Los Angeles County
Metropolitan Transportation Authority

Electric Vehicle Parking Strategic Plan

2023–2028

Metro

June 2022

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Executive Summary

The 2023-2028 Electric Vehicle Parking Strategic Plan (EV Parking Strategy or Plan) provides a strategic blueprint for sustainable, cost-effective, and efficient investments in electric vehicles and charging infrastructure for Metro. The EV Parking Strategy complements the 2019 Metro Climate Action and Adaptation Plan and 2020 Moving Beyond Sustainability plan, focusing on opportunities to increase access to employee, transit-rider, and public charging and supporting Metro's long-term transition to zero-emission vehicles.

The EV Parking Strategy offers data-driven insight into the current state of the Southern California market for electric vehicles (EVs), as well as the policy and regulatory directives driving regional and state-wide efforts to increase EV adoption. The plan then offers recommended goals, strategies, and prioritization plans for achieving identified objectives in each of the core EV Parking Strategy focus areas:

Table 1. EV Parking Strategy Goals and Enabling Strategies

EVPSP Goals	**Employee Commuting** At least **4** charging ports **at each employee facility**	**Transit Riders** Charging for **5% of Park & Ride** spaces, including 20% EV-ready for Capital Projects	**Public Charging** Evaluating new **multi-modal opportunities** for fast charging siting
Enabling Strategies	Install chargers and make-ready[1] charging infrastructure to **plan for long-term growth** **Planning for at least 50%** of charging ports installed in Disadvantaged Communities **Leveraging local and state partnerships** for incentives and coordination to support EV adoption Proactive EV **charging network management** and **re-investing program revenues** to support future growth		

For each segment of the EV Parking Strategy, we review a market analysis, technical requirements, and operational considerations for the charging network.

Based on existing internal and public data, we project the upfront capital and operational costs of achieving Metro's EV Parking Strategy objectives and review available incentives to reduce these costs. The EV Parking Strategy concludes with proposed market-informed metrics to track Metro's progress toward EV Parking Strategy goals.

[1] Make-ready infrastructure includes all of the supporting electric infrastructure and upgrades to bring electricity from the power source to the parking space. EV chargers are installed on a completed "make-ready."

1. Introduction and EV Parking Strategy Objectives

Metro has committed to helping the state meet ambitious emissions reduction goals through a variety of strategies and measures across our service region by reducing our own agency emissions and serving the Los Angeles (LA) region with more sustainable transit options that get people out of their cars. As the population of electric vehicle (EV) drivers grows, Metro will need to design our services, facilities, and operations to serve a growing population of riders and employees who drive EVs. This EV Parking Strategy defines the charging infrastructure requirements, outlines a prioritized approach to charging deployment, and proposes the costs and benefits associated with completing the EV Parking Strategy. The Plan also defines policies and management strategies to facilitate a successful charging program for internal operations and public use.

Purpose of the EV Parking Strategy

This EV Parking Strategy provides a framework to help Metro meet growing rider and employee interest in zero-emission vehicles. It also positions Metro to complement other regional and statewide efforts by supporting EV adoption through increased access to daily charging. The EV Parking Strategy addresses Metro's employee, transit-rider, and public charging segments. A separate initiative will address Metro's non-revenue fleet (NR) charging. The increased adoption of EVs among employees and riders will also enable fuel and maintenance savings for our employees and patrons, compared to existing fossil-fueled vehicles.

Metro's Role in Vehicle Electrification

The 2019 Metro Climate Action and Adaptation Plan[2] (CAAP) commits to a 79% reduction in greenhouse gas (GHG) emissions by 2030 and specifies the measures Metro will implement to meet this ambitious goal. CAAP measures include installing EV charging infrastructure at Metro facilities for employee commuter use. The EV Parking Strategy operationalizes those goals to build on existing progress and meet the 2030 targets specified in the CAAP and reinforced in the 2020 Moving Beyond Sustainability (MBS) plan.[3]

Regional and state efforts to electrify the transportation sector further necessitate the need for a comprehensive EV Parking Strategy. In 2020, Governor Newsom issued Executive Order N-79-20, requiring California to phase out the sale of non-zero-emission vehicles by 2035,[4] further reinforcing the state's long-term shift toward electric and other zero-emission vehicles. At the local level, Metro was among the leaders of the Los Angeles Cleantech Incubator (LACI) Transportation Electrification Partnership, which has defined the region's Zero Emissions 2028 Roadmap.[5] The latest Roadmap edition calls for achieving three goals by 2028, supported individually and collaboratively by the public and private contributors:

> Achieve 80% EV market share (vehicles sold) and 30% of the total passenger vehicle population.

