet tools (based on CMAQ tools) for MPOs to use for this process and updates them for each plan cycle to facilitate use by MPOs with varying levels of resources. MassDOT also allocates a fair amount of authority to MPOs in the project evaluation process, as projects for the STIP are first prioritized using regional frameworks and then aggregated into a statewide program of projects.

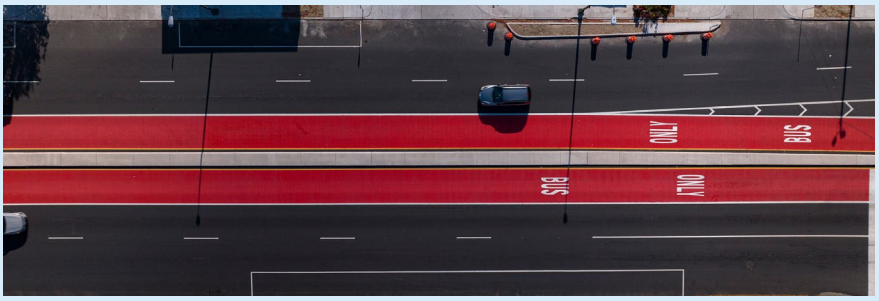
Like Colorado, statewide legislation enacted in Massachusetts in 2021 that calls for GHG reductions by setting emissions limits for each contributing sector of the economy has been instrumental in driving better outcomes from the transportation planning and project prioritization processes (193rd General Court of the Commonwealth of Massachusetts 2021). From 2021 to 2022, Massachusetts saw a year-over-year decrease of over 4% in VMT, second only to West Virginia, where challenges with population decline and unemployment contribute to VMT reduction.[5] Massachusetts has also adopted a bold Clean Energy and Climate Plan for 2050 that sets additional goals for emissions reduction in transportation, calling for an 86% reduction in transportation emissions from 1990 levels by 2050 (Commonwealth of Massachusetts 2022).

[5]Table VM-3 from FHWA 2021 and 2022 Highway Statistics Series, available at https://www.fhwa.dot.gov/policyinformation/statistics/2021/.

## Case study: Virginia

***In Virginia, a statewide project prioritization process uses measures that better capture the mobility of people and not just vehicles, but the existing weighting of project evaluation criteria has room for improvement to support emissions reduction goals.***

The Viginia DOT's (VDOT) statewide project selection process, SMART SCALE (CTB 2025), quantitatively assesses $CO_2$ offset based on increased non-single occupancy VMT and reduced heavy-duty vehicle hours of delay using standard emissions factors. SMART SCALE also uses a weighting system in which projects in rural regions receive less weight on factors such as congestion mitigation and higher weight on economic development compared to urban areas. However, the weight on environmental quality—which is the only criterion that directly factors in emissions—is the same for all regions at only 10% (CTB 2024). Projects that include elements such as energy-efficient fleets also get points in this category.




*Dedicated bus lanes are shown in Richmond, Virginia. Image credit: Joe Sohm/Visions of America*

In Virginia's largest urban areas, SMART SCALE weights congestion mitigation criteria at 45% in its calculation. It is notable that these congestion mitigation measures assess *person* throughput and hours of delay rather than *vehicular* throughput/hours of delay, therefore capturing the full existing capacity of a roadway by accounting for its ability to move people rather than vehicles. While this approach factors in how transit, bike, and pedestrian improvements can contribute to congestion mitigation, a rebalancing of priorities in the SMART SCALE framework to more directly emphasize emissions reduction goals could accelerate Virginia's progress on reducing per-capita VMT as articulated in Objective E.1. of the state's adopted transportation vision (CTB 2020).

