CAMPO
CAPITAL AREA METROPOLITAN PLANNING ORGANIZATION
CENTRAL TEXAS

TRANSPORTATION EMISSIONS REDUCTION PLAN

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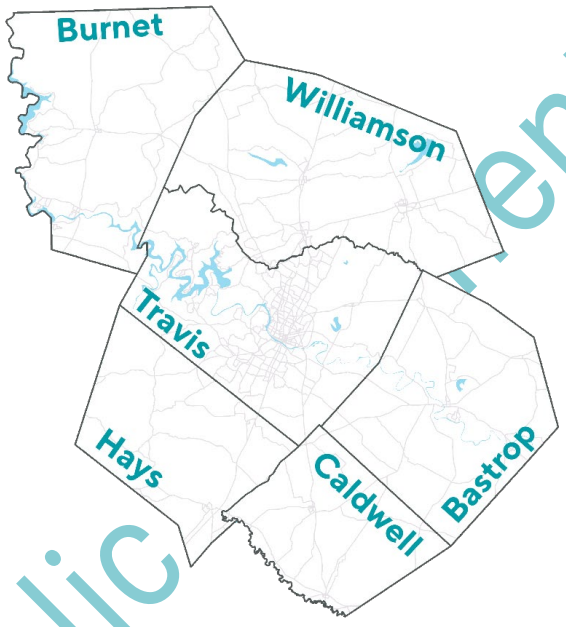
List of Abbreviations

BAU	Business -as-Usual
CAMPO	Capital Area Metropolitan Planning Organization
CAPCOG	Capital Area Council of Governments
CCAP	Comprehensive Climate Action Plan
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Process
CO	Carbon monoxide
CO_2	Carbon dioxide
CRP	Carbon Reduction Program
CTTMS	Central Texas Traffic Management System
U.S. EPA	United States Environmental Protection Agency
EV	Electric vehicle
FHWA	Federal Highway Administration
GHG	Greenhouse gas
HOV	High-occupancy vehicle
ITS	Intelligent Transportation Systems
LCFS	Low Carbon Fuel Standard
LEV	Low-emission vehicles
MPO	Metropolitan Planning Organization
$PM_{2.5}$	Particulate matter
RTP	Regional Transportation Plan
SOV	Single-occupancy vehicle
TCEQ	Texas Commission on Environmental Quality
TIP	Transportation Improvement Program
TSMO	Transportation system management and operations
TTI	Texas A&M Transportation Institute
TxDOT	Texas Department of Transportation
VOCs	Volatile organic compounds
VMT	Vehicle Miles Traveled
ZEB	Zero-emission buses
ZET	Zero-emission trucks
ZEV	Zero-emission vehicles

Chapter 1: Introduction

The Capital Area Metropolitan Planning Organization (CAMPO) serves as the designated Metropolitan Planning Organization (MPO) for the greater Austin region in Central Texas, encompassing Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson Counties (Figure 1). The Capital Area supports a population exceeding two million residents and boasts a thriving economy, including corporate headquarters, the state capitol complex, and multiple universities. The region also offers a variety of environmental, recreational, and entertainment amenities that contribute to its overall quality of life. Effective regional transportation planning is essential to maintaining and improving this high standard of living, ensuring the system meets both current and future needs.

Figure.7¡.Map.of.the.CAMPO.region



CAMPO developed this Transportation Emissions Reduction Plan to evaluate emissions related to surface transportation and provide a regional implementation strategy that will contribute to emissions reduction. This planning effort assessed the region's current emissions, developed future emission scenarios, developed regional goals, objectives, and performance measures in collaboration with the steering committee, and resulted in an actionable set of strategies to address transportation emissions in the region and enhance CAMPO's role in air quality planning and programming.

Transportation Emissions in the CAMPO Region

We use our transportation systems in nearly every aspect of our daily lives, to get to work, school, healthcare, recreation, our homes, and shopping. Not only do these systems connect us, but they also serve as the backbone of our economy. At the same time, motor vehicles emit pollution that harms local air quality and trap heat within the atmosphere.

The transportation sector is the largest source of greenhouse gas (GHG) emissions nationally and within the Austin region. Transportation sources such as cars, trucks, and buses, contributed about 34% of GHG emissions within the Austin-Round Rock-Georgetown metropolitan statistical area in 2022[1]. These emissions, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O),

[1]City of Austin, Priority Climate Action Plan: Austin-Round Rock-Georgetown Metropolitan Statistical Area, March 1, 2024. https://www.epa.gov/system/files/documents/2024-03/city-of-austin-austin-rrock-georgetown-pcap.pdf

trap heat in the atmosphere, and have effects on weather systems, including more extreme precipitation, floods, and periods of drought.[2] CO_2 is the most prevalent GHG, and for reporting purposes, emissions of CH_4 and N_2O are often converted in CO_2 equivalent (or CO_2e), based on the global warming potential of each gas. GHGs persist in the atmosphere for decades to centuries and are well mixed through the lower atmosphere, so where and when emissions are generated (e.g., season, time day) does not influence their impact.

The transportation sector also contributes to local air pollution, which adversely affects public health. Vehicle exhaust emits volatile organic compounds (VOCs) and oxides of nitrogen (NOx), which in the presence of sunlight and heat create ground-level ozone (also called "smog"). Due to these atmospheric interactions, ozone pollution is most likely to form during warmer months. Exposure to ozone causes respiratory issues and can aggravate asthma.[3] Vehicle exhaust and tire wear also generate fine particulate matter, known as $PM_{2.5}$ (particulates under 2.5 microns in diameter), which can lodge in the lungs and affect the heart. Exposure to $PM_{2.5}$ can cause respiratory symptoms, aggravate asthma, decrease lung function, and lead to cardiovascular issues including premature death in people with heart or lung disease. Fine particles are also the main cause of reduced visibility (haze) in parks and wilderness areas.[4] Due to short-term atmospheric reactions, accumulation of pollutants can vary day to day and sometimes lead to "hot spot" concentrations. Communities near heavily used roadways, such as highways and main arterial corridors, have significantly higher levels of these pollutants compared to other areas, and generally face a higher risk of developing cardiovascular and respiratory diseases.[5]

CAMPO plays a key role in transportation planning and funding investments within the greater Austin region. The investment decisions that CAMPO and its transportation partners (in local governments, the Texas Department of Transportation, and others) make can affect motor vehicle emissions levels, and in turn support improved regional air quality, public health, and quality of life.

Purpose

With this emissions reduction plan, CAMPO aims to support a thriving, healthy, and economically vibrant Central Texas region. The overall purpose and goal of this plan is as follows:

Support the health and sustainability of the CAMPO region by reducing motor vehicle emissions, while enhancing safety, mobility, the economy, and quality of life.

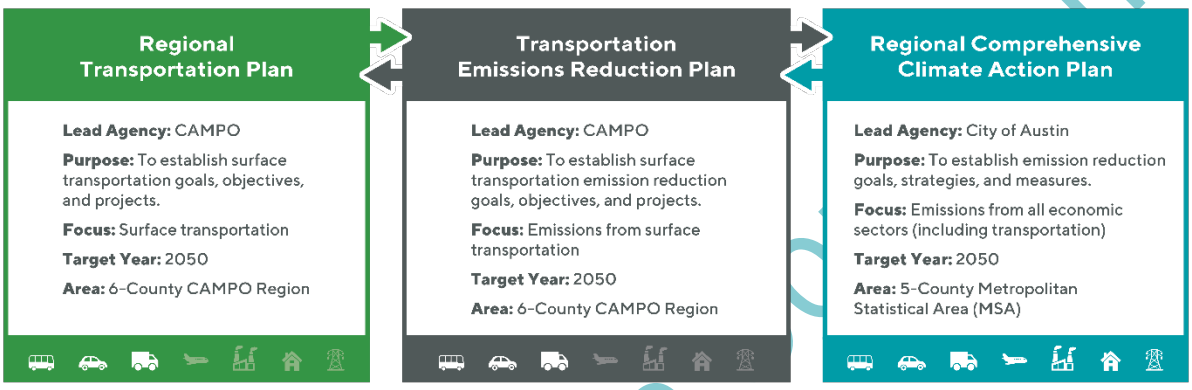
This plan supports the region's long-range vision for transportation and builds directly upon the goals of CAMPO's 2050 Regional Transportation Plan (RTP). By providing an implementation

[2] U.S. Global Climate Research Program, Fifth National Climate Assessment (NCA5). Crimmins, A.R., C.W. Avery, D.R. Easternling, K.E. Kunkel, B.S. Stewart, and T.K., Maycock, Eds. 2023, https://toolkit.climate.gov/sites/default/files/2025-07/NCA5_2023_FullReport.pdf
[3] U.S. Environmental Protection Agency, Ozone and Your Health, February 2009, https://www.airnow.gov/sites/default/files/2020-02/ozone-c.pdf.
[4] U.S. Environmental Protection Agency, Particulate Matter Basics, updated May 30, 2025, https://www.epa.gov/pm-pollution/particulate-matter-pm-basics
[5] American Lung Association, The Road to Clean Air: Benefits of a Nationwide Transition to Electric Vehicles, https://www.lung.org/getmedia/99cc945c-47f2-4ba9-ba59-14c311ca332a/electric-vehicle-report.pdf

strategy to help the region reduce transportation emissions, the Transportation Emissions Reduction Plan supports the RTP's "Stewardship" goal, which includes improving public health outcomes, while also supporting goals related to safety, mobility, the economy, equity, and innovation. This plan also was coordinated with and supports the Austin-Round Rock-Georgetown

Figure.8¡.Regional.Planning.Coordination.and.Relationship.between.Plans

Metropolitan Statistical Area's Regional Comprehensive Climate Action Plan (CCAP), which describes a regional strategy to get to net zero GHG emissions. Figure 2 shows how the RTP, the Transportation Emissions Reduction Plan, and the CCAP relate to each other.



In the near-term, the Transportation Emissions Reduction Plan can help inform CAMPO's allocation of funds through the federal Carbon Reduction Program. More broadly and long-term, the plan can help to inform transportation investment decision-making across a wide variety of funding programs and support partner agencies in identifying and prioritizing transportation projects that support emissions reduction.

Plan Development Process

Stakeholder and Public Engagement

The goal of the stakeholder engagement process was to gather input from diverse perspectives, facilitate productive discussion around transportation emissions reduction, and develop consensus on regional emissions reduction priorities. Phase 1 included opportunities for stakeholders to provide initial input on the planning process and help prioritize strategies that were analyzed to support the goals, objectives, and investments that will lead to the reduction of emissions. Phase 2 included opportunities for stakeholders to review the draft plan documentation and provide input on the planning outcomes before it goes to the Transportation Policy Board for adoption and implementation. The Stakeholder and Public Engagement Summary is provided in **Appendix A**.

Steering.Committee.

A steering committee of transportation professionals representing the CAMPO region was established to guide the development of the plan. Throughout both stakeholder engagement phases, the steering committee met six times to discuss the direction of the plan.

- **Meeting #1:** Introduction to the Transportation Emissions Reduction Plan and discussion of the role of the steering committee and the approach to public engagement

- **Meeting #2:** Stakeholder listening session, discussion of the baseline inventory, BAU forecast, and alternative forecasts
- **Meeting #3:** Update on the scenario analysis, discussion of content for the strategy toolkit, and introduction of draft goals and objectives,
- **Meeting #4:** Summary and discussion of the reduction strategy assessment memo, as well as in-depth discussion of goals, objectives, and performance measures, and an introduction to the draft plan outline
- **Meeting #5:** Update on the scenario analysis, discussion of the emissions reduction strategy assessment, and discussion of recommendations for priority outcomes
- **Meeting #6:** Discussion of the draft plan and comment resolution - ***planned***

Public.Participation

The public engagement process was split into two phases. The Phase 1 focused on gathering information on the public's priorities for transportation emissions reduction efforts, while Phase 2 aimed to disseminate the draft plan and gather feedback from the public. CAMPO hosted public engagement pop-up events to inform the public about the plan and solicit feedback on emissions reduction strategies. CAMPO gathered public input on both the draft and final plans through online surveys and an online open house on the project website.

Phase 1

Figure.9¡.Public.engagement.phases.and.events

During Phase 1, CAMPO held six pop-up events from May 17 to June 7, 2025– one in each county within the region – and an online open house to introduce the planning effort and collect input from the community on regional priorities and potential strategies. The same information was available online and in-person. Open house materials included informational exhibits, a fact sheet outlining the purpose of the Transportation Emissions Reduction Plan, and a survey to gather information on factors influencing mode choice and priorities for emissions reduction strategies. All materials were posted online and available in English and Spanish. Input was collected through printed or online surveys, emailed comments, and verbal comments at in-person engagement events. The Transportation Emissions Reduction Plan development team received 179 survey submissions. Verbal comments and questions from in-person engagement events were also documented and considered in the development process.

Input from workshops held as part of development of the Austin region CCAP was also reviewed to understand public perspectives about transportation emissions reduction strategies.

Phase 2

During Phase 2, CAMPO is sharing the draft Transportation Emissions Reduction Plan with the public through an online open house and pop-up events to gather feedback, and to refine the plan. [***Process underway***]

Emissions Analysis and Scenario Development

To support the development of the Transportation Emissions Reduction Plan, CAMPO conducted a region-wide transportation sector emissions analysis. The analysis included the following steps:

- Documenting baseline emissions in the CAMPO region
- Developing a 2050 Business-As-Usual emissions forecast for the region
- Developing alternative 2050 emissions forecasts based on scenarios

The analysis is covered in Chapter 3 and explains future transportation investment scenarios that can reduce regional transportation emissions.

Goals, Objectives, and Performance Measures

CAMPO created goals, objectives, and performance measures for reducing emissions in the transportation sector. These align closely with the 2050 RTP and CCAP. Activities included:

- Drafting goals and objectives based on historic and current regional goals
- Facilitating a dialogue with stakeholders about the region's priorities
- Considering performance measures to track progress toward goals and objectives over time

Strategies and Recommendations

In alignment with the region's goals, CAMPO developed a toolkit of tangible strategies for local transportation agencies to implement to reduce transportation-related emissions. The strategy development process included the following:

- Evaluating numerous existing potential emissions reduction strategies
- Creating 25 fact sheets for specific, highly effective strategies
- Analyzing each strategy's effectiveness in terms of cost and emissions reductions
- Highlighting co-benefits of each strategy
- Recommending actions for the Transportation Policy Board to implement this plan and promote the toolkit

Drafting the Transportation Emissions Reduction Plan

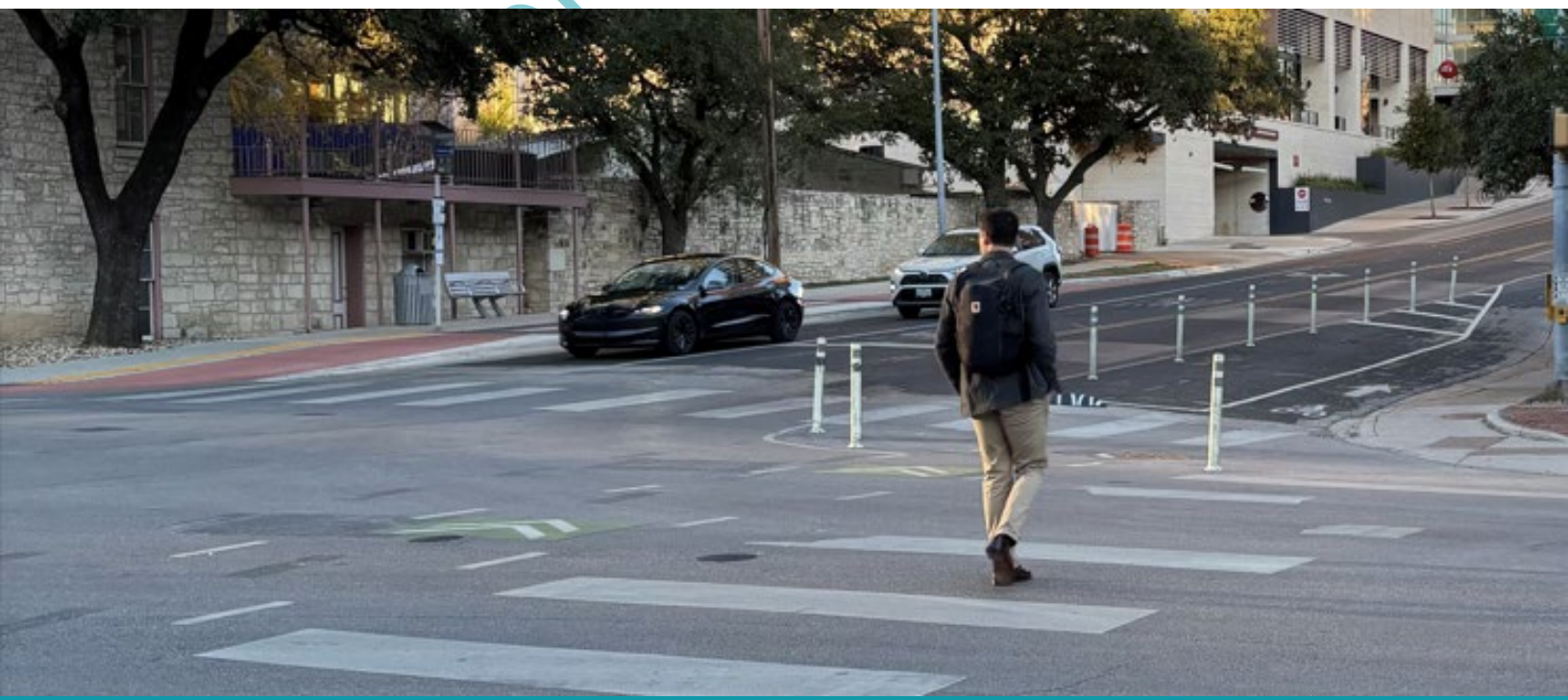
These activities culminated in the development of this comprehensive Transportation Emissions Reduction Plan, which describes emissions reduction strategies, selection process, implementation roles, policy actions, and investment directions.

Plan.Organization

This plan is organized as follows.

- **Chapter 1: Introduction** introduces the Transportation Emissions Reduction Plan's purpose, relation to other CAMPO regional plans, and the organization of the document.
- **Chapter 2: Transportation Emissions in the CAMPO Region** describes existing transportation emissions sources and trends in the CAMPO region, as well as forecasts.
- **Chapter 3: Analysis of Regional Transportation Strategies** describes an assessment of transportation strategies that was conducted, including scenario modeling that was conducted to explore the potential emissions benefits and other co-benefits of different investment strategies and policies.
- **Chapter 4: Transportation Emissions Reduction Goals and Objectives** defines regional emissions reduction goals and objectives that form the basis for the emissions reduction strategy to guide regional investments, as well as performance measures for tracking progress.
- **Chapter 5: Strategies for Reducing Transportation Emissions** provides a menu of strategies for regional, local, and state transportation agencies, and highlights key regional priorities.
- **Chapter 6: Implementing the Regional Strategy** discusses recommendations for CAMPO that will support implementation of the plan.
- **Appendix A** includes a summary of the stakeholder engagement activities that helped guide the development of this plan.

The plan is accompanied by a comprehensive **strategy toolkit** that compiles guides for each Transportation Emissions Reduction Plan strategy. Each strategy guide includes information on the type of projects and policy actions available for practitioners to utilize to realize emissions reductions in the transportation sector, information on co-benefits, implementation timelines, implementation costs, applicable location or geography types, and local project examples.



Chapter 2: Transportation Emissions in the CAMPO Region

As the region's MPO, CAMPO is responsible for planning and programming funds for transportation projects within the six-county region. Unlike several other urbanized areas in Texas (the Dallas-Fort Worth, Houston-Galveston-Brazoria, and San Antonio regions), the Austin metropolitan area currently meets all federal air quality standards, called the National Ambient Air Quality Standards or NAAQS. These standards are established by the United States Environmental Protection Agency (U.S. EPA) to protect human health and welfare.

The Austin region, however, is frequently close to the limit for ozone, and there is concern that in the future the Austin region could be redesignated as in nonattainment of the standards. Redesignation would create several new requirements in the transportation planning process, including modeling and assessing the impacts of transportation plans and investments on emissions levels. This Transportation Emissions Reduction Plan is a proactive effort to support emissions reduction to help ensure that the region does not fail to meet federal air quality standards, and to support the region's stewardship goals for supporting public health and quality of life for residents of the region.

