

## Strategies to Reduce Transportation Greenhouse Gas Emissions

### Addressing the Carbon Footprint of Transportation

On-road transportation produces greenhouse gas (GHG) emissions due to vehicle use and transportation infrastructure construction and maintenance. The amount of vehicle miles traveled, the energy efficiency of travel, and the carbon intensity of fuel used (including upstream emissions associated with fossil fuels and electricity) affect the amount of GHG emissions produced from vehicles using the transportation network. In addition, construction and maintenance of transportation infrastructure (including roads, transit, and other facilities) also create GHG emissions due to embodied emissions associated with materials production and delivery, as well as energy used by equipment and facilities, as shown in Figure 1.

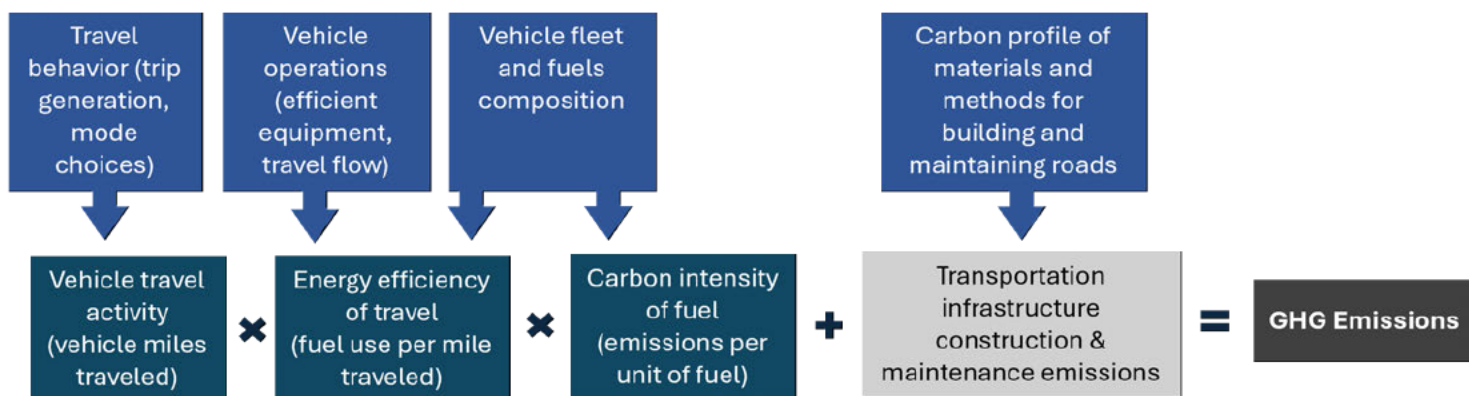


Figure 1. Factors that Affect Transportation GHG Emissions for Consideration in the Transportation Planning Process

Transportation GHG reduction strategies address one or more of these components. Transportation investments and policies can support **travel behavior changes** that reduce overall driving (vehicle miles traveled), **vehicle operations changes** that improve the energy efficiency of travel, and the **transition of vehicle fleets** to more fuel-efficient or low-carbon (zero tailpipe emissions) vehicles. Transportation agencies can also use **low-carbon materials and methods in the construction and maintenance** of transportation facilities to reduce GHG emissions.

### WHAT IS THE ROLE OF TRANSPORTATION PLANNING IN ADVANCING STRATEGIES?

Investment and policy decisions in the transportation planning process can support GHG emissions reduction by:

- Prioritizing infrastructure for sustainable travel modes, such as transit, walking, and biking, and investing in programs such as ridesharing and incentives that reduce vehicle travel
- Coordinating with land use planners to support development and investments that reduce vehicle travel needs
- Making operational changes, such as retiming traffic signals and installing roundabouts, or using energy-efficient equipment such as LED lighting
- Supporting electric vehicle (EV) use by installing charging infrastructure and switching public fleets to clean vehicles

GHG reduction also depends on decisions outside of the transportation planning process, including carbon pricing, low-carbon fuel requirements, fuel economy standards, land use reforms, vehicle incentives, and renewable energy generation.

