

2025 Los Angeles County Metropolitan Transportation Authority Climate Action and Adaptation Update – Final

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Executive Summary

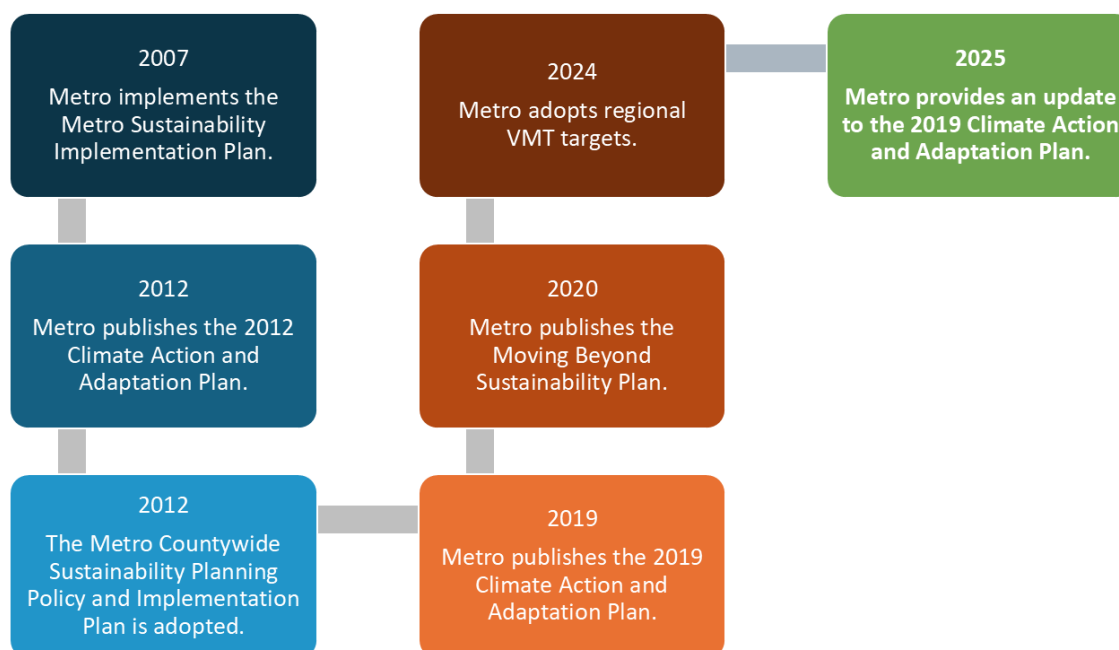
The Los Angeles (LA) County Metropolitan Transportation Authority (Metro) system serves a broad range of mobility needs in a large, interconnected region. The goals set out in our 2019 *Climate Action and Adaptation Plan* (CAAP) support Metro’s overarching mission to deliver a world-class transportation system that enhances the quality of life for all who live, work, and play in LA County, while reducing greenhouse gas (GHG) emissions and increasing system resilience.

The 2019 CAAP outlines a set of policies, programs, and projects for Metro to reduce operational GHG emissions, displace regional GHG emissions, and become more resilient to the impacts of climate-related events such as extreme heat, flooding, or power disruptions. By focusing on both adaptation and mitigation, Metro is reducing operational emissions while investing in systems that can resume service quickly after extreme weather events and ensure the safety of transit riders.

2025 Climate Action and Adaptation Plan Update Objective

The objective of the 2025 CAAP Update is to share progress made to reduce GHG emissions and prepare for the impacts of climate change since the publication of the 2019 CAAP. This CAAP Update also integrates GHG reductions related to the adoption of regional Vehicle Miles Traveled (VMT) targets in 2024 (**Figure 1**).

Figure 1. Metro Climate Action and Adaptation Timeline



A Holistic View of Metro's Climate Actions

Public transportation is a powerful tool for reducing GHG emissions. Metro's fundamental role in the region is to provide reliable and sustainable public transportation options. Through operation of our rail and bus services, major capital project investments and the implementation of an ambitious Long Range Transportation Plan, Metro is reducing transportation emissions by providing low-carbon transportation options to LA County residents, employees, and visitors. By continuing to decarbonize our operations, Metro also contributes to achieving regional and statewide emissions reduction goals. This CAAP Update offers insights into the transformative climate actions that Metro has undertaken above and beyond providing foundational, low-carbon rail and bus services, including an overview of the regional and local collaborations Metro participates in to support wider climate goals.

Operational Greenhouse Gas Emissions Reductions

The 2019 CAAP established an operational GHG reduction goal of 79% from 2017 levels by 2030, or roughly 300,000 metric tons of carbon dioxide equivalent (MTCO_{2e}). As of 2023, Metro reduced emissions by over 65% from the 2017 baseline, demonstrating steady progress toward achieving our 2030 goal.

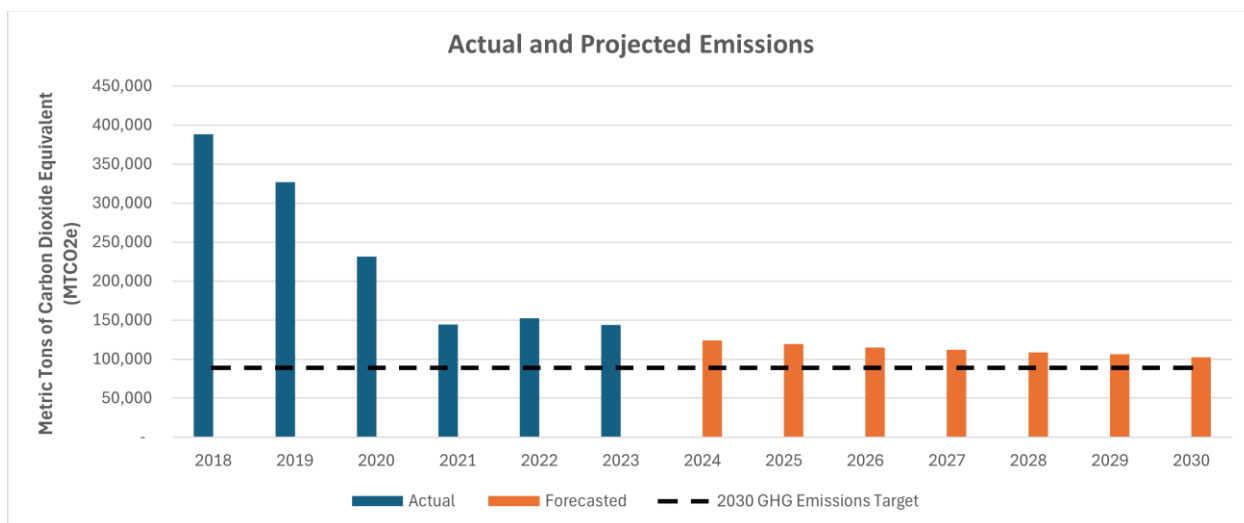
This achievement is largely due to Metro's transition away from the use of diesel fuel for our buses. Since 2017, Metro's bus fleet transitioned to renewable compressed natural gas (biomethane or renewable natural gas). Zero Emissions Buses (ZEBs) were introduced on the Metro G Line in the San Fernando Valley in 2019 and Metro expects to achieve a fully ZEB fleet by 2035.