VDOT also clearly articulates an organizational priority to efficiently use resources and promote the cost effectiveness of transportation investments across the board, as emphasized by three of the seven guiding principles for the department (GP 1, GP 3, and GP 5, CTB 2020). This emphasis can also support a shift from traditional, costly projects like highway expansion and free up funding for more impactful projects, like large-scale investments in transit, which help reduce VMT. SMART SCALE mandates that the project prioritization process considers the benefits of a project relative to its costs, though it considers project cost in terms of how much funding is requested through SMART SCALE and not total lifecycle costs. To build on this existing framework, VDOT could consider integrating emissions impacts of capacity-adding projects into the project cost estimate completed as part of the prioritization process.

## Case study: California

***In California, policy requirements to focus on VMT reduction offer a promising model for other states to consider, but ensuring outcomes meet policy objectives remains crucial.***

The California DOT (CalTrans) developed the California Emissions Estimator Model (CalEEMOD), which estimates ozone precursors, criteria pollutants, and GHGs from land use development and linear projects based on extensive research. Most quantifications are sourced from the California Air Pollution Control Officers Association's Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity (CAPCOA GHG Handbook) with Appendix C describing the emissions reduction measures, data sources, and calculations.

Like in Colorado, state legislation in California sets more stringent requirements for GHG tracking in the transportation planning process. California Senate Bill 743 mandated a move away from level of service and vehicle hours of delay measures to instead focus on VMT reductions in transportation project evaluation (California Governor's Office of Land Use and Climate Innovation 2020). This legislation is certainly a model for other states to follow, but effective policy implementation is critical for realizing emissions reduction goals. CalTrans has been the subject of critique for its interpretation and implementation of these requirements in projects like the Yolo I-80 Corridor Improvement (NRDC 2024), so it will be important to monitor how well proposed mitigation measures for projects that increase VMT actually deliver on transportation decarbonization goals.


*The 405 freeway, with a dedicated carpool lane, is shown in Los Angeles, California. Image credit: Daniel Melling/UCLA Emmett Institute via Flickr (https://www.flickr.com/photos/156678922@N05/49924557342/in/photostream/ licensed under CC BY-NC-ND 2.0*

## Case study: Minnesota

***In Minnesota, a focus on system preservation coupled with state policy directives to establish GHG emissions reduction performance targets and promote increased transparency in the transportation project selection process offers a promising blueprint for other states.***

The Minnesota DOT (MnDOT) has a stated policy of directing most of its funding to asset management in order to keep the existing system in a state of good repair (MnDOT 2025c). To increase transparency in the decision-making process for transportation investments, MnDOT also publishes its project selection criteria and rankings (MnDOT 2022b) for all highway projects in compliance with state legislation enacted in 2017.


*A State of Minnesota electric fleet vehicle is shown at a charging station. Image credit: MN Pollution Control Agency (MPCA) via Flickr: https://www.flickr.com/photos/mpcaphotos/46656432184/in/photostream/ licensed under CC BY-NC 2.0*

In the overall project prioritization process, MnDOT categorizes projects before ranking them, helping to avoid the challenge of comparing the impacts of investments across different modes (MnDOT 2022a). Importantly, MnDOT also performs a benefit/cost analysis for all major expansion projects and uses a graduated scale[6] to assign higher points to expansion projects that have higher estimated benefits relative to costs (MnDOT 2025a). New mandates from the Minnesota state legislature further require MnDOT to "mitigate the GHG emissions impacts of all capacity expansion projects on Interstate, U.S. highway, state highway, and business highway routes" (MnDOT 2025b).

MnDOT also developed a state-specific Carbon Emissions Tool (with guidance for use) for six project types across the following categories that align with the Minnesota Carbon Reduction Strategy: electrification, travel options, and low carbon infrastructure and system management (MnDOT 2024a, 2024b). MnDOT's methodology for quantifying project-level GHG reductions can be found in appendix D of the Minnesota Carbon Reduction Strategy.