How Transportation Creates Emissions and Why Transportation Investments Matter

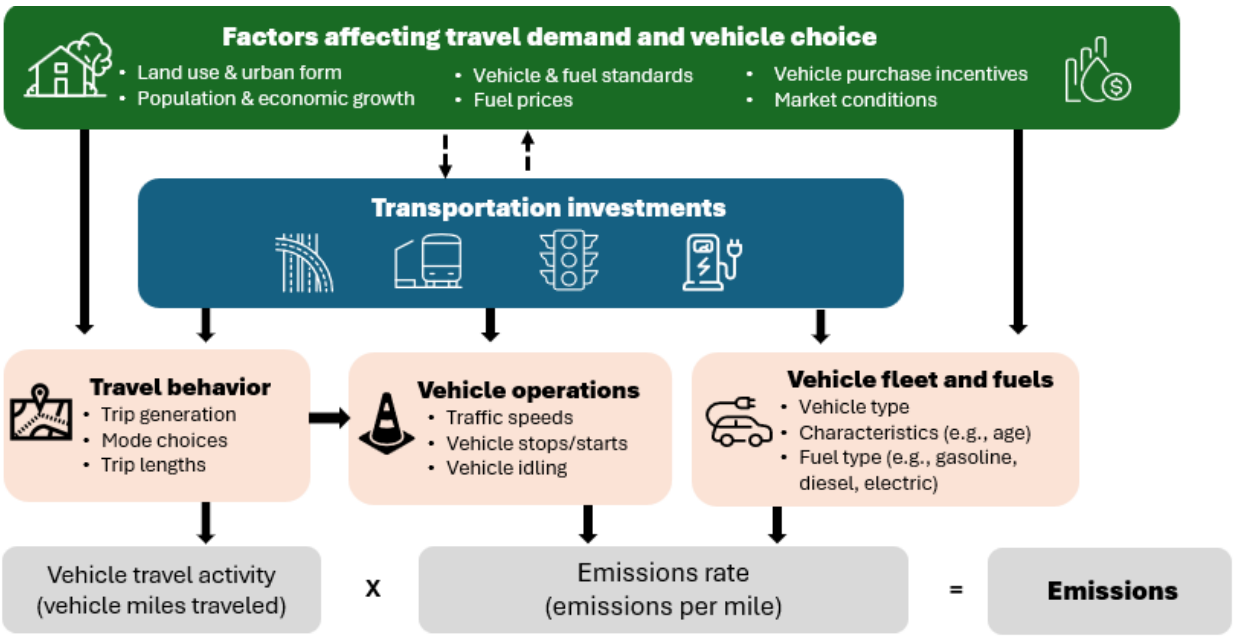
Emissions from motor vehicles are generated through fuel combustion. Emissions – including GHGs, ozone precursors VOC and NOx, and particulates – are released via tailpipe exhaust. In addition, VOCs are released through evaporation of fuels, and particulates are generated from break and tire wear.

In general, on-road transportation emissions are a function of the amount of vehicle use, typically expressed as vehicle miles traveled or VMT, and the rate of emissions generated during vehicle travel (expressed as emissions per mile). As shown below in Figure 4, many factors influence VMT and emissions rates. For instance, population growth, land use development patterns, fuel prices, and the cost of travel affect the level of VMT within the region. Federal vehicle emissions standards, fuel economy standards, fuel prices, and market conditions also affect the types of vehicles that people purchase, which affect emissions rates.

At the same time, regional transportation investments and policy decisions made through the transportation planning process play a key role in influencing vehicle travel activity, vehicle efficiency, and vehicle choice decisions, which in turn affect the factors involved in producing GHG emissions. Transportation investments and policies affect travel behavior by affecting the availability and viability of choices such as driving alone, ridesharing, using transit, walking, or biking (called "mode choice), as well as how many trips people make and the length of those trips (e.g., based on the ease of travel, cost of travel, and other factors), which in turn affect VMT. Transportation investments and policies also affect traffic congestion and travel speeds, which impact on-road vehicle fuel economy or energy efficiency. Although traditionally, transportation agencies have not been viewed as having significant impacts on the vehicle fleet, investments in EV

charging infrastructure and purchase or lease of EVs for public fleets such as transit buses also indirectly and directly affect the types of vehicles on the road.

Figure.0¡.How.Transportation.Affects.Emissions

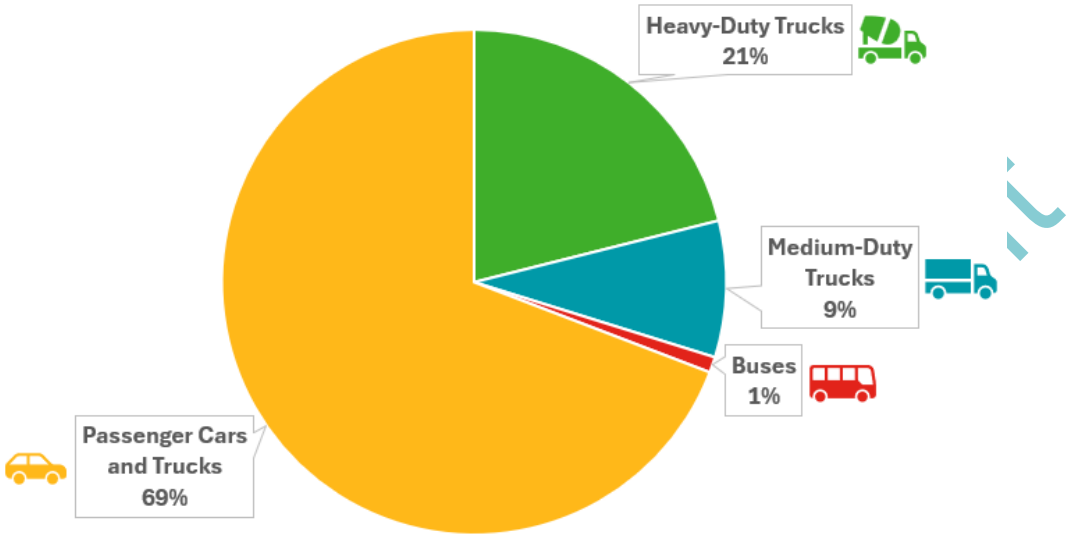


CAMPO and its transportation partners' investment decisions and policies (e.g., parking policies, incentives), therefore, play a vital role in influencing the amount of emissions generated by motor vehicles within the CAMPO region.

Sources of Transportation Emissions

Most transportation sector emissions are produced by on-road motor vehicles, and of those emissions by motor vehicles, over two-thirds come from passenger vehicles, as shown in Figure 5 below. It is important to note, however, that despite their much smaller share of VMT, medium- and heavy-duty trucks make up about 31% of on-road emissions, so freight travel is a significant source of emissions within the region.

Figure.❶.Regional.On_Road.GHG.Emissions.by.Vehicle.Type?868❶



Source: ICF, CAMPO Emissions Forecast, Baseline Analysis

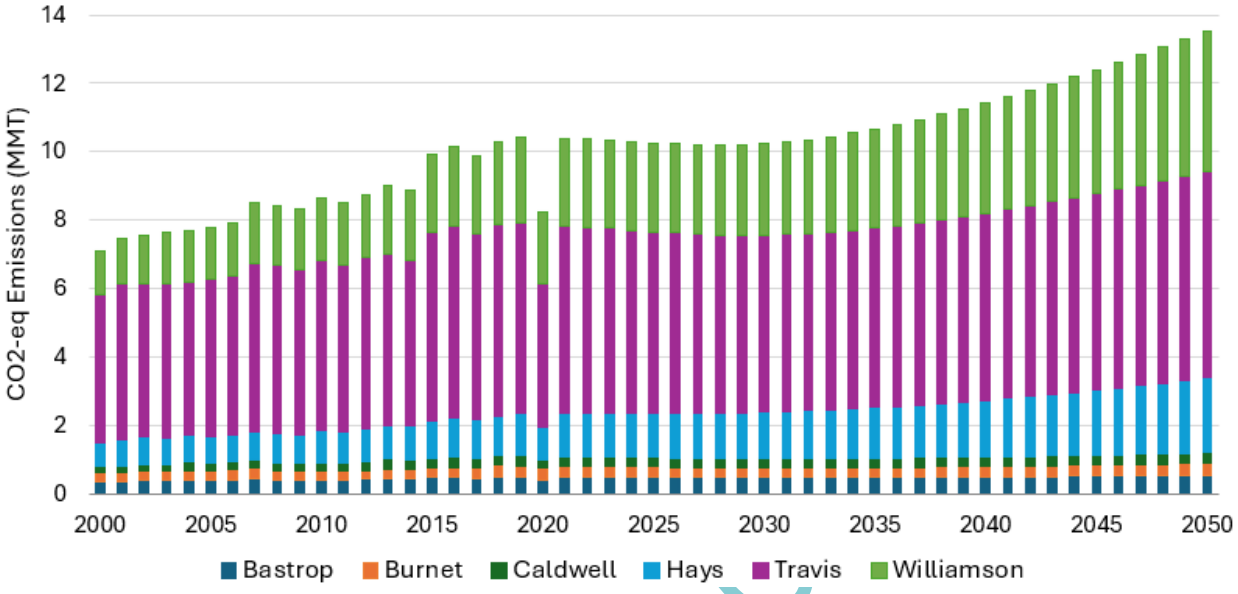
Historical and Forecast Emissions Trends

The Texas A&M Transportation Institute (TTI), as required by the Texas Commission on Environmental Quality (TCEQ) and the Texas Department of Transportation (TxDOT), manages and updates inventories of on-road mobile source emissions of air pollutants for all 254 Texas counties across the state.[6] TTI also develops forecasts of future on-road transportation emissions, which depend on forecasts of VMT and future vehicle technology trends. TTI's inventory forecasts were developed based on the U.S. Environmental Protection Agency's MOVES3 model, which was released in 2020, and reflect federal emissions standards in place at that time.

Figure 6 shows historical and future forecasts of on-road GHG emissions from the six counties that are part of the CAMPO region: Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson. Despite a significant drop in on-road emissions due to the pandemic in 2020, the CAMPO region's on-road vehicle emissions of GHGs have steadily risen overall, and within each county. These increases have generally occurred since CO_2, the most prevalent GHG, is a direct product of fuel combustion and the carbon content of fuel. Over time, VMT has increased faster than improvements in vehicle fuel economy, leading to higher levels of CO_2e emissions. Based on federal emissions standards as of 2020, CO_2e emissions were projected to continue to decline by 2030 but subsequently increase.

[6] Texas Air Quality Portal, On-Road Trends Emission Inventory, https://txaqportal.org/on-road-trends-emission-inventory/

Figure 4. CAMPO Region On-Road Greenhouse Gas Emission Trends Inventory from TTI (8666 - 8680) in Million Metric Tons (MMT)



In contrast, on-road emissions of NOx, VOCs, and PM2.5 have declined sharply over time, due to improvements in vehicle emissions control technology driven by federal emissions standards. These improvements, however, do not continue to keep pace with VMT, and the TTI forecasts anticipate increases in these emissions into the future, as show in the following figures.

Figure 5. CAMPO Region On-Road GHG Emissions Inventory from TTI (8666 - 8680) and Projections (8680 - 8666) in Metric Tons (MT) NOx

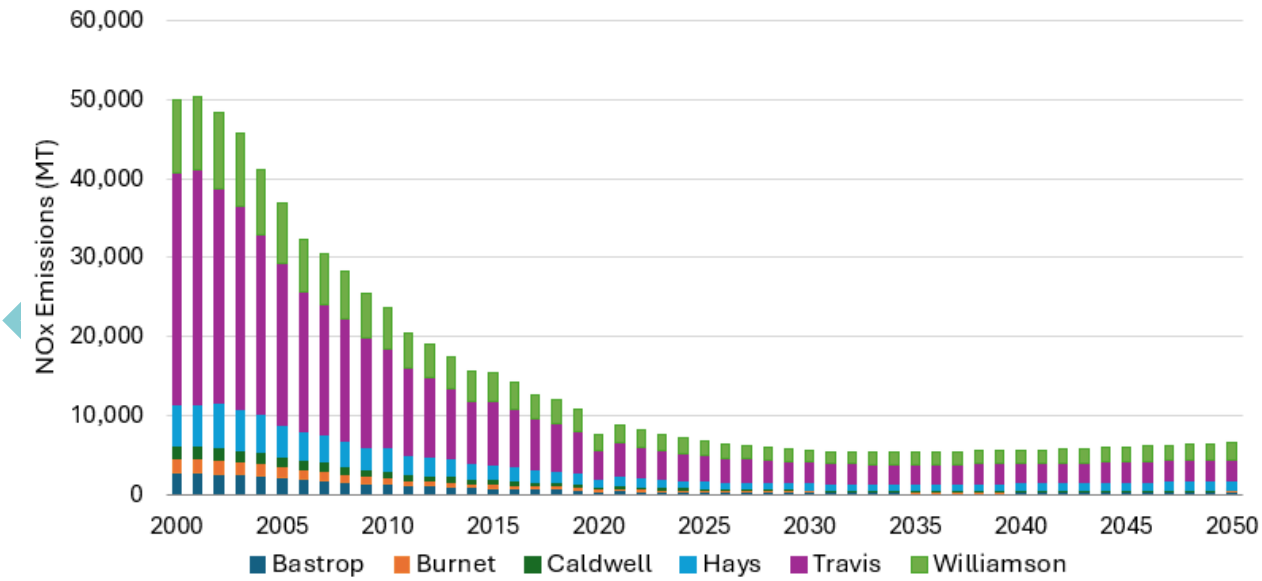


Figure.4¿CAMPO.Region.On_Road.GHG.Emissions.Inventory.from.TTI.(8666.-.8680).and. Projections.(8681_8606)?in.Metric.Tons.(MT).VOC

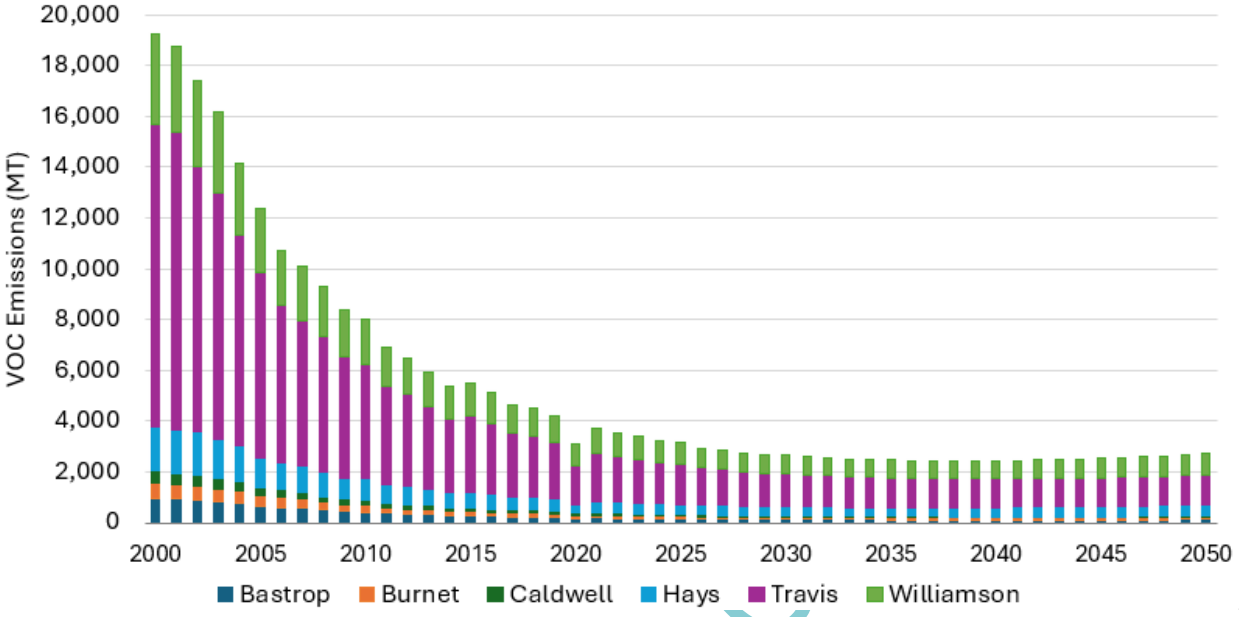
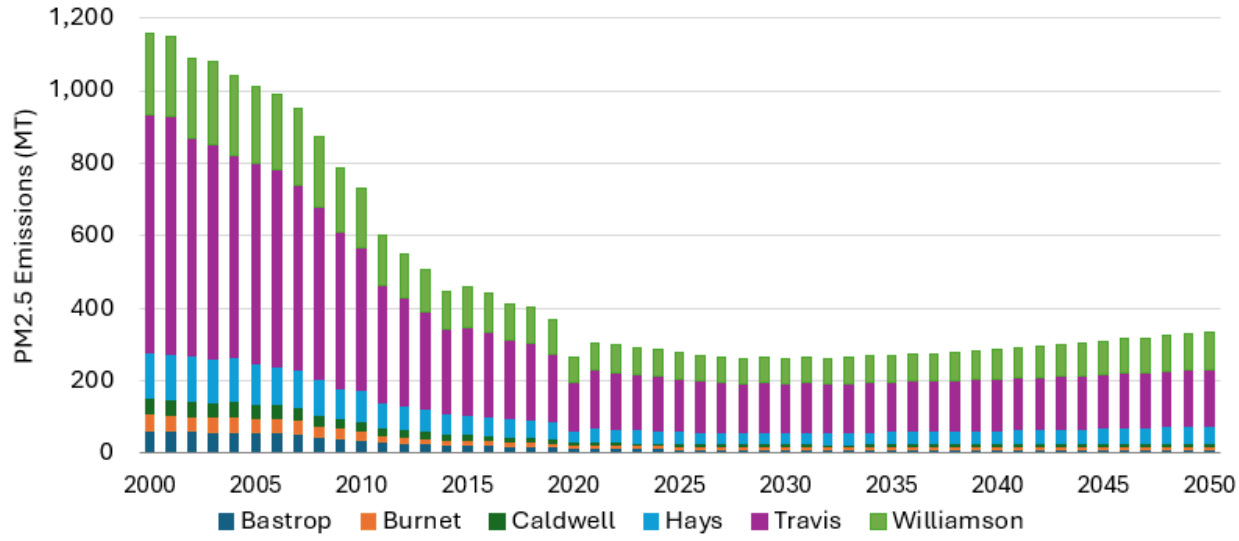


Figure.5¿CAMPO.Region.On_Road.GHG.Emissions.Inventory.from.TTI.(8666.-.8680).and. Projections.(8681_8606)?in.Metric.Tons.(MT).PM8¡1



Updated Forecasts of Future Transportation Emissions

For the CAMPO Transportation Emissions Reduction Plan, updated forecasts for 2030 and 2050 were developed using updated forecasts of VMT from CAMPO's travel demand model and the latest versions of EPA's MOVES4 and MOVES5 models to account for updated federal emissions standards.

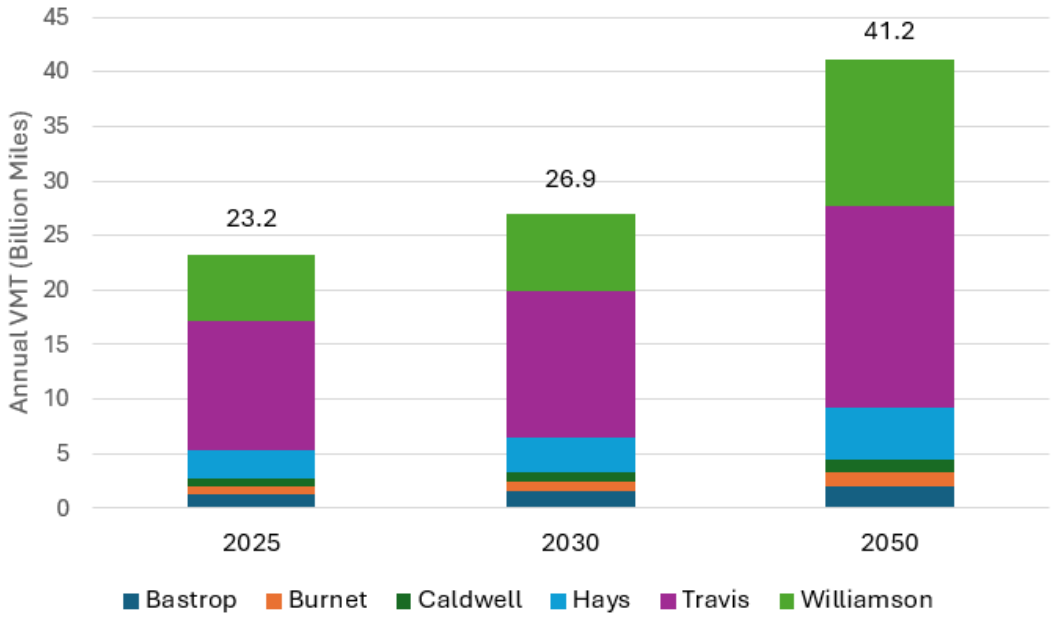
Updated VMT Forecast

An updated VMT forecast was developed based on assumptions of population, employment, and land use utilized in the 2050 RTP, and derived from CAMPO's travel demand model. In addition, based on feedback from the Transportation Emissions Reduction Plan Steering Committee, the baseline forecast – referred to as the "business as usual" or BAU forecast – was adjusted to reflect anticipated future telework levels. CAMPO's travel demand model was calibrated to traffic levels pre-pandemic when the work-from-home rate among working residents in the CAMPO region was 8.79% (based on the American Community Survey's 5-year estimate for 2019). However, the most recent work-from-home estimates are considerably higher – 24% for Williamson County and 27% for Travis County, based on the American Community Survey's 1-year estimate for 2023. Consequently, the work trips rates in the model were adjusted to assume a 20% telework rate regionally in 2030 and 2050.