As shown in **Figure 2**, the forecast projects that Metro will reach 76% reduction from 2017 GHG levels by 2030, slightly less than the 79% goal established in the 2019 CAAP.¹ This is largely due to Metro's reliance on utilities including LADWP and Southern California Edison to provide the electricity that power our vehicles and facilities. While Metro's electricity providers are transitioning to carbon-free sources, per the State Renewable Portfolio Standard or the commitments in the LA Green New Deal, the pace of grid energy decarbonization is a hinderance to Metro's ability to meet the 2030 goal. Pursuing initiatives, such as the purchase of "green power," or electricity with higher levels of renewable energy content from LADWP or from the region's community choice energy provider, Clean Power Alliance, are options to further reduce

¹The forecast assumes that future years will maintain the same level of service as in 2023. Additionally, it incorporates assumptions from the LA Metro Fleet Transit plan, including the transition from renewable natural gas to a battery electric fleet, continually reduced emissions grid-delivered electricity, and renewable energy generated by solar panels at Metro facilities. The forecast also integrates assumptions from the "Energy Efficiency Long Term Plan," aiming for Metro to achieve a 17% reduction in GHG emissions from facilities by 2030.

emissions from Metro operations by 2030 and support Metro’s long-term goal of carbon neutrality by 2050.

Figure 2. Metro Greenhouse Gas Emissions Reduction Progress



Regional Leadership in Achieving Greenhouse Gas Emissions Reduction Goals

The 2019 CAAP determined that Metro’s mobility services displace 903,000 MTCO₂e annually. This reduction in single-occupancy VMTs underscores the critical role that the agency plays in regional climate action. These displaced or “avoided” emissions are the result of people shifting to lower-carbon alternatives to driving (referred to as “mode shift”) and to Metro’s infrastructure and services encouraging land use patterns that result in shorter and fewer personal vehicle trips. This CAAP Update uses an updated methodology to calculate displaced emissions. The 2023 calculation determined that Metro’s services were responsible for avoiding 1.07 million metric tons of carbon dioxide equivalent (MMTCO₂e) emissions.²

The 2025 CAAP Update builds on the present-day snapshot of displaced transportation emissions that Metro services enable, incorporating a longer view of Metro’s important role in reducing LA County’s transportation-related emissions into the future. In April 2024, Metro adopted a VMT target that reflects a 15.4% reduction in daily VMT per LA County resident by 2045 (from a 2016 baseline). This target reflects a long-term commitment to shaping travel behavior to, from, and

² Fehr & Peers. (2024). *LA Metro Climate Action and Adaptation Plan Greenhouse Gas Emissions Displacement Calculation Methodology*. Memorandum.

within LA County.³ The target captures the future VMT reductions that are possible from implementing our ambitious portfolio of adopted plans, policies, and projects, and focuses on opportunities to accelerate non-capital programs, given the urgency of achieving climate action this decade. Metro's committed actions include improved bus frequency reflecting the implementation of the *NextGen Bus Plan*, rail infrastructure enhancements, dedicated bus lanes, and development of affordable, transit-oriented housing at Metro station areas.

Meeting the VMT reduction targets will represent approximately 500,000 MTCO₂e of additional avoided emissions in 2045. Reductions in VMT provide other important environmental and health benefits above and beyond climate emissions reductions, such as reductions in air pollution, land consumption for roadway infrastructure, and collisions.

California's policy goals also call for steady advancements in clean vehicle technologies, such as increased fuel efficiency and expansion of zero emission vehicles (ZEVs). Achieving the VMT reduction targets in a future where the anticipated technology improvements and ZEV adoption rates are realized would nearly halve emissions related to passenger travel in LA County, from 46.94 million MTCO₂e in 2016 to 25.62 million MTCO₂e in 2045, a 54% reduction.

Continuing to reduce GHG emissions in the region necessitates a systemwide perspective and collaborative approach with regional stakeholders. This includes coordinated implementation of programs like the Regional Transportation Demand Management (TDM) Program and regional partnerships to obtain the funding needed to advance climate action goals. Regional and state efforts to reduce emissions are advanced by encouraging the adoption of transit-supportive land use or transit-oriented communities policies by local jurisdictions, continuing to participate in the statewide Transit Transformation Task Force, and continuing to support regional planning with agencies like the Southern California Association of Governments (SCAG).

Climate Change Risk and Resilience

Metro conducted a climate risk screening of assets, staff, and customers in 2022 to better understand the degree of exposure to the impacts of climate change. Using the top climate-related risks identified in the 2019 CAAP, the screening evaluated the impacts of heat, flooding, power outages, landslides, and mudslides on the entire operating region. Using downscaled climate model data consistent with the California Fourth Climate Assessment Report from current conditions through 2050, the screening analyzed the impacts of these hazards on bus, subway, and light rail infrastructure and operations, as well as passenger and employee health and safety. The results included both systemwide trends and more granular analysis that

³ The baseline year of the VMT reduction analysis that underpinned the selection the VMT reduction target was 2016 and the horizon year was 2045 to align with the calibrated and validated baseline/horizon years of the Southern California Association of Governments Activity Based Model.

identified specific bus lines, subway lines, light rail corridors, and infrastructure at the highest risk of specific hazards. The screening led to a 2023 evaluation of Metro's current adaptation measures and recommendations for additional measures to address climate risks. This CAAP Update provides a high-level overview of the findings of this work.

A Continued Focus on Equity

The 2019 CAAP is unique in how it centers equity in climate action and adaptation. Metro's commitment to equity includes adopting the Equity Platform, investing in a ZEB transition, and advancing our *Bus Stop Improvement Plan*. Investing in these programs, in addition to providing the critical transportation services that the public relies on, benefits Metro riders and the region by improving air quality and providing vulnerable communities with improved transit access. Equity strategies are embedded in the 2019 CAAP to ensure that historically underserved places and people, including Metro's Equity-Focused Communities, are prioritized for climate action and adaptation measures. This equity focused approach is carried forward into the 2025 CAAP Update.

Section 1. Introduction – Why a Climate Action and Adaptation Plan Update?

Metro provides safe, efficient, reliable and accessible transportation services to nearly one-third of California’s residents. Our services offer more sustainable transportation options that produce fewer GHG emissions than relying on single occupancy vehicles. Metro’s services are critical to helping the region and the State of California meet their GHG reduction goals for the highest emitting sector: transportation.⁴

Climate change is already impacting Angelenos. Extreme heat is the deadliest climate hazard in the United States, leading to more deaths than hurricanes, floods, and tornadoes combined. The 2021 *LA County Climate Vulnerability Assessment* found that the countywide daily maximum temperature will increase by an average of over 5° F to a mid-century average of nearly 99° F. These patterns underscore the urgent need to redouble attention on reducing GHG emissions and build a resilient system that continues to connect Angelenos to opportunity, even under current and future climate hazard conditions.

