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REVISED
EXECUTIVE MANAGEMENT COMMITTEE
AUGUST 18, 2022

SUBJECT: CLIMATE EMISSIONS ANALYSIS - METRO'S INDIRECT IMPACT ON GREENHOUSE GAS EMISSIONS

ACTION: RECEIVE AND FILE

RECOMMENDATION

RECEIVE AND FILE the Climate Emissions Assessment: Metro's Indirect Impact on Greenhouse Gas Emissions Report (Attachment A).

ISSUE

As transportation planner and coordinator, designer, builder and operator for the country's largest, most populous county, Metro has an important role to play in the fight against climate change and in meeting our global, state and local targets. Our current commitments and contributions to reducing greenhouse gas (GHG) emissions are detailed in several strategic documents, including the agency's *Climate Action & Adaptation Plan (CAAP)*, *Moving Beyond Sustainability (MBS),* and the *Long Range Transportation Plan (LRTP)*.

In September 2021, to build on these strategic plans, Director Garcetti requested additional details on the projected Vehicle Miles Traveled (VMT) and GHG emission impacts resulting from Metro's planned programs and policies.

As a first step in responding to this Board direction, Metro undertook an analysis to evaluate the individual VMT and GHG impacts of Metro's planned capital expansion projects, service improvements, pricing policies, and strategic programs, most of which are included in the LRTP and were similarly analyzed on a program level in support of that document. Recognizing the limitations of a disaggregated analysis approach, the VMT and GHG emission impact calculations that are presented for each program and initiative were prepared conservatively and the analysis does not account for the synergistic benefits or dampening effects of the holistic program laid out and analyzed in the LRTP.

Additionally, this analysis acknowledges the uncertainty associated with any transportation modeling exercise that involves forecasting future trends, present in this disaggregated analysis as well as program-level analyses such as the LRTP analysis. These uncertainties are particularly notable at

this moment in time, as the data used in this analysis pre-dates COVID-related shifts in travel behavior, land use patterns, and some of the fundamental relationships between the two. Given the above uncertainties, it is not possible to generate a high level of precision in the results.

The results of the analysis do offer high-level insight into the relative impacts of Metro's programs on GHG emissions only, as just one of many metrics that guide Metro's investment decisions in order to meet the goals outlined in Metro's Strategic Plan. The results are intended to provide a foundation for further study and to be a catalyst for the refinement of the analysis methodology.

BACKGROUND

In California, climate action planning is driven by the targets established in the 2016 Senate Bill 32 (SB 32), which establishes targets for Statewide emissions reductions of 40% from 1990 levels by 2030, and 80% from 1990 level by 2050.

Los Angeles County, as part of its commitment to the Paris Agreement, is moving toward a zero-carbon energy system. The *Our County* sustainability plan includes targets of achieving a 25% reduction in greenhouse gas emissions from 2015 levels by 2025, a 50% reduction in greenhouse gas emissions by 2035, and carbon neutrality by 2050. The *Our County* sustainability plan also includes targets to increase countywide trips by foot, bike, micromobility, or public transit to 15% of total trips by 2025 and to 50% by 2045, and targets to reduce daily vehicle miles travelled per capita to 20 miles by 2025 and 10 miles by 2045.

Achieving these reductions in GHG emissions in the transportation sector is critical to achieving the State, County, and City goals and in supporting the national commitment to the Paris Agreement. The transportation sector is responsible for 41% of the GHG emissions in the State of California and 52% of the GHG emissions for the Los Angeles County. Emissions from gasoline used in on-road passenger cars, trucks, and SUVs account for approximately 78 percent of the transportation inventory. Through its core services of providing bus and rail transit, Metro enables the traveling public to reduce their VMT, encouraging mode shift and disrupting single occupancy vehicle (SOV) driving habits.

Metro's own goal is to become a zero-emissions agency by 2050. The MBS and the CAAP include the target of achieving a 79% reduction in GHG emissions from 2017 baseline, by 2030. To reduce emissions, the MBS calls for reducing energy consumption by 17% at facilities from the 2030 Business as Usual scenario, transitioning Metro's fleet to zero emissions technology, and decarbonizing Metro's energy and fuel supply.

Metro also contributes to regional GHG emission avoidance by providing low- and zero-emissions modes of transportation and through the land use changes that occur in response to the transit system. In 2019, Metro's transportation services enabled over 900,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) to be avoided, with an estimated 20% as the direct result of individuals taking Metro rather than driving alone in SOVs, and the remaining 80% as an indirect result of changing land use patterns that result in a denser, mixed-use development pattern.

While Metro's existing transportation and mobility services already significantly reduce regional VMT,

Metro's suite of future initiatives will continue to play a key role in VMT reduction and GHG emission avoidance over time. As expectations for Metro's contribution to County and Regional GHG emissions reduction activities continue to evolve, the agency recognizes the need to understand better the relative VMT and GHG reduction benefits of Metro's various programs and policies.

DISCUSSION

Metro's 2020 Long Range Transportation Plan (LRTP) provides a detailed roadmap for planning, building, operating, maintaining, and partnering to deliver expanded transportation infrastructure and improved mobility over a 30-year timeframe. The programs and projects outlined in the 2020 *LRTP* include bus and rail infrastructure expansion, active transportation programs, transportation demand management, and highway modernization. Additionally, Metro has identified bold policies and programs to augment the implementation of the *LRTP* investments, including NextGen Bus Improvements and Congestion Pricing.

The *LRTP* quantifies the projected impact of Metro's planned programs holistically. The GHG impacts of each program had not previously been evaluated using a disaggregated approach. As Metro's responsibilities expand and VMT/GHG requirements continue to evolve, the agency recognizes the need to better understand the relative benefits of Metro's various programs.

As a result, Metro has undertaken this analysis of the individual VMT and GHG impacts of several of its major initiatives, using the *2020 LRTP* technical document and other Metro program studies as the basis for our assumptions. This analysis (Attachment A) offers high-level insight into the relative GHG emissions reductions resulting from the implementation of each of the LRTP initiative and additional efforts that have been advanced since the adoption of the LRTP. The VMT values for each program were used to estimate GHG emissions using per mile and trip-based emission factors from the California ARB's EMFAC model for each year between 2017-2047. The EMFAC model incorporates changing fleet mix assumptions, with the vehicle fleet becoming more efficient and producing fewer emissions per mile over time.

Disaggregating Metro's major transportation initiatives' individual VMT and GHG impacts is complicated and has significant limitations. Mobility patterns and behavior in Los Angeles County are highly interconnected. *Therefore, the results of this disaggregation analysis and the potential VMT and GHG impacts of Metro's planned programs are approximate, imprecise, and do not account for the holistic program's synergistic benefits or dampening effects.*

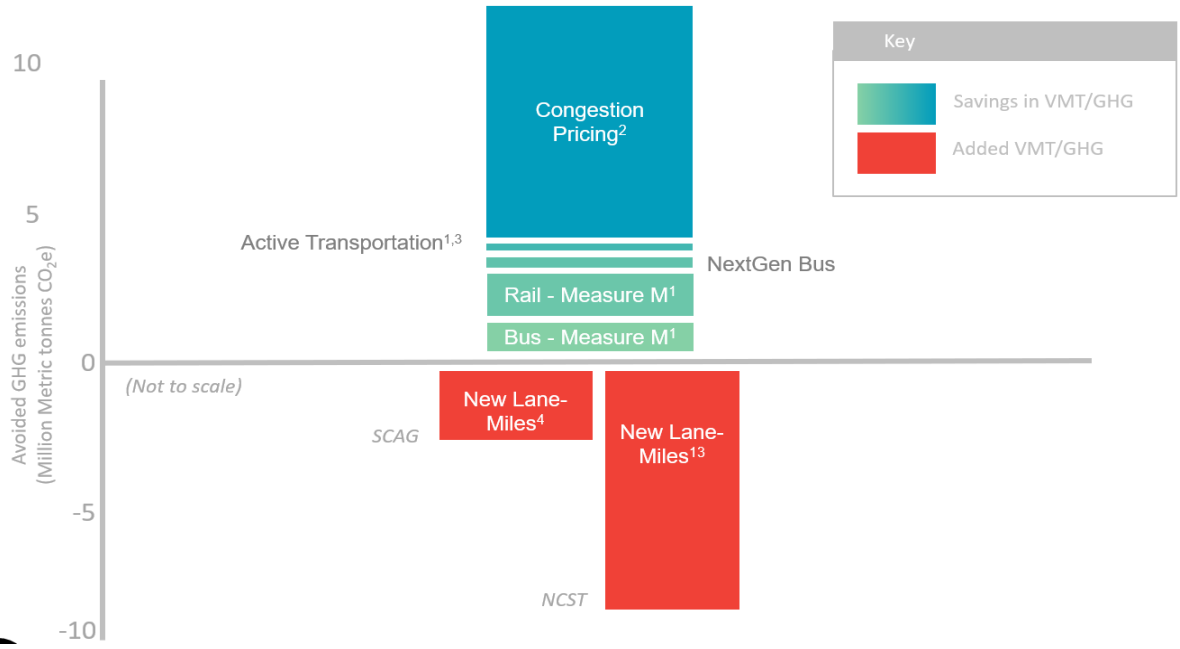
In addition, there is a lack of consensus among transportation planners about how to quantify the relationship between roadway projects and induced VMT, particularly when roadway projects incorporate multi-modal components as has been established as a priority for Metro's future roadway investments. This unresolved technical discussion is happening among planning entities in California in real time in relation to compliance with SB 743-- including in the working group for LA Metro's own VMT Mitigation Program led by Metro Planning staff. We do not attempt to resolve it these open technical questions related to the elasticity of various types of roadway facilities. The body of literature is based on historic nationwide data that is used to perform VMT calculations; however, the burden is on Self Help Counties to find locally relevant data. Instead, we point to a range of outcomes related to new capacity being added to roads and highways based on quantification approaches that

are under consideration.

Despite these limitations, this exercise is an important first step to better understanding the climate impacts of Metro programs relative to one another and throughout the county.

Disaggregated Impacts of Metro's Initiatives

This analysis used published methodologies developed by various agencies (California Air Resources Board and Caltrans) and best-available regional and local input model parameters wherever possible to estimate the VMT impacts for individual initiatives. The resulting VMT values for each of the programs were then used to estimate GHG emissions using per mile and per trip-based emission factors from the CARB's EMFAC model for each year between 2017-2047. Using the *LRTP* results and other Metro-provided data as the basis for this analysis was deemed appropriate and the quantification approach was found to be sound and acceptable by independent peer-reviewers.



[1] *Included in 2020 LRTP.*
[2] *Indicates initial modeled performance analysis, further scoping and detailed analysis required.*
[3] *This includes 244 miles of bike lanes across the County that further incentivizes the use of active transportation.*
[4] *Calculations of induced VMT from highway expansion calculated based on SCAG's Regional Travel Demand Model.*
[5] *Calculations of induced VMT from highway expansion calculated based on the NCST calculator, the statewide tool included in recent Caltrans SB 743 guidance.*

Overall, our preliminary calculations confirm the prior LRTP programmatic analysis showing that the implementation of Metro's *LRTP* and the other complementary strategic initiatives will reduce VMT and avoid greenhouse gas emissions.

Collaboration is Key

In a region with ambitious VMT and GHG reduction goals, Metro's existing and planned system alone is insufficient to meet the necessary State and county emission reduction targets. While these preliminary calculations provide initial estimates of the relative VMT and GHG impacts of the agency's major programs, deeper analysis is needed to fully identify the impacts of programs that Metro supports or funds in the region, such as Metrolink and municipal transit agencies, and the potential synergies across these programs. This analysis is a starting point for Metro and our regional partners to build consensus on a standardized methodology for evaluating the GHG impacts of our major programs.