Finally, recent Minnesota legislation (Minnesota Legislature Statute 174.01 subd. 3) called for MnDOT to set GHG emissions reduction performance targets for transportation sector emissions by February 1, 2025, further codifying three climate-focused goals from the state's 16 adopted goals for the transportation system (MnDOT 2023). State-level guidance on emissions target setting gave MnDOT considerable flexibility to determine on which factor to base its targets (i.e., geographic regions, per capita, mode based, or a combination), and as of February 2025 MnDOT has established surface transportation emissions reduction performance targets based on a per-capita calculation for each of 16 designated geographic regions across the state (MnDOT 2025b). Using a per-capita calculation helps accommodate for discrepancies in anticipated versus actual population growth that may impact the attainability of targets in the long run, and MnDOT's calculation of annual benchmarks toward five-year targets provides a usual guide for MPO partners working toward these statewide goals.

[6] "Return on Investment" metric breakdown, available on p.75 of https://edocs-public.dot.state.mn.us/edocs_public/DMResultSet/download?docId=3565817.

# Insights and lessons learned

### *1. State DOTs should take the initiative to ensure that emissions and air quality impacts are not left out of the equation or undervalued when making investment decisions.*

State policies related to GHG reduction play an important role in directing DOTs to adopt more stringent goals and evaluation criteria for transportation projects, and policies from Colorado, Massachusetts, and Minnesota outlined above offer exemplary frameworks for this type of guiding legislation. Still, DOTs should not wait for statewide policy adoption to refine existing practices. Instead, they should exercise their decision-making power to lead on this issue by directing funding toward projects that advance more sustainable modes of transportation.

States that do consider emissions reduction in the project selection process typically only weigh the criteria between 5% and 11% in the overall evaluation framework, as exemplified by weighting metrics from SMART SCALE in Virginia and Data Driven Decisions in Illinois (IDOT 2023), while traditional evaluation approaches tend to place a higher weighting on congestion mitigation measures, often in the realm of 20% (like in Illinois) to 40% (like in Virginia's biggest urban centers) of total project score. This makes it difficult for a project to "out-compete" other projects on the merits of its impact on emissions, since the lower weighting on these criteria is often not sufficient to sway the full score of a project. In this same vein, states should also assess whether project evaluation frameworks unintentionally reward points for the same metric across different criteria. If the same metric is being "double-counted" for different evaluation criteria, eliminating these redundancies can free up weights that can be reallocated to award projects for their emissions-reducing impacts.

### *2. A prioritization process that emphasizes clean transportation investments translates to a project portfolio that helps states and localities reach many kinds of goals for the transportation system.*

An overall program of projects that channels less funding to traditional highway expansion projects and more funding to projects that support sustainable transportation (such as public transit, bicycle, pedestrian, or EV projects) is most likely to result in positive impacts related to emissions reduction goals. Agencies can achieve this through various means, and year-over-year VMT decreases seen in Massachusetts exemplify how this approach can change the impact of a state's investments.

As another example, policies requiring cost/benefit analysis in Minnesota and Virginia described above are rooted in goals of fiscal responsibility, but have also been instrumental in these states' decisions to think more critically about highway expansion projects. In other words, although the weighting of project evaluation criteria is often discussed as a "balancing act," many projects and policies have impacts across different investment categories. Planners and policymakers should think of project evaluation criteria as an interconnected matrix rather than only as siloed goals for the transportation system that are in competition with one another.

The Colorado DOT offers a good example for how to frame these cross-cutting impacts of projects. As noted in 2 CCR 601-22, Colorado's state legislation governing the transportation planning process:

> ... Other aspects of transportation infrastructure can facilitate reductions in emissions and thus serve as mitigations rather than contributors to pollution. For example, the addition of transit resources in a manner that can displace Vehicle Miles Traveled (VMT) can reduce emissions. Moreover, improving downtown pedestrian and bike access, particularly in areas that allow individuals to shift multiple daily trips for everything from

work to dining to retail, can improve both emissions and quality of life. All told, a reduction in VMT has numerous societal co-benefits including reduced fatal and serious injury crashes, wildlife mortality, and traffic congestion and improvements to public health, worker productivity, and Colorado's economy.