While telework reduces work trips, research suggests that teleworkers make more non-work trips than commuters (e.g., for errands). A recent national study suggests that workers make one additional, non-work trip on days they work from home.[7] Consequently, the overall result regionally was about a 1.7% reduction in VMT compared to the unadjusted forecast.

The resulting VMT forecast is shown below in Figure 10. According to these estimates, regional VMT increases from about 23.69 billion miles in 2025 to 26.49 billion miles in 2030 (an increase of about 12%), to 40.38 billion miles in 2050 (an overall increase of about 70% over the period 2025 to 2050).

Figure.76¿Total.Estimated.Annual.VMT.in.8680?:8696?.and.8606.in.Updated.Baseline.Forecast. (with.telework.adjustment)



[7] Hassan Obeid, Michael L. Anderson, Mohamed Amine Bouzaghrane, Joan Walker, Does telecommuting reduce trip-making? Evidence from a U.S. panel during the COVID-19 pandemic, Transportation Research Part A: Policy and Practice, Volume 180, 2024, 103972, ISSN 0965-8564

Updated Emissions Forecasts

Since the release of MOVES3, the U.S. EPA has issued two additional updates, MOVES4 and MOVES5 to reflect the most up-to-date federal emissions standards and policies.

- MOVES4, released in August 2023, accounts for the EPA's December 2021 revision to GHG standards for 2023 and later model year light-duty vehicles (LDGHG 2023 rule) and EPA's March 2023 heavy-duty engine and vehicle standards, which set tighter emissions standards for NOx, PM, VOCs, and CO for heavy-duty on-road vehicles and engines starting in model year 2027 (HD2027). MOVES4 also accounts for increased EV uptake due to the Inflation Reduction Act's (IRA) clean vehicle tax credits.[8]
- MOVES5, the most recent version of the model, includes that latest emission standards adopted by the U.S. EPA in Spring 2024, which significantly reduced GHG emissions allowable from new vehicles.[9,10] These requirements assumed that by model year 2032, nearly two-thirds of all new light-duty vehicles (passenger cars, sport utility vehicles, and pickups) sold would be electric, and over 40 percent of all medium-duty vehicles sold would be electric.

While typically the latest emissions model should be used for developing a forecast, the current federal administration made clear its intent to roll back the 2024 emissions standards, as well as Corporate Average Fuel Economy (CAFE) standards. Consequently, rather than using MOVES5, updated emissions forecasts were developed using MOVES4. However, MOVES4 also incorporates assumptions about a significant increase in EV sales due to the adoption of IRA clean vehicle tax credits, which help motivate EV purchases, especially for light-duty vehicles. These credits were originally expected to expire at the end of 2032. However, the credit officially ended on September 30, 2025, several years prior to the originally scheduled deadline.[11] Consequently, the EV sales fractions in MOVES4 were adjusted to account for the ending of these tax credits.

> Federal policy has significant impacts on motor vehicle emissions forecasts. Looking forward in the both near-term and out to 2050, changes in federal emissions standards and fuel economy standards for motor vehicles would have significant impacts on the forecast.

In addition to emissions from on-road sources, this study also included estimates of emissions associated with electricity used by EVs. While EVs produce zero tailpipe emissions and are often referred to as zero emissions vehicles, the electricity used to power these vehicles is associated with some emissions. To calculate electricity emission factors, two sources were used: Texas-based electric vehicle emission factors from Argonne National Laboratory's R&D GREET Model

[8] U.S. Internal Revenue Service (IRS), Credits for new clean vehicles purchased in 2023 or after, August 2024, https://www.irs.gov/credits-deductions/credits-for-new-clean-vehicles-purchased-in-2023-or-after

[9] U.S. EPA, Final Rule: Multi-Pollutant Emissions Standards for Model Years 2027 and Later Light-Duty and Medium-Duty Vehicles, March 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-multi-pollutant-emissions-standards-model#:~:text=On%20March%2020%2C%202024%2C%20EPA,starting%20with%20model%20year%202027

[10] U.S. EPA, Final Rule: Greenhouse Gas Emissions Standards for Heavy-Duty Vehicles – Phase 3, March 2024, https://www.epa.gov/regulations-emissions-vehicles-and-engines/final-rule-greenhouse-gas-emissions-standards-heavy-duty

[11] U.S. Internal Revenue Service (IRS), Clean vehicle tax credits, December 2025, https://www.irs.gov/clean-vehicle-tax-credits

(v2024) and standard vehicle efficiencies (kWh electricity per mile) from EPA MOVES4. ***Emissions forecasts were developed both for on-road vehicle use (tailpipe emissions) and total transportation emissions (including both tailpipe emissions from conventionally powered vehicles and electricity used by EVs).***

Figure 11 illustrates the final BAU forecast of GHG emissions both by vehicle class—light-duty (LD), bus, and heavy-duty (HD)—as well as by county, inclusive of both tailpipe emissions from vehicles and electricity used by motor vehicles. Under these assumptions, GHG emissions are forecast to decline from 10.5 to 9.8 million metric tons (MMT) CO2e over the period 2025 to 2030 (a 6.4% decline), but will increase to 11.2 MMT CO_2e by 2050 (a 6.9% increase from the 2025 level). Not accounting for electricity, the BAU forecast has GHGs declining from 10.4 to 9.6 MMT CO_2e over the period 2025 to 2030 (a 7.2% decline), but increasing to 10.5 MMT by 2050 (about a 1.2% increase from the 2025 level).

Figure.77¿BAU.Transportation.GHG.Emissions.Forecast?Tailpipe.Emissions.and.Electricity.

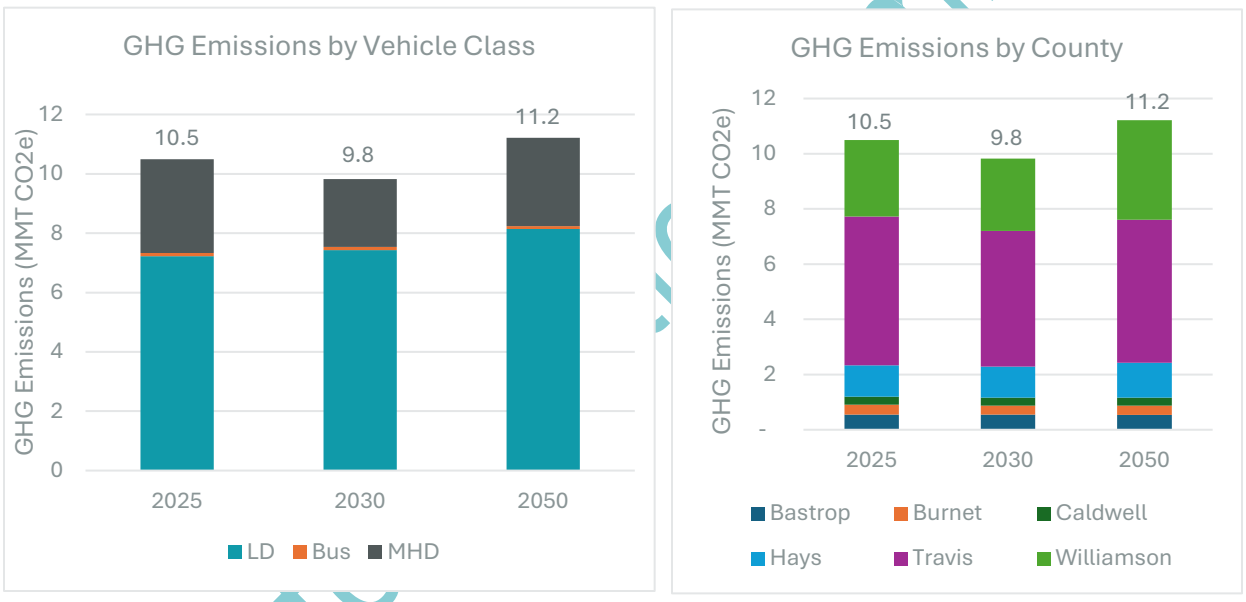


Figure 12 to Figure 13 show the BAU forecasts for criteria pollutant emissions, also inclusive of both tailpipe emissions and electricity-related emissions. Under this forecast, NOx and VOC emissions are anticipated to decline (in contrast to the TTI forecasts using MOVES3 which showed increases over time), but PM2.5 emissions are anticipated to grow slightly as increases in VMT more than outweigh reductions in emissions rates, and EVs also produce brake and tire wear.

Figure.78¿BAU.NOx.Emissions.Forecast.by.County

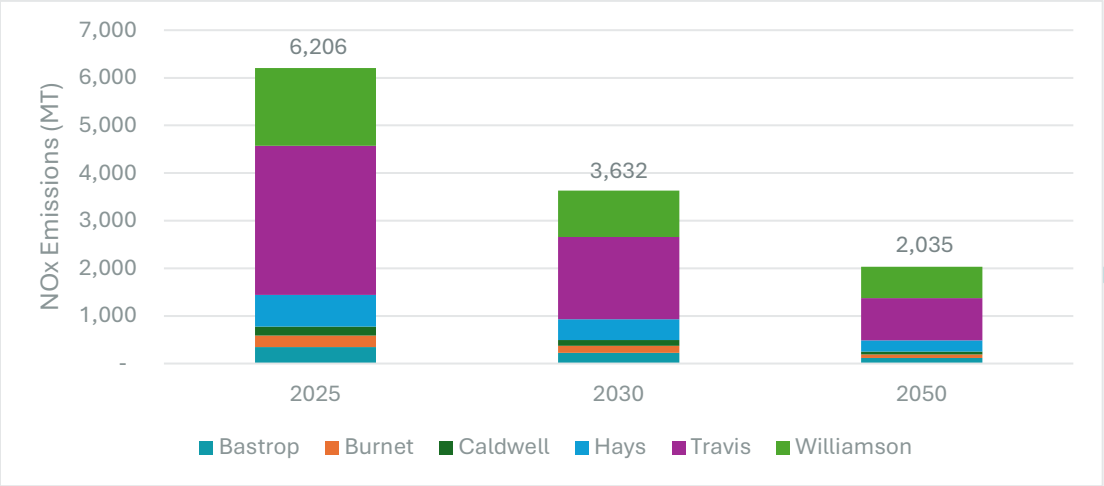


Figure.79¿BAU.VOC.Emissions.Forecast.by.County

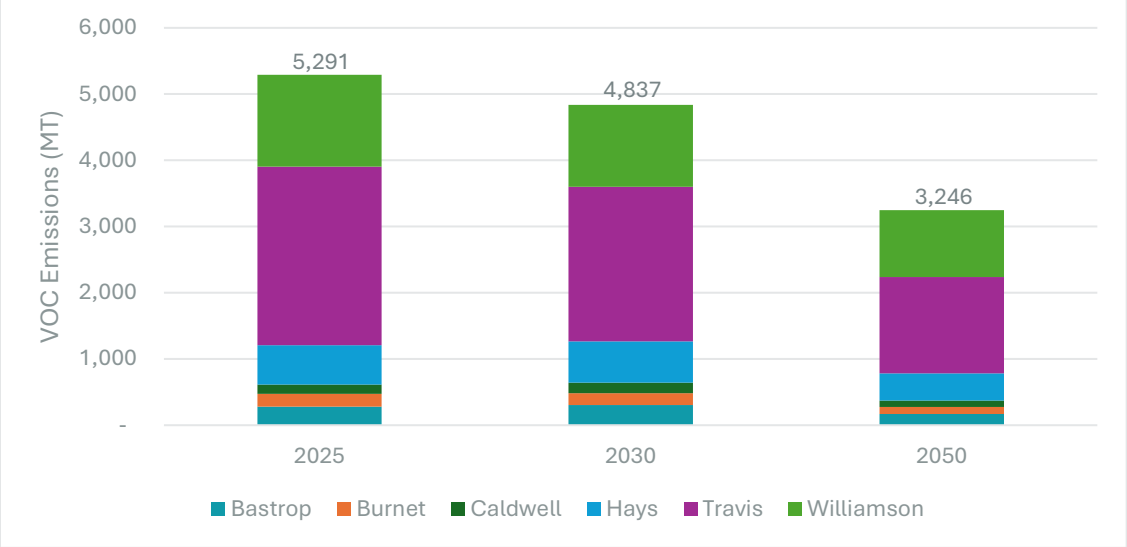
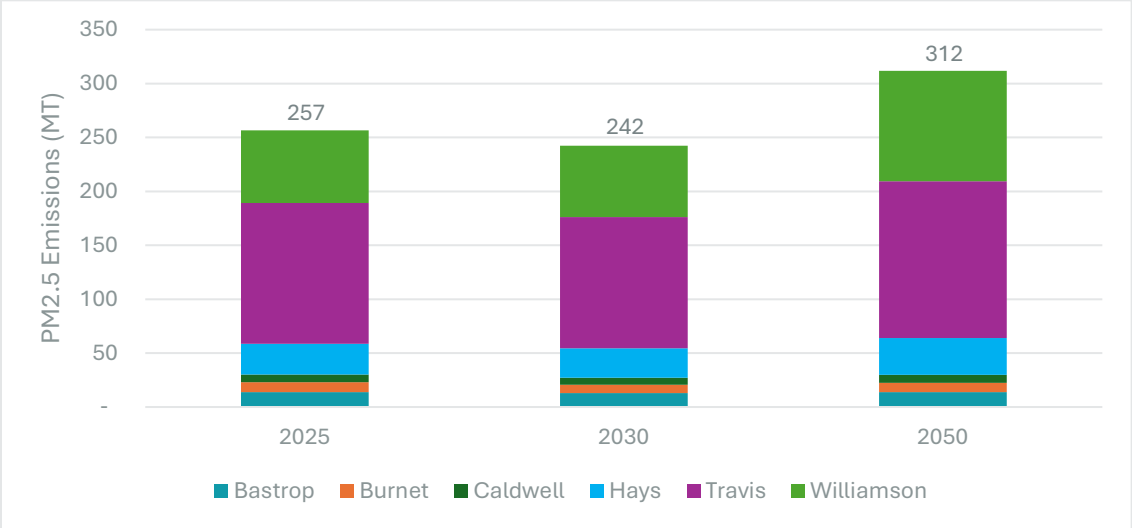


Figure.70¿BAU.PM8¡❶Emissions.Forecast.by.County



A key implication of these forecasts is to note that overall emissions levels are heavily dependent upon federal motor vehicle emissions and fuel economy standards. The current federal policy context related to vehicle emissions standards is uncertain and may involve further rollbacks of federal standards. While these factors are outside of the control of state, regional, and local transportation agencies, regional efforts to reduce emissions can focus on actions within the control of local and regional agencies related to transportation investments and policy.

Chapter 3: Analysis of Regional Transportation Strategies

This chapter explores different scenarios of regional transportation investments and policies to explore their potential effects on reducing transportation emissions.

Scenario Analysis: What Can the Region Do?

With guidance from the Transportation Emissions Reduction Plan Steering Committee, scenario modeling was conducted to assess the potential emissions impacts associated with the implementation of transportation strategies that could be undertaken by CAMPO and/or state or local partners. The purpose of this analysis was to help CAMPO and partners understand the potential impacts of transportation strategies on regional emissions to help support development of strategy priorities for the Transportation Emissions Reduction Plan. This study analyzed the effects of strategies on GHG emissions and criteria pollutant emissions, including VOCs, NOx, CO, and $PM_{2.5}$ considering both tailpipe emissions from motor vehicles and total transportation emissions including those associated with electricity use by EVs.

Approach

Strategy scenarios were developed with input from the Transportation Emissions Reduction Plan Steering Committee, with a focus on exploring strategies that could be implemented within the six-county CAMPO region. The study also explored the implications of broader policies that might require state-level action.

A set of six core strategies, which include a combination of transportation investments and policy actions, was analyzed.

- **Transportation investments** – Scenarios 1 to 4 focused on transportation investments that could be implemented locally (with support from federal, state, or local funding) and that typically would flow through CAMPO's transportation planning and programming process. These represent additional projects or enhanced programs beyond the investments already included in the 2050 RTP:
  - **Transportation system management and operations (TSMO) investments** (Scenario 1) – Transportation projects and programs to optimize the performance of existing roadways, such as enhanced traffic incident management, traffic signal coordination, and freeway and arterial management strategies (e.g., ramp metering). *Analyzed by applying estimates of potential delay reduction on freeways and arterials from literature/program studies on advanced freeway management and signal improvement programs.*
  - **Transit and active transportation investments** (Scenario 2) – Investments in new transit projects, as well as investments in new bicycle and pedestrian projects. *Modeled the "illustrative transit projects" list within the CAMPO RTP, which are not currently within the fiscally-constrained list using CAMPO's travel demand model, and conducted off-model sketch analysis assuming increases in bicycle/pedestrian mode shares (doubling bike/ped mode share by 2050).*
  - **Ridesharing investments** (Scenario 3) – Investments in enhanced travel demand management programs and incentives, as well as infrastructure such as park-and-ride

facilities to help encourage ridesharing. *Conducted off-model analysis assuming a doubling of carpool share for work trips by 2050.*

- **Clean public fleets** (Scenario 4) – Transitioning transit buses, school buses, and other public fleet vehicles to zero or low-emissions vehicles. *Conducted off-model analysis assuming conversion of all public fleets to zero emissions by 2050.*

- **Faster passenger EV adoption** (Scenario 5) – Build out of public EV charging infrastructure, incentives, and education/outreach to encourage households looking for a vehicle to purchase or lease EVs. These policies and investments could be implemented at the local or regional levels, or could be part of statewide policies (e.g., state tax credits or incentives for EV purchases). *Conducted off-model analysis assuming a 5 percentage point increase in the share of new passenger vehicles sales that are EVs by 2030; the EV sales increment ramps down subsequently so that no increase in EV sales beyond the baseline assumption is assumed for 2050 (as EVs become a larger share of the market, public EV charging infrastructure would be more widely available and EVs would be at cost parity with conventional vehicles).*
- **Freight technology and fuels strategies** (Scenario 6) – Increased use of biofuels and use of alternative fuel heavy-duty vehicles through incentives, fueling stations along freight corridors, and/or policies (to be adopted at the state-level) such as a biodiesel blending mandate or Low Carbon Fuel Standard. While there are some local or regional supportive policies and investments, these policies would generally need to be implemented at a statewide level. *Conducted off-model analysis*

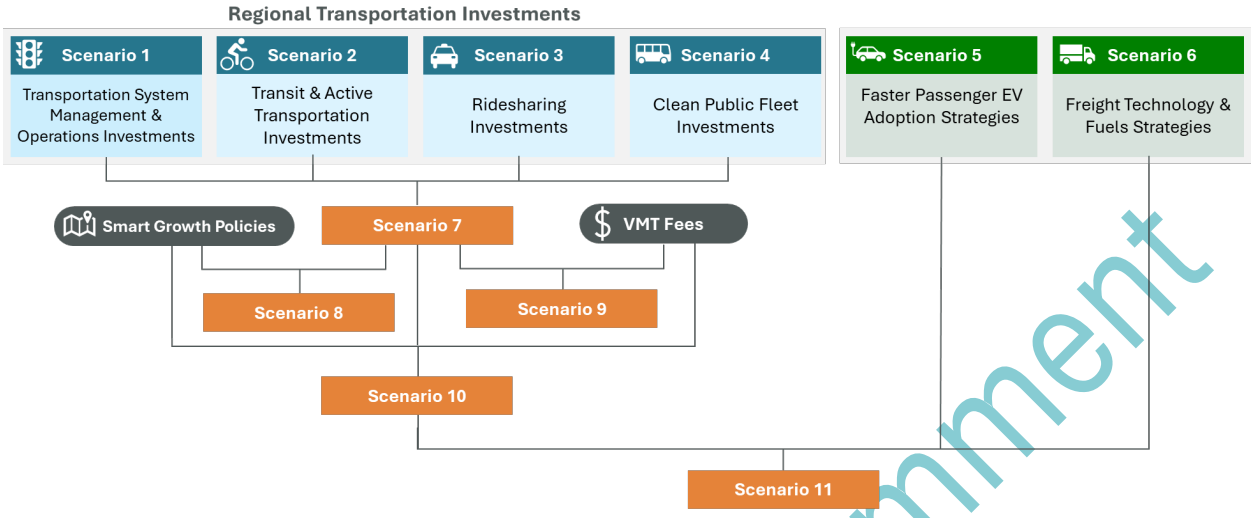
In addition, two additional strategies were explored in combination with others:

- **Smart growth policies** – Policies to encourage more walkable, transit-oriented development in activity centers, which could be adopted at the local level (e.g., via zoning, local ordinance, incentives), recognizing that some state action may be required given limited land use authority of non-incorporated areas. *Modeling assumed 25% of anticipated household and employment growth from 2025-2030 and 75% growth from 2030-2050 outside of activity centers within each county shifts to activity centers within the same county.*
- **VMT fees** – Mileage-based user fees, which would increase the cost of driving, and would most likely need to be adopted at the state level. *Conducted off-model anlaysis assuming $0.05/mile fee in 2030 and $0.10/mile fee in 2050 (in current dollars).*

Figure 15 below displays how these strategies were combined into 11 scenarios. Each of the six strategy scenarios was modeled individually, and then the scenarios were combined into additional scenarios:

- Scenario 7 included a combination of Scenarios 1 to 4;
- Scenario 8 added smart growth policies, while Scenario 9 added VMT fees;
- Scenario 10 included both policies; and
- Scenario 11 also added on the strategies under Scenarios 5 and 6.