Partnering agencies across the region must work together to tackle this challenge through meaningful, coordinated action, including land use polices that prioritize public transit, affordable housing, and denser, mixed-use development, economic policies that account for the real cost of driving, and bringing additional resources to the task of providing accessible and affordable zero emissions travel options for all. Current and future collaboration between Metro and other agencies, including the Caltrans, the Southern California Council of Governments (SCAG), LA County, the City of Los Angeles and other local jurisdictions, and the other five regional County Transportation Commissions, amongst others, is essential for successful climate action planning and mitigation, addressing both transportation and land use policies.

EQUITY PLATFORM

The analysis is not designed to be used for decision-making and it does not recommend actions to prioritize programs or funding since issues of equity and access to opportunity have not been evaluated. While this analysis scope does not include actions to prioritize programs or funding, it is recommended that issues of equity, mobility, and access be evaluated concurrently and given equal consideration during further study on the VMT and GHG emissions impacts of Metro's programs and projects. It is important to note the very low automobile ownership among Metro's bus and rail riders. Equity must be considered concurrently because some programs that advance VMT reduction goals may not advance equitable outcomes. Likewise, some programs that advance equity may not realize the greatest VMT reduction, but that does not make them any less worthwhile - the benefits and burdens of each program and project must be viewed holistically.

Equity related considerations that should be included in any Metro programs or projects include:

- Specific impacts to Metro's Equity Focus Communities (EFCs)
- Potential for disproportionate exposure to environmental burden
- Disparities in access to Metro services
- Unique or specific barriers related to gender, race, and/or varying abilities
- Vulnerabilities related to age, income, and/or chronic health conditions

- Potential for the displacement of business and/or residents

The projected reductions in VMT and GHG emissions will result from a combination of rail and bus capital projects, revised bus operations protocols, active transportation projects, and travel pricing strategies. These beneficial impacts of Metro's programs and policies from VMT reduction, including GHG emissions avoidance and enhanced public health, are Countywide in scope and scale. These projects and programs will be implemented throughout Metro's service territory, without focusing on geographically specific impacts.

However, there may be concurrent air quality improvements that could have a locally beneficial impact, including Metro's EFCs, disadvantaged communities (DACs), and areas with high CalEnviroScreen scores for pollution burden combined with high CalEnviroScreen scores for Sensitive Populations and/or Socioeconomic Factors.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

This report supports Metro's fourth and fifth Strategic Plan Goals. This analysis reaffirms the need to collaborate with regional agencies to establishes to set meaningful GHG and VMT reduction targets for Los Angeles County (Goal #4). This analysis also demonstrates responsive, accountable, and trustworthy governance in support of Board Motion 45 (Goal #5) by providing transparency through baselining our indirect climate emissions impacts.

The staff recommends that Metro work with our regional partners to build consensus on a standardized methodology for evaluating the GHG impacts of our major programs, ensuring consistency and a more accurate comparison between projects and strategies. All future sustainability and long-range plans and reports will address progress on the development and achievement of Metro's VMT and GHG targets, as well as financially unconstrained pathways to achieve these targets.

Metro staff will leverage the findings of this analysis and work cross-departmentally to:

- Standardize methodology for calculating the VMT and GHG impacts of projects and programs;
- Re-baseline Metro's estimates for the VMT and GHG impacts of projects and programs;
- Further explore the establishment of achievable regional VMT/GHG reduction targets for Metro and set a reporting structure and timeline to achieve these targets;
- Complete the development of the VMT Mitigation Program for Roads and Highways and ExpressLanes, and;
- Continue implementing Motions 2020-0412 and 2021-0467 to Modernize the Metro Highway Program
- Consistently apply equity considerations to Metro's current and future VMT/GHG reduction programs and projects.

ATTACHMENTS

Attachment A - Emissions Reduction Analysis: Metro's Regional Impact on Greenhouse Gas

Emissions
Attachment B - Metro Board Motion 45

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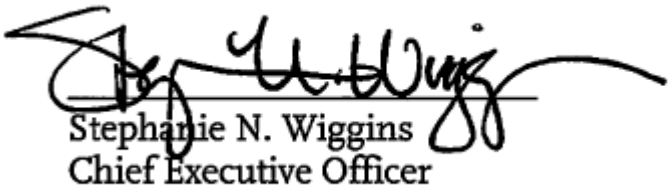

Stephanie N. Wiggins
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REVISED

CLIMATE EMISSIONS ANALYSIS:

METRO'S INDIRECT IMPACT ON GREENHOUSE GAS EMISSIONS

August 2022

Contents

EXECUTIVE SUMMARY 3

SECTION I: INTRODUCTION 7

Federal and State Climate Goals 7

Regional Climate Planning Efforts 8

Metro's Historical GHG Emission Impacts 10

Metro's Planning Efforts 11

SECTION II: GHG IMPACTS OF METRO'S TRANSPORTATION INVESTMENTS 12

Disaggregated Impacts of Metro's Initiatives 13

I. Transit Infrastructure Expansion 13

Bus System Expansion 13

Rail System Expansion 14

2. NextGen Bus Service 15

3. Active Transportation 16

4. New Lane Miles 17

ExpressLanes 18

5. Congestion Pricing 19

6. Impacts of Metro's other initiatives 21

Shared Mobility 21

Regional Transportation Demand Management (TDM) Program 21

Land Use Benefits of Transit 22

Metro's Net Impact on Regional GHG Emissions 22

SECTION III: NEXT STEPS 25

EXECUTIVE SUMMARY

As transportation planner and coordinator, designer, builder and operator for the country's largest, most populous county, LA Metro has a unique and critical role to play in the fight against climate change for the Los Angeles region. Our commitments and contributions to reducing greenhouse gas (GHG) emissions are detailed in several strategic documents, including the agency's 2019 *Climate Action & Adaptation Plan (CAAP)*, *Moving Beyond Sustainability (MBS)* strategic plan, and the *2020 Long Range Transportation Plan (LRTP)*. Through its core services of providing bus and rail transit, Metro enables the traveling public to reduce their vehicle miles traveled (VMT), encouraging mode shift and disrupting single occupancy vehicle (SOV) driving habits.

In fact, since 2012, Metro has consistently reduced more emissions through its transit services than it generates through daily operations[1]. Metro's efforts to further avoid regional GHG emissions are through a suite of transportation and mobility services paired with bold policies described in the 2020 *LRTP.* The purpose of this analysis is to explore further Metro's indirect impact on GHG emissions resulting from the implementation of these initiatives—including bus and rail infrastructure expansion, active transportation, demand management, and better bus service-- to reduce regional VMT, and thus takes the LRTP document as its point of departure.

When viewed holistically, LA Metro's planned initiatives are designed to have synergistic effects, enabling each program to leverage co-benefits, delivering a more efficient system than any programs could provide individually. By 2047, implementation of the *LRTP*'s capital investments is projected to increase annual transit trips per capita by 81%, reduce annual vehicle hours of delay per capita by 31% and ultimately avoid annual regional GHG emissions by 19% from the 2047 baseline scenario[2].

While the *LRTP* quantifies the projected impact of Metro's planned programs holistically, the impacts of each program have not previously been evaluated. As a result, Metro has undertaken this high-level quantification exercise to disaggregate the individual VMT and GHG impacts of each initiative identified above, using the *2020 LRTP* Technical Document and other on-going Metro programs and studies as the basis for our assumptions[3]. This work sheds light on how transportation policies and programs contribute to regional climate emissions, primarily through their impacts on travel patterns (mode-shift) and on vehicle miles traveled (VMT).

Disaggregating these programs' VMT and GHG impacts is complicated and has significant limitations. While VMT and GHG impact estimates for each program are presented in this report, there was consensus among the stakeholders involved in this assessment that the relative impacts of each program provide greater insight than the absolute values. This exercise is a first step to better understanding the benefits of Metro programs relative to one another and throughout the county. The results of this assessment are summarized in the table below.

[1] *Metro Climate Action and Adaptation Plan (Pg.13)*

[2] *Our Next LA 2020 Long Range Transportation Plan (Pg.22)*

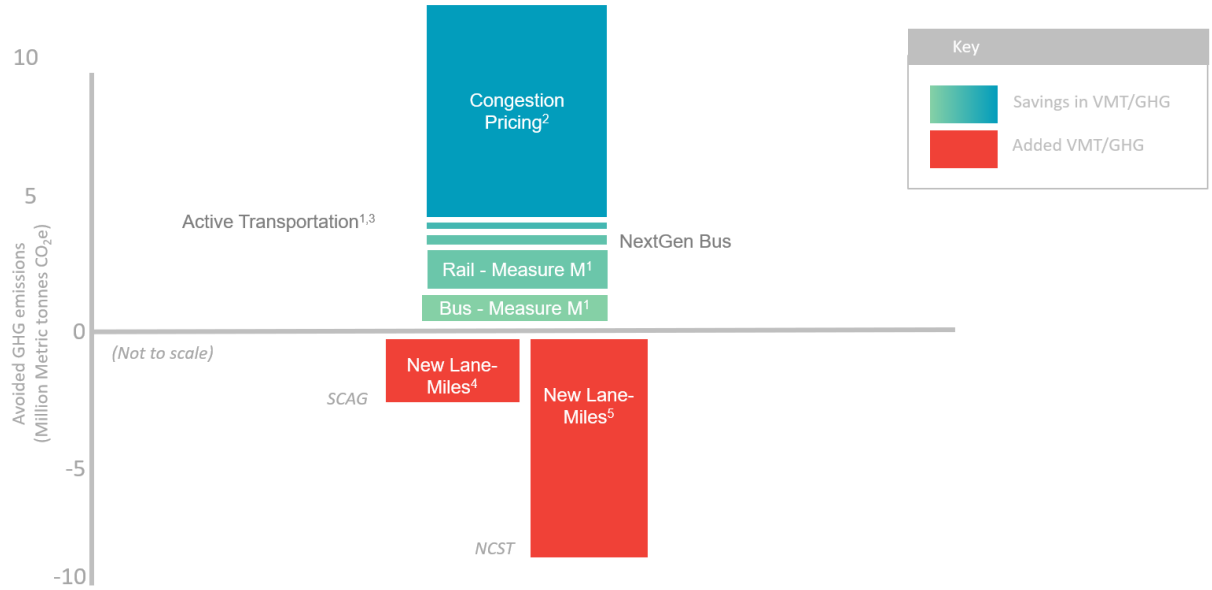
[3] *This quantification exercise used published methodologies from the California Air Resource Board and off-model calculations. All details on methodologies and assumptions can be found in the Climate Emissions Analysis Appendices.*

Disaggregated Impacts of Metro's Initiatives

Initiative	Impact on VMT In Target Years		Cumulative Impact on VMT[5]	Impact on GHG Emissions In Target Years ($MTCO_2e$)		Cumulative Impact on GHG Emissions ($MTCO_2e$)[5]
	2017	2047	2017 through 2047	2017	2047	2017 through 2047
Bus – Measure M[1]	-	-419,257,000	-3,574,723,000	-	-54,000	-1,002,000
Rail – Measure M[1]	-	-203,764,000	-5,491,555,000	-	-110,000	-1,517,000
NextGen Bus *(Starts in 2023)*	-	-25,113,000	-665,449,000	-	-7,000	-190,000
Active Transportation[1,2]	-75,000	-162,000	-3,650,000	-40	-60	-1,400
New Lane Miles (Low-High)[3]	- – -	+581,847,000 – +2,221,100,000	+9,582,876,000 – +36,880,300,000	- – -	+153,000 – +585,000	+2,632,000 – +10,111,000
Congestion Pricing[4]	-1,070,547,000	-1,307,450,000	-36,818,128,000	-401,000	-344,000	-10,926,000

***BLUE SHADING** Indicates more speculative bold policies and programs that require further analysis.*

Relative Change in GHG Emissions Resulting from Metro's Initiatives (Million Metric tonnes CO_2e)



1. *Included in 2020 LRTP (excludes Metrolink).*
2. *Indicates initial modeled performance analysis, further scoping and detailed analysis required.*
3. *This includes 244 miles of bike lanes across the County that further incentivizes the use of active transportation.*
4. *Calculations of induced VMT from highway expansion calculated based on SCAG's Regional Travel Demand Model.*
5. *Calculations of induced VMT from highway expansion calculated based on the NCST calculator, the statewide tool included in recent Caltrans SB 743 guidance.*

This analysis utilized published methodologies and best-available regional and local input model parameters wherever possible. Where locally derived data was not available, statewide default values were applied. Independent peer reviews deemed it appropriate to use the *LRTP* results and other Metro-provided data as the basis for this analysis. They found the quantification approach to be sound and acceptable. Nonetheless, the effort to disaggregate the individual VMT and GHG impacts of major

regional transportation initiatives has significant limitations that should be acknowledged due to the highly interconnected and synergistic nature of the transportation system in Los Angeles County.