### *3. The effectiveness of project evaluation criteria depends on how accurately they connect project impacts with plan goals.*

Evaluation criteria can also be refined to better connect anticipated project impacts with the goal categories they are meant to address. For example, some states measure the equity impact of projects by simply assessing whether a project occurs in predominantly a low-income or minority community. Projects get points if they occur in one of these areas and lose points if they do not. This approach should incorporate more nuance, going beyond the assumption that a project yields a benefit just for being completed, especially as it relates to projects that would increase VMT and related NOx, particulate, and GHG emissions in disadvantaged communities. Likewise, as discussed above, the application of VMT mitigation strategies, such as in California, must be closely monitored to ensure investments are furthering the agency's articulated policy goals for emissions reduction.

As a promising practice in line with this suggestion, the Boston MPO recently integrated multimodal performance monitoring into its Unified Planning Work Program (UPWP) in an effort to more accurately capture how projects impact mobility across all modes (Hicks and Asante 2019). This approach incorporates measures such as lane density, calculated as *(vehicle volumes for one hour period * occupancy counts for one hour period)/number of lanes,* which can help quantify the impacts of commonly used VMT mitigation strategies like high-occupancy vehicle (HOV) lanes and bus-only lanes. State DOTs can consider integrating a measure like this into project evaluation frameworks to better prioritize projects that move more people with less road space. This metric also better facilitates comparison of the impact of potential investments across modes, allowing for DOTs to more directly compare a transit project to a highway project, for example.

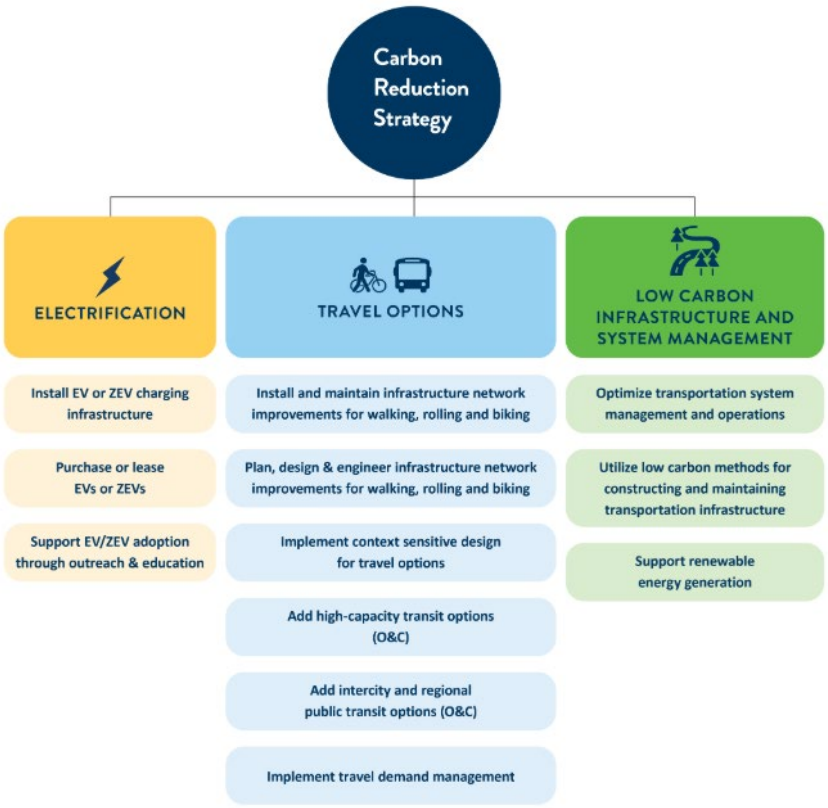



Figure 1: Image from Minnesota DOT's Carbon Reduction Strategy outlining examples of investments that support carbon reduction goals. Source: MnDOT 2023.