Figure.7❶.Strategy.Scenarios.Analyzed



It is important to recognize that there is a high level of uncertainty associated with the extent to which certain scenario assumptions or outcomes can be achieved (e.g., uncertainty about the extent to which bicycle/pedestrian investments could yield the assumed level of shift from driving to bicycle/pedestrian modes that doubles bicycle/pedestrian mode share). Overall, the scenario assumptions employed what was judged to be reasonable assumptions for potential major investments; these assumptions are generally modest compared to strategy implementation assumptions that are often used in emissions reduction plans designed to demonstrate pathways to decarbonize transportation or achieve deep emissions reductions, such as the Austin region's CCAP.

Methodology

At a high level, the analysis methodology consisted of six general steps, as shown in the figure below:

Figure.7❷.Methods.Used.for.Scenario.Analysis

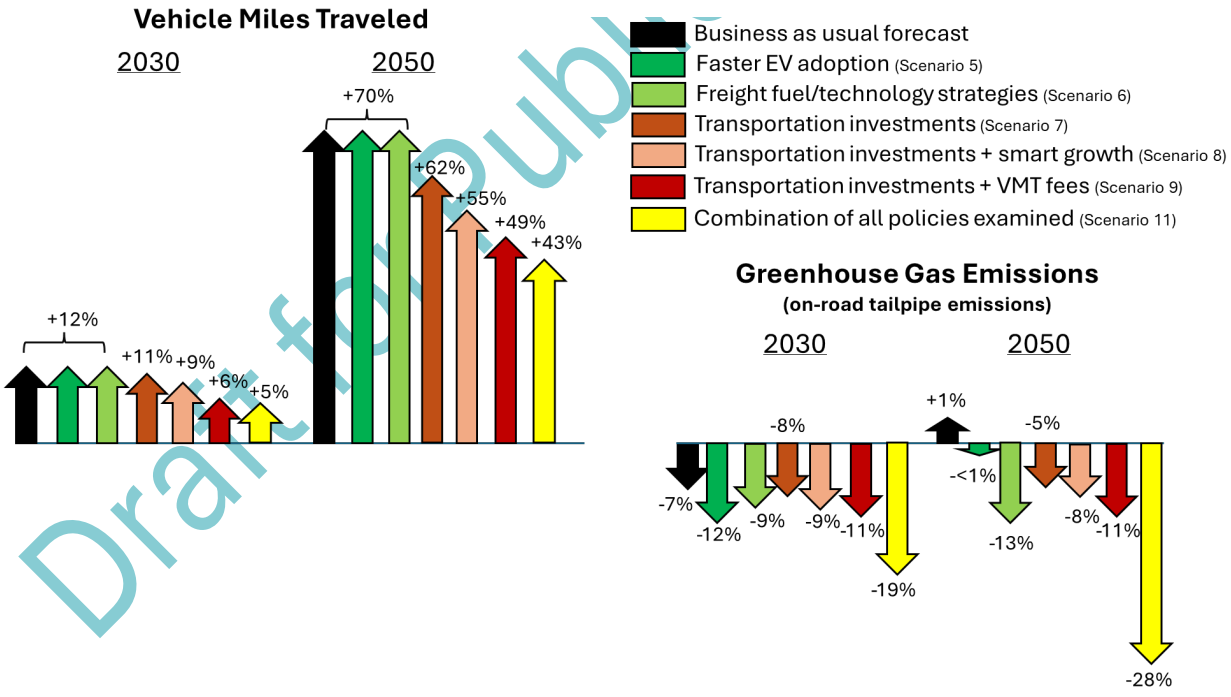
1. Develop a "business as usual" BAU forecast of VMT and emissions for 2030 and 2050 based on anticipated population, employment, land use, and transportation investments from CAMPO's 2050 RTP. As noted in Chapter 2 discussing this BAU forecast, CAMPO's travel demand model was re-run to account for higher levels of telework than was used for modeling the RTP. Emissions rates were then developed using EPA's MOVES4 model with some adjustments to account for the ending of federal EV incentives. This baseline was then set up in a spreadsheet tool to distribute VMT across vehicle type (passenger cars, passenger trucks, buses, heavy-duty vehicles, etc.) and define emissions rates for conventional vehicles. Electricity-related emissions were also forecast based on anticipated emissions rates in the power sector.

2. Run CAMPO's travel demand model to gauge the impact of transit investments and smart growth policies on VMT.
3. Adjust the model-generated mode shares to account for the impact of further active transportation and ridesharing investments as well as VMT fees.
4. Adjust the fleet mix to reflect faster electrification of public fleets and private vehicles using Argonne National Laboratory's VISION tool to translate sales assumptions into the on-road fleet composition.
5. Adjust the emissions rates to assess the impact of TSMO strategies on congestion and the impact of greater biofuel use by medium and heavy-duty vehicles.
6. Calculate the resulting VMT and emissions relative to the business-as-usual scenario to determine the percent reduction in 2030 and 2050.

Results

Figure 17 summarizes the estimated impacts of the strategies on VMT and tailpipe GHG emissions, based on the scenario analysis (Note: The impacts of transportation investment strategies are shown in total (Scenario 7, which includes strategies within Scenarios 1, 2, 3, and 4).

Figure.7❸.Estimated.Impacts.of.Key.Scenarios.on.VMT.and.GHG.Emissions.(on_road.vehicle. tailpipe.emissions)?8696.and.86❶6?compared.to.868❶levels



While there are various uncertainties, the modeling suggests that:

» **By 2050, greenhouse gas (GHG) emissions levels will likely remain high despite vehicle technology improvements, due to large increases in VMT, without further regional/local actions.** VMT regionally is forecast to increase by 70% from the 2025 level by 2050 in the baseline forecast, and cleaner vehicles do not offset all of the travel growth. In

all scenarios, there is a significant growth in VMT in the CAMPO region, corresponding with rapid regional population growth.

- **Efforts to spur faster EV adoption by households have the highest potential of all the strategies explored for near-term emission reductions** (as can be seen by the 12% reduction in GHGs in 2030, associated with Scenario 5), but these effects will decline over time as EVs become a larger share of the market, as EV prices decline in relation to conventional vehicles, and as EV infrastructure is less of a barrier to adoption.
- **Freight technology and fuel strategies have large potential for emission reduction** (as can be seen by the 9% reduction and 13% reduction in GHG emissions by 2030 and 2050, respectively, compared to 2025 levels). However, these strategies would generally require state action (e.g., a biodiesel blending mandate or Low Carbon Fuel Standard).
- **Enhanced regional transportation investments as part of CAMPO's transportation planning process would yield emissions reduction, as well as traffic reduction and other benefits.** Additional investments in TSMO, transit, bicycle/pedestrian infrastructure, ridesharing, and clean public fleets would reduce regional emissions (as shown in Scenario 7). These impacts are anticipated to be modest by 2030 (GHG emissions levels are reduced by 8% from 2025 levels compared to about 7% without these investments), which should be expected based on the short time-frame and time it typically takes for projects to be implemented. The benefits increase by 2050 (GHG emissions levels are reduced by 5% from 2025 levels compared to about a 1% increase without these investments). These transportation strategies help to reduce VMT and could have important benefits in relation to safety and mobility goals.
- **Smart growth land use patterns could amplify the effects of other strategies** by enabling shorter trip lengths and fewer vehicle trips (as shown in Scenario 8, which yields more reduction in VMT and emissions than Scenario 7, particularly in 2050).
- **Road mileage-based user fees also could yield additional reductions in VMT and emissions** by making driving more costly and encouraging shifts to other modes or reduced vehicle trip-making.
- **Combining all strategies would yield the largest impacts** both on vehicle travel and emissions.

The estimated VMT and GHG reduction impacts of the strategies are presented in Table 1 for each individual scenario, showing the impacts of different regional transportation investment strategies (Scenarios 1 to 4), as well as the other scenarios. This table presents percent reductions compared to the BAU forecast (rather than comparing to 2025 levels, which was shown in the chart above), and present results incorporating the electricity associated with EVs.

Table.7¡.Estimated.Impacts.of.Scenarios.on.VMT.and.GHG.Emissions.Results.(both.on_road. vehicle.tailpipe.emissions.and.electricity.emissions.used.by.EVs).relative.to.the.BAU.Forecast

Scenario		Vehicle Miles Traveled		Greenhouse Gas Emissions	
		2030	2050	2030	2050
1	TSMO Strategies	-	-	-0.1%	-0.5%
2	Transit & Active Transportation Investments	-0.7%	-3.9%	-0.6%	-3.2%
3	Ridesharing Investments	-0.2%	-1.3%	-0.2%	-1.1%
4	Clean Public Fleet Investments	-	-	<0.1%	-0.8%
5	Faster EV Adoption	-	-	-4.2%	-1.0%
6	Freight Fuel/Technology Strategies	-	-	-2.2%	-12.3%
7	Scenarios 1-4	-0.8%	-5.2%	-0.8%	-5.7%
8	Scenarios 1-4 + Smart Growth	-2.2%	-8.8%	-2.2%	-9.2%
9	Scenarios 1-4 + VMT Fees	-4.8%	-12.7%	-4.3%	-11.9%
10	Scenarios 1-4 + Smart Growth + VMT Fees	-6.2%	-16.3%	-5.6%	-15.5%
11	Scenarios 1-6 + Smart Growth + VMT Fees	-6.2%	-16.3%	-11.7%	-27.7%

The scenarios demonstrate that based on the assumptions used in the scenarios:

- **Among the different types of transportation investments analyzed, transit and active transportation investments showed the greatest potential to reduce VMT and GHG emissions** (Scenarios 1 to 4). While transit investments were estimated to have notable impacts, the largest effects are due to increases in the level of bicycling and walking assumed.
- **Ridesharing investments showed the next largest potential for emissions reductions,** reflecting the assumption of a doubling in carpooling by 2050 while also reflecting that these investments largely affect on only work trips.
- **TSMO strategies and clean public fleet investments do not reduce VMT, and generally showed modest effects on emissions on a regional scale.** While TSMO strategies can have significant benefits in terms of reducing vehicle delay on specific corridors or facilities, overall the effects are modest due to the fact that the incremental emissions associated with delay on roadways is relatively small compared to the total amount of emissions from vehicle operations; moreover, operations strategies reduce emissions associated with delay by conventional vehicles, while conventional vehicles become a smaller share of all vehicles by 2050. Fleet vehicles such as buses also make up a small share of total regional emissions. That said, TSMO strategies save travel time and improve system reliability, and clean public fleet vehicles may help spur further adoption of EVs by the public.
- **Combining all four of the transportation investment strategies yields about a 0.8% reduction in VMT and GHGs from the BAU level in 2030 and over 5% reduction from the BAU level in 2050.** While these effects are somewhat modest, they reflect only the impacts of increased regional and local transportation investments, without other policy actions.

- **Achieving more substantial reductions in emissions requires adopting additional policies, such as those related to freight fuel and technology, land use, and/or mileage-based user fees.** These policies amplify the effects of transportation strategies in terms of reducing vehicle travel by reducing trip lengths and generating additional mode shifts to transit, biking, walking, and ridesharing, as well as addressing the significant role of freight vehicles in regional emissions.

The scenario analysis highlights that while federal and state policies related to vehicle emissions standards, fuel composition, incentives for EV use, and road pricing are necessary to achieve deep emissions reductions, regional and local transportation investments and policies play an important role in reducing motor vehicle emissions.

While emissions benefits are modest in comparison to federal and state policies on motor vehicle technology and fuels, regional and local transportation investments help reduce transportation emissions, while also supporting community goals.

The following charts show impacts on other air pollutants, which generally follow the same pattern.

Figure.74.NOx.Emissions.by.Scenario

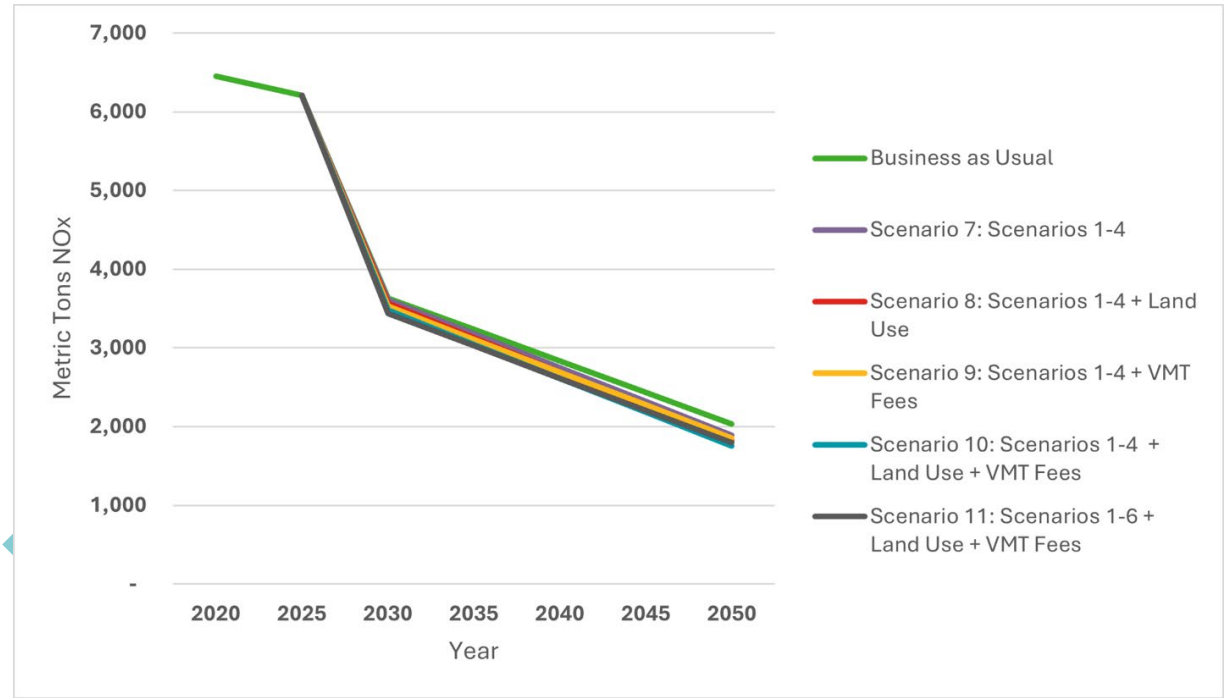


Figure.76.VOC.Emissions.by.Scenario

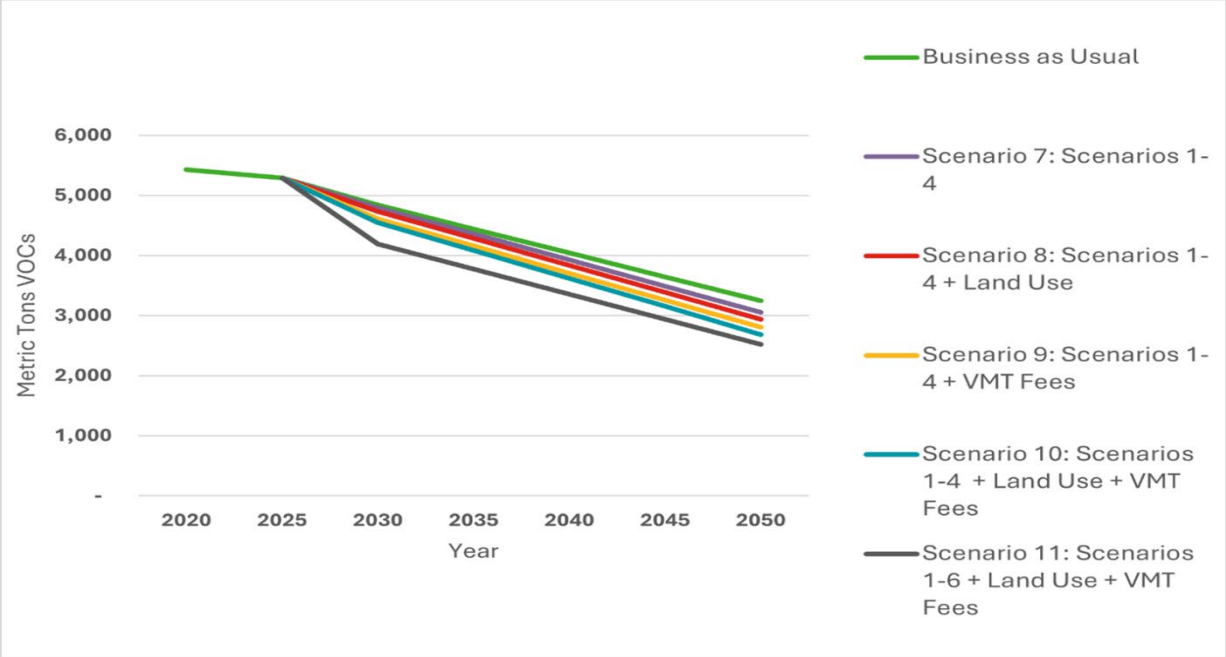
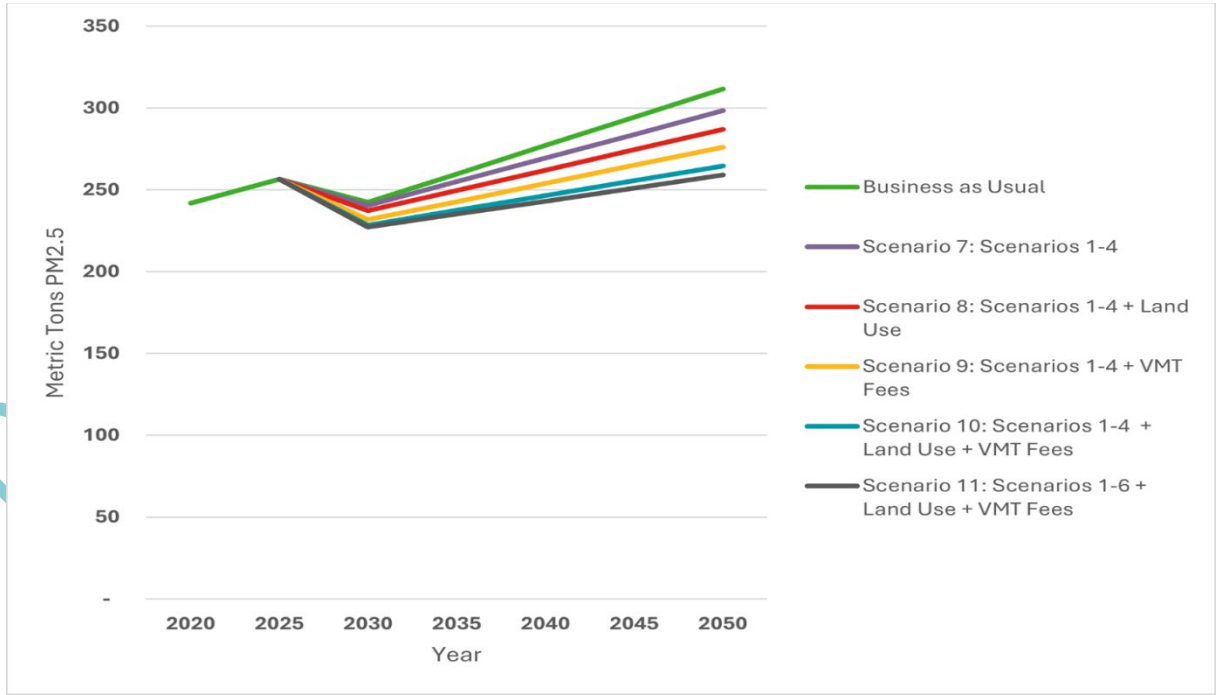


Figure.86.PM$_{8.0}$.Emissions.by.Scenario

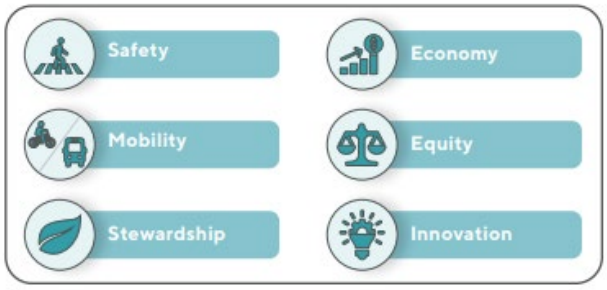


Chapter 4: Regional Transportation Emissions Reduction Goals and Objectives

This Transportation Emissions Reduction Plan defines a regional strategy to reduce motor vehicle emissions, while supporting other regional goals. The purpose and overall goal for this plan is to **support the health and sustainability of the CAMPO region by reducing motor vehicle emissions, while enhancing safety, mobility, the economy, and quality of life**.

This purpose recognizes that emissions reduction is an important component of CAMPO's Stewardship goal to improve public health and protect the environment. At the same time, this plan was crafted with a strong recognition that to be effective, transportation emission reduction strategies must advance a wide array of regional goals. The good news is that there are many strategies that offer win-win solutions by reducing emissions while advancing every one of CAMPO's regional goals, including Safety, Mobility, Economy, Equity, and Innovation.