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[2] Metro (2019). Metro Climate Action and Adaption Plan 2019. http://media.metro.net/projects_studies/sustainability/images/Climate_Action_Plan.pdf

[3] Metro (2020). Moving Beyond Sustainability Strategic Plan 2020. http://media.metro.net/2020/Moving-Beyond-Sustainability-Strategic-Plan-2020.pdf

[4] Executive Department, State of California, 2020. Executive Order N-79-20. Issues September 23, 2020. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

[5] LACI (2019). Transportation Electrification Partnership Zero Emissions 2028 Roadmap 2.0. Published November 26th, 2019. https://laincubator.org/wp-content/uploads/LA_Roadmap2.0_Final2.2.pdf

> Shift 20% of all single-occupancy vehicle trips to zero-emission public transportation, bikes, or other active transportation modes.

> Advance zero-emission solutions for all public investments in surface vehicles and related infrastructure for goods movement.

Metro will play a vital role in reaching all three of these targets, whether through our plans to electrify the bus fleet or future capital investments that will support the region's sustainable growth. The LACI Roadmap also targets the installation of 84,000 public and workplace chargers across the region. Transportation electrification at Metro's facilities will enhance efforts by other partners, including the City of Los Angeles' 2019 Green New Deal and the Los Angeles Department of Water and Power (LADWP), Southern California Edison (SCE), and the Southern California Public Power Authority (SCPPA), who have also increased their investments in transportation electrification.

State and Regional Progress

The Electric Vehicle (EV) market in California is approaching an inflection point. As of the end of 2020, over 625,000 battery (BEV) and plug-in hybrid (PHEV) electric vehicles were registered across the state. Of these, more than one-in-three in the state were registered in the Los Angeles-Long Beach-Santa Ana Metropolitan Statistical Area (MSA). While these EVs represent only about 2.5% of the total light-duty vehicle population, new vehicle sales in the Los Angeles MSA have rapidly grown to exceed 8% of total new sales statewide.[6] In 2020, Governor Newsom issued Executive Order N-79-20, requiring California to phase out the sale of non-zero-emission vehicles by 2035,[7] further reinforcing the state's long-term shift toward electric and other zero-emission vehicles (ZEVs).

At the same time, global automobile manufacturers continue to announce significant investments in EV market growth while phasing out internal combustion engine technologies. Ford and General Motors (GM) combined have planned $56 billion of investment in EVs by 2025; Kia, Mitsubishi, Subaru, Volkswagen, and Volvo all project between 40-60% of their global sales will be electric by 2026. GM is also targeting the phase-out of diesel and gas powertrains entirely in the light-duty segment by 2035.[8] In 2021, Tesla exceeded 900,000 electric vehicles delivered globally for the first time.[9] Bloomberg New Energy Finance projects that battery pack prices – the main driver of EVs' higher incremental costs – will fall below $100/kWh by 2024 and drop another 40% by 2030 – enabling EVs to have a price advantage over comparable gasoline vehicles.[10] These market factors, bolstered by evolving consumer preferences, put EV adoption on a path for significant growth in the coming decade.

In projecting a path to meet the state's long-term greenhouse gas reduction goals, the California Air Resources Board (CARB) forecasts more than doubling BEVs' market share to more than 25% of vehicle sales in 2025 and nearly 50% in 2030. This trajectory would put more than eight

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[6] California Energy Commission. California Energy Commission Zero Emission Vehicle and Infrastructure Statistics. Data last updated April 30, 2021. Retrieved 6/24/2021 from https://www.energy.ca.gov/zevstats

[7] Executive Department, State of California. Executive Order N-79-20. Issues September 23, 2020. https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf

[8] Car and Driver. "Here are all the promises automakers have made about electric cars," June 26, 2021. https://www.caranddriver.com/news/g35562831/ev-plans-automakers-timeline/

[9] Tesla. Tesla Q4 2021 Vehicle Production Deliveries, January 2, 2022. https://ir.tesla.com/press-release/tesla-q4-2021-vehicle-production-deliveries

[10] Bloomberg New Energy Finance, Electric Vehicle Outlook 2021 – Executive Summary. Accessed June 30, 2021. https://bnef.turtl.co/story/evo-2021/page/7/1?teaser=yes

million zero-emission vehicles on the road, primarily BEVs, by 2030.[11] Today, the Los Angeles MSA represents 37% of the EV population in the state. If CARB's projections are realized, this will equate to three million EVs on the road in the Los Angeles MSA in 2030, or 12-fold growth over the decade.

