



Notice: This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for the contents or use thereof. The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the objective of this report.

Minnesota's Data-Driven Approach to Promoting Greenhouse Gas Emissions Reductions in Transportation Project Selection

OVERVIEW

The Minnesota Department of Transportation is committed to addressing climate change. The [2022 Statewide Multimodal Transportation Plan](#) calls out climate action and the reduction of greenhouse gas (GHG) emissions as key priorities. Minnesota Department of Transportation (MnDOT) created and utilizes the [Minnesota Infrastructure Carbon Estimator](#) (MICE) tool to track and manage the GHG emissions associated with the construction and maintenance of transportation facilities. MnDOT also developed a methodology for qualifying GHG emissions reduction from different project types as it was developing a Carbon Reduction Strategy (CRS) per FHWA requirements. MnDOT Districts, Area Transportation Partnerships (ATPs), and metropolitan planning organizations (MPOs) will consider GHG emissions when selecting projects for federal funding from the Carbon Reduction Program.

BACKGROUND

In 2007, Minnesota established the [Next Generation Energy Act](#) to establish a statewide goal of reducing GHG emissions in the transportation sector by 80% below 2005 levels by 2050. The Governor's office established a Climate Change Subcabinet and Advisory Council on Climate Change to create the Climate Action Framework as a roadmap for implementing the State's GHG reduction goals across sectors. The Framework includes subgoals and associated near-term strategies for reducing emissions in six categories: clean transportation, climate-smart natural and working lands, resilient communities, clean energy and efficient buildings, healthy lives and communities, and clean economy.

GOALS AND TARGETS

In 2022, the [Minnesota Climate Action Framework](#) updated statewide emissions goals to reduce emissions 50% by 2030 and achieve net-zero emissions by 2050.

MnDOT used the [Minnesota Energy Policy Solutions tool](#) to evaluate GHG reductions and sequestration impacts of actions proposed under the Minnesota Climate Action Framework. The modeling provided valuable insights to understand the impacts of different actions. The results indicate the magnitude of possible GHG reductions from actions, which was one of many criteria used to prioritize actions without requiring detailed emissions modeling (Table 1).

MnDOT has developed subgoals to help achieve its GHG reduction targets: a decrease in VMT 20% per capita by 2050 and to reach 20% electric vehicles on the roads by 2030. The State and regional



U.S. Department of Transportation
Federal Highway Administration



transportation planning organizations' strategies for reducing VMT – which bears a direct relationship to vehicles emissions – directly determine the State's ability to achieve its GHG reduction goals (Figure 1).

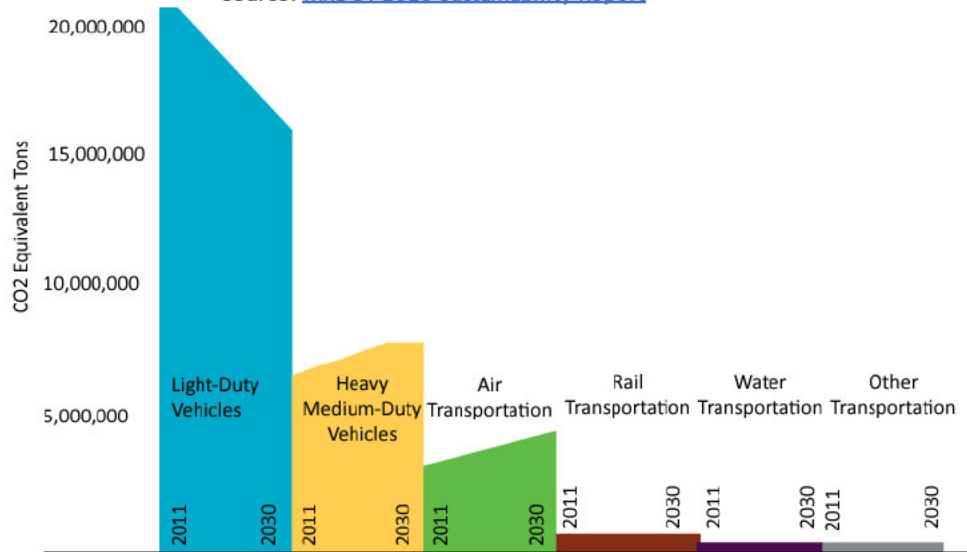
Table 1. Assumptions and magnitudes of relative impact of GHG reduction strategies within transportation sector proposed in the Framework

Source: [Minnesota Energy Policy Solutions Tool](#)

Model Policy	Magnitude of Cumulative GHG Reductions
Electric vehicle (EV) charger deployment	Low
EV range and charging time	Low
EV sales: Passenger and light-duty commercial vehicles (LDVs) and heavy-duty vehicles (HDVs)	Medium - combined
Electric vehicle subsidy: Passenger LDVs	
Low Carbon Fuel Standard (LCFS)	
Fuel Economy Standard: Passenger and commercial LDVs and HDVs	Medium
Mode Shifting: Passenger LDVs	Medium

Figure 1: Minnesota's Forecasted Greenhouse Emissions by Transportation Mode, 2011-2030

Source: [MnDOT 2016 Sustainability Report](#)





INTEGRATION WITH TRANSPORTATION PLANNING

MnDOT's 2019 [Pathways Report](#) quantified emission reductions of various strategies and actions to achieve statewide GHG goals under the 80% by 2050 (Figure 2) and the net-zero by 2050 (Figure 3) scenarios.