The VMT and GHG emission impact calculations presented for each program and initiative were prepared conservatively and do not account for either the synergistic benefits or dampening effects of the holistic program laid out in the LRTP (for more detail on assumptions and calculations, see the Climate Emissions Analysis Appendices). The individual program-by-program results are not intended to be additive, and to sum up the results across all programs would misrepresent the findings presented in this analysis.

Additionally, this analysis acknowledges the uncertainty associated with any transportation modeling exercise, including uncertainty associated with input variables that are themselves estimations (for example, estimates, factors, and assumptions based on sampling); uncertainty in predictive variables (for example, future population growth or ridership trends as Metro's projects are completed); and propagated uncertainty through a sequence of calculations (for example, using point averages rather than a range as an input to a subsequent calculation step).

These sources of uncertainty are particularly notable at this moment in time, as the data used in this analysis pre-dates COVID-related shifts in travel behavior, land use patterns, and some of the fundamental relationships between the two. Specifically, this analysis uses pre-COVID projections for transit ridership and VMT. At the same time, post-COVID trends will be highly influenced by how temporary or permanent behavioral changes are in telecommuting, substitutions for mass transit and ride-hailing, increased walking and bicycling, changes in suburban or urban residential preferences, growth in e-commerce and their combined net effect on driving [4].

As a result, these estimates should be revisited every four years in alignment with the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) with updated assumptions, inputs, and variables that are likely to change over time. While the results accurately show the relative impacts of Metro's programs, it is not possible to have a high degree of precision in the results, given the above uncertainties. This analysis is intended to provide a foundation for further study and is not designed to inform decision making beyond catalyzing the development of a baseline and refining methodology. Further study is needed to quantify the impacts of each program more accurately. A standardized methodology needs to be adopted by Metro for conducting these analyses moving forward.

In a region with ambitious VMT reduction goals, Metro's existing system alone is insufficient to meet the necessary State and county emission reduction targets. In fact, substantial, coordinated, bold action must be taken at every level of governance to achieve a low carbon future. Collaboration between Metro and other agencies, including the Southern California Council of Governments (SCAG), LA County, the City of Los Angeles and other local jurisdictions, and the other five regional County Transportation Commissions, among others, is essential for successful climate action planning and mitigation, addressing both transportation and land use policies.

As a next step, it is recommended that Metro work with our regional partners to build consensus on a standardized methodology for evaluating the GHG impacts of our major programs, ensuring consistency and a more accurate comparison between projects and strategies. All future sustainability and long-range plans and reports should address progress on the development and achievement of Metro's VMT and GHG targets, as well as financially unconstrained pathways to achieve these targets.

[4] *Will COVID Drive an Early Peak in Transportation Activity and Oil Demand?*

Metro staff will leverage the findings of this analysis and work cross-departmentally to:

- Standardize methodology for calculating the VMT and GHG impacts of projects and programs;
- Re-baseline Metro's estimates for the VMT and GHG impacts of projects and programs;
- Further explore the establishment of achievable regional VMT/GHG reduction targets for Metro and set a reporting structure and timeline to achieve these targets;
- Complete the development of the VMT Mitigation Program for Roads and Highways, and ExpressLanes;
- Continue implementing Motions 2020-0412 and 2021-0467 to Modernize the Metro Highway Program, and;
- Consistently apply equity considerations to Metro's current and future VMT/GHG reduction programs and projects.

While critical, it is important to note that VMT reduction and GHG emissions avoidance are not the agency's only priorities. Metro also believes that equitable access to opportunity should be at the center of decision making around public investments and services. Issues of equity, mobility and access to opportunity should be evaluated concurrently during further study on the VMT reduction and GHG emissions avoidance benefits of Metro's programs and projects. Equity must be considered concurrently because some programs that advance VMT reduction goals may not advance equitable outcomes. In contrast, some programs that advance equity may not realize the greatest VMT reduction, but that does not make them any less worthwhile – the benefits and burdens of each program and project must be viewed holistically. For e.g., the Rail to Rail Active Transportation Corridor Project will promote biking and walking – thereby reducing VMT, but also increase road safety, access to transit and opportunities.

SECTION I: INTRODUCTION

Nations and communities worldwide are already facing dramatic examples of our changing weather patterns, including extreme heat, wildfires, drought, storms, flooding and sea level rise. The latest report from the Intergovernmental Panel on Climate Change (IPCC, 2022), the world's authoritative body on climate science, finds that the earth is projected to reach or exceed 1.5 degrees C (2.7 degrees F) of warming within the next two decades because of GHGs that are already present in the atmosphere. Limiting warming to this level, which is essential for preventing the most severe climate impacts, depends on mitigation actions taken during this decade. With 14% of global GHG emissions attributable to the transportation sector (road, rail, air, and marine transportation), and 95% of the world's transportation energy derived from petroleum-based fuels (largely gasoline and diesel[5]), avoiding GHG emissions associated with the transportation sector is a fundamental strategy in the global effort towards a low carbon future.

As transportation planner and coordinator, designer, builder and operator for the country's largest, most populous county, Metro has a critical role to play in the fight against climate change for the Los Angeles region. Our commitments and contributions to reducing greenhouse gas (GHG) emissions are detailed in several strategic documents, including the agency's 2019 *Climate Action & Adaptation Plan (CAAP)*, *Moving Beyond Sustainability (MBS)* strategic plan, and the *2020 Long Range Transportation Plan (LRTP)*.

This analysis aims to further explore Metro's impact on GHG emissions through the implementation of numerous initiatives that encourage mode shift away from single occupancy vehicle (SOV) driving. Mitigation measures that target operational emissions are outlined in the *CAAP* and are not considered in this report. Metro presents this initial analysis to evaluate the relative contributions of Metro's various programs on regional GHG mitigation efforts and in acknowledgment of the need for substantial and coordinated action to support, align with and contribute to regional, state, national and international efforts to address the climate crisis.

Federal and State Climate Goals

In alignment with the Paris Climate Agreement and President Biden's new GHG emission reduction target, the United States is committed to reducing the nation's total GHG emissions to 50%-52% below 2005 levels by 2030[6]. To meet these federal climate goals, reducing GHG emissions in the transportation sector is critical. The movement of people and goods is the single largest contributor to the U.S.'s share of GHG emissions, accounting for 29%[7] of the total.

The State of California has taken a decisive action by adopting a comprehensive suite of climate legislation, including commitments to:

- Reduce GHG emissions to 40% below 1990 levels by 2030.
- Reduce short-lived climate pollutants, like methane, by 40-50% below 2013 levels by 2030.
- Procure 60% of all electricity from renewable sources by 2030 and 100% by 2045.
- Generate consistent revenue for transportation projects that improve mobility efficiency and emissions reduction through an increased gasoline tax.
- Set regional GHG emissions targets and use the regional transportation planning process to

[5] *Global Greenhouse Gas Emissions Data.*
[6] *President Biden Sets 2030 Greenhouse Gas Pollution Target.*
[7] *Sources of Greenhouse Gas Emissions.*

achieve reductions in emissions.

> Direct at least 25% of state cap-and-trade revenues to projects that benefit disadvantaged communities.

Transportation generates 41%[8] of all GHG emissions in California, with the majority of emissions coming from on-road vehicles. To meet federal and state goals and targets, significant GHG emission reductions in transportation is essential. Many of the statewide strategies for reducing transportation related GHGs are focused on vehicle electrification, including Governor Newsom's Executive Order N-79-20 that combustion engine vehicles be phased out of new sales by 2035. While some of the GHG emissions resulting from increased VMT over the last few years have been offset by the state-mandated improvements in vehicle efficiency, electrification and increased fuel efficiency efforts must be combined with measures to actively reduce per capita VMT, particularly in the next decade while utilities are still transitioning their power supply from fossil fuels to renewables. Beyond the climate benefits, reducing VMT provides additional community benefits, including congestion reduction, air quality improvements, safety benefits, and increased access to existing and new mobility options.

Passed in 2013 and implemented in 2018, Senate Bill (SB) 743 modifies regulations under the California Environmental Quality Act (CEQA). It requires cities and counties in California to establish thresholds of significance for measured VMT. This threshold replaces the previously used Level of Service (LOS) and is now utilized to determine potential transportation impacts. According to SB 743, preference is given to land use and transportation planning decisions and investments that reduce VMT and contribute to the reduction in greenhouse gas emissions required.

This legislation at the state level models the type of strategic, aggressive action that must be taken at every level of governance to achieve a low carbon future and combat the climate crisis. Now more than ever, a regional focus on avoiding emissions in the transportation sector is crucial to meeting these targets.

Regional Climate Planning Efforts

Until recently, low gas prices and strong employment in LA County have made car ownership more widely accessible[9]. Additionally, increased housing costs have caused many historically high-users of transit to move away from more centralized, transit-rich neighborhoods. As a result, Metro's 2020 *LRTP* projects an upward trend in regional per capita VMT in future years[10]. Increased VMT may cause more congestion on LA County roads, more GHG emissions and more pollution – reducing the quality of life for all LA County residents.

For the Los Angeles region, GHG reduction and climate action require collaboration between several different governments and agencies, including Southern California Association of Governments (SCAG), Los Angeles County, the City of Los Angeles and other local jurisdictions, the region's various County Transportation Commissions (CTCs) and many others. Climate action planning for the region is coordinated through SCAG, which is required to prepare a Sustainable Communities Strategy (SCS) every four years in accordance with SB 375. The goal of the SCS is to reduce GHG emissions from cars and light duty trucks as a major strategy toward achieving the state determined regional GHG emission reduction targets.

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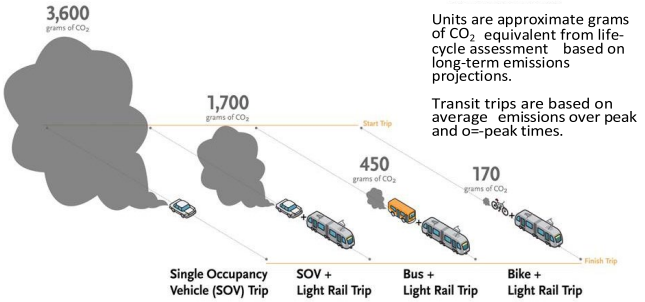
[8] Current California GHG Emission Inventory Data | California Air Resources Board.
[9] Lower Gas Prices Drive Down Cost of Car Ownership.
[10] 2020 Long Range Transportation Plan Technical Document (pg.121).