Metro has identified multiple strategies to help the state meet ambitious emissions reduction goals – and more broadly, to serve the LA region by reducing vehicle trips through more sustainable transit options. As the rate of EV adoption grows, Metro will need to evolve our services, facilities, and operations to serve a growing population of riders and employees that drive electric vehicles. The EV Parking Strategic Plan defines the charging infrastructure requirements, outlines a prioritized approach to charging deployment, and proposes the costs and benefits associated with completing the EV Parking Strategy. The EV Parking Strategy also defines policies and management strategies to facilitate a successful charging program for internal operations and public use.

Assessment of Local and Peer EV Charging Deployment

Implementation of the EVPSP will establish Metro as a leader both within Southern California and among peer agencies concerning support for the oncoming growth of EV drivers. Staff reviewed progress and/or plans for EV charging from local and national peers or sister agencies for comparison with the Plan:

- **City of Los Angeles:** Over the last five years, the City has installed approximately 350 charging stations at 19 locations across the city, 140 chargers are designated for city fleet vehicle use, while 210 are made available for public and city employee use. The City Council recently passed a motion to develop and implement an Electric Vehicle Master Plan to aid in the electrification of 10,000 city fleet vehicles. The city's plan would add charging at more than 600 city-owned properties.[12] As of early 2021, there were just over 11,000 commercial charging stations in Los Angeles largely funded by incentives from the Department of Water and Power. Several city agencies installed over 1,300 of these stations, including the Bureau of Street Lighting, and the Departments of Transportation and General Services. This surpasses the mayor's 2023 goal of 10,000 stations two years ahead of plan. The city targets 25,000 chargers installed by 2025, of which Metro's EVPSP would be in direct support.[13]
- **Los Angeles Department of Water and Power (LADWP):** In addition to funding incentive programs for commercial charging stations, LADWP has supported the installation of 430 chargers on streetlight poles across the city.
- **Bay Area Rapid Transit (BART):** BART is in the pilot stage of EV charging for its facilities, deploying 44 chargers at two rail station parking facilities. BART's board adopted an EV Charging Policy[14] in November 2021, which acknowledged the District's role to reduce the environmental footprint of regional transportation, as the largest operator of vehicle parking for a rail operator in the state. The Policy sets high-level goals and strategies for EV charging deployment but does not contain long-term targets for charger deployment.

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[11] California Air Resources Board, Revised Draft – 2020 Mobile Source Strategy, April 23, 2021.
https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf
[12] CleanTechnica.com, Electric Vehicle Master Plan" — 10,000 EVs For Los Angeles, April 12, 2022.
https://cleantechnica.com/2022/04/12/electric-vehicle-master-plan-10000-evs-for-los-angeles/
[13] LADWPnews.com, Mayor Garcetti Announces the City Has Helped Install 10,000 EV Chargers, January 6, 2021.
https://www.ladwpnews.com/mayor-garcetti-announces-the-city-has-helped-install-10000-ev-chargers/
[14] BART, Electric Vehicle Charging Policy, November 18, 2021.
https://www.bart.gov/sites/default/files/docs/BART%20Electric%20Vehicle%20Charging%20Policy%20-%20Final.pdf

> **City of Boston:** Boston released its Zero-Emission Vehicle Roadmap[15] in 2022, which broadly covers the city's goals to support widespread adoption of electrification, ensure affordable, convenient access to charging, and electrify the municipal fleet. Targets for the roadmap include ensuring every household in the city is within a 10-minute walk of an accessible EV charging station by 2040 and installing 1,055 level 2 chargers owned by the city or privately by 2025.

While many peer transit agencies are actively planning for and implementing bus electrification plans, a scan of other large peer transit agencies' sustainability planning did not identify long-term or large-scale EV planning for employee or transit rider use on the scale envisioned in the EVPSP.