The purpose of this CAAP Update is to share Metro’s progress since the release of the 2019 CAAP and highlight how our role in regional climate action has evolved beyond the initial strategies set out in the 2019 CAAP. This update details how we are reducing GHG emissions as a fundamental part of advancing our mission to provide a world-class transportation system that enhances the quality of life for all who live, work, and play in LA County.

Metro’s climate action and adaptation efforts encompass measures to reduce operational GHG emissions, influence regional mode shift to lower-carbon mobility options, and adapt to the natural hazards of today and tomorrow. Highlights of progress since 2019 include the following:

- Providing updated accounting for the GHGs avoided as a result of Metro’s services
- Reducing operational emissions through efforts like our *ZEB Rollout Plan*
- Influencing regional travel patterns through expanded transit service
- Adapting to address the impacts of climate hazards like extreme heat on system operations, staff, and riders
- Integrating carbon reduction and climate risk management responsibilities into employee duties, operations and maintenance procedures, long-term planning, and project development processes

⁴California Air Resources Board. (2024). *2022 Scoping Plan Documents*. <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>

Centering Equity in Climate Action and Adaptation

Climate change disproportionately impacts underserved communities.⁵ Since 2019, Metro made significant progress in defining the relationship between transportation and equity by operationalizing our Equity Platform through the Equity Information Hub. The Equity Platform was designed to continually inform, shape, and guide every facet of our projects, investments, and new initiatives. Incorporating equity into Metro’s climate action and adaptation work ensures that people who are most transit-dependent and have the least resources are beneficiaries of our climate strategies.

This CAAP Update identifies the climate action and adaptation strategies that deliver the greatest equity co-benefits to Metro riders and the region, resulting in a healthier, safer future for LA County. For example, electrifying Metro’s bus fleet reduces GHG and criteria air pollutant emissions. These reductions may help reduce the risk of cardiovascular and respiratory disease in the communities we serve and in turn reduce healthcare costs for individuals and households across LA County.

⁵ Environmental Protection Agency. (2021). *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts*. U.S. Environmental Protection Agency, EPA 430-R-21-003.

Section 2. What is Metro's Role in Regional Transportation Emissions?

Public transportation is critical to supporting our state and regional climate goals. In California, the transportation sector is the largest contributor to the state's GHG emissions. Nationally, the use of public transit saved 63 MMTCO₂e emissions in 2018, the equivalent of taking 16 coal power plants offline for a year⁶.

Today, Metro's services enable residents, workers, and visitors to shift their travel to a lower-carbon alternatives to single-occupancy vehicles. Metro's presence in the region also catalyzes land use patterns that result in shorter and fewer personal vehicle trips. Metro services were responsible for 1.07 MMTCO₂e of avoided emissions in 2023.⁷

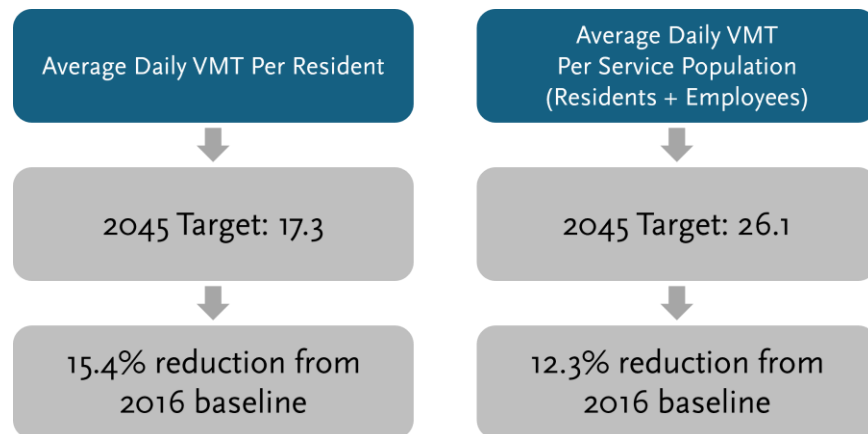
In addition to the climate benefits that Metro brings to the region today, we have also committed to additional future emissions reductions. Metro is one of the first transit agencies in the United States to adopt regional targets for Vehicle Miles Traveled (VMT) reductions per capita, connecting investments in transportation system improvements with climate-related outcomes (**Figure 3**). With a horizon year of 2045, the VMT reduction targets reflect a long-term commitment to shaping travel behavior to, from, and within LA County, and capture the VMT outcomes from implementing a portfolio of adopted plans, policies, and projects.⁸ Metro has also committed to accelerating non-capital components of our plans, policies, and projects, recognizing the urgency of achieving climate action this decade.

⁶ TRCP (2021). *Research Report 225: An Update on Public Transportation's Impacts on Greenhouse Gas Emissions*.

⁷ Fehr & Peers. (2024). *LA Metro Climate Action and Adaptation Plan Greenhouse Gas Emissions Displacement Calculation Methodology*. Memorandum.

⁸ The baseline year of the VMT reduction analysis that underpinned the selection the VMT reduction target was 2016 and the horizon year was 2045 to align with the calibrated and validated baseline/horizon years of the Southern California Association of Governments Activity Based Model.