To prepare the SCS, SCAG compiles the capital projects and policies provided by Metro and the five other County Transportation Commissions in the SCAG region in the form of Long Range Transportation Plans (*LRTPs*). Metro's *LRTP* encompasses all of Metro's service growth and expansion plans. SCAG incorporates these plans into a regional analysis of program benefits. These program benefits are combined with regional land use forecasts. The resulting GHG emission avoidance values are submitted to the California Air Resources Board (CARB) for review and certification and then adopted by the SCAG Regional Council. In 2018, CARB established the following VMT and GHG reduction targets for the SCAG region:

- 8% per capita reduction in GHG emissions by 2020 (relative to 2005)
- 19% per capita reduction in GHG emissions by 2035 (relative to 2005)
- 5% decrease in daily vehicle miles per capita by 2045 (relative to baseline trend)

Greenhouse Gas Emission Benefits of Transit



Mikhail Chester et al, "Infrastructure and Automobile Shifts: Positioning Transit to Reduce Life-Cycle Environmental Impacts for Urban Sustainability Goals," Environmental Research Letters 8, no.1 (2013). doi:10.1088/1748-9326/8/1/015041

The 2020 – 2045 SCS titled *Connect SoCal* outlines how the planned programs of the six CTCs (including Metro) aim to achieve these GHG reductions through implementing projects and policies that reduce VMT. The SCS targets a 5% decrease in daily VMT per capita, with a target daily VMT of 20.7 miles by 2045, as compared to the 2016 baseline of 23.2 miles.

While not part of the SCS development process, Los Angeles County's *OurCounty* Sustainability Plan recognizes the important role of the County in achieving regional goals. Strategy 8A related to mobility, establishes the following VMT reduction targets:

- By 2025, achieve a 20-mile average daily VMT and 15% of all trips made by foot, bike, micro-mobility or public transit.
- By 2035, achieve a 15-mile average daily VMT and 30% of all trips made by foot, bike, micro-mobility or public transit.
- By 2045 achieve a 10-mile average daily VMT and 50% of all trips made by foot, bike, micro-mobility or public transit.

Metro is identified as a key partner in the *OurCounty* plan. Many of the actions described in the plan are consistent with the projects and policies included in Metro's planning and program efforts. However, the County targets are aspirational and set much more aggressive targets than the current regulations that guide the SCS and *LRTP* process. These targets consider the impact of land use policy changes in addition to programs that directly reduce SOV trips and are intended to serve as guideposts for future planning efforts by LA County, LA City, the regional transportation agencies and other regulatory decision makers, and in shaping upcoming SCS efforts. As part of Motion 45, Metro will be referencing these goals while considering the development of regional VMT reduction and mode shift targets for the agency.

Metro's programs also contribute to the City of Los Angeles' commitment to achieving climate neutrality for community wide GHG emissions by 2050. The City of Los Angeles' *Green New Deal* plan outlines a series of mobility and zero emissions vehicle targets that contribute to meeting the 2050 goal, including:

- Increasing the percentage of all trips made by walking, biking, micro-mobility/matched rides or transit to at least 35% by 2025; 50% by 2035; and maintain at least 50% by 2050.

> Reducing VMT per capita by at least 13% by 2025; 39% by 2035; and 45% by 2050.

> Increase the percentage of electric and zero emission vehicles in the city to 25% by 2025, 80% by 2035 and 100% by 2050.

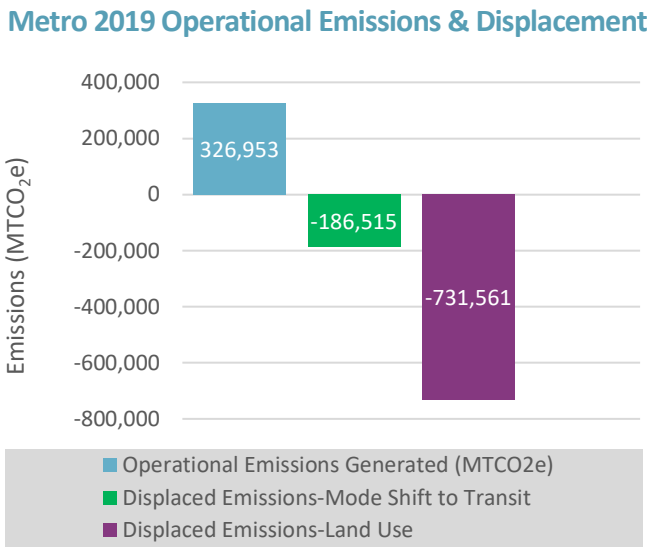
> Electrify 100% of LA Metro and LADOT buses by 2030.

Metro is partnering with the City of Los Angeles to support several plan measures, including improving bike and pedestrian safety, reducing bus travel times, providing infrastructure for zero emissions buses, and providing shade structures for riders to mitigate heat island effects.

Metro's Historical GHG Emission Impacts

Metro must measure and monitor the agency's impacts to meet its aggressive emission reduction goals. Metro generates GHG emissions through operational activities, including transportation operations (rail and bus fleet), as well as non-modal sources (non-revenue vehicles, facility energy use, etc.). However, Metro also contributes to regional GHG emission avoidance by providing alternative modes of transportation and through the land use changes that occur in response to the transit system. Since 2012, Metro has consistently reduced more emissions indirectly through its transit services than the agency generated through operations. In 2019, Metro's transportation services avoided over 900,000 metric tons of carbon dioxide equivalent ($MTCO_2e$). An estimated 20% of these emissions were avoided as a direct result of individuals taking Metro rather than driving alone in SOVs, known as mode-shift.

The remaining 80% of emissions were avoided as an indirect result of changing land use patterns that result from the presence of Metro's service[11], known as the land-use effect[12]. A more dense, mixed-use development pattern adjacent to transit resources results in more walking and cycling and less driving, even by those who do not use public transportation. When thinking regionally, an increase in transit service and transit ridership translates to an increase in avoided GHG emissions.



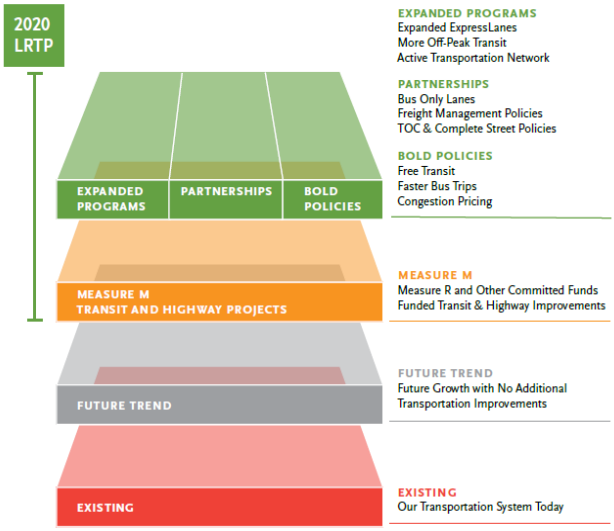
While Metro's existing transportation and mobility services already significantly reduce regional VMT, Metro's suite of initiatives will play a key role in VMT reduction and GHG emission avoidance through mode shift and land use patterns, in support of regional and state GHG emission reduction goals.

[11] *2019 Climate Action and Adaptation Plan (pg.13)*
[12] *APTA 2018 (pg.9).*

Metro's Planning Efforts

Metro's *2020 Long Range Transportation Plan (LRTP)* provides a detailed roadmap for planning, building, operating, maintaining, and partnering to deliver expanded transportation infrastructure and improved mobility over a 30-year timeframe. The capital investments laid out in the plan include the construction or improvement of 22 transit corridors, expanding the Metro rail network to over 200 stations covering nearly 240 service miles, expanding Bus Rapid Transit service to more communities, highway enhancements, along with regional rail improvements.

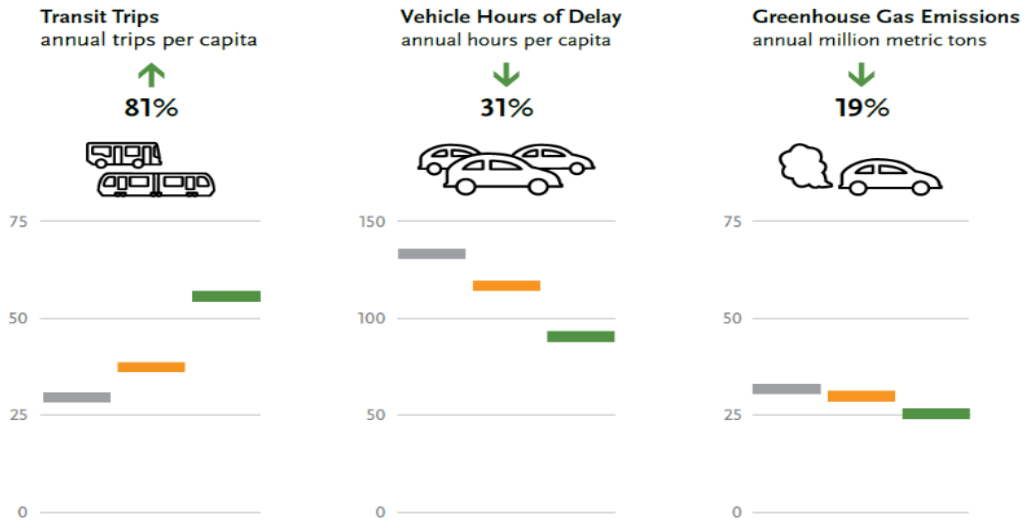
Elements of the 2020 *LRTP*



In addition to these capital investments, Metro has identified bold policies and programs to augment these infrastructure improvements, including Reduced Fare/Free Transit, NextGen Bus improvements, and Congestion Pricing. When viewed holistically, these initiatives are designed to have synergistic effects, enabling each program to leverage co- benefits across the other initiatives and deliver a more efficient system.

By 2047, implementation of the *LRTP*, including the adoption of these bold policies, is projected to increase annual transit trips per capita by 81%, reduce annual vehicle hours of delay per capita by 31% and ultimately decrease annual regional GHG emissions by 19% from the 2047 future trend scenario[13].

Holistic Benefits of Metro's Initiatives Outlined in the *LRTP*



[13] *Our Next LA 2020 Long Range Transportation Plan (pg.22).*

SECTION II: GHG IMPACTS OF METRO'S TRANSPORTATION INVESTMENTS

The *LRTP* quantifies the projected impact of Metro's planned programs holistically. The GHG impacts of each program had not previously been evaluated using a disaggregated approach. As Metro's responsibilities expand and VMT/GHG requirements continue to evolve, the agency recognizes the need to better understand the relative benefits of Metro's various programs and standardize Metro's methodology for calculating, forecasting and tracking emissions and VMT reductions across the county.

As a result, Metro has undertaken this analysis of the individual VMT and GHG impacts of several of its major initiatives, using the *2020 LRTP* technical document and other Metro program studies as the basis for our assumptions. The resulting VMT values for each program were then used to estimate GHG emissions using per mile and trip-based emission factors from the CARB's EMFAC model[14] for each year between 2017-2047. Disaggregating the VMT and GHG impacts of these programs is complicated and has significant limitations this exercise is the first step to better understanding the benefits of Metro's programs relative to one another and throughout the county. While the estimated VMT and GHG impacts that can be attributed to individual programs are presented in this report, there was consensus among the stakeholders involved in preparing this assessment that the *relative* impacts of each program provide greater insight than the absolute values. The results of this assessment are summarized in the following sections of this report, including the projected VMT and GHG emissions impact for each program individually[15].

This analysis used published methodologies and best-available regional and local input model parameters wherever possible. Where locally derived data was not available, statewide default values were used. Using the *LRTP* results and other Metro-provided data as the basis for this analysis was deemed appropriate and the quantification approach was found to be sound and acceptable by independent peer-reviewers. However, because the transportation system in Los Angeles County is highly interconnected and synergistic, the effort to disaggregate the individual VMT and GHG impacts of major regional transportation initiatives has significant limitations that should be acknowledged.