Metro's Current EV Progress

As of May 2022, Metro operates 108 Level 2 EV charging ports, of which 81 are deployed at Park and Ride (P&R) locations for public use (see Figure 1 below). Metro's non-revenue fleet operates 25 chargers, and two chargers are reserved for use at Metro's Gateway building. Metro's charging equipment is compliant with the Open Charge Point Protocol (OCPP), which allows for the flexibility and interoperability of various charging network service providers across Metro's network and on existing charging hardware. This important feature provides ease for scalability and a level of "future-proofing" of charging assets to allow them to operate with new charging services as needed in the future. Metro will continue to require OCPP-compliant hardware in future procurements or deployments as part of the EVPSP.

P&R chargers are installed across 18 locations, with three to four ports installed at most sites. Union Station Gateway has the most, with 13 ports installed. From July to October 2021, the P&R chargers averaged 10-11 sessions per charger each month, down from a peak of 50 sessions per charger per month in January 2020, before the beginning of the coronavirus pandemic.[16] Two locations (Sierra Madre Villa on the L Line [Gold] and Willow on the A-Line [Blue]), had consistently higher use, with 17-32 charging sessions per month. Charging events between July and October 2021 have averaged between 17 and 21 kilowatt-hours (kWh), or roughly 55-70 miles of electric range per session. During those months, 68 P&R stations provided electricity for approximately 50,000 zero-emission miles per month. These stations also delivered $1,600-$1,800 in revenue per month from drivers paying for station usage, or $2.36 per session. This equates to $0.12 per kWh of energy delivered, or just over $1 per gallon equivalent of gasoline, enabling significant savings for EV drivers compared to driving a fossil-fueled car.

Metro's current network of 108 chargers is operated and maintained through a contract with Axxera, which is set to expire in August 2022. As described in Sections 5 and 6 below, Metro plans to extend this contract for up to 24 months while soliciting a long-term partnership solution to deploy the full EVPSP.

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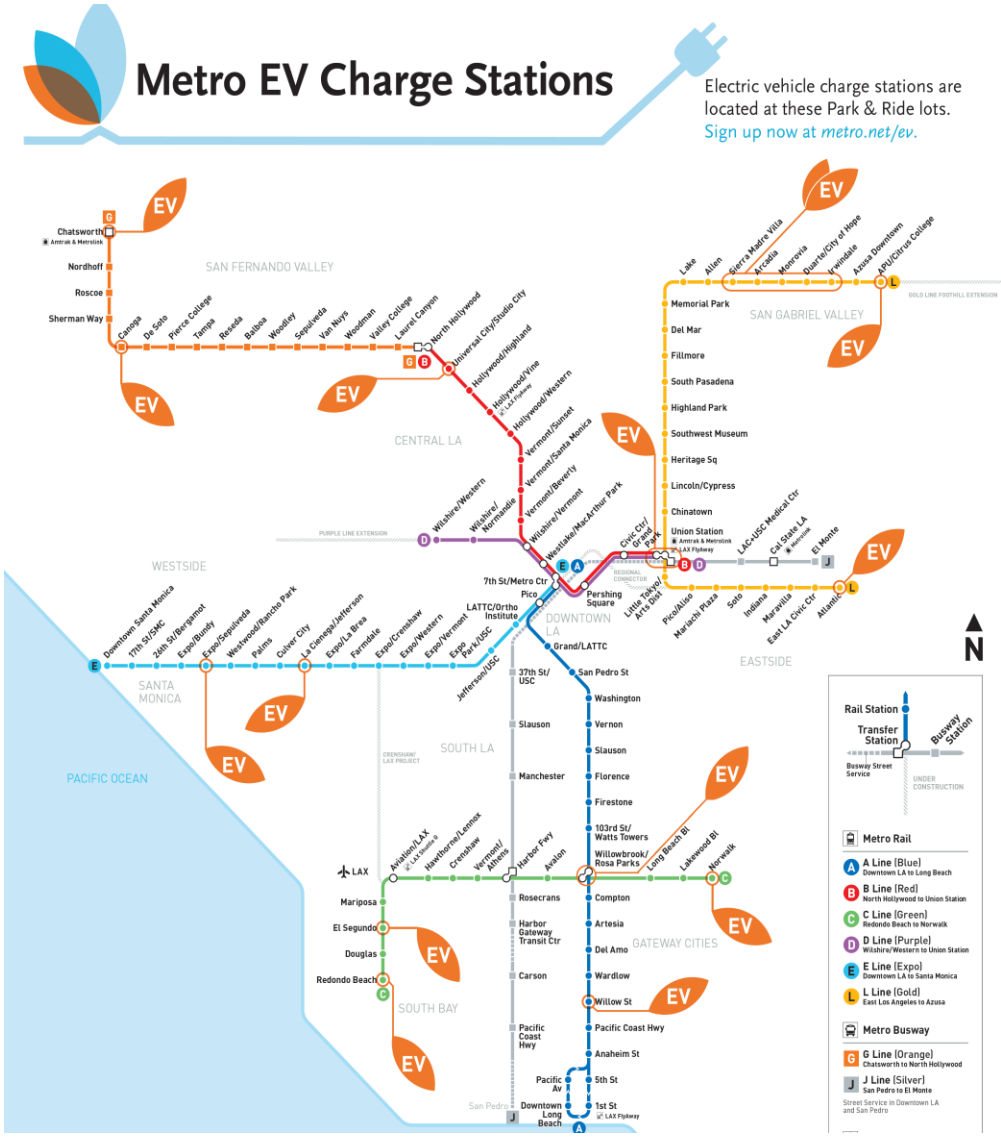
[15] Boston.gov, City of Boston Zero Emission Vehicle Roadmap, 2022. https://www.boston.gov/sites/default/files/file/2020/12/Boston%20ZEV%20Roadmap_1.pdf