Figure 3. Metro's Adopted Vehicle Miles Traveled Targets

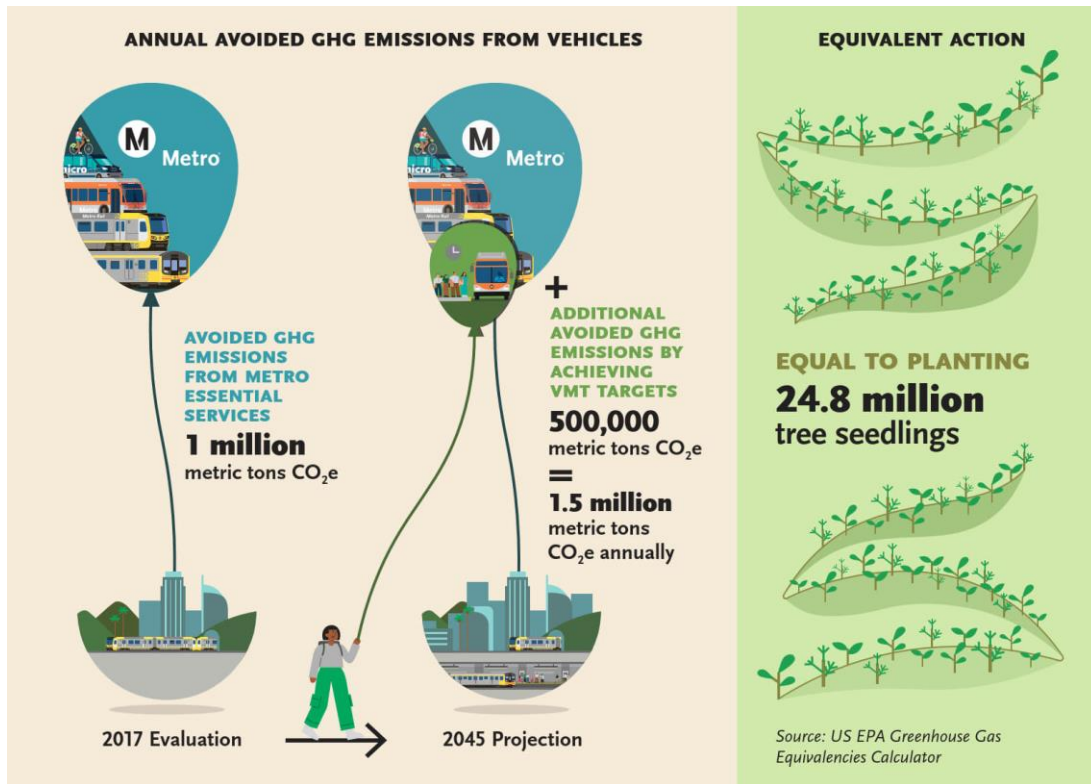


The targets complement those adopted by the City and County of Los Angeles and demonstrate a commitment to achieving the reductions identified in the SCAG *Connect SoCal* plan. The targets also contribute to the State VMT per capita reduction goal of 25% below 2019 levels by 2030 and 30% below 2019 levels by 2045.⁹ Meeting these VMT reduction targets would represent an additional approximately 500,000 MTCO₂e avoided emissions in 2045 in Los Angeles County. These reductions in VMTs provide other important environmental and health benefits such as reduced air pollution, land consumption for roadway infrastructure, and collisions. Metro's adoption of VMT targets underscores the agency's commitment to enabling and shaping sustainable transportation choices for LA County residents, workers and visitors.

Metro plays a critical role in reducing GHG emissions by providing sustainable, low-carbon transportation options for LA County residents, employees, and visitors. **Figure 4** shows the annual avoided GHG emissions due to Metro's transit services in 2023 as well as the additional GHG emissions avoided if the VMT targets are achieved by 2045. Metro services offer sustainable alternatives to driving.

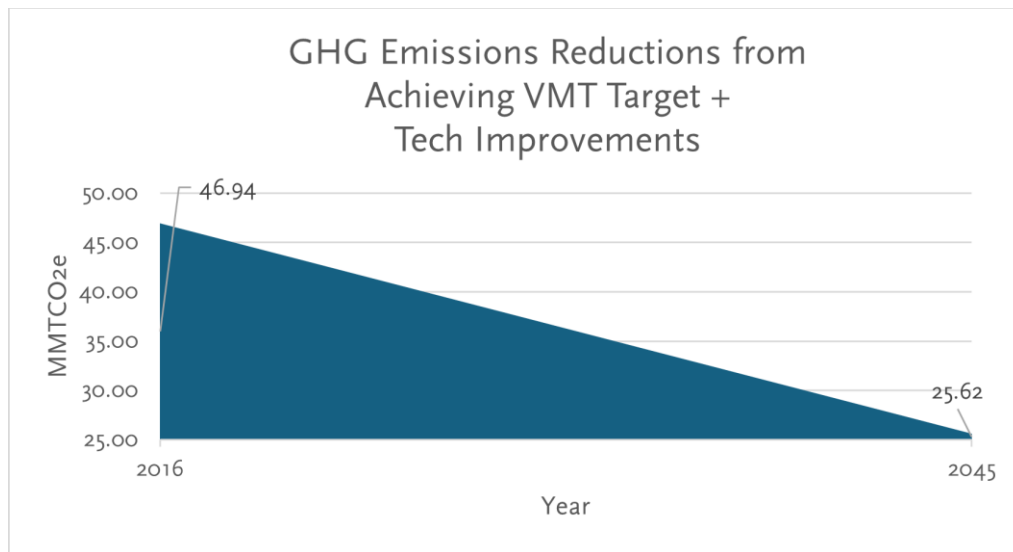
⁹California Air Resources Board. (2024). *2022 Scoping Plan Documents*. <https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>

Figure 4. Annual Avoided Greenhouse Gas Emissions from Vehicles



California’s policy goals also call for steady advancements in clean vehicle technologies, such as increased fuel efficiency, and expansion of Zero Emission Vehicles. Achieving the VMT reduction targets in the context of a future where the anticipated technology improvements and ZEV adoption rates are realized would cut emissions related to passenger travel in LA County nearly in half, from 46.94 million MTCO₂e in 2016 to 25.62 million MTCO₂e in 2045, a 54% reduction. **Figure 5** shows the GHG reduction potential of meeting the VMT targets by 2045, in the context of major ZEV adoption and aggressive improvements to passenger vehicle fuel efficiency.

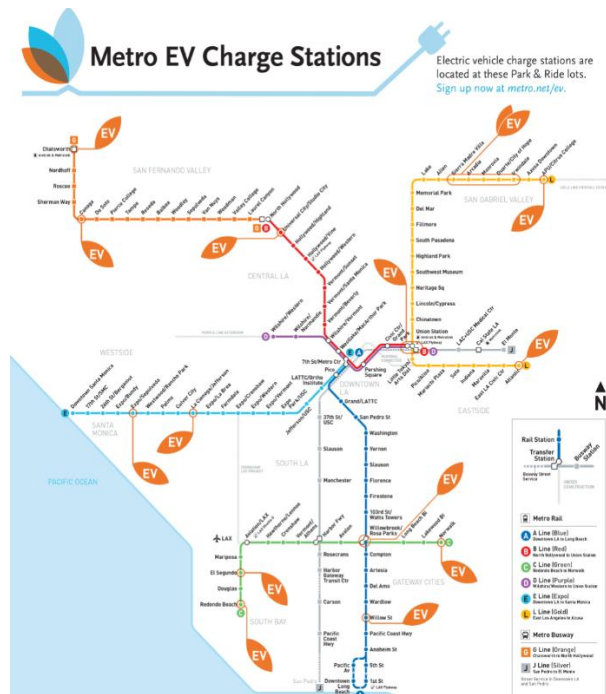
Figure 5. Greenhouse Gas Emissions Reductions from Achieving Vehicle Miles Traveled Targets and Technological Improvements



Aside from Metro’s own work to convert our bus fleet to zero emissions technology (as discussed in Section 3), Metro does not have direct control over the development and adoption of passenger vehicle ZEV technology and improvements to fuel efficiency. However, the agency remains committed to partnering and advancing this work where feasible. The agency adopted a five-year *Electric Vehicle Parking Strategic Plan* to encourage the transition to electric vehicles among Metro employees, transit riders and the general public. **Figure 6** shows existing Metro Park-and-Ride locations. Metro serves in the Leadership Group of the Los Angeles Cleantech Incubator’s Transportation Electrification Partnership and continues to engage with heavy duty vehicle improvements.¹⁰

¹⁰ For more information about Los Angeles Cleantech Incubator’s Transportation Electrification Partnership, see <https://lincubator.org/transportation/>.