### *4. Cost/benefit assessments for major investments should continue to be refined and should be connected to emissions reduction goals.*

Traditional evaluation approaches tend to primarily assess the assumed benefits for congestion mitigation from highway expansion instead of balancing the anticipated benefits with total project costs, including costs from increased emissions that come from increased VMT. States should look for ways to better forecast future maintenance costs associated with major highway expansion projects to improve understanding of the full range of project costs, as well as forecasting potential savings from reduced VMT that could result if highway expansion dollars were directed to more efficient modes. Colorado's cost/benefit analysis developed as a part of 2 CCR 601-22 offers a good example of how to quantify the benefits of emissions reduction, especially as it relates to savings from safety outcomes associated with VMT reduction.

According to a 2019 analysis from Transportation for America, each lane mile of roadway costs an average of $24,000/year to maintain in a state of good repair, but few DOTs factor these costs into project evaluation frameworks (Transportation for America 2019). Tools such as the National Asphalt Pavement Association's GHG Emissions Inventory can be great resources for projecting the increase in emissions from maintenance of additional lane miles that would result from capacity-adding projects (National Asphalt Pavement Association, 2022).

The cost/benefit analyses from Minnesota and Virginia described above are good examples of how state DOTs can prioritize cost-effective investments, but each of these tools (and others like them) could be augmented with additional analysis. For example, state DOTs can look to quantify the economic costs associated with GHG emissions (as outlined in this 2022 benefit/cost analysis (BCA) guidance from U.S. DOT) and integrate this measure into project evaluation criteria. For example, using table A-6 from this BCA guidance, each metric ton of carbon dioxide emissions in 2024 has an economic cost of $55. Assuming an average of one metric ton of $CO_2$ is emitted for every 2,500 miles driven (U.S. EPA 2023 and EPA 2024b), agencies could begin to calculate the dollar costs of increased emissions from projects that add to VMT over time and factor this into the overall project evaluation process. From 2021 to 2022, fewer than half of all states saw a reduction in VMT per capita on federally aided highways,[7] so tracking how growing VMT contributes to total costs, inclusive of economic costs associated with increased emissions, can provide states with new insight when prioritizing projects. These calculations are not dissimilar to logic used in calculating the economic cost of congestion, which is used to support many arguments for highway expansion.

## What comes next

State departments of transportation exercise a great deal of influence over the investment of billions of dollars of federal funds in transportation projects across the country. To make meaningful progress on clean transportation goals and emissions reduction targets, states must direct these funds *away* from projects that stand to generate major increases in VMT and *toward* projects that support low- and no-carbon emissions modes of travel.

In the project prioritization process, state DOTs should look to act on the levers they control and maximize investments in public transit projects, active modes, electric vehicle infrastructure, operational

[7] Calculated with NST-EST2023-POP table from https://www.census.gov/data/tables/time-series/demo/popest/2020s-national-total.html and Table VM-3 from FHWA 2021 and 2022 Highway Statistics Series, available at https://www.fhwa.dot.gov/policyinformation/statistics/2021/.

improvements for more efficient traffic flow, and baseline system maintenance needed to support the continued operations of the transportation system. Likewise, these agencies should capture the true scale of costs of projects that are projected to increase VMT, such as major highway-widening projects, by applying more scrutiny to these investments in the project prioritization process. Finally, state DOTs should also use their weight and influence to help guide levers they do not directly control, such as land use planning, in better coordination with local partners.

As state and local governments alike look toward 2025 and beyond, it will be increasingly important for their work to align and support clean transportation investments in the face of uncertainty around the next five-year federal transportation bill. With continued coordination and increased knowledge of how to direct federal funds to yield the biggest impact on emissions reduction goals, state DOTs can leverage their power to usher in the changes to the nation's transportation networks that are needed to accelerate national progress toward critical goals for emission reduction.