The VMT and GHG emission impact calculations presented for each program and initiative in the following text were done conservatively and do not account for either the potential synergistic benefits or dampening effects of the holistic program laid out in the LRTP (*for more detail on assumptions and calculations, see the Climate Emissions Analysis Appendices*). The individual program-by-program results are not intended to be additive, and to sum up the results across all programs would misrepresent the findings presented in this analysis.

Additionally, this analysis acknowledges the uncertainty associated with any transportation modeling exercise, including: uncertainty associated with input variables that are themselves estimations (for example, estimates, factors, and assumptions based on sampling); uncertainty in predictive variables (for example, future population growth or ridership trends as Metro's projects are completed); and propagated uncertainty through a sequence of calculations (for example, using point averages rather than a range as an input to a subsequent calculation step).

These sources of uncertainty are particularly notable at this moment in time, as the data used in this analysis pre-dates COVID-related shifts in travel behavior, land use patterns, and some of the fundamental relationships between the two. Specifically, this analysis uses pre-COVID projections for transit ridership and VMT, while post-COVID trends will be highly influenced by how temporary or

[14] *California Air Resources Board Emission Factor model.*

[15] *This quantification exercise used published methodologies from the California Air Resource Board and off- model calculations. All details on methodologies and assumptions can be found in the Climate Emissions Analysis Appendices.*

permanent behavioral changes are in telecommuting, substitutions for mass transit and ride-hailing, increased walking and bicycling, changes in suburban or urban residential preferences, growth in e-commerce and their combined net effect on driving [16].

The methodologies used in this analysis were developed by various agencies (California Air Resources Board and CALTRANS) to estimate emissions at the project-level. As a result, these estimates should be revisited regularly with updated assumptions, inputs, and variables that are likely to change over time. While the results accurately show the relative impacts of Metro's programs, it is not possible to have a high degree of precision in the results, given the above uncertainties. This analysis is intended to provide a foundation for further study and is not designed to inform decision-making beyond catalyzing the development of a baseline and refinement of methodology. Further study is needed to quantify the impacts of each program accurately and a standardized methodology needs to be adopted by Metro for conducting these analyses moving forward.

Disaggregated Impacts of Metro's Initiatives

1. Transit Infrastructure Expansion

The foundation for Metro's package of initiatives is the planned expansion of the bus and rail transit system. Funding for this expansion is provided by Measures M and R, LA County sales tax measures to fund projects to ease traffic congestion, repair local streets and sidewalks, expand public transportation, retrofit bridges for earthquakes and subsidize transit fares.

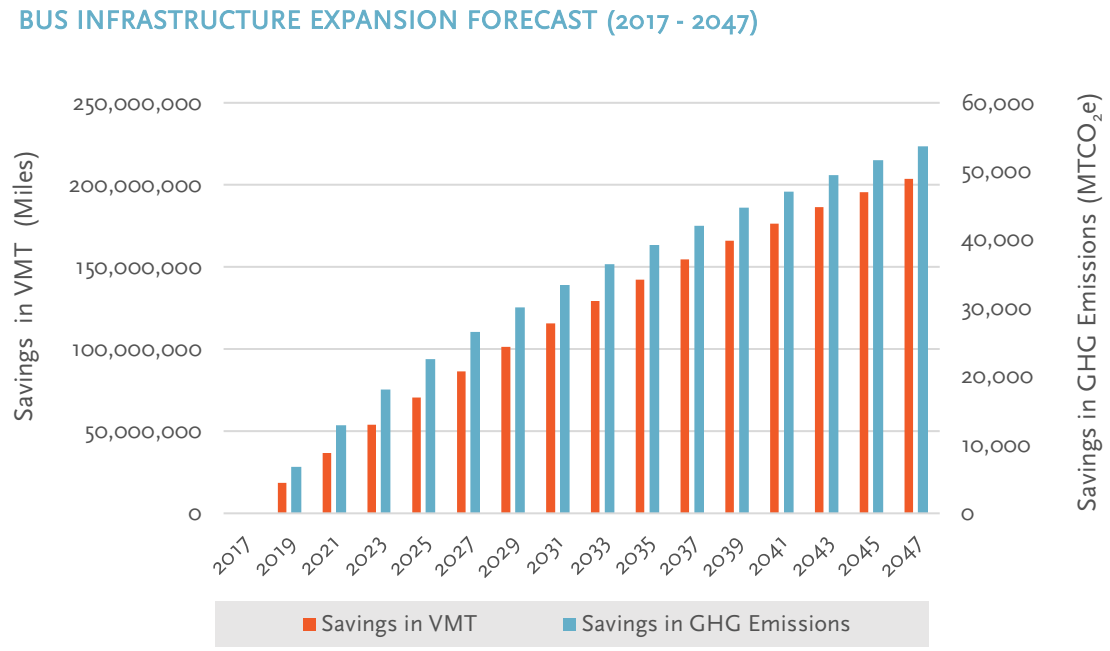
Bus System Expansion

Metro's bus network is the core of the LA County public transport system and currently accounts for approximately three-quarters of weekday ridership across the whole system[17]. Through Measure M, Metro is making infrastructure improvements to increase the bus system's speed and carrying capacity. The *BRT Vision and Principles Study*, released in 2020, identified performance standards and design criteria for all future Bus Rapid Transit (BRT) projects, including bus-only lanes, traffic-signal priority, high-quality stations with all-door boarding, integration with transit-oriented communities and safe pedestrian and bicycle connections. These improvements will expand Metro's bus-based transit system and establish a network of fast, high-frequency and high-capacity bus service across LA County.

Near-term bus system projects include the North Hollywood to Pasadena BRT and the North San Fernando Valley Transit Corridor (Chatsworth to North Hollywood). Future projects will also include converting strategic Metro Rapid corridors (routes identified as high traffic and faster service) to BRT corridors with dedicated bus-only lanes.

While the bus network will continue to play an important role in providing mobility services, as Metro invests in expanding the rail network, it is expected that the share of Metro riders taking the bus will decrease from 72.7% in 2017 to 50.1% in the horizon year of 2047. Using the Quantification Methodology developed for the California Climate Investments (CARB, 2019), Metro's bus infrastructure expansion projects are projected to continue to shift people from SOV trips onto public transit, reducing over 3.5 billion VMT and avoiding over 1.0 million $MTCO_2e$ greenhouse gas emissions in the LA region between 2018 and 2047.

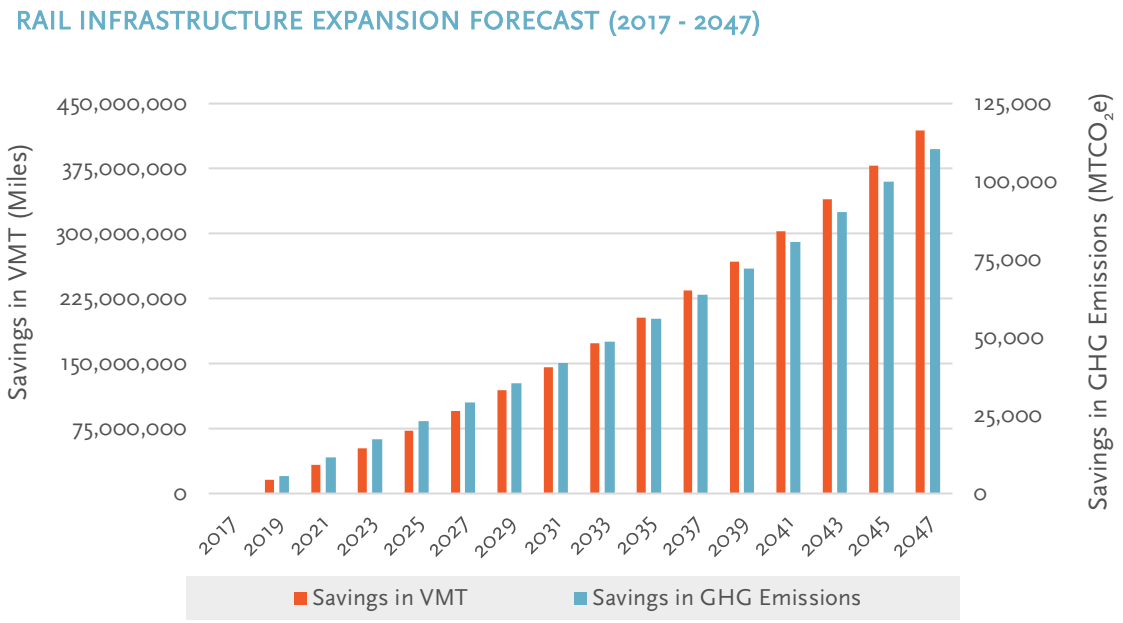
[16] *Will COVID Drive an Early Peak in Transportation Activity and Oil Demand?*
[17] *Metro Interactive Estimated Ridership Stats.*



Rail System Expansion

Metro operates six rail lines throughout the county, including four light rail lines (A, C, L, E) and two heavy rail lines (B, D). Expansion plans funded by Measure M will bring the Metro rail network to over 200 stations covering nearly 240 rail service miles. Construction is currently underway on several of these new rail corridors. The Crenshaw/LAX Transit Project light rail line, expected to open in FY 2023, will extend from the E Line (Expo) to the C Line (Green), with a station at the Los Angeles International Airport's Automated People Mover. The Regional Connector Transit Project, scheduled to open in 2022, will connect the L Line (Gold) to the A Line (Blue) and E Line (Expo) to provide more stations and greater connectivity in downtown Los Angeles. The Westside D Line (Purple) subway extension along Wilshire Boulevard is under construction in three phases, with Section 1 from Western to La Cienega scheduled to open in 2024. Other near-term projects include the Metro Gold Line Foothill Extension to Claremont, which recently broke ground, the East San Fernando Valley Light Rail Project, the West Santa Ana Branch Transit Corridor and the C Line (Green) Extension to Torrance.

Metro's heavy and light rail network currently carries approximately one-fourth of the average weekday ridership in Los Angeles. Both systems are powered by electricity, delivered through the third rail or the overhead catenary. Using the Quantification Methodology developed for the California Climate Investments (CARB, 2019), the rail infrastructure expansion projects are projected to shift people from personal auto travel onto the rail system, reducing nearly 5.5 billion VMT and avoiding 1.5 million $MTCO_2e$ GHG emissions in the LA region between 2018 and 2047.