Figure 6. Metro Park and Ride Locations with Electric Vehicle Charging Stations



Vehicle Miles Traveled Mitigation Program

In April 2024, the Metro Board of Directors adopted the VMT Mitigation Program. This program aims to provide a streamlined VMT mitigation process for projects on the State Highway System through the development and sale of mitigation credits, which in turn can fund Metro programs that offset increases in VMT.

The stakeholder engagement process to develop this program involved virtual community meetings, presentations to Metro advisory bodies, and policy working groups. Attendees included councils of government executive directors and staff, transit operators, staff from local agencies, Caltrans and CARB. This extensive consultation ensured that numerous and diverse stakeholders in the region could provide input and shape the program.

The program includes a pilot VMT Mitigation Bank, which provides a clear and defensible approach to offset increases in VMT (**Figure 7**). The pilot bank creates a pathway to invest VMT mitigation dollars directly into VMT-reducing projects and Metro's related programs (or those of our public agency partners).

Figure 7. Goals of the Pilot Vehicle Miles Traveled Mitigation Bank

The Goals of the Bank

- **Provide a streamlined, effective and enforceable approach** to mitigate VMT impacts from highway capacity projects on the SHS
- **Develop and offer VMT mitigation credits** to SHS projects
- **Establish the credit values** of mitigation projects and programs
- **Identify procedures** for the sale of credits, including debiting the credit table
- **Establish oversight procedures** to regularly evaluate the Program

Cleaner Goods Movement

As the most populous county in the United States and home to one of its busiest ports, LA County experiences and facilitates massive daily goods movement. To address the environmental impacts of goods movement, Metro spearheaded collaborations through the 2021 *LA County Goods Movement Strategic Plan*. Metro worked with regional partners such as CARB, the Los Angeles Clean Tech Incubator, and the Ports of Los Angeles and Long Beach. The plan outlines how investing in freight rail, deploying cleaner truck technology to replace diesel, strategically managing the role of goods movement, and curbside management planning and policies can support a healthier and economically vibrant LA County.

Transportation Demand Management

Metro is developing a Transportation Demand Management strategy that outlines ways to shift from relying on private vehicles toward increased walking, biking, and transit. TDM programs reduce congestion and improve air quality. Incorporating equity into the TDM strategy, by viewing transportation through the eyes of systems users, is essential to ensure that access to diverse transit options is fair and just.

Metro currently manages TDM programs to reduce reliance on single-use vehicles and reduce regional VMT through rideshare. This includes the Metro Vanpool Program, which subsidizes the leasing of vanpools for LA residents to facilitate more sustainable modes of transportation. Through the TDM strategy, Metro has identified several additional initiatives for implementation:

- Mobility Hub Activation and Community Engagement
- Fostering Multimodal Kids for the Future
- New Transit Corridor Zones
- Carpool and Shared Mobility Solutions
- Transit Tourism

The Long Beach-East Los Angeles Corridor (Formerly I-710 South) Mobility Investment Plan

Metro is acting through the *Long Beach-East Los Angeles (LB-ELA) Corridor Mobility Investment Plan* to reinvest money from highway expansion and development to better support community needs, multimodal transportation, and active transportation.¹¹

In May 2021, Metro’s Board approved a motion to suspend work to advance the I-710 South Corridor Project. The motion also directed Metro to develop a plan to identify and support local projects that would advance mobility along the corridor. In September 2021, staff initiated the LB-ELA Corridor Task Force to engage locally impacted communities and inform recommendations for investments in multimodal projects along the corridor. A robust and diverse set of local stakeholders made up the Community Leadership Committee, which helped shape and develop the *LB-ELA Corridor Mobility Investment Plan*.

The vision of the plan is to deliver an equitable, shared LB-ELA corridor transportation system that provides safe, quality multimodal options for moving people and goods; a system that will foster clean air (zero emissions), healthy and sustainable communities, and economic empowerment for all residents, communities, and users in the corridor.

The plan includes over 200 projects and programs to meet its vision and goals:

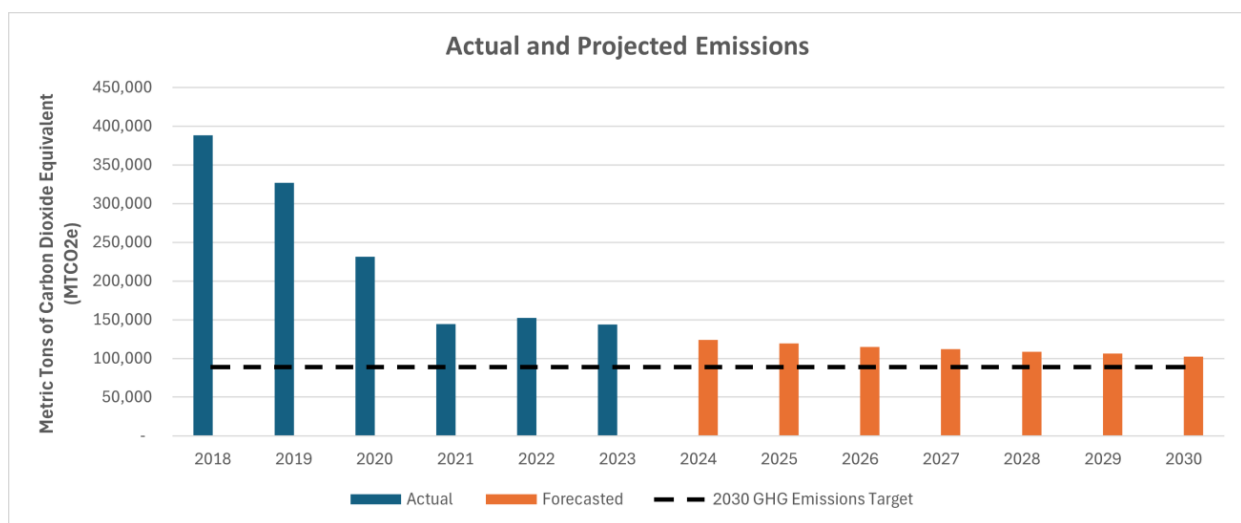
- Active transportation facilities
- Transit service and rider experience
- Multimodal complete street designs
- Zero-emission goods movement infrastructure
- Targeted investments to I-710 infrastructure that repair multimodal connections across the freeway and reduce its impacts on surrounding communities

¹¹ Metro. (2024). *Long Beach—East Los Angeles Corridor Mobility Investment Plan*.
<https://www.dropbox.com/scl/fo/of2kaxtofnamz4sre8vp/ANpNkDSmYOkUsGAvURSwhfl?dl=0&e=1&preview=1+English+LB-ELA+Final+CMIP.pdf&rlkey=9byndcgxpmzhzliirt6pr8zpII>

Section 3. How is Metro Delivering on Operational Emissions Reductions Goals?