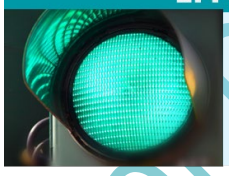
Figure 21. CAMPO's Regional Goal Areas



Regional Emissions Reduction Goals: Three Pillars of the Strategy

The regional strategy for transportation emissions reduction focuses on three pillars, with associated goals, as shown below:

EFFICIENT TRANSPORTATION



Manage a safe and efficient regional transportation system that reduces emissions by limiting unnecessary travel delay and optimizing the performance of the system to support mobility and economic vitality.

CONVENIENT TRAVEL OPTIONS

Develop a robust, safe, and affordable multi-modal transportation network that provides convenient travel options, reduces the need for personal vehicle travel, and enhances the quality of life for community members of all ages and abilities.

CLEANER TRAVEL

Create and maintain a clean transportation system, including supporting options for zero and low-emissions vehicles for a thriving, healthy, and resilient Central Texas community.

These three pillars address key factors that contribute to emissions: vehicle operations (which affect fuel economy and emissions rates), the amount of vehicle miles traveled, and vehicle technologies and fuels. Each is discussed below, describing goals and associated objectives, which form the basis for the regional strategy and support CAMPO's long-term transportation vision.

Efficient Transportation

As the CAMPO region's population continues to grow steadily, traffic congestion is expected to increase, which contributes to excess emissions as vehicles are stuck in additional hours of travel delay or idling. "Efficient transportation" focuses on reducing unnecessary vehicle emissions associated with traffic delays and idling due to system operations (such as poor or unoptimized signal timing), as well as delay due to incidents, special events, road weather conditions, work zones, and other events. It also focuses on opportunities to improve safety, resulting in fewer traffic incidents that lead to congestion, to reduce traffic associated with searching for parking, and to support travelers in making efficient choices for when, where, and how to travel, including by transit and non-motorized options.

As shown in the scenario analysis conducted for this plan and national literature on the effectiveness of emissions reduction strategies, while efficient transportation strategies can reduce delay and emissions in major corridors and along roadways, the overall emissions effects are generally modest on a regional scale. However, these strategies are generally cost-effective, particularly in the near-term.

Efficient transportation strategies also provide many benefits, including improved safety and travel time savings, which support economic vitality and quality of life. Efficient transportation also ensures good stewardship of transportation resources by optimizing the performance of existing infrastructure.

The regional Transportation Emissions Reduction Strategy identifies two priority objectives for efficient transportation, focusing on advancing strategies that enhance the reliability of the region's transportation network and efforts to reduce crashes and minimize travel delay, while supporting opportunities for multimodal travel options.

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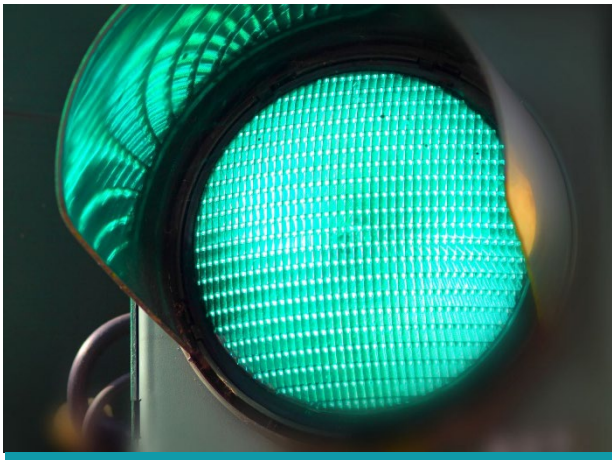


GOAL: EFFICIENT TRANSPORTATION

Manage a safe and efficient regional transportation system that reduces emissions by limiting unnecessary travel delay and optimizing the performance of the system to support mobility and economic vitality.

OBJECTIVES

- Enhance the reliability of the region's transportation network through efficient transportation system management and operations
- Improve infrastructure and apply technologies to reduce crashes and minimize travel delay, while supporting low-emissions travel options

Convenient Travel Options

Increasing convenient transportation options, including walking, bicycling, transit, and ridesharing options, provides the public with alternatives to driving alone. Since conventional vehicles emit pollution during travel due to fossil fuel combustion, providing options for people to drive less helps to reduce motor vehicle emissions. Walking and biking produce zero emissions while other options generate significantly fewer emissions per trip.

The scenario analysis and literature on the effectiveness of transportation emissions reduction strategies shows that providing more convenient travel options generally provides moderate emissions reduction benefits. The cost effectiveness of travel option strategies also varies widely depending on community context. For instance, adding transit services can be cost-effective in encouraging shifts from driving in areas with sufficient density of employment, jobs, and other destinations, but often will not be very cost-effective in areas where land use densities do not support service provision and major infrastructure such as rail can be very expensive. Investments to support bicycling, walking, and micromobility (e.g., scooters) generally provide modest system-wide emissions benefits since they substitute for short trips, but these investments are generally low-cost, and can be cost-effective particularly when creating connected networks in more urbanized areas and near transit stations so that people can substitute longer trips.

Convenient travel options strongly support many transportation goals related to access and mobility, safety, and equity by providing affordable, safe, and reliable alternative transportation systems. With concerns about household affordability, convenient low-cost travel options can help households to reduce expenses associated with gas, vehicle maintenance, and in even vehicle ownership if they can meet mobility needs without a person vehicle or have fewer vehicles in the household. Convenient travel options support access to employment and other services that benefit communities with limited access, which in turn can also stimulate local economic development.

GOAL: CONVENIENT TRAVEL OPTIONS

Develop a robust, safe, and affordable multi-modal transportation network that provides convenient travel options, reduces the need for personal vehicle travel, and enhances the quality of life for community members of all ages and abilities.

OBJECTIVES

- Provide more options for biking and walking
- Make transit a viable option for more trips
- Help travelers combine trips, rideshare, and use other alternatives to driving alone
- Create opportunities for residents to live, work, and play in proximity

The regional Transportation Emissions Reduction Strategy identifies four priority objectives for convenient travel options. These objectives focus on “win-win” strategies, and do not include mileage-based user fees or other disincentives to driving (although those strategies can be effective, they also can be challenging to implement, particularly at a local level, and may have affordability concerns). Beyond providing infrastructure for biking, walking, and transit, transportation agencies can provide services that help travelers combine trips, rideshare, or use other alternatives to driving alone. In addition, more compact, mixed-use development supports use of transit, walking, and biking and helps to reduce vehicle trip lengths. Land use planning can be highly cost-effective since most public efforts involve zoning and other requirements, do not create direct costs, and efficient land use patterns can reduce infrastructure costs.

Cleaner Travel

Cleaner travel focuses on using zero- and low-emissions vehicles and fuels. Electric vehicles emit zero tailpipe emissions and on a life-cycle basis produce considerably less GHG emissions than fossil fueled vehicles. Transitioning vehicles used by households, businesses, and public sector fleets, therefore is critical for plans to reach net zero carbon emissions and to achieve deep emissions reductions to support public health.

National research shows that cleaner travel strategies, such as helping the households switch from conventionally fueled vehicles to EVs, supporting the conversion of public fleets, and helping support the use of cleaner fuels such as biodiesel for freight offer the greatest potential for large reductions in emissions and can be very cost-effective.

Cleaner travel strategies do not directly support regional safety or mobility goals. However, they are targeted toward pollution reduction and are the most rapid opportunity to achieve significant reductions in vehicle emissions, particularly in the context of a growing region with growing travel needs. The efficacy of technology solutions is demonstrated by the significant reductions in criteria pollutant emissions from motor vehicles even while vehicle travel has increased.

That said, the most significant lever for shifting to low- and zero-emissions vehicles, however, is federal vehicle standards, and other policy actions to support this shift (e.g., vehicle tax credits) are most often applied at the federal and state levels. The cost-effectiveness of efforts at the local and regional levels, such as local incentives, outreach and education, and supply of EV charging infrastructure, is less well documented since it is difficult to tie these investments directly to changes in vehicle purchase decisions.

GOAL: CLEANER TRAVEL

Create and maintain a clean transportation system, including supporting options for zero and low-emissions vehicles for a thriving, healthy, and resilient Central Texas community.

OBJECTIVES

- Provide opportunities for the public to utilize affordable zero- and low-emissions vehicles
- Support the conversion of public fleets, including transit vehicles to zero- and low-emissions options
- Help support use of cleaner fuels and vehicles for freight

The regional Transportation Emissions Reduction Strategy identifies three priority objectives for convenient travel options. The first two objectives focus on opportunities that can be taken at the regional and local levels, while the last objective addressing freight likely will require more state action but there are supportive local actions that can be advanced.

Achieving these Goals and Objectives

Making investments in transportation infrastructure and services to achieve these goals and objectives requires funding. CAMPO is responsible for planning for and programming funds for transportation investments and plays a critical role in developing regional consensus among partner agencies about needs and priorities for investment. These three emissions reduction goals, and the associated objectives can help not only in looking at a narrow set of funding associated with programs like the federal Carbon Reduction Program and Transportation Alternatives Set Aside, but to think broadly about how the region is investing in transportation.

This may require new ways of thinking about how to optimize the transportation system and making tradeoffs. While a significant amount of regional transportation investments are planned to go toward new roadway capacity to address growing population and travel demand, this regional emissions reduction strategy can help to inform the prioritization and programming of funds by CAMPO under the various programs that it administers, most of which have flexibility for funding.

While road capacity projects can help to reduce traffic congestion and emissions in the near-term, particularly in locations with bottlenecks, road capacity is generally recognized as making it easier to drive and in the long-term generally induces additional vehicle trip-making, which works against emissions reduction goals. Although roadway investments often play an important role in addressing mobility needs, other strategies aimed at managing travel demand and optimizing performance of existing systems should generally be considered first and prioritized in the investment decision making process. These strategies also generate many benefits for communities, including improvements in safety, mobility, access, and equity.

Performance Measures for Tracking Progress

Tracking progress will help CAMPO how it is doing in relation to emissions reduction. At the highest level, key performance measures for tracking progress include:

- **Number of days when air pollution in the region exceeds healthy levels** – available from the U.S. Environmental Protection Agency and TCEQ.
- **Emissions of CO_2e, NOX, VOC, and $PM_{2.5}$ from motor vehicles** – available from TCEQ's mobile source emissions inventories developed by county.

In addition, this plan also recommends a set of performance measures that can be used for tracking progress toward achieving the goals laid out in this plan, as shown below in Figure 22. Data to use for tracking these measures already exists and these measures are generally easy to track, which will be helpful in assessing overall progress.

Figure.88¡.Performance.Measures.for.Tracking.Progress.Toward.CAMPO¾s.Three.Emissions. Reduction.Goal.Areas.(along.with.desired.direction)

EFFICIENT TRANSPORTATION					
Reduce total vehicle hours of delay	Reduce peak hours of excessive delay per capita	Reduce hours of truck delay	Reduce crash rates		
CONVENIENT TRAVEL OPTIONS					
Reduce VMT per capita	Increase non-SOV) mode share	Increase walking, biking, transit mode share	Increase transit ridership	Increase the # of households within walking distance of transit	Increase the # of miles of biking facilities, sidewalks, and paths
CLEANER TRAVEL					
Increase EV share of vehicle registrations		Increase zero-emissions transit fleet percentage			

Chapter 5: Strategies for Reducing Transportation Emissions

This chapter identifies strategies that reduce transportation emissions and advance the region's broader goals relating to safety, mobility, stewardship, economy, equity, and innovation. Local governments, transit agencies, and other transportation partners are encouraged to consult this list when considering transportation projects to submit for funding, and to consider what strategies may work best to address their transportation needs.

Regional Investments and Policies: A Menu of Options

lFigure 23 displays a menu of 25 strategies to advance the Transportation Emission Reduction Plan's goals. While the objectives highlighted in Chapter 4 highlight regional priorities, transportation agencies will need to consider which individual strategies are most relevant and valuable to prioritize in their own communities based on context, the transportation challenges faced, and the conditions in specific corridors and locations. As a companion piece to this plan, CAMPO has created a companion **Strategy Toolkit** which covers information on applicable contexts, implementation cost, implementation timeline, implementation resources, strategy examples, and co-benefits in detail. A brief description of each strategy and potential projects and policy actions is provided below.

Figure.89¡.Transportation.Emissions.Reduction.Plan.Pillars.and.Strategies

EFFICIENT TRANSPORTATION STRATEGIES	CONVENIENT TRAVEL OPTIONS STRATEGIES	CLEANER TRAVEL STRATEGIES
» Freeway Management	» Bicycle Network Improvements	» Clean Light-Duty Vehicles
» Traffic Signal Improvements	» Pedestrian Network Improvements	» Zero- and Low-Emission Buses
» Traffic Incident Management	» Shared Micromobility	» Zero- and Low-Emission Municipal Fleets
» Freight Operational Improvements	» E-Bike Incentives	» Clean Medium- and Heavy-Duty Vehicles
» Road Safety Improvements	» Bus Service Improvements	» Support Low-Carbon Fuel Deployment
» Parking and Curb Space Management	» Transit Priority Measures	
» Travel Incentives and Trip Planning Resources	» High Capacity Transit Development	
	» Transit Amenities	
	» Transit Fare Strategies	
	» Community Outreach	
	» Employer-Based Travel Demand	
	» Park And Ride Facilities	
	» Land Use Planning	

Efficient Transportation

OBJECTIVES	STRATEGIES
EFFICIENT TRANSPORTATION	
Enhance the reliability of the region's transportation network through efficient transportation system management and operations	» Freeway Management » Traffic Signal Improvements » Traffic Incident Management » Freight Operational Improvements
Improve infrastructure and apply technologies to reduce crashes and minimize travel delay, while supporting low-emissions travel options	» Road Safety Improvements » Parking and Curb Space Management » Travel Incentives and Trip Planning Resources

Freeway.Management

Freeway management focuses on optimizing the performance of limited access highways through use of infrastructure or technology applications. Emission reductions may be realized through reduced vehicle delay. Specific projects or treatments will depend on the specific needs, dimensions, and other characteristics of the corridor. Effectiveness may be enhanced through implementation of complementary strategies such as travel incentives and trip planning resources, and employer-based travel demand management.

Co-Benefits: Freeway Management

- Improves safety
- Decreases secondary crashes for travelers and first responders
- Reduces congestion and saves travel time
- Promotes economic growth by increasing access to commercial and employment opportunities

Projects and Policy Actions

- Reversible lanes that can change direction to match peak traffic flow.
- Transit-only lanes that reserve a traffic lane for the exclusive use of public transit buses.
- Truck-only lanes that reserve a traffic lane for the exclusive use of trucks.
- High-occupancy vehicle (HOV) lanes are managed highway lanes that are open to vehicles having typically two or more people.
- High-occupancy toll lanes are HOV lanes that allow vehicles that do not meet occupancy requirements to pay a toll to use the lane.
- Part-time shoulder use allows vehicles to use highway shoulders to alleviate congestion.
- Bus-on-shoulder operations that allow public transit buses to use freeway shoulders to bypass traffic congestion.
- Ramp control measures such as traffic signals, signing, and gates to regulate the number of vehicles entering or leaving the highway.

- Dynamic junction control uses traffic monitoring and signals to control access to mainline and ramp lanes at interchange areas with congestion.
- Variable speed management dynamically adjusts speed limits based on real-time conditions like congestion or weather.
- Work zone management ensures safe and efficient traffic flow around road construction through traffic control strategies, clear public information and signage, and other transportation operation strategies.

Traffic.Signal.Improvements

Co-Benefits: Traffic Signal Improvements

- Improves safety
- Reduces congestion and travel time
- Promotes economic growth by increasing access to commercial and employment opportunities

Traffic signal improvements can involve a variety of treatments to synchronize traffic signals and manage the speed flow of different modes on a corridor. Optimizing traffic signals on arterials helps manage the safe and efficient movement of freight, public transit, and other vehicles, while also reducing travel times and emissions. Signals can be updated to utilize real-time information or other data to reduce time vehicles are waiting and idling, and special treatments like transit signal priority can help to support efficient transit services. While some signal times are synchronized to increase the vehicle traffic throughput and reduce peak-hour congestion, signal timing can also be timed for the uninterrupted flow of bicyclists and/or to reduce vehicle speeds to create a safer corridor for all mode users. Implementing traffic signal improvements alongside employer-based travel demand management, traffic incident management, bus service improvements, bicycle and pedestrian improvements, and freeway management can amplify emissions reductions.

Projects and Policy Actions

- Synchronize and coordinate the timing of traffic signals at intersections on high-volume corridors to improve traffic flow and transit travel speeds.
- Implement exclusive or priority transit, pedestrian, and bicycle signals, such as queue jumps for transit vehicles.
- Modify traffic signals to extend a green light to allow an approaching truck to cross an intersection.
- Collect real-time data from detectors and adjust coordinated signal timings per cycle using parameters defined by predetermined timing plans.
- Use software to make timing changes to signals in response to traffic conditions with each cycle using an algorithm.
- Allow emergency vehicles to transmit a signal to the traffic signal controller, which then provides a green signal in the direction of travel.

Traffic.Incident.Management

Traffic incident management (TIM) is designed to reduce travel delays due to roadway crashes. TIM measures are a cost-effective approach to address congestion and reduce emissions by helping to

clear incidents more quickly. To amplify the effect, TIM measures can be implemented alongside strategies that improve roadway operations like freeway management, arterial management, and road safety improvements.

Co-Benefits: Traffic Incident Management

- Improves safety by decreasing secondary crashes for travelers and first responders
- Reduces congestion and reduces travel time

Projects and Policy Actions

- Implementing safety service patrols to improve response times to incidents and collisions.
- Improving incident detection systems and incident-related communication between jurisdictions, DOTs, and transit agencies.
- Collecting real-time traffic data to better route emergency vehicles to traffic incidents.

Freight.Operational.Improvements.

Efficient freight movement is a key aspect of growth in the CAMPO region. The region's businesses, industries, and residents' economic vitality relies on the movement of goods by truck and rail. The region is traversed by Interstate Highway (IH) 35, a corridor that supports trade, commerce, and passenger travel connecting major cities in Texas and beyond. Improving freight operations, namely the loading, travel, and unloading of essential items such as food, medicine, and clothing by truck, rail, and air, can reduce emissions by increasing efficiency. Other strategies that complement freight operational improvements and maximize the emission reduction potential include transitioning to low- or zero-emission medium- and heavy-duty vehicles, incident management, and freeway and arterial management to improve the efficiency of freight travel. Improving parking and curb space management can increase the efficiency of loading and unloading resources.

Projects and Policy Actions

- Implementing idle reduction policies and technologies.
- Incentivizing mode shifts from truck to rail and micromobility delivery as a last-mile delivery solution.
- Developing incentives or policies to encourage off-peak freight delivery.
- Implementing curb space management policies for efficient delivery.
- Implementing intermodal freight facilities.
- Applying ITS and real-time data to support operations, such as real-time truck parking information.
- Encouraging the use of freight management information systems that monitor truck movements, cargo manifests, arrival and departure times, and equipment availability.

Co-Benefits: Freight Operational Improvements

- Improves safety
- Reduces congestion
- Improves efficiency of loading and unloading freight
- Reduces noise pollution
- Improves air quality

Road.Safety.Improvements

Road safety improvements focus on enhancing safe opportunities for travel across all modes. Safety improvements can reduce emissions both by reducing crashes that contribute to travel delay and unnecessary emission as well as by making walking, biking, or using transit more viable as an alternative to driving. Improvements such as complete streets and traffic calming measures help achieve this goal. Raised crosswalks, bumpouts, and pedestrian signage improve visibility of people walking and biking. Protected bike lanes and sidewalk buffers increase the separation of vulnerable travelers from vehicle traffic. Road safety improvements, particularly when paired with strategies that improve transit and micromobility access, can contribute to reductions in emissions.

Co-Benefits:
Road Safety Improvements

- Improves safety
- Promotes economic growth by increasing access to commercial and employment opportunities
- Fosters a healthy, walkable, connected communities
- Provides a strong sense of place
- Improves local water quality, provide habitat for pollinators, and enhance resiliency through green infrastructure and stormwater management

Projects and Policy Actions

- Building roundabouts at traffic intersections.
- Narrowing travel lanes with on-street parking, medians, pedestrian islands, and trees.
- Using vibrant paint for street markings and areas with key intermodal interactions.
- Installing speed humps, speed cushions, and speed tables.
- Increasing pedestrian visibility at intersections through use of raised crosswalks, bumpouts, signage, landscaping, and lighting.
- Installing protected bike lanes and shared-use paths.
- Minimizing the size of a corner radius.
- Implementing speed enforcement measures through advanced technology and in collaboration with public safety departments.

Parking.and.Curb.Space.Management.

Parking and curb space management include a wide array of actions that can improve efficiency by expediting deliveries, reducing the time vehicles "circle" to locate parking, and incentivizing use of more sustainable travel options rather than driving. Prohibiting on-street parking during peak hours can alleviate congestion, while reserving on-street parking spaces for pick-ups and drop-offs may reduce double-parking. Parking and curb space management policies may also include increasing the price of parking (such as during peak periods) and reducing the supply of

Co-Benefits:
Parking and Curb Space Management

- Improves safety
- Reduces congestion
- Improves the operation and efficiency of local businesses
- Improves affordability and reduces the cost of living and owning property by separating the price of parking from renting or buying property

parking to encourage use of more efficient modes like transit. To provide an adequate and accessible substitute to driving, parking, and curb space management can be paired with bus service improvements, micromobility, and road safety improvements.