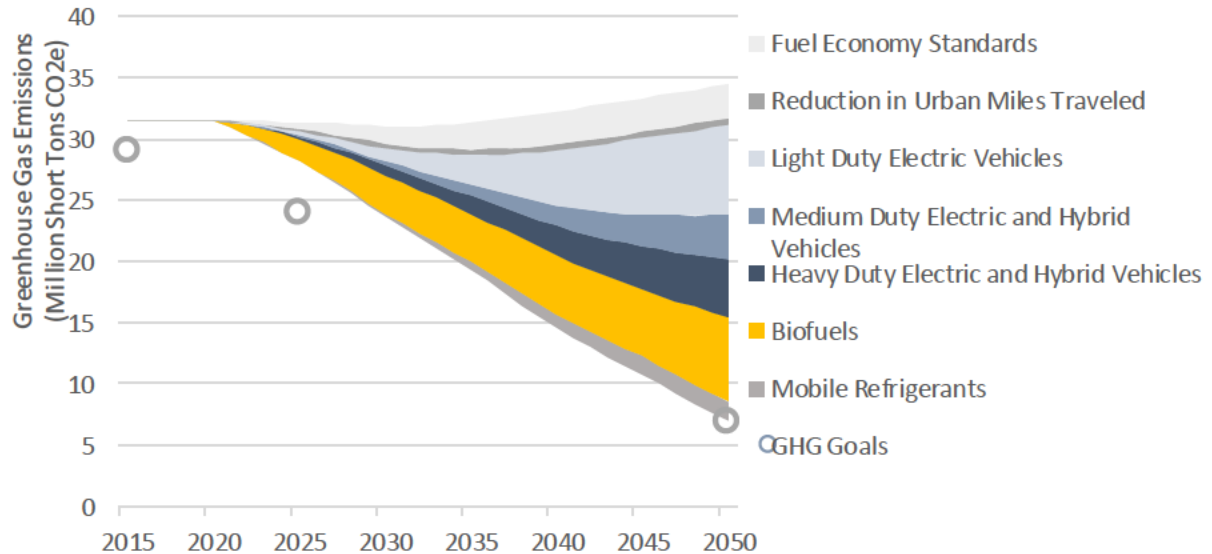


Figure 2: Estimated GHG emissions savings by measure considered in 80 X 50 scenario relative to Pathways reference scenario

Source: [Pathways to Decarbonizing Transportation in Minnesota](#)

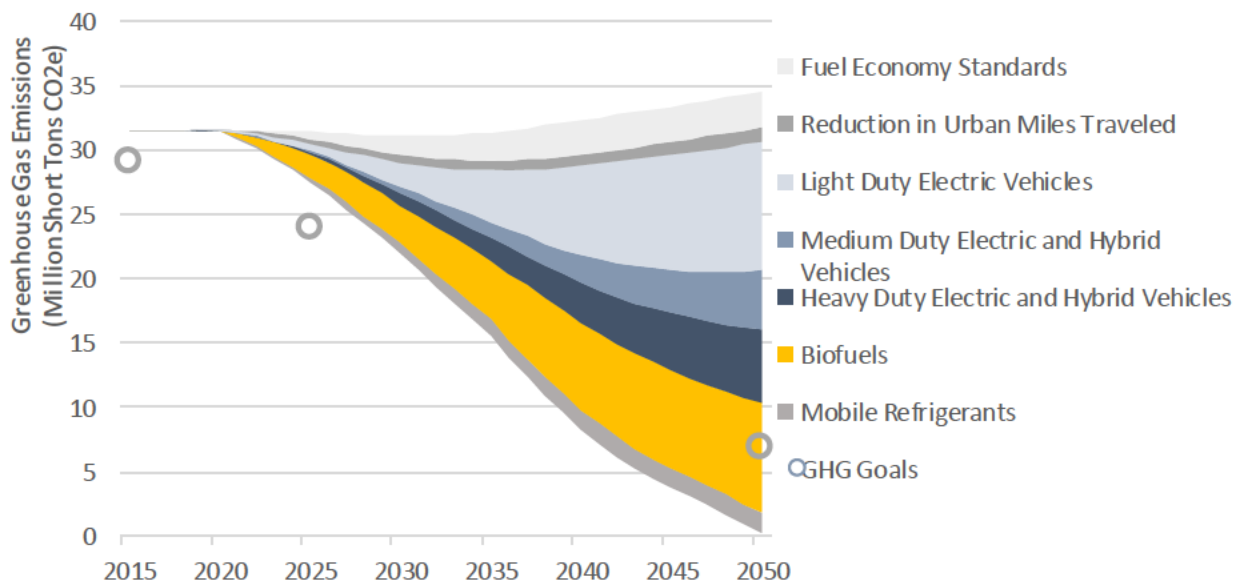


Figure 3: Estimated GHG emissions savings by measure considered in 100 X 50 scenario relative to Pathways reference scenario

Source: [Pathways to Decarbonizing Transportation in Minnesota](#)



U.S. Department of Transportation
Federal Highway Administration



From a statewide perspective, MnDOT is working to reduce GHG emissions in the transportation sector while enhancing mobility and fostering sustainable development. The Statewide Multimodal Transportation Plan is Minnesota's highest level policy plan for transportation and contains specific climate action performance measures. Strategies include promoting lower emission modes of travel, such as walking, bicycling, and taking transit, in addition to electric vehicle, alternative fuels, and other innovative planning projects.