Through our 2019 CAAP and 2020 ten-year strategic plan, *Moving Beyond Sustainability*, Metro committed to reducing operational GHG emissions by 79% by 2030 (relative to 2017 levels) and by 100% by 2050. To achieve these reductions 13 specific measures were identified in the 2019 CAAP. **Figure 8** demonstrates that Metro reduced our GHG emissions annually in five of the past six years, equating to an overall 65.5% decrease since 2017. In 2022, emissions increased slightly overall due to a rebound in service levels following the COVID-19 pandemic.

Figure 8. Metro's Greenhouse Gas Emissions: Forecasted vs. Actual



As shown in **Figure 8**, the forecast projects that Metro will reach 76% reduction of 2017 GHG levels by 2030, slightly less than the 79% goal established in the 2019 CAAP.¹² This is due to Metro's reliance on utilities, including LADWP and Southern California Edison, to provide the electricity that powers our vehicles and facilities. While Metro's electricity providers are transitioning to carbon-free sources, per the State Renewable Portfolio Standard or the commitments in the LA Green New Deal, the pace of grid energy decarbonization is a hinderance to Metro's ability to meet the 2030 goal. Pursuing initiatives, such as purchasing "green power," or electricity with a higher amount of renewables from LADWP or the region's community choice

¹² The forecast assumes that future years will maintain the same level of service as in 2023. Additionally, it incorporates assumptions from the LA Metro Fleet Transit plan, including the transition from renewable natural gas to a battery electric fleet, continually reduced emissions grid-delivered electricity, and renewable energy generated by solar panels at Metro facilities. The forecast also integrates assumptions from the "Energy Efficiency Long Term Plan," aiming for Metro to achieve a 17% reduction in GHG emissions from facilities by 2030.

energy provider, Clean Power Alliance, are options to further reduce emissions from Metro operations by 2030 and support Metro's long-term goal of carbon neutrality by 2050.

Since 2017, Metro's bus fleet transitioned to renewable compressed natural gas (biomethane or renewable natural gas). ZEBs were introduced on the Metro G Line in the San Fernando Valley in 2019 and Metro expects to achieve a fully ZEB fleet by 2035. Other initiatives, such as the purchase of electricity with a higher percentage of renewables from the region's community choice energy provider, Clean Power Alliance, further reduced emissions from Metro operations.

Metro continues to roll out ZEVs and is beginning to implement the *Electric Vehicle Parking Strategic Plan*, which will grow our network of 3,000 EV charging stations serving non-revenue vehicles, employees, and the public by 2028. The resulting increase in electric demand may contribute to short-term increases in GHG emissions associated with Metro operations. As the State of California moves toward its goal of 100% clean electricity by 2045, Metro will realize significant emissions reduction from the shift to ZEVs.

The following sections describe key actions Metro has taken to reduce operational GHG emissions in further detail.

Zero-Emission Vehicle Deployment

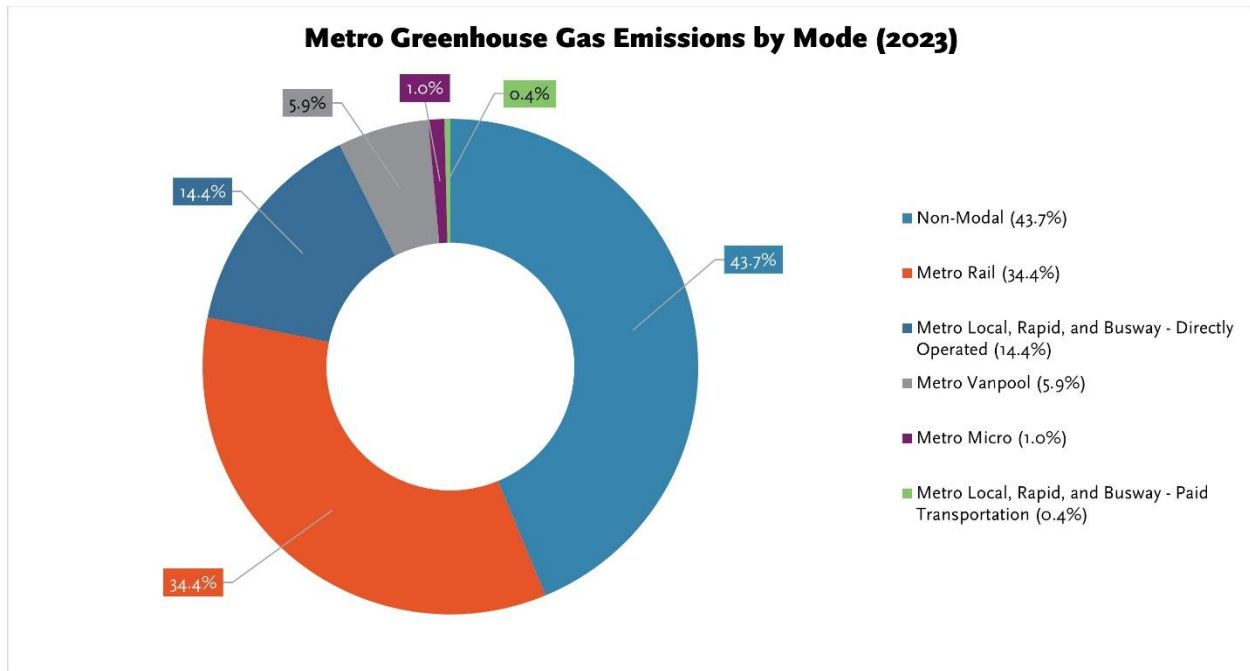
In 2021, Metro initiated 100% zero-emission bus rapid transit (BRT) service along the Metro G Line. To date, these vehicles have accumulated over 5 million miles of zero-emission service. All 60-foot articulated compressed natural gas buses on the Metro G Line were replaced with new, 60-foot articulated ZEBs that have zero-tailpipe emissions. The buses operate all day along the 18-mile corridor by using rapid en-route chargers installed at North Hollywood, Canoga, and Chatsworth Stations.

Delivering ZEBs for the G Line contributes to Metro's equity goals as over half of the Metro G Line's 36 stops are directly located in or adjacent to Equity Focus Communities in North Hollywood, Valley Village, Van Nuys, Lake Balboa, Reseda and Canoga Park.

Facility Energy Management and Renewable Energy

Metro's facility electricity represents one of our largest sources of non-modal GHG emissions (**Figure 9**). The 2019 CAAP identifies several energy savings measures, including a goal to replace all lighting fixtures with LED lights.

Figure 9. Metro Emissions by Mode (2023)



Metro also developed a blueprint for identifying and implementing proposed upgrades and replacements of building systems at facilities that will ultimately result in lower energy consumption, GHG emissions, and operating costs. The *Energy Efficiency Long Term Plan* identifies opportunities for implementing measures outlined in the 2019 CAAP at major operating facilities and to improve energy efficiency across operations.

Section 4. How is Metro Addressing Climate Risk?