Projects and Policy Actions

- Implement dynamic parking programs such as peak pricing that facilitate turnover and improve messaging to communicate parking availability.
- Increase parking fees and taxes.
- Encourage commercial businesses to deliver and unload shipments overnight to reduce congestion and potential conflicts between freight trucks and other travel modes.
- Separate the price of using a parking spot from renting or purchasing a home or office.
- Eliminate parking minimums or impose parking maximums.
- Restrict or prohibit construction of new surface parking lots.
- Designate curb space for specific uses, such as loading zones or shared ride pickups and drop-offs.

Travel Incentives and Trip Planning Resources

Co-Benefits: Travel Incentives and Trip Planning Resources

- Enhances mobility by increasing awareness of travel options
- Improves travel efficiency
- Reduces congestion
- Improves access to jobs, education, and commercial opportunities

Travel incentives and trip planning resources can be an important tool to reduce congestion and increase travel efficiency by encouraging mode shifts from driving alone and shifts in travel time and routing. Trip planning resources make low-emission options, such as transit, ridesharing, biking, or a combination of modes, easier to navigate through mobile apps, convenient payment options, and rideshare matching services. Travelers can be encouraged to use transit, ridesharing, or bicycling through discounted transit passes or software that shows cheaper or faster travel routes by integrating active transportation modes. Trip planning resources can also support more efficient routing or incentivize changes in travel behavior such as traveling during off-peak periods. This strategy can be more effective if implemented in conjunction with other strategies that improve high-capacity transit development, bus services, shared micromobility, and park and ride facilities. Other pairing options, such as freeway and arterial management and employer-based travel demand management, can further amplify this strategy's efficiency benefits.

Projects and Policy Actions

- Establish reward programs for traveling during off-peak hours, traveling along alternate routes, and for the use of low-emission travel modes such as public transit, vanpools, and carpools.
- Develop web and mobile applications with real-time multimodal traveler information. Information should accurately show available transportation modes, travel time, and other important information such as schedules, pricing, and delays. The application should allow users to plan their trip through multiple modes.

Offer incentives for traveling during off-peak hours or traveling along alternate routes.

Convenient Travel Options

OBJECTIVES	STRATEGIES
CONVENIENT TRAVEL OPTIONS	
Provide more options for biking and walking	» Bicycle Network Improvements » Pedestrian Network Improvements » Shared Micromobility » E-Bike Incentives
Make transit a viable option for more trips	» Bus Service Improvements » Transit Priority Measures » High Capacity Transit Development » Transit Amenities » Transit Fare Strategies
Help travelers combine trips, rideshare, and use other alternatives to driving alone	» Community Outreach » Employer-Based Travel Demand » Park And Ride Facilities
Create opportunities for residents to live, work, and play in proximity	» Land Use Planning

Bicycle.Network.Improvements.

Enhancing the regional and local bicycle network helps to facilitate bicycle use and encourage mode shifts from driving. More than 50% of driving trips nationally are three miles or fewer, and 28% are under one mile. This shows serious potential to shift driving trips to bicycling trips if attractive, inclusive, safe, and comprehensive bicycle network infrastructure is implemented. Due to shorter trip lengths, the emission reduction potential of bicycle improvements is limited. The effects of improving bicycle networks on emissions are amplified when improvements are paired with existing or enhanced transit service, e-bike incentives, and denser land use regulations, which make it easier to bicycle between destinations.

Projects and Policy Actions

- Construct separated bike lanes, protected on-road bike lanes, and standard on-road bike lanes.
- Build shared use paths that are fully separated and exclusively intended for biking and walking.
- Upgrade existing unprotected on-street bike lanes to create higher levels of separation from traffic and enhance safety and comfort for bicyclists.
- Improve intersection crossings for bicyclists, including signage, transition zones, and/or bicycle crossing signals.

Co-Benefits: Bicycle Network Improvements

- Benefits public health by facilitating active lifestyles
- Reduces the cost of living associated with owning a vehicle
- Reduces car dependency
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities

» Install end-of-trip amenities such as bicycle parking, lockers, showers, changing rooms, and maintenance equipment to encourage people to bike to work and after-work destinations.

Pedestrian.Network.Improvements

Improving and expanding pedestrian networks creates a safer, more accessible, and walkable environment, which may encourage travelers to swap driving trips for walking trips. More than 50% of driving trips nationally are three miles or fewer, and 28% are under one mile. This shows that there is serious potential for more trips to be taken by walking if the appropriate infrastructure is implemented. Emissions can be amplified when pedestrian improvements complement existing or enhanced transit services and when physical environments are redesigned to prioritize pedestrians, through traffic calming, which slows vehicle speeds and makes it safer for people to walk, and land use and zoning policies that increase residential density.

Co-Benefits: Pedestrian Network Improvements

- Benefits public health by facilitating active lifestyles
- Improves safety by offering safer transportation options
- Reduces the cost of living associated with owning a vehicle
- Reduces car dependency
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Projects and Policy Actions

» Construct multi-use trails and paths.

» Fill incomplete sidewalk gaps, prioritizing locations with severe injuries or fatalities.

» Install high-visibility crosswalks, pedestrian refuge islands, raised crossings, and overpasses or underpasses on high-traffic corridors

» Add pedestrian-scale lighting and clear signage to improve visibility and wayfinding at intersections and midblock crossings.

» Retrofit intersections with pedestrian countdown signals (auditory), crosswalks, and ADA-compliant ramps.

Shared.Micromobility

Micromobility refers to travel through compact, low-speed modes such as shared bikes, scooters, e-bicycles, and e-scooters. Implementing and improving micromobility policies can offer a solution to previously missing first and last-mile connections to public transit, encouraging travelers to swap driving trips for micromobility trips. E-bikes, which use pedal assist technology to operate at higher speeds with lower user effort, are more accessible for larger segments of the population and can replace longer driving trips. Micromobility most effectively reduces emissions when paired

Co-Benefits: Shared Micromobility

- Benefits public health by facilitating active lifestyles
- Reduces the cost of living associated with owning a vehicle, personal e-bike, or personal e-scooter
- Reduces car dependency
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities

with pedestrian and bicycle network improvements, bus service improvements, and traffic calming strategies to create a safer use environment.

Projects and Policy Actions

- Establish, expand, or improve existing e-bikeshare programs, including purchasing more bikes, adding more stations, and creating e-bike libraries that allow people to borrow e-bikes for longer periods, which introduces people to the positive impacts of micromobility.
- Establish, expand, or improve existing e-scooter programs by increasing the number of scooters and expanding the coverage area.
- Provide subsidies to low-income communities and students for shared bicycle and shared scooter programs.

E_Bike.Incentives

Providing e-bike incentives can encourage travelers swap driving trips for e-bike trips. The effects of e-bike incentives on emissions can be amplified when targeted at locations with existing or enhanced transit, enabling people to bike to a bus stop or rail station. Combining this strategy with bus service improvements, bicycle network improvements, micromobility, and community outreach will likely provide greater benefits. Traffic calming strategies and land use policies are also effective strategies to support e-bike incentives.

Co-Benefits: E-Bike Incentives

- Benefits public health by facilitating active lifestyles
- Reduces the cost of living associated with purchasing a vehicle and/or a personal e-bike
- Reduces car dependency
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Projects and Policy Actions

- Provide purchase rebates or tax credits.
- Regulatory support such as updating traffic laws, subsidizing shared e-bike services, designing e-bike classifications, and establishing infrastructure standards to support the continued adoption of e-bikes.
- Outreach and education campaign, including community workshops and test ride events, partnerships with local bike shops and nonprofits, online resources and multilingual support, and targeted campaigns in underserved areas.

.Bus.Service.Improvements

Enhancing public bus services can encourage travelers to choose transit over driving alone. Currently, public transit only accounts for 4% of commute trips in the CAMPO region because in many low-density parts of the region, transit is less cost-effective and time-competitive. Bus service improvements are more effective when paired with transit amenity improvements, shared micromobility network expansions, road safety improvements, park

Co-Benefits: Bus Service Improvements

- Benefits public health by facilitating active lifestyles
- Improves safety by offering safer transportation options
- Reduces the cost of living associated with owning a vehicle
- Reduces congestion
- Improves mobility
- Produces economic benefits from improved access to employment, education, and commercial opportunities

and ride facilities, and land use policies that encourage dense growth. Complementing fixed-route services with paratransit and on-demand services can encourage travelers to take transit, especially in rural and lower-density communities.

Projects and Policy Actions

- Increase service area with a focus on serving areas with a high likelihood of using transit.
- Increase bus frequency and reduce the amount of time between buses (e.g., 30-minute frequency to 15-minute frequency).
- Increase service span and increase the hours of operation, such as extending bus service later into the evening.
- Adjust the direction of bus routes and modify service span to better match travel patterns and improve connections and transfers to other buses and travel modes.
- Offer or improve paratransit.
- Offer or improve shuttles and on-demand services.
- Provide all-door boarding.
- Enable mobile or off-board payments.
- Improve information dissemination.

Transit.Priority.Measures

Transit priority measures are relatively low-cost solutions to improve bus service efficiency. Projects such as bus-only lanes, queue jumps, and signal priority treatments allow transit to "skip" congestion caused by SOV-trips. These projects can make transit a more time-competitive option compared to driving alone, reducing VMT from travelers' mode shifts, and can also enhance the efficiency of bus services by reducing bus delays in congestion.

Projects and Policy Actions

- Implement bus rapid transit.
- Implement bus-only lanes.
- Implement queue jumps.
- Implement transit signal priority.

Co-Benefits: Transit Priority Measures

- Benefits public health by facilitating active lifestyles
- Reduces congestion
- Improves transit efficiency
- Reduces cost of living from decreased car dependency
- Produces economic benefits from improved access to employment, education, and commercial

High.Capacity.Transit.Development

Developing and enhancing high-capacity transit service can encourage travelers to replace more mid-range to long-range driving trips with transit. High-capacity transit includes light rail and commuter rail, which operate on fixed guideways, typically on a dedicated right-of-way. Commuter rail shares many characteristics with heavy rail but primarily serves as a regional network, serving individuals traveling longer distances or commuting to and from work. High-capacity transit travelers can bypass typical peak-hour vehicle congestion and the costs associated with finding and paying for parking, making high-capacity transit a more attractive option than driving alone.

Co-Benefits: High Capacity Transit Development

- Benefits public health by facilitating active lifestyles
- Improves safety by offering safer transportation options
- Reduces the cost of living associated with owning a vehicle
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities
- Stimulates local economic growth

The impact of high-capacity transit, best complemented by transit amenity improvements, micromobility infrastructure improvements, land use policies that encourage higher-density, employer-based travel demand management, and park and ride facilities, can encourage mode shifts among commuters and longer-distance travelers.

Projects and Policy Actions

- Build or extend light rail service with a focus on serving areas with a high likelihood of using transit.
- Build or extend regional rail service with a focus on serving areas with a high likelihood of using transit.
- Increase frequency of rail service.
- Increase service span and increase the hours of operation, such as extending rail service later into the evening or on weekends.
- Adjust rail operating schedules to better match travel patterns.

Transit.Amenities

Enhancing public transit amenities can encourage shifts to public transit. Upgrading stations and providing real-time information have been proven to improve rider comfort and increase ridership. However, improved frequency and reliability of service are stronger indicators of sustainable increases in ridership. Improving public transit amenities and vehicles can prompt a low-to-moderate reduction in emissions when paired with bus service improvements, high-capacity transit, and public transit fare strategies.

Co-Benefits: Transit Amenities

- Improves safety by offering safer transportation options
- Reduces the cost of living associated with owning a vehicle
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Projects and Policy Actions

- Add seating, shelters, shade, lighting, real-time information, restrooms, trash receptacles, and accessibility.
- Improve the pre-trip experience by improving schedule presentation and legibility, publicizing trip planning information, and offering real-time arrival/departure data via multiple platforms.
- Optimize bus stop spacing.
- Construct raised station platforms to simplify boarding and reduce dwell times.
- Implement vehicle amenities such as air conditioning, information displays, Wi-Fi, comfortable seating, adequate seating, and railings.
- Improve the cleanliness of transit stops and vehicles.
- Improve safety and the perception of safety at transit stops and vehicles.
- Install public art at transit stops.

Transit.Fare.Strategies

Modifying public transit fare policies reduces the cost or provides free fare for individuals using transit and can encourage travelers to choose transit over driving alone. Notably, drivers are more responsive to improvements in bus service frequency and on-time performance; therefore, offering reduced or free transit fares alongside strategies such as bus service improvements, high-capacity transit, and improving transit amenities is more likely to encourage mode shift.

Co-Benefits: Transit Fare Strategies

- Improves safety by offering safer transportation options
- Reduces the cost of living
- Reduces car dependency
- Reduces congestion
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Projects and Policy Actions

- Reduced fares.
- Fare-free service.
- Transit passes (e.g., 3-day, 7-day, weekly, and monthly) that reduce costs.
- Implement fare capping to limit the total amount a rider pays within a set period or on a set trip.
- Offer purchasing plans for larger organizations to purchase transit passes for employees, students, and members.
- Operate fare-free or reduced fare services during special events (e.g., reduced fare during Earth Week).

Community.Outreach.

Community outreach and marketing can play an important role in reducing emissions by connecting travelers with transit, biking, walking, shared micromobility, or ridesharing opportunities. While this strategy promotes the use of clean travel modes, its potential to reduce emissions is intensified when combined with other strategies that make multimodal travel more attractive for travelers, such as pedestrian and bicycle network improvements, bus service improvements, and shared micromobility programs. Packaged together with additional strategies

such as employer-based travel demand management, park and ride facilities, and travel incentives, this strategy can support emission reductions related to commute trips.

Co-Benefits: Community Outreach

- Benefits public health by facilitating active lifestyles
- Improves safety by integrating safer travel modes
- Improves mobility for those with limited or no access to a vehicle
- Reduces the cost of living associated with owning a vehicle
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Projects and Policy Actions

- Implement educational and promotional campaigns to encourage bicycling, walking, transit, or ridesharing.
- Conduct regional outreach and promotions such as reduced transit fare during Earth Week.
- Organize community meetings and focus groups to understand transportation needs and promote alternative modes.
- Establish school-based programs, such as required bicycle training.
- Establish special-events programs such as Bike to Work Day.
- Attend public events such as farmers' markets and fairs to gather feedback and promote alternative modes.

Employer_Based.Travel.Demand. Management

Co-Benefits: Employer-Based Travel Demand Management

- Reduces congestion
- Reduces cost of travel (reduced fuel costs, reduce vehicle maintenance) and cost of living associated with owning a vehicle
- Produces economic benefits from improved access to employment, education, and commercial opportunities

Employer-based travel demand management (TDM) is designed to reduce emissions associated with commuting to work. TDM programs encourage travelers who normally drive alone to choose alternatives such as transit, biking, walking, and ridesharing (carpooling, vanpooling, and dynamic ridesharing). These programs may provide financial incentives and subsidies to employees for commuting during non-peak hours and using alternative travel modes, allow employees to telecommute or work flexible hours, and install end-of-trip facilities such as bicycle parking, lockers, changing rooms, and maintenance equipment. Nationally, work trips make up 30% of household VMT, offering the potential to have a sizable impact on reducing emissions. Implementing this strategy alongside other strategies that improve the experience of alternative travel modes, such as high-capacity transit development, bus service improvements, and enhancing micromobility, would maximize the impact of employer TDM.

Projects and Policy Actions

- Provide incentives for ridesharing, including free access to express lanes, preferred parking, and a guaranteed ride home.

- Implement trip reduction ordinances that require employers or developers to reduce vehicle travel demand.
- Conduct outreach to employers and employees to encourage TDM programs.
- Establish a regional program that offers TDM resources to employers and ridesharing resources, such as ride matching for commuters.

Park And Ride Facilities

Park and ride facilities are specially designated parking areas or garages that allow commuters to transition from solo driving to buses, trains, shuttles, carpools, vanpools, or other forms of public transport. The effectiveness of park and ride services in lowering emissions and making travel more efficient depends on the accessibility of dependable transit or rideshare options, potential savings, and the facility's comfort. Enhancements like improved transit connections, employer-driven travel demand programs, freeway management utilizing HOV and toll lanes, incentives, and accessible trip planning resources can also boost their popularity.

Co-Benefits: Park And Ride Facilities

- Improves safety
- Expands transportation options
- Reduces congestion
- Reduces cost of living associated with owning a vehicle
- Produces economic benefits from improved access to employment, education, and commercial opportunities
- Encourages mixed-use development supporting growth of local businesses

Projects and Policy Actions

- Construct or expand park and ride facilities at key locations, including major transit hubs or proximity to highways connecting major employment centers.
- Reserve underutilized parking lots for overflow parking when park and ride lots are full.
- Install amenities at park and ride facilities to increase traveler safety and comfort, such as lighting, information kiosks, emergency call boxes, benches, shelters, and landscaping.
- Install bicycle parking and maintenance tools for park and ride users who bicycle to the location.
- Place wayfinding signs to park and ride lots.
- Advertise and promote existing park and ride lots, along with destinations accessible via transit from the lot.
- Monitor real-time parking availability and provide information to travelers via website or mobile app.
- Develop apps or software to allow travelers to reserve parking spaces. Reservation systems can include a set of first-come, first-served spaces to accommodate travelers without using the app.

Land.Use.Planning.

Land use planning greatly affects transportation systems by shaping travel distances and modes, ultimately influencing travel demand and emissions. Encouraging dense, mixed-use development through zoning and urban design shortens distances between homes, jobs, and businesses, reduces VMT, and supports walking, biking, and public transit. These outcomes are strengthened by complementary strategies like traffic calming, improved pedestrian and bike networks, enhanced bus and high-capacity transit, and micromobility options.

Projects and Policy Actions

- Increasing development density through measures such as infill development, upzoning, density bonuses, accessory dwelling units (ADUs), transfer of development rights, and more.
- Facilitating transit-oriented development (TOD) by providing incentives for high-density mixed-use development that is walkable, bikeable, and close to transit.
- Revising zoning to locate housing closer to employment and commercial centers.
- Siting public facilities along transit corridors or in dense neighborhoods.
- Restricting auto-oriented design on commercial corridors that may support walking, bicycling, or transit.
- Encouraging age-friendly communities.

Co-Benefits: Land Use Planning

- Benefits public health by facilitating active lifestyles
- Improves safety from reduced VMT and lower vehicle speeds
- Reduces congestion
- Reduces cost of living associated with owning a vehicle
- Expands housing supply and improves housing affordability
- Produces economic growth from improved access to employment, education, and commercial opportunities
- Encourages mixed-use development supporting the growth of local businesses
- Preserves open and green spaces
- Improves water quality with use of green infrastructure and stormwater

Cleaner Travel

OBJECTIVES	STRATEGIES
CLEANER TRAVEL	
Provide opportunities for the public to utilize affordable zero- and low-emissions vehicles	» Clean Light-Duty Vehicles
Support the conversion of public fleets, including transit vehicles, to zero- and low-emissions options	» Zero- and Low-Emission Buses » Zero- and Low-Emission Municipal Fleets
Help support use of cleaner fuels and vehicles for freight	» Clean Medium- and Heavy-Duty Vehicles » Support Low-Carbon Fuel Deployment

Clean.Light_Duty.Vehicles..

Transitioning light-duty vehicles from internal combustion engines to low- or zero-emission alternatives offers substantial potential for significant emissions reductions. Low-emission vehicles (LEVs), such as hybrid EVs and plug-in hybrid EVs, produce fewer tailpipe emissions compared to conventional vehicles. ZEVs, which include battery EVs and hydrogen fuel cell EVs, generate no tailpipe emissions.

Facilitating the adoption of ZEVs and LEVs will yield multiple benefits for communities.

Co-Benefits: Clean Light-Duty Vehicles

- Reduces fuel costs
- Reduces noise pollution
- Produces economic growth from job creation associated with vehicle manufacturing and the development of charging and fueling infrastructure

Projects and Policy Actions

» Provide tax credits or rebates to encourage the purchase of new or used ZEVs and LEVs and/or installation of home charging.

» Provide tax credits or rebates (e.g., Cash for Clunkers) to promote the retirement of internal combustion engine vehicles.

» Plan for, develop, or finance the installation of public EV charging and hydrogen fueling stations.

» Reserve priority parking spaces with charging for EVs in public parking facilities. Conduct public outreach and education on EVs to raise awareness of their benefits.

» Install signage for ZEV charging infrastructure to reduce range anxiety.

» Amend building codes/regulations to minimize the burden for installing charging infrastructure.

» Increase vehicle emissions standards (state policy) to set a higher threshold for allowable fuel efficiency for on-road vehicles.

Zero_and Low_Emission Buses

Transitioning bus fleets–public transit buses, school buses, and privately operated buses–to low-emission and zero-emission buses (ZEBs) powered by electricity or hydrogen can significantly reduce emissions in the CAMPO region. Paired with the procurement of ZEBs, other strategies that encourage increased ridership include bus service improvements and high-capacity transit development, including bus rapid transit.