### WHO IS INVOLVED IN IMPLEMENTATION?

**State legislatures** can implement policies related to fuel or carbon pricing, vehicle purchase incentives, set low-carbon fuel standards, and approve funding to support GHG reduction strategies.

**State Departments of Transportation (DOTs) and Metropolitan Planning Organizations (MPOs)** can employ project prioritization criteria that consider the GHG emission impacts of projects or programs, prioritize low-carbon construction materials and methods, and work with stakeholders to focus funding on strategies that reduce GHG emissions.

**Local governments** can support land use decisions that reduce transportation GHGs, local policies related to parking pricing and demand management, and incorporate GHG goals into projects.

**Transit agencies** can prioritize projects that both lower GHG emissions due to mode shift from private vehicles to transit and projects that reduce GHG emissions from the transit system itself.

**The private sector** can support implementing travel demand management programs, installing EV charging stations, or transitioning to zero emission vehicle fleets, among other actions.

## OPPORTUNITIES TO REDUCE GHG EMISSIONS FROM MULTIPLE SOURCES

There are many opportunities to reduce GHG emissions from on-road passenger and freight transportation, as well as from the construction, maintenance, and operation of transportation facilities. The table below describes some examples of these strategies.

| MOTOR VEHICLES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | INFRASTRUCTURE CONSTRUCTION, MAINTENANCE, AND OPERATIONS                                                                                                                                                                                                                                                                                                                                             |
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| <p><b>Support the adoption of zero emission vehicles or fuel-efficient vehicles:</b></p> <ul style="list-style-type: none"><li>• Install EV charging infrastructure</li><li>• Purchase or lease zero emission vehicles for public fleets (transit buses, garbage trucks, etc.)</li><li>• Invest in priority zero emission freight corridors</li></ul>                                                                                                                                                                           | <p><b>Reduce embodied emissions in transportation infrastructure:</b></p> <ul style="list-style-type: none"><li>• Conduct preventative maintenance to extend the life of infrastructure</li><li>• Reduce the amount of material or use recycled asphalt, concrete, and other materials</li><li>• Use low-carbon materials like bio-based binders</li><li>• Use local materials and fill</li></ul>    |
| <p><b>Support reducing vehicle travel through mode shifts and travel behavior changes (e.g., shorter trip lengths):</b></p> <ul style="list-style-type: none"><li>• Invest in active transportation infrastructure and programs</li><li>• Implement travel demand management strategies</li><li>• Integrate land use and transportation planning to reduce trip lengths and increase opportunities for walking and bicycling, including transit-oriented development</li><li>• Improve multimodal freight connections</li></ul> | <p><b>Reduce emissions from construction and maintenance equipment and energy used in transportation operations:</b></p> <ul style="list-style-type: none"><li>• Reduce construction equipment activity or use more efficient construction equipment (e.g., EVs)</li><li>• Install energy-efficient lighting</li><li>• Install energy-efficient traffic signals and variable message signs</li></ul> |
| <p><b>Reduce vehicle delay and idling and improve traffic flow:</b></p> <ul style="list-style-type: none"><li>• Electrify truck stops</li><li>• Coordinate traffic signals</li><li>• Replace intersections with roundabouts</li><li>• Implement incident management programs</li></ul>                                                                                                                                                                                                                                          | <p><b>Generate renewable energy to support transportation and other uses:</b></p> <ul style="list-style-type: none"><li>• Install solar panels and wind turbines in the right-of-way and on transportation facilities</li></ul>                                                                                                                                                                      |

## RESOURCES

- Federal Highway Administration, [Sustainable Pavement Program](#) website.
- National Cooperative Highway Research Program (NCHRP), [Reducing Greenhouse Gas Emissions: A Guide for State DOTs](#), 2022.
- NCHRP, [Greenhouse Gas Mitigation Measures For Transportation Construction, Maintenance, And Operations Activities](#), 2010.
- U.S. Departments of Energy, Transportation, and Housing and Urban Development, and Environmental Protection Agency, [The U.S. National Blueprint for Transportation Decarbonization](#), 2023.