It is imperative for Metro to continue monitoring and responding to the impacts of climate change on our system, staff, and riders. Metro conducted a 2022 Climate Risk Screening of top vulnerabilities identified in the 2019 CAAP, noting the ways in which buses, light rail, subway, employees, and riders can be impacted. Increased extreme heat, electric grid outages, inland flooding, and land and mudslides are the top climate-related hazards for Metro, based on the CAAP.

Extreme heat poses the greatest risk to the system and can damage buses and disrupt service by impacting electrical and mechanical equipment, deteriorating bus tires and reducing the battery life of electric buses. Nearly 90% of bus routes (by mile) are in areas that experience extreme heat that could cause partial system failure (**Figure 10**). Heat can also lead to buses losing air conditioning.

More than 70% of bus routes (by mile) are in high-risk heat areas and many highly vulnerable routes are in Equity Focus Communities, compounding the heat exposure risk for people traveling from and through these places.

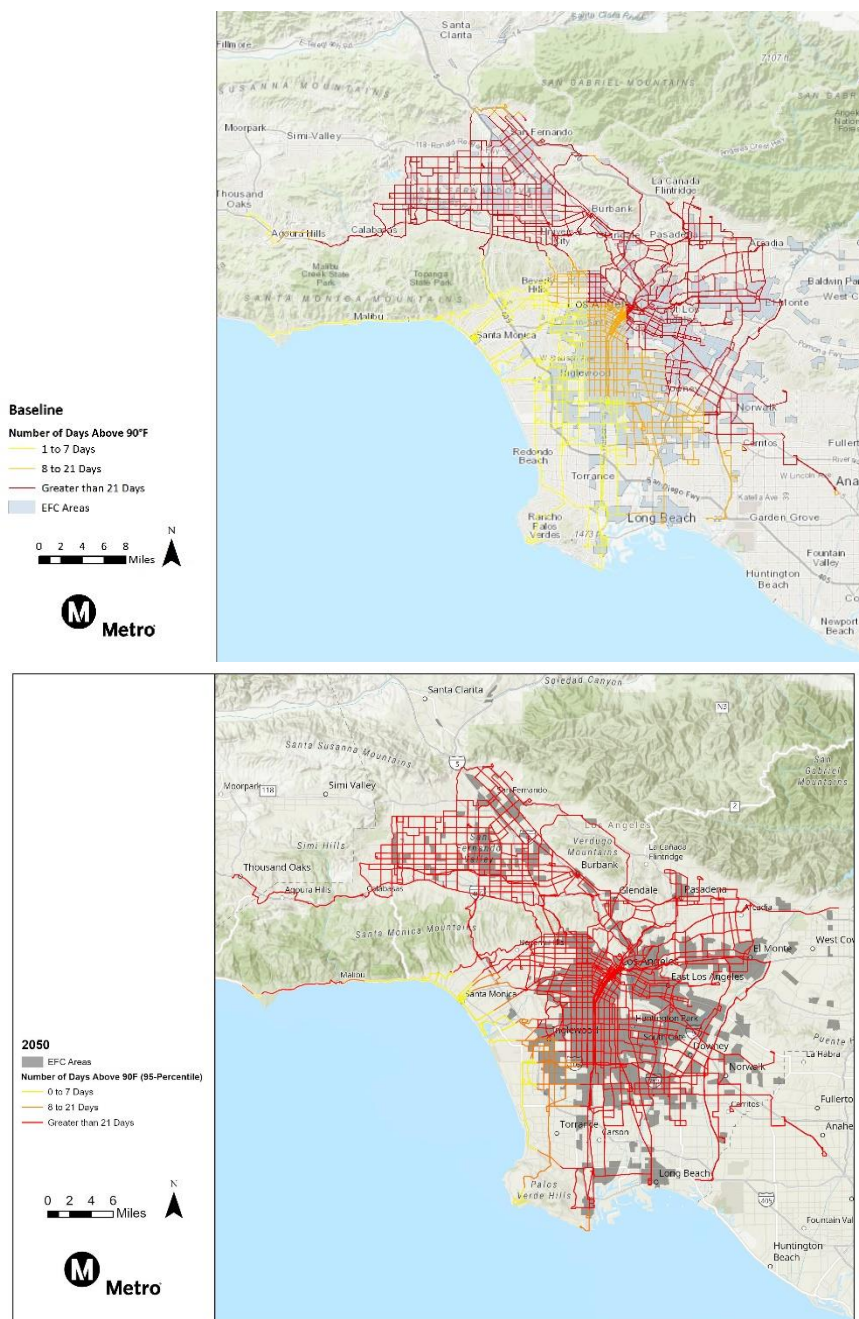
Bus stops along many of these routes are in areas of sustained high risk for high temperatures, increasing the risk to system users of heat exhaustion, heat stroke, and other heat-related illnesses. Bus shelters, which can help mitigate heat risk for passengers, are present at less than a quarter of Metro bus stops.

While heat risk is most prevalent for buses, heat also poses a risk across other modes, including light rail and subways. Similar to the risk posed at bus stops, extreme heat poses a risk to passengers at outdoor light-rail stations. Extreme heat can damage rail tracks, communications and information technology systems, signal systems, and overhead catenary lines. Extreme heat can also lead to service disruptions, as trains need to reduce speed and staff need to conduct rail inspections to ensure there is no damage that could create a safety hazard. The highest climate risks are along portions of the Metro L Line, A Line, and C Line. Further, extremely hot ambient temperatures can impact the operations of air conditioners and ventilation systems in subway stations, posing heat risks to passengers and potentially leading to damage to station rail infrastructure, electrical and mechanical systems, and elevators.

The 2022 Climate Risk Screening included an assessment of impacts of flooding, mudslides and landslides, and power outages, all of which are expected to increase in the coming decades due to climate change. Flooding, mudslides, and landslides have the potential to disrupt bus, light rail, and subway service, damaging assets and creating hazardous conditions for passengers. Climate change is also likely to result in more frequent power outages from increased temperatures, flooding, and storms. These outages disrupt bus, light rail, and subway service. Backup generators

provide some power to critical assets but are not able to support larger-scale system power loss. Power loss can leave subways and light rail inoperable, prevent electric buses from charging, and disrupt critical communications and operations systems.

Figure 10. Extreme heat (number of days over 90°F) overlaid with Metro bus lines for today and 2050



Increasing Metro’s Climate Resilience

Preparing Metro’s systems, assets, and operations for impacts from hazards like extreme heat, major storms, and wildfires is key to creating a resilient and forward-thinking agency. - The *All-Hazards Mitigation Plan* focuses on making climate change and emergency management an agency-wide consideration. Metro combined the climate risk screening results with adaptation options from the *All-Hazards Mitigation Plan* in 2023.

Table 1 outlines some of Metro’s actions to reduce climate risks. Some of these actions have already been implemented, while others are pending, ongoing, or in early planning stages.