Co-Benefits: Zero- and Low-Emission Buses

- Reduces noise pollution
- Produces economic growth from job creation associated with ZEB manufacturing and the development of charging and fueling infrastructure

Projects and Policy Actions

» Pursue federal funding opportunities such as the FTA's Low or No Emission Vehicle Program to support the purchase of zero-emission buses and related infrastructure.

» Apply for technical assistance programs like the National Renewable Energy Laboratory's Clean Bus Planning Awards to develop customized fleet electrification plans.

» Continue building infrastructure, such as end-of-line charging infrastructure, to support 8-hour battery lifespan buses that operate for about 16 hours of rotation daily.

» Work with utilities to produce low-carbon electricity or hydrogen fuel to power buses.

» Consider onsite clean electricity or fuel generation for ZE medium- or heavy-duty vehicles.

» Identify opportunities for collective purchasing of ZE and low-emission vehicles for local agencies.

» Partner with local colleges and universities to offer ZE maintenance training, with pipelines to ZE maintenance providers.

Zero_and Low_Emission Municipal Fleets.

Local agencies can directly reduce emissions by transitioning municipal fleets such as public works vehicles, emergency vehicles, and others to ZEVs. While emissions from municipal fleets are a relatively small share of the transportation sector's contribution to emissions (in Austin, the fleet accounts for less than one percent of the city's GHG emissions), this strategy can still have a noticeable impact.

Co-Benefits: Zero- and Low-Emission Municipal Fleets

- Reduces noise pollution
- Produces economic growth from job creation associated with manufacturing and the development of charging and fueling infrastructure

Projects and Policy Actions

» Participate in the Climate Mayors EV Purchasing Collaborative, which provides support in offsetting the upfront costs associated with EV acquisition.

» Adopt municipal policies to mandate ZEV procurement.

» Partner with utility companies to build charging stations.

- Participate in the Drive EV Fleets program, run by a national non-profit coalition that supports public fleet electrification by offering a centralized portal to competitively bid EVs, charging infrastructure, financing options, and expert guidance from a nationwide network of specialists.

Clean Medium- and Heavy-Duty Vehicles

Co-Benefits: Clean Medium- and Heavy-Duty Vehicles

- Reduces fuel costs
- Reduces noise pollution
- Produces economic growth from job creation associated with vehicle manufacturing and the development of charging and fueling infrastructure

Medium- and heavy-duty vehicles, which include large passenger and freight vehicles such as school buses, transit buses, box trucks, tractor-trailers, and fire trucks, produce approximately one-fifth of transportation emissions, despite lower VMT than other vehicle classes. Transitioning medium- and heavy-duty vehicles from conventional internal combustion engines to zero-emission trucks (ZETs) is a critical step in achieving significant emission reductions. ZETs are typically powered by a battery-electric engine, eliminating emissions from driving–but secondary emissions may be created from electricity or fuel generation.

Supporting the transition to ZETs may spur economic development associated with new jobs in medium- and heavy-duty vehicle manufacturing, charging and fueling infrastructure, and maintenance and operational service jobs.

Projects and Policy Actions

- Implement EV and hydrogen infrastructure, including charging stations, signage, and parking spaces for medium- and heavy-duty vehicles.
- Amend building code and regulations to include charging infrastructure that is accessible to ZETs.
- Adopt more stringent emissions standards for medium- and heavy-duty vehicles (state policy).
- Local jurisdictions and regional governments can offer incentives and subsidies to private organizations to purchase ZETs and fund supporting infrastructure (e.g., charging, workforce training), like the Texas Emissions Reduction Plan at the state level.
- Grant medium- and heavy-duty trucks priority access to curbside loading zones and truck parking plazas.

Support Low-Carbon Fuel Deployment

Co-Benefits: Support Low-Carbon Fuel Deployment

- Produces economic growth from job creation associated with the production and distribution of low-carbon fuels

The use of alternative, low-carbon fuels to replace gasoline and diesel fuel is a critical strategy to reduce emissions in the CAMPO region. Alternative fuels, such as biofuel (e.g., ethanol, biodiesel, biogas), renewable diesel, natural gas, and propane, produce fewer emissions than conventional petroleum fuels. This strategy is particularly impactful for medium- and heavy-duty vehicles used in freight distribution, which largely use diesel fuel and in 2022 accounted for 23% of GHG emissions in the US. Using biofuels as a transition between conventional diesel and full electrification can reduce emissions by approximately 74% when compared to diesel. Supporting the adoption of

alternative fuels provides secondary benefits, such as supporting economic development associated with new jobs related to the production and distribution of the fuel.

Projects and Policy Actions

- Replacing petroleum-based fuels with biofuels, renewable diesel, and natural gas in fueling stations, especially along freight corridors.
- Offering incentives to accelerate the adoption and use of alternative fuels across sectors.
- Implement a Low Carbon Fuel Standard (LCFS) at the state level. LCFS is a policy designed to decrease the carbon intensity of fuels and make alternative fuels more competitive.
- Establishing and revising regulations to facilitate the local production of alternative fuels.
- Implementing a biodiesel blending mandate.

Considering CAMPO's Diverse Geographical Contexts

Most strategies can be implemented in all contexts (rural, suburban, and urban) but strategies related to transit, bicycling, walking, and micromobility tend to be most applicable in locations with sufficient density and mix of uses. Whether it is the urban core of the City of Austin or rural and suburban Hays County, the CAMPO region holds a diverse array of communities and contexts that will influence which strategies are applicable and cost-effective, and how strategies are implemented. Factors that affect implementation include development patterns, existing transportation infrastructure and services, and types of actions that agencies are permitted to take. For example, the implementation of strategies such as shared mobility that would be effective in reducing GHG emissions in urban areas but may not be applicable to a rural area due to the density and nature of development and travel patterns. Table 2 shows each strategy and the geographical context in which the strategy is most applicable.

Table.8¡.Strategies.and.Most.Applicable.Geographical.Contexts

Strategies	Urban	Suburban	Rural
Freeway Management	✓	✓	
Traffic Signal Improvements	✓	✓	
Traffic Incident Management	✓	✓	✓
Freight Operational Improvements	✓	✓	✓
Road Safety Improvements	✓	✓	✓
Parking and Curb Space Management	✓	✓	
Travel Incentives and Trip Planning Resources	✓		
Bicycle Network Improvements	✓	✓	✓
Pedestrian Network Improvements	✓	✓	✓
Shared Micromobility	✓		
E-Bike Incentives	✓	✓	✓
Bus Service Improvement	✓	✓	

Transit Priority Measures	✓	✓	
High Capacity Transit Development	✓	✓	
Transit Amenities	✓	✓	
Transit Fare Strategies	✓	✓	
Community Outreach	✓	✓	✓
Employer-Based Travel Demand	✓	✓	
Park And Ride Facilities	✓	✓	
Land Use Planning	✓	✓	
Clean Light-Duty Vehicles	✓	✓	✓
Zero- and Low-Emission Buses	✓	✓	
Zero- and Low-Emission Municipal Fleets	✓	✓	✓
Clean Medium- and Heavy-Duty Vehicles	✓	✓	✓
Support Low-Carbon Fuel Deployment	✓	✓	✓

Below are highlights of what implementation might look like in different contexts.

Rural Areas: Rural areas are characterized by low population density, with small towns and wide expanses of open space. With limited alternatives to driving and few opportunities to improve roadway efficiency, emissions reduction strategies in rural areas tend to focus heavily on the transition to cleaner vehicles, although improved infrastructure for walking and biking in rural town centers can be supportive as well. Examples of strategies that may be prioritized in rural areas include:

- Supporting EV adoption by households and businesses, such as through incentives for purchasing EVs and installing Level 2 chargers at home (incentives could be at the county level) – with generally longer travel distances, switching one household vehicle to an EV can save families substantial amounts on fuel costs.
- Enhancing traffic management for festivals, other special events, and recreational sites to reduce seasonal or site-specific travel delays, and enhancing the experience for drivers.

Suburban Areas: Suburban areas are generally characterized by a separation of land uses with ample parking across residential, commercial, and industrial areas. With low to moderate density, most suburban areas tend to be car-dependent, although some areas have commuter rail and activity hubs that support or may be primed to support shifts from driving to walking, biking, or transit. Emissions reduction strategies in suburban areas can encompass nearly all strategies listed above, and tend to rely strongly on transitioning to cleaner vehicles, improving the efficiency of travel, and filling gaps in walking,

biking, and transit to support less auto dependency. Examples of strategies that may be prioritized in suburban areas include:

- Installing public EV charging stations at workplaces, shopping centers, and multifamily housing complexes, as well as along major highway corridors, plus EV incentives and outreach to support faster adoption of EVs.
- Improving traffic signal coordination and timing to reduce vehicle travel delays, while also identifying opportunities for transit signal priority and enhanced bus services to make transit a more viable option for travelers.
- Filling gaps in sidewalks and bicycle networks so that individuals have the option to walk or bike for short trips, along with safe crosswalks and other roadway safety enhancements – In addition to allowing people to reduce vehicle trips and reducing crashes, these networks can support local recreation and more community connections.
- Within incorporated areas and where allowable, supporting increased residential and commercial development near transit stations and development design along major corridors that is more pedestrian-oriented.

Urban Areas: As the most densely populated parts of the region, urban areas tend to be defined by higher concentrations of commercial activity and a greater mix of land uses. With higher density of development and less ample parking, emissions reduction strategies in urban areas often focus heavily on enhancing convenient travel options, such as transit, biking, and walking to reduce the need for vehicle travel. Examples of strategies that may be prioritized in urban areas include:

- Enhancing public transit, including enhancing the frequency of transit, incorporating transit priority measures such as bus-only lanes, providing real-time bus information, and converting to zero emissions buses.
- Expanding active transportation infrastructure, such as through protected bike lanes and expanding micromobility options to enable people to safety travel without a vehicle.
- Targeting increased development density, including housing and commercial development, around high-capacity transit corridors to maximize the value of these transit investments and enhance access for residents, customers, and visitors.

Chapter 6: Implementing the Regional Strategy

CAMPO and regional stakeholders can translate this plan's goals into action by integrating emissions reduction considerations throughout the transportation investment and policy decision-making process at the regional and local scales. To advance objectives identified in the Transportation Emissions Reduction Plan, the following seven actions are recommended for implementation by CAMPO, in coordination with regional partners:

Support Local Governments in Identifying Projects and Programs for Funding that Support Emissions Reduction

Local governments identify projects for funding through the regional transportation planning process and should be encouraged to identify projects that help to reduce emissions while achieving other goals. To help spur these concepts, CAMPO should promote the availability of the Transportation Emissions Reduction Plan's "menu of strategies" and Toolkit to local agencies to help them identify potential transportation investments for regional funding that reduce emissions.

Update the Regional Project Prioritization Process to Strengthen the Role of Emissions Reduction

As the region's federally designated MPO, CAMPO directly administers the distribution of federal funding under three programs:

- **Surface Transportation Block Grant Program**, which provides flexible funding and may be used for infrastructure construction or repair, operational improvements, safety programs and projects, and planning activities, among other types of projects.
- **Transportation Alternatives Set-Aside Program**, which funds pedestrian and bicycle facilities, recreational trails, safe routes to school projects, community improvements, and environmental mitigation.
- **Carbon Reduction Program (CRP)**, which funds emissions reduction projects across a wide array of project types.

To administer these funding programs and facilitate effective distribution to project sponsors, CAMPO developed a project evaluation and selection process that emphasizes several key factors. CAMPO's process for prioritizing regional transportation projects is organized around scoring projects within seven project categories – Roadway, ITS/Operations, Transit, Active Transportation, TDM, Transportation Planning, and Other – as described in CAMPO's Guide to the Selection of Regional Transportation Projects (Fall 2025).

The current scoring methodology does not directly address emissions impacts of projects within these categories, although it does account for factors that have a direct relationship to emissions reduction, such as whether roadway projects incorporate pedestrian and bicycle accommodations and transit elements, and whether transit projects show anticipated ridership and potential growth. The process also evaluates the projected reduction in VMT and Vehicle Hours Traveled through a cost-benefit analysis, which can approximate emission reduction.

Approaches to enhance the project selection process could include:

- **More directly accounting for the emissions impacts of projects within the project scoring,** including specific emission reduction points within the planning factor (qualitative) criteria matrices for each category, and measuring emission reduction in the existing cost-benefit analysis process. This approach could draw on data already used in the application, such as estimates of VMT reduction for certain project categories, and/or the development and application of sketch planning methods to estimate emissions effects of projects based on project characteristics.
- **Adjusting the existing scoring weights in the project selection process** to prioritize projects and project types that are likely to reduce emissions, including travel demand management, operational improvements, transit, and active transportation projects in relation to capacity projects.

Enhance the Region's Congestion Management Process (CMP) to Prioritize Demand Management and Operations Strategies Over Capacity Expansion

TDM and TSMO strategies are designed to reduce vehicle travel and traffic congestion, respectively, without adding new roadway capacity. These strategies reduce emissions compared to roadway capacity projects, which, in the long term, can lead to additional vehicle traffic.

As an MPO in an urbanized area with population over 200,000, CAMPO implements a Congestion Management Process (CMP), which is a systematic approach for managing congestion and mobility and includes monitoring system performance, analyzing congestion problems and needs, and identifying and assessing strategies to support programming for projects. To further bolster projects that will reduce emissions, CAMPO may enhance its existing CMP to focus more on multimodal system performance and prioritize TSMO and TDM strategies over added-capacity enhancements.

As part of the CMP, MPOs in non-attainment for ozone or carbon monoxide are required to analyze reasonable TDM and TSMO strategies as an alternative to capacity expansion for any corridor in which a project that will result in a significant increase in SOV capacity is proposed to be advanced with federal funds. If the analysis demonstrates these strategies cannot satisfy the need for additional capacity, then the CMP must identify reasonable TDM and TSMO strategies to manage the facility safety and effectively and incorporate those strategies into the project or commit to implementation in the corridor.[12] Regardless of a potential non-attainment designation, to support emissions reduction efforts, CAMPO could design and implement a similar process to review and consider these strategies for any proposed capacity-enhancing projects prior to inclusion within the RTP and prior to funding under the region's Transportation Improvement Program (TIP).

Establish Targeted Regional Funding for Emissions Reduction Projects

To advance emissions reduction strategies, CAMPO can develop and administer targeted regional funding programs to encourage the development of local emissions reduction policies and projects. These programs can be funded through the federal funding programs or included in CAMPO's general budget funding as appropriate.

[12] eCFR :: 23 CFR 450.322 -- Congestion management process in transportation management areas.

Example programs could include:

- **Signal Operations Improvement Program** – CAMPO should continue to invest in the development of the Central Texas Traffic Management System (CTTMS). Within the CAMPO region, operational control of traffic signals is maintained by each agency. Coordination among agencies managing traffic signals for planned and unplanned occurrences is done sporadically or on an infrequent basis. This lack of coordination can have negative impacts on safety, traffic flows, and congestion for travel between jurisdictions. The CTTMS seeks to alleviate these issues through the establishment of a digital platform that will automate the necessary signal coordination among agencies and serve as a foundation for a regional traffic management center for Central Texas. Examples of similar regional programs include the North Central Texas Council of Governments' Regional Traffic Signal Program, which has developed an implemented timing plans across over 2,000 signalized intersection in the Dallas-Fort Worth metro area.
- **Complete Streets Program** – An example of a Complete Streets Program includes the East-West Gateway Council of Governments, the MPO for the St. Louis region. This "Great Streets Initiative" program provides scalable planning assistance to local governments to support roadway projects that strengthen economic and social benefits by centering communities around interesting, lively, and attractive streets that serve all modes. EWG has helped communities through the development of detailed plans, which generally take 8-10 months and involve significant community engagement and data analysis, yielding a detailed planning report with implementation recommendations; or strategic plan projects, which center on a community charrette to help articulate a vision for the community.
- **Transportation-Land Use Coordination Program** – An example of a Transportation-Land Use Coordination Program includes the Atlanta Regional Commission's Livable Centers Initiative grant program that incentivizes local jurisdictions to re-envision their communities as vibrant, walkable places; consultant support is provided to convene local partners to develop a local vision for land use, transportation, and open space, and establish a framework for cooperation to support implementation of community improvements. Similarly, the Metropolitan Washington Council of Governments' Transportation Land-Use Connections Program provides short-term consultant services to local jurisdictions on small planning projects that promote mixed-use walkable communities and support a variety of transportation alternatives.
- **Regional Emissions Reduction Program** – This could function as a pre-Congestion Mitigation and Air Quality Improvement (CMAQ) Program for the CAMPO region by setting aside a share of STGB funds to dedicate to projects that reduce emissions, in addition to CRP funds, potentially in partnership with programs administered by the TCEQ. For instance, the Metropolitan Transportation Commission in the San Francisco Bay Area has established a Climate Initiatives Program, funded through CMAQ and CRP funds, which provides funding for innovative projects and solutions that have demonstrated emissions reduction benefits, such as car sharing programs, Safe Routes to Schools programs, and activities to promote the adoption of EVs. This program could also establish procedures for CAMPO planning processes to successfully incorporate non-attainment area requirements for a proactive foundation if there are any changes to the region's air quality designation status.

Strengthen Regional Air Quality Outreach Programs

CAMPO can look for opportunities to strengthen regional air quality programs and continue investment in regional transportation demand management programs, including CAMPO's Commute Solutions. The Austin region already has regional programs in these areas,

which are coordinated by partners including CAMPO, CAPCOG, CapMetro, the Central Texas Regional Mobility Authority, the Capital Area Rural Transportation System (CARTS), the City of Austin, and others:

- *Air Central Texas (ACT),* a regional clean air campaign, which is coordinated by CAPCOG with support from the Central Texas Clean Air Coalition.
- *Commute Solutions*, which serves Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson Counties in Central Texas, and provides resources and outreach to help people find a rideshare match, plan a transit trip, look for bike routes, and log commute trips for rewards, as well as provide emergency ride home services.
- *Movability,* Central Texas' transportation management association, which works with employers and employees throughout Central Texas to encourage mobility solutions that reduce congestion and improve air quality; Movability operates annual and ongoing commuter challenges, recognizes employer efforts, and operates programs like a SchoolPool grant program.

In 2023, CAMPO invested $4 million in CRP funding for the implementation of the Regional Transportation Demand Management Plan. Additionally, in 2024, the City of Austin received a $47.9 million Climate Pollution Reduction Grant from the U.S. Environmental Protection Agency to help the city work with regional partners to improve regional transit service, invest in infrastructure, and TDM activities. In 2025, the City of Austin released a TDM Strategic Plan for 2025-2029, which aims to achieve a non-single-occupant-vehicle mode share of 50 percent by 2039.

Coordinate with Local Governments on Transportation and Land Use

Recognizing that the region is growing rapidly and there are opportunities to support emissions reduction, mobility, economic vitality, and community livability through enhanced transportation-land use coordination, CAMPO could develop a regional policy to support enhanced coordination.

For instance, the Metropolitan Washington Council of Governments worked with local planning departments to designate Regional Activity Centers, where each county aligns land use plans to support these activity centers, and location within activity centers is used as a prioritization criterion for a variety of grants administered by the MPO.

CAMPO has previously identified regional centers and could work with local governments to revisit the concept and identify regional activity centers and develop updated criteria for their designation and how they can be incorporated into the planning process.

This effort should recognize the constraints associated with land use planning, including the lack of zoning authority within unincorporated areas. By laying out regional policy priorities and strengthening collaboration among partners in relation to transportation investments and activity centers, such a regional effort could support many existing policy goals of the Transportation Policy Board including enhancing mobility, strengthening housing opportunities, and supporting community livability.

Support Regional Electric Vehicle Deployment

Fostering collaboration among agencies in the region around clean transportation strategies is vital to the success of regional EV deployment. Recognizing the importance of shifting the vehicle fleet to zero-emission vehicles to achieve significant emissions reductions, CAMPO can

spearhead efforts to advance regional planning and coordination for EV infrastructure development for private vehicles and public fleets, as well as public outreach promoting the benefits of EVs.

Several other MPOs have developed regional EV deployment plans, including the Atlanta Regional Commission (Regional Transportation Electrification Plan) and the Metropolitan Washington Council of Governments, which included development of an EV charger siting priority map to help local governments in targeting ideal locations for community charging (Regional Electric Vehicle Infrastructure Implementation Strategy). Such a plan would supplement the Texas Electric Vehicle Infrastructure Plan, with a focus on both long-distance and community-based charging infrastructure needs, accounting for factors like travel corridor access and community needs, particularly in relation to multi-family housing.

CAMPO could also support coordinated planning and purchasing for local governments in relation to their own public fleets and coordinate public education and outreach on the benefits of electric vehicles, common misconceptions, and provide opportunities for the public to learn about these vehicles (e.g., EV ride and drive events).

Appendix A: Stakeholder Engagement Summary

Phase 1 Outreach

The Capital Area Metropolitan Planning Organization (CAMPO) invited the public to participate in the development of the Transportation Emission Reduction Plan, including an online open house with in-person pop-up engagement events in Bastrop, Burnet, Caldwell, Hays, Travis, and Williamson counties to introduce the planning effort and collect input from the community on regional priorities and potential strategies.