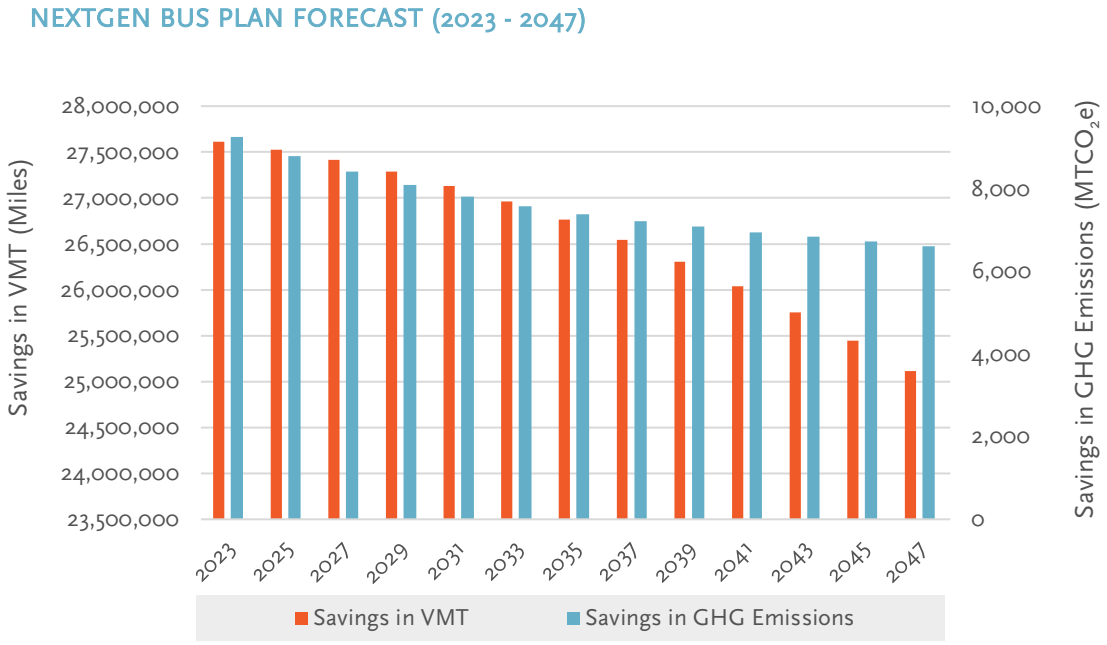
The average length of a trip displaced by transit is considered the same for bus and rail riders. Although the bus system currently carries three times more riders than the rail system in Los Angeles, the investments in the rail system are expected to increase the share of rail riders from 27.3% in 2017 to 49.9% in the horizon year 2047. While the required investment to expand the rail system is higher than that of the bus system due to acquisition of right-of-way and construction and procurement of related infrastructure (power transmission, rolling stock etc.), these investments are expected to result in larger reductions in personal auto VMT and GHG emission avoidance due to higher car ownership rates among rail riders compared to bus riders. The historical costs for the bus system were lower than rail as they use the existing infrastructure (roads and highways) and have comparatively cheaper rolling stock. However, in the future, as Metro moves towards electrifying the entire bus fleet, the investment costs for bus infrastructure will increase.

2. NextGen Bus Service

Metro is currently implementing the NextGen Bus Plan, a reimagining of Metro's bus service delivery to make transit a more appealing and convenient choice than driving. During the NextGen Bus Study's development, the public identified bus speed and reliability improvements as the single most important step Metro could take to retain and grow ridership, increase the carrying capacity of local roadways and shift regional travel patterns toward more efficient modes. Based on rigorous study, robust public input, and technical analysis, the redesigned bus system is expected to make bus service more competitive relative to other travel options by providing faster, more frequent and reliable service, giving Los Angeles residents and commuters an alternative to sitting in gridlock and improving transportation equity (e.g., improving travel time parity between modes and improving travel times and access for existing riders).

The bus improvement program's potential benefits include reduced bus overcrowding through more frequent and faster service, improved safety for motorized and non- motorized users, and reduced GHG emissions and VMT due to shifts from use of personal autos. The service enhancements achieved from this project are expected to support rider retention and increase ridership by at least 5% over the

baseline[18]. The shift of passengers from personal vehicles to the improved bus services is estimated to reduce nearly 0.7 billion VMT and avoid nearly 0.2 million $MTCO_2e$ between 2023 and 2047.



3. Active Transportation

Active transportation programs play a role in reducing VMT by offering transportation alternatives that enable people to leave their cars at home. On their own, active transportation investments will reduce the shortest trips first, resulting in nominal VMT reductions. However, active transportation programs have synergistic benefits, including enabling the shift to transit for longer trips. The VMT reductions associated with those trips are already captured in the rail and bus calculations above. Investments in active transportation can be considered prerequisite to achieving the VMT reductions from bus, rail and NexGen investments through the creation of more walkable and bikeable neighborhoods, enabling short trips to be taken by foot or bike. Active transportation projects are important in public transit's overall attraction and accessibility and provide auxiliary community benefits, such as improving pedestrian safety and motivating more people to walk instead of using vehicles.

Metro's active transportation programs advance the agency's ongoing commitment to enhance access to transit stations, create safer streets and develop a regional network to improve mobility for people who walk, bike and take transit. Emphasizing first/last mile access to transit, Metro's Bike Share program, Bike Parking Program, and the First/Last Mile Program support the emission benefits of the bus and rail network by enabling car-free regional travel. Since the Metro Bike Share program launched, riders have collectively pedaled over four million miles and reduced over 3.8 million pounds of CO_2 emissions from the air[19]. However, most planning and support for active transportation and complete streets projects occurs at the local level.

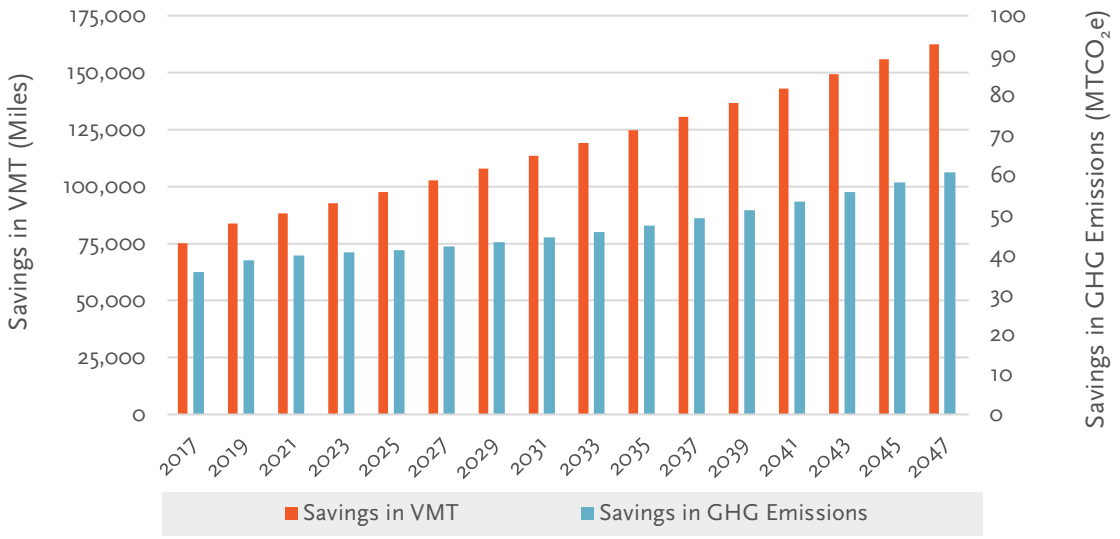
Metro's Active Transport, Transit and First/Last Mile (MAT) Program provides more than $850 million to local jurisdictions to support design and implementation of convenient connections and efficient transfers between transportation modes, including walking and bicycling and rolling. These are also the

[18] *NextGen Bus Speed & Reliability Improvements (pg. 21).*
[19] https://bikeshare.metro.net/about/data/

most affordable means of transportation in LA County. This competitive grant program will fund active transportation infrastructure projects throughout the region. Beyond the $850 million already committed, an additional $365 million is dedicated to the LA River Path project, which will close an eight-mile gap through downtown Los Angeles in the existing multi-use path. Additionally, other Metro funding streams, notably Measure M's Multi-Year Subregional Programs, are utilized for active transportation projects.

Metro's investments in active transportation projects include major facilities and bicycle and pedestrian programs at the local level, providing a better environment for non-motorized travel and improving the modes' connectivity to transit. Combined with the projects implemented by the local jurisdictions, these are projected to reduce 3.6 million VMT and avoid over 1,400 $MTCO_2e$ GHG emissions in the LA region between 2017 and 2047, as estimated using the Methods to Find the Cost-Effectiveness of Funding Air Quality Projects for Evaluating Motor Vehicle Registration Fee Projects and Congestion Mitigation and Air Quality Improvement (CMAQ) Projects (CARB, 2019).

ACTIVE TRANSPORTATION (CYCLING, WALKING, ROLLING) FORECAST
(2017 - 2047)



4. New Lane Miles

New lane miles added to the Metro system come in the form of additional miles on highways, in ExpressLanes and as part of major arterials. These improvements are designed to:

- Improve traffic flow, trip reliability and travel times
- Improve regional mobility and system performance
- Reduce recurring congestion, high-frequency traffic incident locations and operational deficiencies on state highways in LA County
- Enhance multimodal efficiency, safety, equity, and sustainability

Metro is also prioritizing project enhancements that encourage VMT reduction and improve safety, such as multi-modal connectivity projects, freeway interchange improvements, signal synchronization, transit signal priority, integrated corridor management and arterial street improvements. Metro's new highway construction projects will mitigate their VMT impacts to a level classified as less than significant under

CEQA (as required by SB 743). Based on current Caltrans policy, it is likely that future highway projects that include general purpose and high occupancy vehicle lanes will be required to mitigate any VMT impacts by directly incorporating VMT-reducing project components or by providing funding through a bank or exchange to meet these new requirements.

While the benefits of adding new lane miles include reducing congestion and idling emissions, these projects also induce travel as capacity increases and congestion eases. Despite improvements to fuel efficiency over time, without VMT mitigation required by SB 743, these projects are likely to increase regional VMT and GHG emissions. Recognizing that highways are part of LA County's transportation infrastructure and are necessary for supporting integrated-corridor management and goods movement in LA County, Metro is committed to trying to mitigate the effect of new lane miles and thinking about these challenges holistically.

One common approach to estimating the induced travel effects of building new lane-miles is to use an elasticity of VMT with respect to added lane miles. This calculation quantifies how a percent increase in lane miles generates a percent increase in VMT. For example, an elasticity of 1.0 means a 10% increase in lane miles results in a 10% increase in VMT, an elasticity of 0.5 means a 10% increase in lane miles results in a 5% increase in VMT, and so on.

Using a lower elasticity (such as those derived by SCAG from their locally developed regional Travel Demand Model) produces a lower estimate of induced VMT, while using a higher elasticity (such as the Caltrans-approved UC Davis Induced Travel Demand Calculator produced by the National Center of Sustainable Transportation), produces a higher estimate of induced VMT. For highway project development and approval, using a local tool that has been sufficiently and dynamically validated to local conditions would produce an estimate that is based more closely on and reflective of local conditions. At the time of writing, Caltrans regularly requires the UC Davis Induced Travel Demand Calculator, which results in a larger estimate for induced VMT when a regional Travel Demand Model does not meet the criteria in their Checklist for Evaluating Adequacy of Travel Demand Models for Estimating Induced Travel[20]. Through a separate effort, Metro is undertaking an evaluation of SCAG's regional Travel Demand Model against Caltrans' Checklist.

Therefore, in our analysis, the long-term induced VMT generated by adding new lane-miles were calculated using a range, bounded by a lower, locally-preferred elasticity number from SCAG (0.23), and a higher, Caltrans-preferred number (1.0). (*For more detail on assumptions and calculations, see the Climate Emissions Analysis Appendices*).

Cumulatively, the proposed expansion of lane miles in the LA region is expected to induce between 9.5 billion and 36.8 billion VMT and between 2.6 million and 10.1 million $MTCO_2e$ GHG emissions, as estimated using the UC Davis induced travel demand calculator[21].

ExpressLanes

Metro's ExpressLanes on the I-110, I-10, and I-105 improve the corridor performance through a reduction in recurring peak period congestion and travel times, as well as an increase in average speeds, throughput and reliability for freight shipments and travelers. These lanes address the existing degradation of the High-Occupancy Vehicle (HOV) lanes by deploying dynamic pricing to manage existing capacity better, thereby offering greater travel time reliability and an enhanced mobility choice

[20] *Transportation Analysis Framework, Caltrans (2020).*
[21] *Induced Travel Calculator, National Center for Sustainable Transportation.*

to travelers.