Table 1. Metro Actions to Reduce Risks Due to Extreme Heat and Power Outages (adapted from 2023 Climate Risk Analysis)

Climate Impact	Metro Actions
EXTREME HEAT	
Sagging catenary lines	Metro is currently testing a spring tensioner system along the L Line. The C, A, and E Lines are noted in the <i>All-Hazards Mitigation Plan</i> for similar improvements.
Extreme temperatures in the subway tunnel	There are AC units in enclosures every 0.5 mile of rail (complies with American Railway Engineering and Maintenance-of-Way Association temperatures for train controller systems). Metro identified at-risk underground equipment and is designing for critical temperatures, cooling systems, or both.
POWER OUTAGES	
Impacts to subway system third rail power	The system is electrically continuous between several Traction Power Substations (TPSS). This means that if there is a loss of power to one TPSS, train operations can be maintained for at least two hours at maximum designated headway during rush hours (or longer duration during off-peak times).
Backup generators run out of fuel and stop operating	Generators provide a limited amount of backup power and after a certain amount of time, they must be shut down and refueled. However, during power outages, Metro staff may not know the site is running on backup power because the generators turn on automatically. To increase staff awareness, Metro is piloting a system that triggers a strobe light when the backup generator turns on. The <i>All-Hazards Mitigation Plan</i> calls for installing additional backup generators and establishing microgrids at Metro facilities.
Critical communications interrupted	The <i>All-Hazards Mitigation Plan</i> calls out the need to ensure power stability for communications at all bus and rail divisions by installing uninterruptible power systems to support mission -critical communications during a power outage.

Metro is committed to prioritizing improvements to reduce risk for locations, facilities, infrastructure, equipment, and operations. Ongoing improvements to reduce risks include the following:

- Maintaining a State of Good Repair program
- Increasing redundancy of communication systems
- Installing backup power
- Coordinating regional multi-agency resilience programs
- Preparing to provide resources to meet the post-disaster needs of staff and riders

The following sections highlight key Metro actions taken to increase system resilience since the 2019 CAAP.

Metro Tree Policy

As Metro works to create a more environmentally sustainable, equitable, and resilient public transportation system, the protection, planting, and maintenance of trees is a key component. Trees provide multiple community-wide benefits:

- Shade
- Reduced urban heat island effect
- Carbon storage
- Bird and other pollinator habitat
- Improved air quality
- Reduced psychological distress
- Stormwater management

In 2022, the Metro Board approved the Metro Tree Policy, which protects trees through planning, design/construction, and maintenance, and requires replacement of any removed trees, when necessary, at a 2:1 ratio (or at a 4:1 ratio in the case of heritage trees).

The policy directs the agency to adopt species, palette, and planting strategies that maximize opportunities for native species, carbon capture, mitigation of the urban heat island effect, stormwater capture, and the use of recycled water for irrigation (**Figure 11**). The policy commits to a three-year establishment period for newly planted trees and encourages creative approaches to planting replacement trees.

Figure 11. Recommended Tree Palette Microclimate Zones



Microclimate Zones



Transformative Climate Communities Grant Partnership

A \$35 million Transformative Climate Communities grant from the California Strategic Growth Council was awarded in 2022 to a coalition of community-based organizations including Community Partners, SLATE-Z, and the City of Los Angeles. The funding was secured to improve environmental conditions and reduce pollution in South LA by supporting the South LA Eco-Lab. Formed by Metro along with 11 other community partners, this community-driven project facilitates economic development through climate action to achieve the vision for a socially inclusive, sustainable, green community that is resilient to climate change—with improved quality of life, public health, and access to economic opportunity.

Station Evaluation Program

Metro's Station Evaluation Program is an important tool to identify and prioritize resilience improvements. The evaluation program provides actionable data points for maintenance staff to complete repairs and helps identify recurring issues reported by riders, allowing staff to seek remedial and preventative solutions.

In 2022 and 2023, Metro's proactive response to addressing station evaluation issues resulted in a 53% increase in scores for appearance criteria and a 51% increase in scores for functionality criteria. We completed aesthetic repairs at multiple sites, such as inserting updated maps, removing graffiti from map cases and elevator interiors, and replacing informational decals. Operational repairs focused on the condition of escalators, which improved because of reported maintenance orders. Specifically, the B Line corridor station escalators were found to be readily available for riders at all levels, having the biggest increase in functionality scores of all transit

lines with vertical transportation equipment. Recognizing the importance of providing functional, safe, and clean transit stations, Metro intends to strengthen this program through continued collaboration with surrounding jurisdictions and agencies.

Los Angeles County Extreme Heat Campaign Partnership

Metro, the LA County Department of Public Health, and the Los Angeles Regional Collaborative for Climate Action and Sustainability partnered to create content that highlights resources and tips for staying safe on extreme heat days. From August to September 2023, over 2,300 Metro buses featured an extreme heat public service announcement (**Figure 12**).

Figure 12. Los Angeles Regional Collaborative for Climate Action and Sustainability Extreme Heat Campaign, Bus Ad



Bus Stop Improvements Program

Shade and shelter at bus stops was identified as a top rider concern through the 2019 CAAP Rider Survey as well as in the 2020 *Metro Customer Experience Plan*. The 2022 *Customer Experience Plan* update noted that of the 12,268 Metro bus stops, only 24% have a shelter. Though Metro does not own the property where the bus stops are located, staff wanted to better support jurisdictions throughout the service region and formed an interdepartmental team to better address this multi-jurisdictional concern.

In June 2023, Metro launched the Bus Stop Improvement Program to provide regional coordination and inspire local jurisdictions to install bus stops that meet the needs and expectations of riders. We have also developed an initial list of priority bus stops throughout the

service region. Further, Metro provided a list of the 153 highest-need bus stops to the Metro Board based on criteria like Equity Focus Communities, Disadvantaged Communities, and California Heat Assessment Tool data, as well as tree canopy coverage. We've been working with the appropriate jurisdictions to identify funding and opportunities to increase shade/coverage at these bus stops, thereby creating cooler environments for our riders.

Section 5. What's Next?

Metro's overarching goal is to provide a reliable world-class transportation system that enhances quality of life for all who live, work, and play within LA County. The climate action and adaptation measures set out in the 2019 CAAP, and made current in this update to the plan, support this wider mission. Looking ahead, Metro remains committed to implementing these measures to provide a safe, reliable, and accessible transit system that is resilient to the impacts of climate change and supports wider regional emissions reductions goals.

As Metro continues to deliver on these measures for our riders, we're also preparing for Los Angeles to host the Olympic and Paralympic Games in 2028. This major event will draw visitors from around the world and will increase demand for Metro's essential services. Metro is working to ensure the system is prepared to handle the influx of global visitors and provide world-class transportation for all who attend. Metro will continue to take a strategic and forward-thinking approach to ensure the success of the Games while delivering long-term benefits for the diverse communities of LA County.

By focusing on the programs and initiatives that address climate risks and support regional emissions reduction goals, Metro is poised to provide an essential, sustainable service that is resilient to the increasing impacts of climate change and meets the needs of LA County as well as the larger region.