The first phase of public engagement included in-person pop-up engagement events and an online open house and comment period from May 9 through June 12, 2025. The same information was available online and in-person. Open house materials included informational exhibits, a fact sheet, and a survey. All materials were posted online and available in English and Spanish. Input was collected through printed or online surveys, emailed comments, and verbal comments at in-person engagement events. The TERP team received 179 survey submissions. Verbal comments and questions from in-person engagement events were also documented and considered.

Online Open House

Online open house materials were available on campo-terp.com from May 9 to June 12, 2025.

In-Person Engagement Events

Six pop-ups took place from May 17 to June 7, 2025.

The project team collected verbal comments about community priorities, promoted the survey, and distributed push cards with additional information about the online open house and comment period.

County	Event	Date	Location	Number of people engaged
Hays	Mermaid Promenade	Saturday, May 17	San Marcos	33
Bastrop	Elgin Farmers Market	Thursday, May 22	Elgin	15
Burnet	Music on Main	Thursday, May 29	Marble Falls	17
Williamson	Farmer George's Farmers Market	Saturday, May 31	Round Rock	48

Caldwell	Lockhart First Friday Downtown	Friday, June 6	Lockhart	36
Travis	SFC Farmers Market (Republic Square)	Saturday, June 7	Austin	38

Verbal.Comment.Summary

Hays County
Mermaid Promenade – May 17, 2025

Themes of Verbal Comments:

- Commenters express a strong overall interest in increased public transit systems serving Hays County.
- One commenter suggested Hays County adopt a ride share program like the Uber Kyle $3.14 program.
- Commenters supported increased connectivity of roadways in the Austin Metro area.

Bastrop County
Elgin Farmers Market – May 22, 2025

Themes of Verbal Comments:

- Many commenters were interested in the plan and wanted to know more about public transportation.
- Commenters shared support for denser retail to reduce dependency on cars for travel.
- Some commenters did not think that public transportation was necessary to reduce emissions.

Burnet County
Music on Main – May 9, 2025

Themes of Verbal Comments:

- Commenters expressed support for the plan, especially to promote walking to decrease vehicle emissions.

Williamson County
Farmer George's Farmer Market – May 31, 2025

Themes of Verbal Comments:

- Commenters expressed disillusionment with public transportation. One person suggested investing in carpooling options to reduce emissions.
- Commenters noted there was no way to get to the airport from Round Rock without a car.
- Commenters shared their concerns about emissions from freight.

Caldwell County
Lockhart First Friday Downtown – June 6, 2025

Themes of Verbal Comments:

- Commenters expressed frustration that the only way to get around Lockhart was by car.
- Commenters shared a desire for infrastructure that promotes ride-shares and public transit.
- Commenters shared support for electric vehicle adoption incentives.

Travis County
Heroes and Hotrods – June 7, 2025

Themes of Verbal Comments:

- Commenters expressed support for public transportation.
- Commenters requested an expansion of public transportation by implementing more buses on Sundays and expanding commuter rail to service more destinations.

NOTIFICATION TOOLS

CAMPO.Webpage.Announcement

An announcement was posted on the webpage on May 9 notifying the public about the launch of the online open house and open comment period.

Social.Media

Information about the plan and how to participate was distributed through CAMPO's X (Formerly Twitter), Facebook and Instagram accounts from May 12 to June 6.

Media.Outreach

A media release was distributed to local media outlets throughout the region on May 10.

Emails.

Email notices were sent to Steering Committee members and community partners and public information officers on May 13, including newsletter content and social media graphic for participants to share in their own community channels and promote participation. Additional email notices to promote participation before the end of the comment period were sent to stakeholders, Steering Committee members, and community partners on June 12.

Additional.Outreach

The outreach team made direct phone calls and emails throughout the comment period to promote and encourage distribution of online open house materials throughout May and June.

WHAT WE HEARD

Survey.Summary

179 completed or partially completed surveys received

Common themes from multiple choice responses:

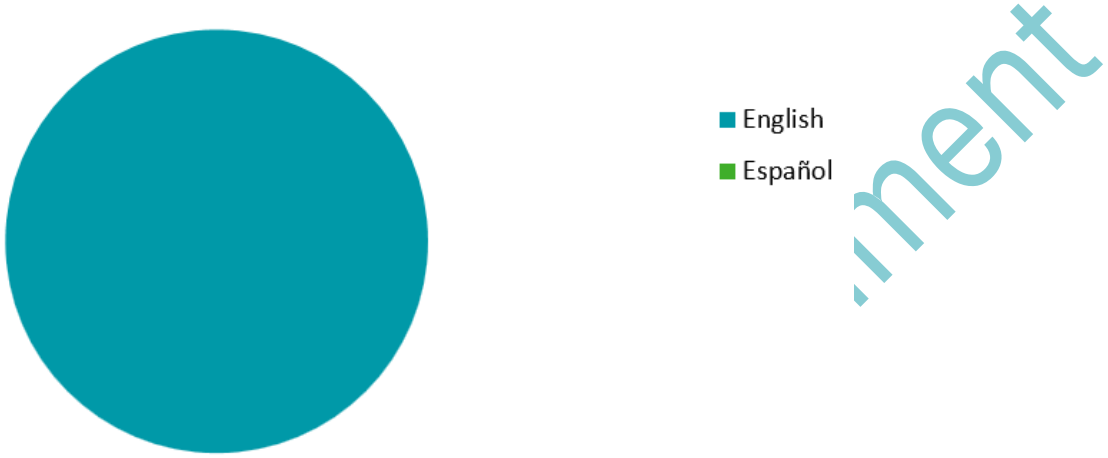
- 61.76% of survey respondents noted they commute by driving alone in a personal vehicle, and 44.85% of respondents work from home.
- 77.54% of survey respondents indicated they travel by driving alone in a personal vehicle when not commuting.
- 60.87% of survey respondents ranked convenience as a factor influencing how they decide to travel.
- 57.25% of survey respondents ranked expansion of light rail or commuter rail systems, and 52.17% of respondents ranked safe or more extensive bicycle infrastructure as transportation improvements they would like to see in their community.
- 70.37% of survey respondents ranked improved active transportation as a very important factor to reduce emissions. 61.71% of survey respondents ranked promoting public transportation as a very important factor to reduce emissions.

Common themes from written responses:

- Survey respondents expressed a strong desire for expanded public transportation, including increased bus services and building an extensive light rail service.
- Some survey respondents expressed concerns with how buses are currently utilized in Austin, citing excessive idling and congesting traffic.
- Survey respondents wanted safer biking and pedestrian infrastructure and less of a focus on building or expanding major highway infrastructure.
- Survey respondents emphasized prioritizing overpasses for better traffic flow and address road debris on major highways.

Q1 - Are you taking this survey in English or Spanish? / ¿Está respondiendo esta encuesta en inglés o español?

178 responses



Q2 – What zip code do you live in?

145 responses

Zip code	# of responses
78749	7
78613	7
78660	6
78704	6
78666	6
78705	6
78723	6
78757	6
78722	5
78702	5
78751	5
78721	4
78701	4
78717	4
78758	4
78753	3

Q3 – In what ZIP code do you work?

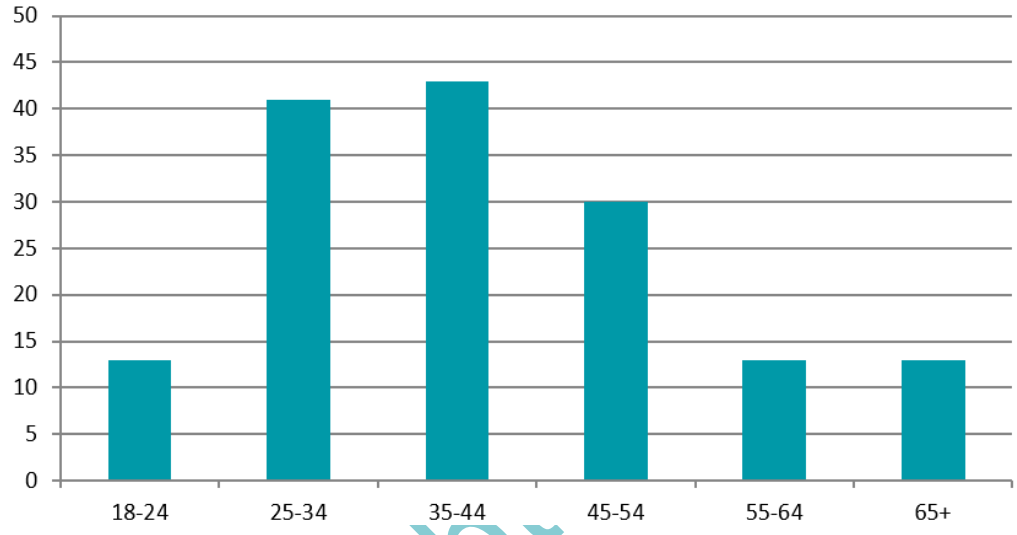
141 responses

Zip code	# of responses
78701	9
78717	6
78702	6
78712	6
78751	6
78660	5
78666	5
78759	5
78666	4
78713	4
78741	4
78728	3
78753	3

78758	3
78757	3
Don't work	3

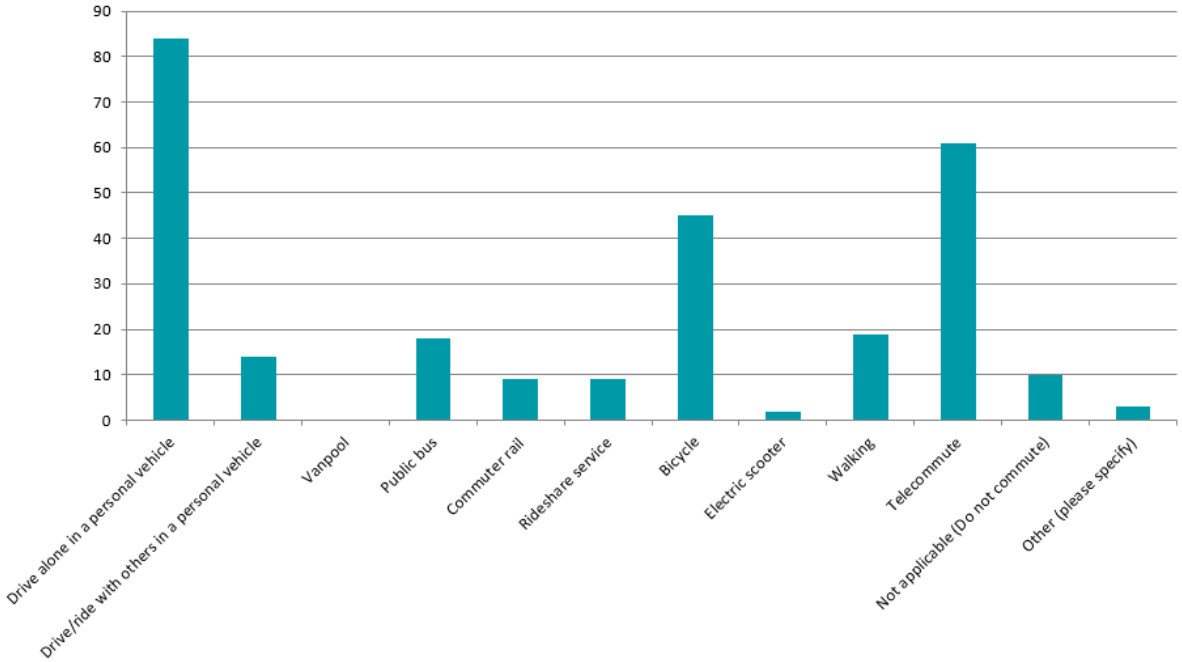
Q4 – What is your age group?

153 responses



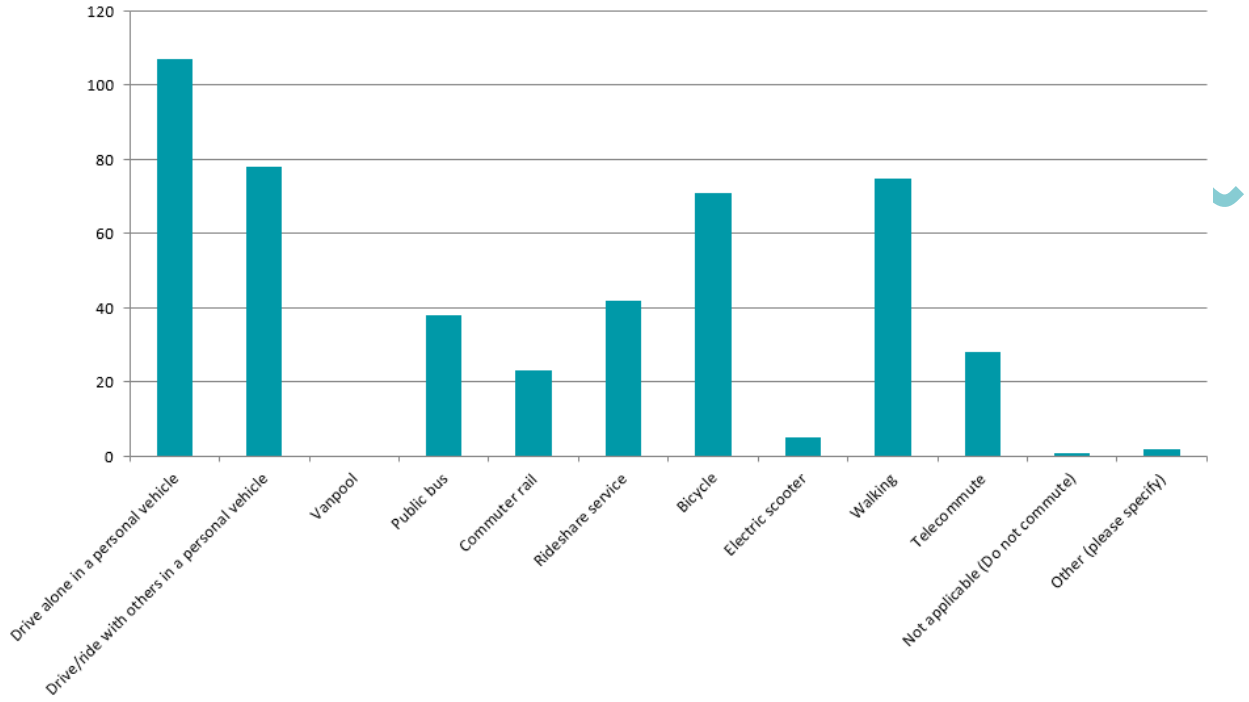
Q5 – What forms of transportation do you use regularly for commuting (regular travel to work or school)? Select all that apply.

136 responses



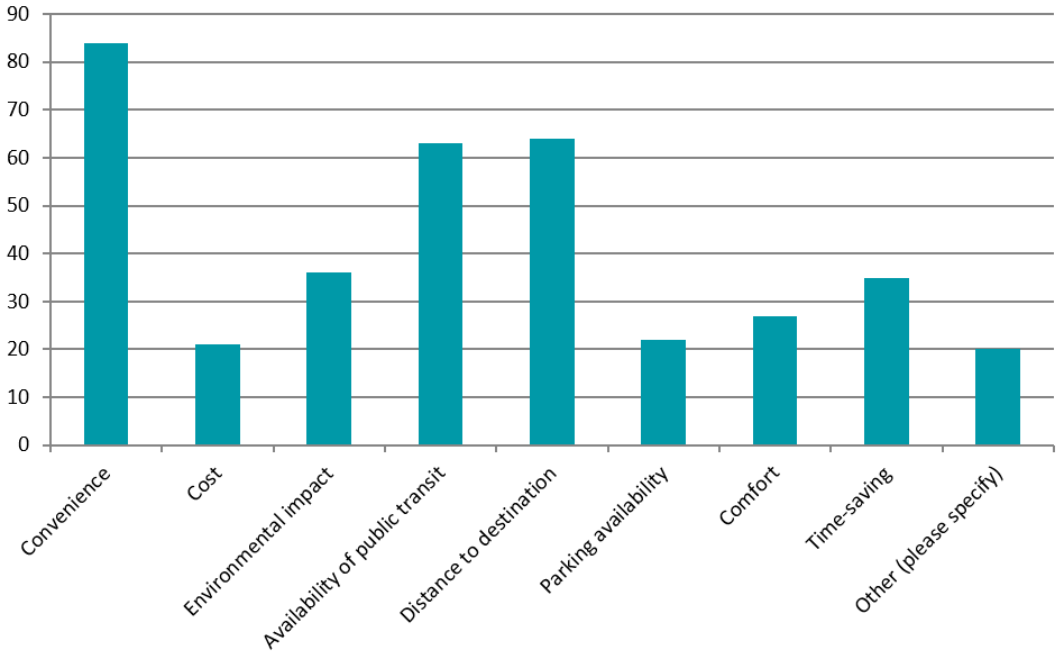
Q6 – What forms of transportation do you use regularly for personal use (any travel that is not for regular attendance to work/school)? Select all that apply.

138 responses



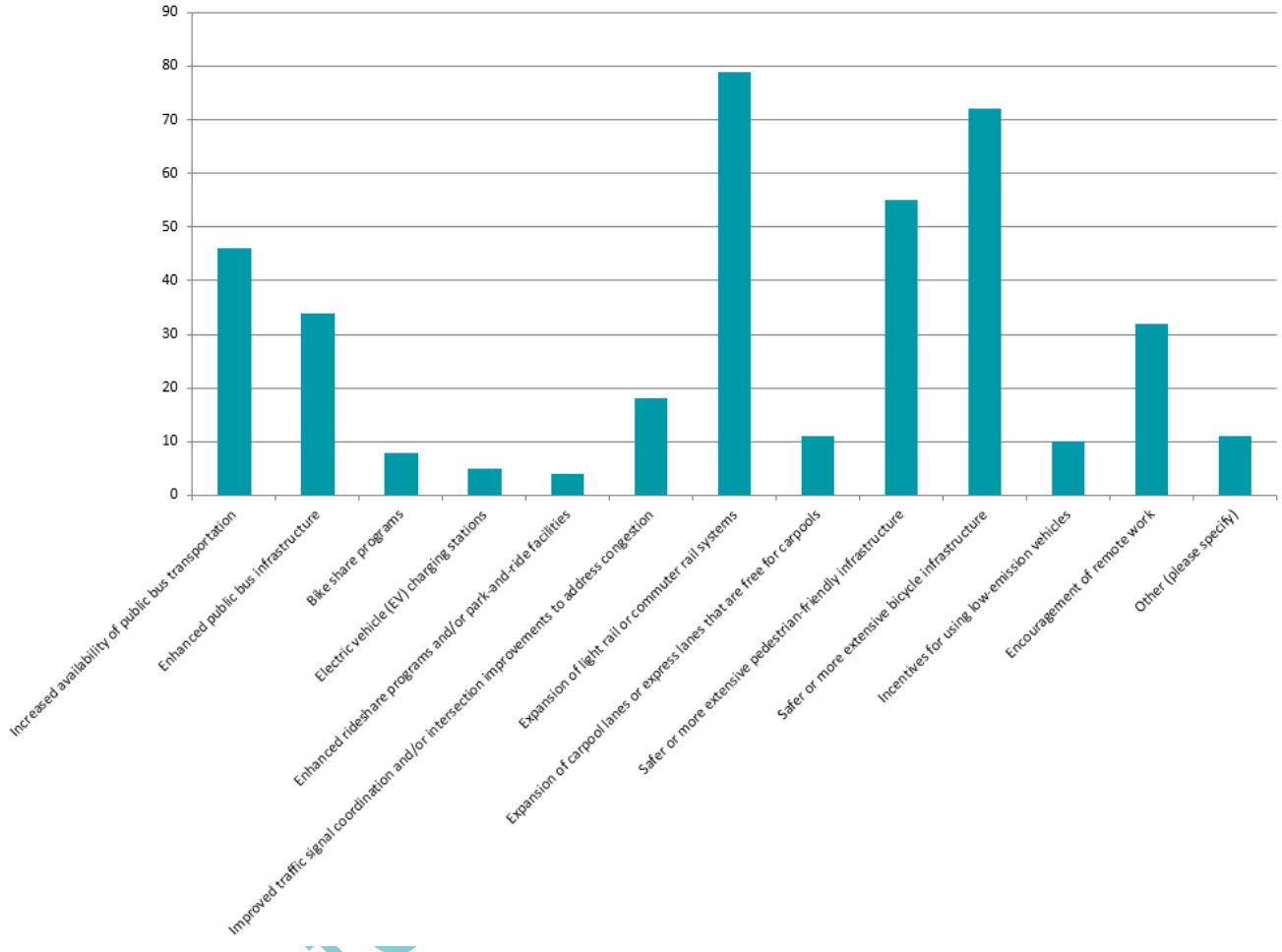
Q7 - What factors most influence your choice of how to travel (by driving, transit, biking, walking, etc.)? (Select up to three options.)

138 responses



Q8 – What transportation improvements would you like to see in your community? (Select up to three options.)

138 responses



Q9 – Please rank the priority of the factors below that you believe are most important for the region to consider when prioritizing strategies to reduce transportation emissions.

137 responses