Specifically, the Metro I-110 and I-10 projects converted and expanded the existing HOV carpool lanes to ExpressLanes, sometimes referred to as High-Occupancy Toll (HOT) lanes, where carpoolers, vanpoolers and eligible clean air vehicles are permitted to use the lanes at no charge with a valid FastTrak® Flex switchable transponder. Single occupant vehicles (SOVs) are given the option to pay a variable toll to avoid congestion.

The I- 110/I-10 ExpressLanes are dynamically priced based on real-time traffic demand in the facility, with prices increasing or decreasing based on the current usage of the ExpressLanes. By using variable pricing to manage traffic demand, traffic flow in the ExpressLanes is continuously managed to maintain speed and flow, providing a reliable alternative to the heavily congested general-purpose lanes (GPLs). The ExpressLanes toll revenue is used to increase mobility and person throughput within the I-10 and I-110 corridors through the implementation of integrated strategies that enhance transit operations, transportation demand management, transportation systems management, active transportation, and capital investments. So far, the Metro Board has approved 20 projects totaling $19 million as part of the Round 1, approved another 21 projects totaling $27 million as part of the Round 2 of the ExpressLanes Net Toll Revenue Grant Program, and allocated a $100 million (net revenue) for multimodal projects/bus services.

Implementing managed/priced lanes, such as ExpressLanes, could influence demand for travel in two directions or could have a negligible effect on VMT, depending on the project conditions. First, converting a general-purpose lane to a managed/priced lane can reduce demand for travel, as the cost of available lane-mile capacity increases. Second, constructing new managed/priced lanes offers additional capacity both directly as a result of the new lane miles, and indirectly as vehicles vacate the general-purpose lanes they were once using in favor of the managed/priced lanes, thereby opening additional capacity on the general-purpose lanes. This additional capacity can have the effect of inducing VMT over a long-range timeframe. The induced travel effect of the new ExpressLanes being constructed is already included in the new lane-miles analysis. Lastly, converting an existing HOV carpool lane to an ExpressLane, as proposed in Metro's I-110 and I-10 projects, is likely to have a negligible impact on VMT.

5. Congestion Pricing

Beyond utilizing pricing with the ExpressLanes Program, Metro's Congestion Pricing initiative is investigating the use of traffic surge pricing to regulate the volume of traffic on the road during peak rush hours. A Traffic Reduction Study (formerly called the Congestion Pricing Feasibility Study) is being conducted to determine:

- If a traffic reduction program would be feasible and successful in LA County.
- Where and how a pilot program with congestion pricing and complimentary transportation options could achieve the project goals of reducing traffic congestion.
- Identify willing local partners to collaborate with on a potential pilot program.

The study explores implementing a congestion pricing model for four concept areas. These areas would require payment of a fee during congested periods of the day. Through engagement with stakeholders and the public, the study is exploring how to realize additional positive outcomes that will benefit residents, workers and businesses in LA County, including improving the economy, supporting environmental and economic justice, and improving health and safety. Potential areas to implement a congestion pricing pilot program include the Santa Monica Mountains Corridor (1A) and US 101 & I-5

Corridor (1B), Downtown LA Freeways Corridor (2), Downtown LA Cordon (3) and the I-10 West of Downtown LA Corridor (4). Initial findings indicate that implementing traffic reduction fees in these concept areas would cause a significant number of people to shift transportation modes to transit, carpool, walking and biking and would also improve air quality.

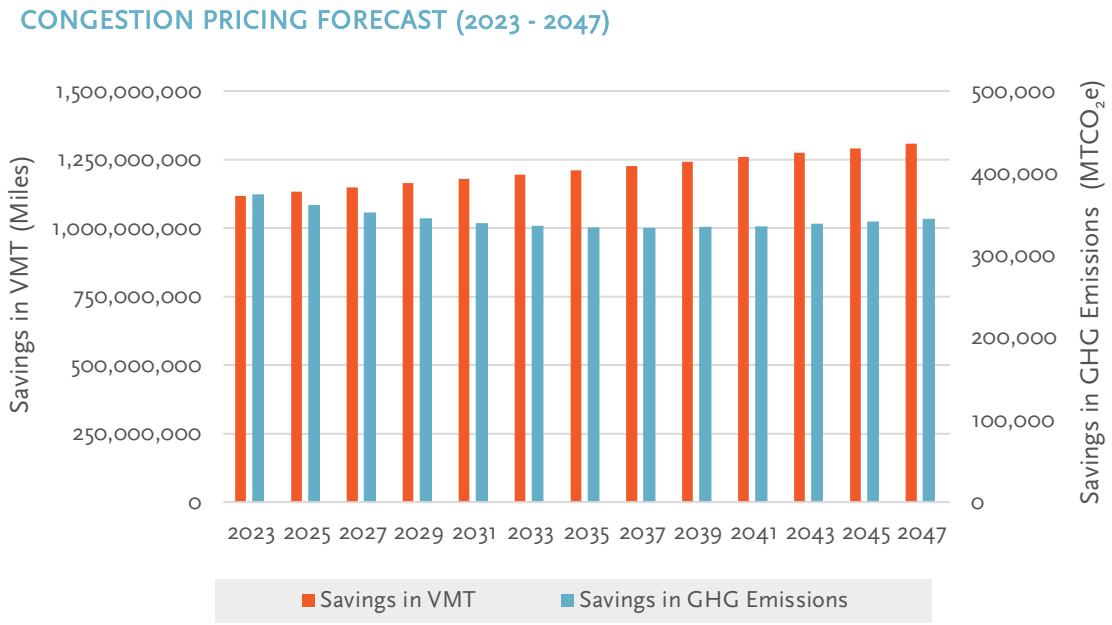
Metro is still in the early stages of studying traffic reduction fees in one or more of these concept areas. However, other major cities have successfully implemented congestion pricing for some time. London adopted congestion fees in Central London in 2003 to help reduce congestion and time spent in traffic. As a result, congestion is greatly reduced, and the program helped London achieve its transportation mode shift goals, with 65% of all trips in the city taking place by walking, cycling or public transportation in 2018[22]. Congestion pricing is also being implemented in 2022 for the New York metropolitan region with an estimated 6.8% reduction in VMT[23]. Metro is investigating whether or not similar benefits could be expected in LA County.

WSP conducted a study with the goal of reducing congestion by pricing the Urban Core, Central Business District (CBD) and Urban Business District (UBD) areas in LA County. With this scenario, trips to a UBD, CBD and Urban Core zone will be charged $3/trip, $6/trip and $9/trip, respectively. Further, using the freeway exit ramps to a CBD and Urban Core zone will increase the fees by an additional $3/trip and $6/trip, respectively. A 1.33% reduction in VMT for LA county is currently predicted from the congestion pricing scenario modeling[24]. If these reductions are realized, congestion pricing would reduce nearly 37 billion VMT and avoid nearly 11 million $MTCO_2e$ GHG emissions between 2017 and 2047.

Concept Area	Concept Area Name	Estimated Daily Change in Weekday Hours of Traffic Delay in 2025*	Estimated Daily Change in Weekday Vehicle Miles Traveled in 2025*
1A	Santa Monica Mountains Corridor	-34,000	-380,000
1B	US 101 & I-5 Corridor	-13,000	20,000
2	Downtown LA Freeways Corridor	-45,000	-890,000
3	Downtown LA Cordon	-44,000	-1,300,000
4	I-10 West of Downtown LA Corridor	-17,000	-360,000

(Source: https://thesource.metro.net/2021/06/24/with-congestion-increasing-heres-an-update-on-metros-traffic-reduction-study/)

[22] *How Road Pricing is Transforming London – and What Your City Can Learn*
[23] *Baghestani, A., Tayarani, M., Allahviranloo, M. and Gao, H.O., 2020. Evaluating the traffic and emissions impacts of congestion pricing in New York City. Sustainability. 12(9), (pG.3655)*
[24] *WSP, Memo: Cordon Pricing Scenario Results for the LRTP Scenario Modeling*



6. Impacts of Metro's Other Initiatives

Other than those already discussed above, Metro also benefits from strategies that reduce SOV trips by encouraging alternatives, such as transit, ridesharing, mobility on demand, vanpooling, walking, biking, shared parking and telework. These strategies are included in the discussion for informational purposes only and are not included in our analysis results because they were not modeled in the *LRTP.*

Shared Mobility

The core focus of Metro's Shared Mobility program is assisting employers and commuters with alternatives to a SOV commute. Examples include utilizing multi-faceted rideshare/mobility programs including carpooling, vanpooling, transit ridership, telecommuting, biking and walking options. Metro's Vanpool Program is one of the largest publicly-funded vanpool programs in the nation, providing essential mobility options for commuters throughout the Southern California region. Through a monthly vanpool subsidy of up to $600, this program incentivizes commuters to reduce single-occupancy VMT by more than 100 million miles annually.

The Shared Mobility program supports Employee Transportation Coordinators at employers across the region who are required to complete regulatory compliance activities for the South Coast Air Quality Management District's Rule 2202. All services are also offered to employers regulated by city/local congestion management strategies and are open to interested unregulated employers and individual commuters looking for an alternative to their drive-alone commute.

Collectively these programs helped avoid 13.7 million VMT and 15.5 million pounds of GHG emissions in FY20 and 21.7 million VMT and 22.8 million pounds of GHG emissions in FY21[25].

Regional Transportation Demand Management (TDM) Program

As identified in the *LRTP*, the Regional TDM Program supports efforts to reduce VMT across LA County by promoting alternatives to SOV trips to the public. Post-pandemic programs include an app advertised

[25] *Planning and TDM Team Communications: FY20 & FY21 Program Impact Estimates.*

inside hotel rooms for visitors to use transit; encouraging county residents to take transit for leisure trips; piloting an incentive program through an FTA AIM grant partnership with Duke University and rolling out a countywide community-based ride matching program that will match residents for carpooling, vanpooling and transit. Additionally, Metro is developing a Countywide TDM outreach campaign to increase awareness of its TDM programs. The campaign will focus on using data, best practices and innovative marketing strategies to change mobility behavior, increasing utilization of non-SOV modes.

Land Use Benefits of Transit

In addition to the direct VMT and GHG reductions resulting from mode shift, the bus and rail expansion projects contribute toward VMT reduction and GHG emission avoidance in LA County by promoting changes in land-use patterns. While Metro has limited control over county land use policies, Metro partners with local governments to create better connections to the regional transportation system.

Metro has adopted a Transit Oriented Community (TOC) Policy formalizing Metro's commitment to partner with the 88 cities and unincorporated areas in LA County to support TOC activities. The goal of the TOC policy is to link local projects to Metro's regional transit investments to achieve five key goals:

- Increase transit ridership and choice
- Stabilize and strengthen communities around transit
- Engage organizations, jurisdictions and the public
- Distribute transit benefits for all
- Capture value created by transit

These communities are designed to make it more convenient to take transit, walk, bike or roll than to drive, and contribute to VMT reductions and GHG avoidance due to land-use.

Metro's Net Impact on Regional GHG Emissions

Based on the modeling conducted for the *2020 LRTP,* Metro's suite of initiatives has a net positive benefit on the LA County region by reducing the VMT associated with personal-auto travel – both through mode-shift and by land-use benefits. Ranging from transit infrastructure expansion and service improvements to travel demand management and pricing policies, these programs are designed to have synergistic effects across the region that will decrease SOV trips, reduce regional VMT and avoid GHG emissions.

Despite the limitations associated with this analysis, our preliminary calculations indicate that implementation of Metro's *LRTP* and the other complementary strategic initiatives will reduce VMT and deliver beneficial land use patterns, putting the agency on track to exceed the GHG avoidance targets outlined in the 2019 *Climate Action and Adaptation Plan and the Moving Beyond Sustainability* strategic plan[26]. The results of this disaggregation analysis and the potential impacts of Metro's planned programs are summarized in the table below.