# Resource library

*Disclaimer: Unless otherwise noted, all links to the resources below were live and accessible as of the publication date of this report. Please note that continued hosting of some of the linked resources on U.S. federal government websites is uncertain.*

- **Federal Highway Administration's (FHWA) GHG Analysis Tools and Resources: (This landing page is no longer accessible as of this report's publication) Overview of recommended, popular tools and resources for states such as
    - FHWA CMAQ Toolkit: Series of spreadsheet tools to help states calculate project air quality benefits for the CMAQ Program
        - Appendix A of *this CMAQ tool user guide for Transit Bus Service Expansion* includes a helpful summary of several tools that facilitate simplified travel demand modeling.
    - EPA MOVES: Model for developing emissions factors of criteria pollutants, GHGs, and toxins at national, county, and project levels
    - FHWA Life-Cycle Assessment Pave (LCA Pave): Excel tool for assessing environmental impacts of pavement materials and designs
    - VisionEval: Policy analysis tool developed by Oregon DOT and FHWA for state and metropolitan region levels for evaluating policy impacts on vehicle travel and GHGs (not for assessing project-level impacts)
    - Reducing Greenhouse Gas Emissions: A Guide for State DOTs (TRB): A comprehensive guide for state DOT professionals to understand how to advance GHG emissions reduction goals across all sectors of DOT activity
    - Energy Emissions Reduction and Policy Analysis Tool (EERPAT): Developed by the FHWA to evaluate strategies for reducing energy use and GHG emissions (not for assessing project-level impacts)
- Transportation Research Board's Greenhouse Gas Evaluation Tools: Extensive list of tools with descriptions on function, labor intensity, limitations, and more with the intended audience of state DOTs

- CAPCOA GHG Handbook: Methods for quantifying project- or community-level GHG reductions including 28 transportation strategies; note that results are given as percentage reduction compared to baseline/no-build scenario of a project rather than a direct amount of GHGs
- Federal Transit Administration's Transit Greenhouse Gas Emissions Estimator: Excel spreadsheet for estimating partial lifecycle GHG emissions and energy use for a transit mode's construction, operation, and maintenance
- Caltrans VMT mitigation playbook (draft): Describes mitigation methods for VMT induced by highway capacity projects in line with mandates from California SB 743
- Induced Travel Calculator: Resource from the National Center for Sustainable Transportation that supports implementation of SB 743 in California. Estimates annual VMT increases from the addition of general-purpose or high-occupancy-vehicle (HOV) lane miles.
- Evaluation of Sketch-Level VMT Quantification Tools: A Strategic Growth Council Grant Programs Evaluation Support Project: Research conducted by the University of California, Davis for the National Center for Sustainable Transportation; evaluates various VMT sketch tools for ease of use, data requirements, applicability, and other factors
- Trip Reduction Impacts of Mobility Management Strategies (TRIMMS): Spreadsheet model for evaluating impacts of transportation demand initiatives (e.g., telework, parking pricing, worksite amenities); can calculate VMT changes
- Fast Facts on Transportation Greenhouse Gas Emissions: EPA resource
- FHWA BCA Guide: Resource on calculating benefit cost analysis for transportation projects; developed by FHWA for use with IIJA discretionary grant projects, but can be leveraged to inform broader project prioritization metrics for state DOTs looking to estimate the economic impacts of emissions reduction
- U.S. DOT Notable Practices in Carbon Reduction Strategies: Collection of best practices from states in developing strategies for compliance with the new Carbon Reduction Program funded through IIJA
- FHWA Infrastructure Carbon Estimator—Final Report and User Guide: Detailed guide on application of FHWA's Infrastructure Carbon Estimator tool, used to estimate life cycle emissions from the materials, construction, maintenance, and usage of roadways
- Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET): For developing emission factors for trucks and buses with various fuels
- Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET): For developing emissions estimates of public charging stations
- National Asphalt Pavement Association GHG Emissions Inventory for Asphalt Mix Production in the United States in 2022: For estimating emissions from different pavement techniques
- CARB Methods to Find the Cost-Effectiveness of Funding Air Quality Projects: For developing assumptions about new users of bike/pedestrian facilities
- PAQONE (Pennsylvania Air Quality Off-Network Estimator): A sketch-planning tool designed to estimate emissions benefits of various types of investments that cannot be estimated with traditional travel demand models; originally developed by PennDOT in the early 1990s and built upon by others in the years since

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