MICE, a state-specific adaption of the Federal Highway Administration's (FHWA) Infrastructure Carbon Estimator tool, provides lifecycle estimates of energy and GHG emissions based on emission and energy use factors for materials and construction activities. MnDOT uses this analysis to assess Build/No Build project alternatives when performing project selection for the State Transportation Improvement Program (STIP). MnDOT customized the tool by creating state-specific inputs for mitigation options, lighting, lane widths, and other metrics. Approximately 95 percent of all MnDOT projects undergo a GHG analysis.

MnDOT is developing a Carbon Reduction Strategy (CRS) per FHWA requirements. The CRS is looking at how to reduce carbon emissions from surface transportation statewide. There are three high-level categories within the CRS that provide a broad approach to reducing GHG: electrification, travel choices, and low-carbon infrastructure and maintenance. Supporting each of the high-level categories are strategies. Within each strategy, project types are identified and associated with eligible funding sources (e.g., Carbon Reduction Program funds, Transportation Alternative funds, Surface Transportation Block Grant funds, National Electric Vehicle Infrastructure funds). The project types will guide how funds are implemented to reduce GHG emissions from Minnesota's surface transportation.

Through the development of the CRS, MnDOT's consultant team developed a methodology for qualifying GHG emissions reduction from different project types. The consultant is developing a toolkit for the Carbon Reduction Program project selection that will also be available to the metropolitan planning organizations (MPOs), allowing them to modify the weights of scoring to their local contexts and use the tool for Transportation Improvement Program (TIP) project selection.

To advance coordination and implementation, the Minnesota Legislature established the [Greenhouse Gas Emissions Impact Mitigation Working Group](#) to prepare recommendations for implementing a Transportation GHG Impact Assessment for capacity expansion projects on State highways prior to inclusion in the STIP or a metropolitan TIP. The Minnesota Legislature also established the [Clean Transportation Fuel Standard Working Group](#) to develop performance-based incentives to reduce carbon pollution from all transportation fuels including gasoline, diesel, biofuels, and electricity.

IMPLEMENTATION AT THE MPO LEVEL

The Metropolitan Council (the Met Council), the MPO for the Minneapolis-St. Paul metropolitan area, prioritizes sustainability and GHG emission reduction in its transportation planning efforts. The agency has a goal to reduce transportation-related air emissions through intentional and sustainable operations, project development, and investment priorities.



U.S. Department of Transportation
Federal Highway Administration



In order to measure and manage the impact of GHG emissions in the region for environmental review processes, the Met Council conducted and established the [Twin Cities Greenhouse Gas Inventory](#) for quantifying emissions across all regional economic sectors. The inventory aims to quantify and track the emissions of various GHG, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). The Met Council also published its [Greenhouse Gas Emissions Scenario Planning](#) in March 2023 and is in the process of developing the GHG Scenario Planning tool. The Met Council estimated GHG emissions from the transportation sector in Minneapolis using the Planning tool, which considered both direct and embodied (indirect) emissions, such as manufacturing, maintaining vehicles, and infrastructure. The strategies evaluated in this work included land use, vehicle electrification, mode shift (use of public transit), road pricing, and parking policy. The scenario planning tool then uses various forecast scenarios, such as increased transit ridership, increased teleworking, and increased population density to calculate the potential reduction in emissions (Table 2). The modes included in the scenarios are bicycles, school bus, urban bus, passenger light duty vehicle, intercity rail, urban rail, and walk/pedestrian.

Table 2: Estimated GHG emissions (thousands of tons CO₂e) under different hypothetical scenarios modeled in Minneapolis by 2040.

Source: [Greenhouse Gas Emissions Scenario Planning](#)

Mode	2018 Baseline	2040 Business as Usual Scenario	2040 Scenarios						
			50% increase in employment density	50% increase in population density	60% vehicle sales battery electric	60% increase in transit service	60% increase in teleworking	\$1 per mile congestion price	\$50 parking per hour
Total	1125.59	941.61	924.46	863.26	931.54	930.11	914.75	882.61	891.3

NEXT STEPS

Looking forward, MnDOT's use of MICE and the Met Council's GHG inventory will continue to inform and advance transportation planning efforts and investment at the State and regional levels. Coordination and collaboration on GHG emissions reduction activities is set to continue through the State working groups. MnDOT is also working with FHWA to explore alternatives analysis and social costs of carbon for projects using the MICE tool.