[26] *Calculations do not consider multimodal synergy of Metro ExpressLanes influencing increase in parallel transit ridership.*

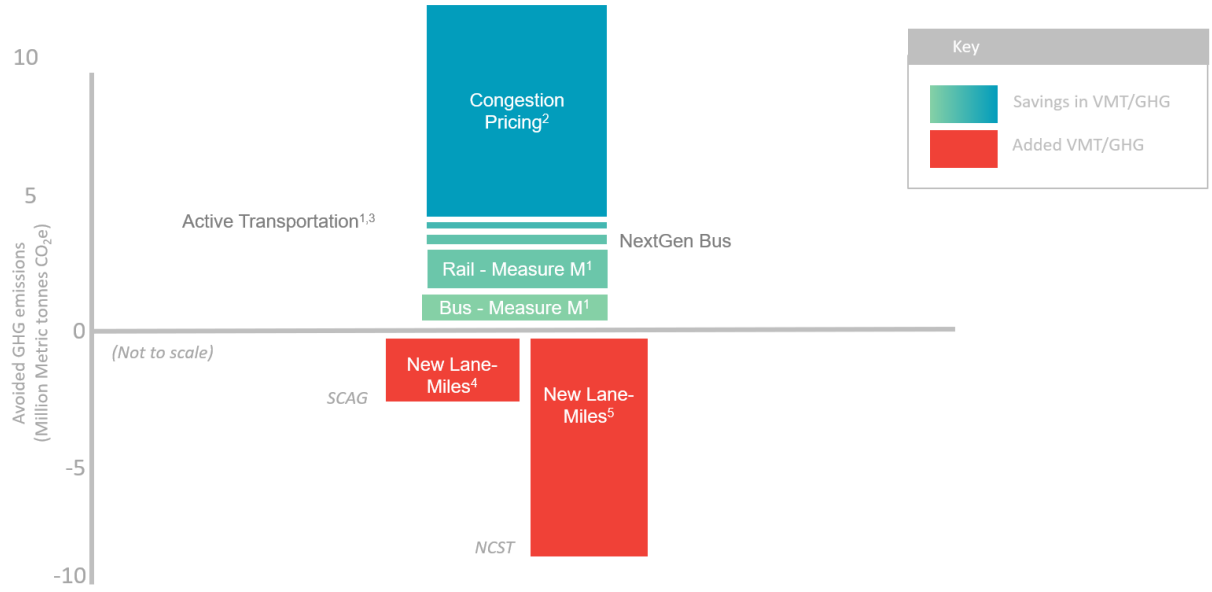
Disaggregated Impacts of Metro's Initiatives

Initiative	Impact on VMT In Target Years		Cumulative Impact on VMT[5]	Impact on GHG Emissions In Target Years ($MTCO_2e$)		Cumulative Impact on GHG Emissions ($MTCO_2e$)[5]
	2017	2047	2017 through 2047	2017	2047	2017 through 2047
Bus - Measure M[1]	-	-419,257,000	-3,574,723,000	-	-54,000	-1,002,000
Rail - Measure M[1]	-	-203,764,000	-5,491,555,000	-	-110,000	-1,517,000
NextGen Bus *(Starts in 2023)*	-	-25,113,000	-665,449,000	-	-7,000	-190,000
Active Transportation[1,2]	-75,000	-162,000	-3,650,000	-40	-60	-1,400
New Lane Miles (Low-High)[3]	- – -	+581,847,000 – +2,221,100,000	+9,582,876,000 – +36,880,300,000	- – -	+153,000 – +585,000	+2,632,000 – +10,111,000
Congestion Pricing[4]	-1,070,547,000	-1,307,450,000	-36,818,128,000	-401,000	-344,000	-10,926,000

***BLUE SHADING** Indicates more speculative bold policies and programs that require further analysis.*

Relative Change in GHG Emissions Resulting from Metro's Initiatives (Million Metric tonnes CO_2e)

The chart below shows the relative the GHG impacts from each program evaluated in this study.



1. *Included in 2020 LRTP (excludes Metrolink).*
2. *Indicates initial modeled performance analysis, further scoping and detailed analysis required.*
3. *This includes 244 miles of bike lanes across the County that further incentivizes the use of active transportation.*
4. *Calculations of induced VMT from highway expansion calculated based on SCAG's Regional Travel Demand Model.*
5. *Calculations of induced VMT from highway expansion calculated based on the NCST calculator, the statewide tool included in recent Caltrans SB 743 guidance.*

However, given the complexity of disaggregating these programs, the results of this analysis contain several uncertainties as described above. While the results accurately show the relative impacts of

Metro's programs, it was not possible to have a high degree of precision in the absolute results. Further study is needed to more accurately quantify the impacts of each program and develop a standardized methodology for conducting these analyses moving forward.

The greatest potential impact of these programs comes from the more speculative bold policies and programs that move beyond infrastructure, including increasing access to free transit, implementing a mileage based VMT fee or implementing congestion pricing. Without investments in supporting infrastructure and transit services, these bold policies and programs would not yield the desired results and could have negative side effects on those who are least able to afford an increased cost of travel. Overall, when implemented effectively, Metro's bold policies have an immediate and considerable impact on encouraging LA County residents to seek non-SOV modes of travel and use the multi-modal options provided by Metro and other agencies across the region.

SECTION III: NEXT STEPS

This analysis is intended to provide a foundation for further study and is not designed to inform decision making beyond catalyzing the development of a baseline and refinement of methodology. While we have completed preliminary calculations and provided initial estimates of the relative VMT and GHG impacts of the agency's major programs, deeper analysis is needed to fully identify the impacts of programs that Metro supports or funds in the region and the potential synergies across other programs being implemented by the various regional agencies.

As a preliminary analysis, these estimates and calculations have helped clarify that Metro's programs and planned infrastructure alone will not meet the aggressive VMT reduction targets laid out by the *OurCounty* Plan. Without control over land use and development in the county, Metro has limited influence over the transportation decisions of LA County residents and those who travel in and out of LA County for business or pleasure daily. Greater support is needed from local municipalities and councils of governments in prioritizing public transit in land-use decisions and developing complete streets and strategic, affordable housing that facilitate public transportation use. In addition, Metro has a long history of partnering with SCAG to model its program's VMT and GHG impacts through the development of the LRTP and the SCS. We recognize that additional collaboration is needed to maximize effectiveness and coordination across the region.

As a next step, Metro should work internally and with our regional partners to build consensus on a standardized methodology for evaluating the GHG impacts of major programs, ensuring consistency and enabling more accurate comparison between projects and strategies. Additionally, Board Motion 45 recommends that Metro set agency specific VMT reduction and mode shift targets to guide decision making on future project and program investments. It is recommended that the Office of Sustainability work with Metro Planning to develop achievable GHG reduction targets that help align Metro with the updated CARB Scoping Plan and SCAG goals. All future sustainability and long-range plans and reports should address progress on the development and achievement of Metro's VMT and GHG targets. In addition, the Roads and Highways group should proceed with developing options for a VMT mitigation program.

It is important to note that VMT reduction and GHG emissions avoidance are not the agency's only priorities. Metro also believes that equity and access to opportunity should be at the center of decision making around public investments and services. Issues of equity, mobility and access should be evaluated concurrently and given thoughtful consideration during further study on the VMT and GHG emissions impacts of Metro's programs and projects. Equity must be considered concurrently because some programs that advance VMT reduction goals may not advance equitable outcomes, while some programs that advance equity may not realize the greatest VMT reduction, but that does not make them any less worthwhile – the benefits and burdens of each program and project must be viewed holistically.

Metro is also evaluating how to effectively communicate the unique role the agency can and will play in avoiding regional GHG emissions and looks forward to continued conversations on how Metro's initiatives contribute to achieving regional and statewide goals and targets.

Transportation infrastructure, programs and service investments must be targeted toward those with the greatest mobility needs first, to improve access to opportunity for all.

Metro

Board Report

File #: 2021-0769, **File Type:** Motion / Motion Response **Agenda Number:** 45.

REVISED
REGULAR BOARD MEETING
DECEMBER 2, 2021

Motion by:

DIRECTORS GARCETTI, SOLIS, KUEHL, BONIN, AND MITCHELL

Addressing Climate Change through Vehicle Miles Traveled Reduction:
Aligning with State of California Climate Goals

Across the globe, cities and countries are taking action to reduce greenhouse gas (GHG) emissions in order to spare future generations from the worst effects of climate change. President Biden rejoined the Paris Agreement and, most recently at the United Nations Framework Convention on Climate Change Conference of the Parties (COP26), committed to reducing GHG emissions 50-52% below 2005 levels in 2030. Additionally, the Infrastructure Investment and Jobs Act, which authorizes billions of dollars in highway, transit, and safety programs, has a strong climate change focus.

The state of California is a global leader in addressing climate change and is prioritizing infrastructure that will support reduced GHG emissions. Governor Newsom's Executive Directive N-19-19 aligns state programs, including $5 billion in annual transportation spending, with GHG reduction goals. The state has set goals in line with global needs under AB 32, now updated under SB 32. Currently, surface transportation is responsible for the largest share of statewide GHG emissions and as such, reducing vehicle miles traveled (VMT) is a central goal to successfully addressing climate change.

Under SB 375, the California Air Resources Board (CARB) sets GHG targets, including VMT reduction goals, for each Metropolitan Planning Organization in the state. The Southern California Association of Governments (SCAG) creates the Regional Transportation Plan/ Sustainable Community Strategy (RTP/ SCS) goals in line with these state goals.
However, as the Metropolitan Transportation Authority overseeing surface transportation in Los Angeles County, Metro has not yet adopted VMT reduction goals in support of the SCAG or CARB targets. In 2019, the County of Los Angeles published a Countywide Sustainability Plan (OurCounty) which created VMT reduction and accompanying mode shift goals, in line with SCAG and CARB targets. Currently, approximately 11% of all commute trips in Los Angeles County were made by foot, bike, micromobility, or public transit, based on 2015 U.S. Census data, and daily trips averaged 21.9 VMT per capita in Los Angeles County in 2017 based on Caltrans analysis.

SUBJECT: ADDRESSING CLIMATE CHANGE THROUGH VEHICLE MILES TRAVELED REDUCTION: ALIGNING WITH STATE OF CALIFORNIA CLIMATE GOALS

RECOMMENDATION

APPROVE Motion by Directors Garcetti, Solis, Kuehl, Bonin, and Mitchell that Metro develop VMT reduction and mode shift targets consistent with and supportive of those in the OurCounty Plan and SCAG RTP/SCS for Board adoption as part of the annual Sustainability Plan update in September 2022.

WE FURTHER DIRECT the CEO to:

A. Include in the Long Range Transportation Plan, Sustainability Plan, and regular reports on the progress of each, financially unconstrained analysis providing options to meet the above goals; and,

B. Include, and present to the Board for consideration, VMT reduction and mode shift projections in project alternatives, operations budgets, program performance, or similar actions that allocate resources toward climate change reduction.

WE FURTHER DIRECT the CEO to use the VMT reduction and mode shift targets of the 2019 OurCounty Plan, as follows, for interim planning and forecasting purposes:

- 2025 Targets:
  - Reduce average daily VMT per capita to 20 miles
  - Increase to at least 15% all trips by foot, bike, micromobility, or public transit

- 2035 Targets:
  - Reduce average daily VMT per capita to 15 miles
  - Increase to at least 30% all trips by foot, bike, micromobility, or public transit

- 2045 Targets:
  - Reduce average daily VMT per capita to 10 miles
  - Increase to at least 50% all trips by foot, bike, micromobility, or public transit

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