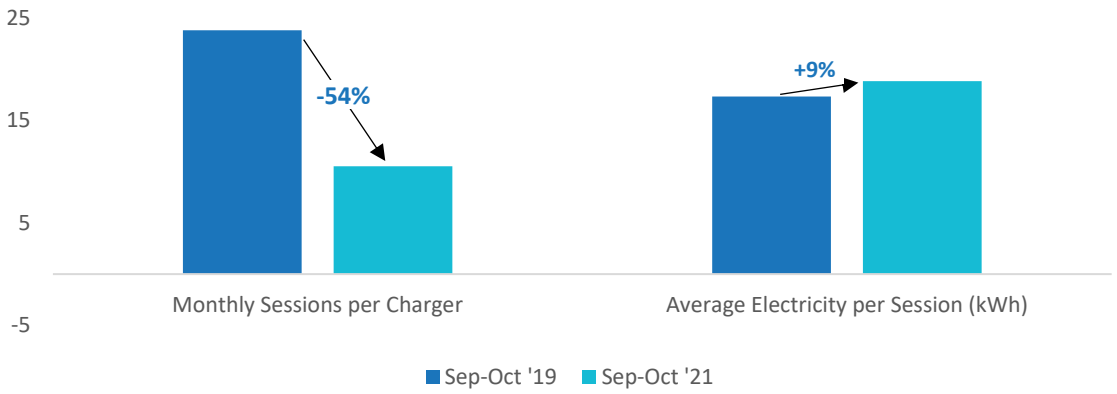
[16] Charging station session and consumption data for public and non-revenue Chargers in 2021 may not be representative of typical historical (or future) months due to impacts of the coronavirus pandemic on travel and commuting patterns.

Figure 1. Metro P&R locations with EV charging stations



Analysis of P&R charging data from July through October 2021 displays a significant decline in usage compared to the months preceding the beginning of the COVID-19 pandemic. This indicates, as expected, that stay-at-home orders and reduced commuting reduced EV charger use, which has not yet rebounded despite increases in vaccination rates this year and the economy's reopening. Comparing the available data from, September-October 2021 with the same months in 2019, before the pandemic, each charger averaged less than half as many sessions per month, and stations saw a 40% reduction in the amount of electricity delivered. Interestingly, the average energy used per session has increased in September and October 2021, with drivers using 9% more electricity each time they charged at a P&R location. While the long-term effects of remote work may change the dynamics for commuters who need daily charging at park and rides. Metro's data continues to show rebounds in the usage of P&R chargers. Comparing the month of April 2021 to April 2022, charging energy dispensed at Metro's P&R chargers increased by 28% and monthly transactions increased by 46%, though they remain below pre-pandemic levels.

Figure 2. Comparison of 2021 P&R Charging Usage to Pre-Pandemic Months

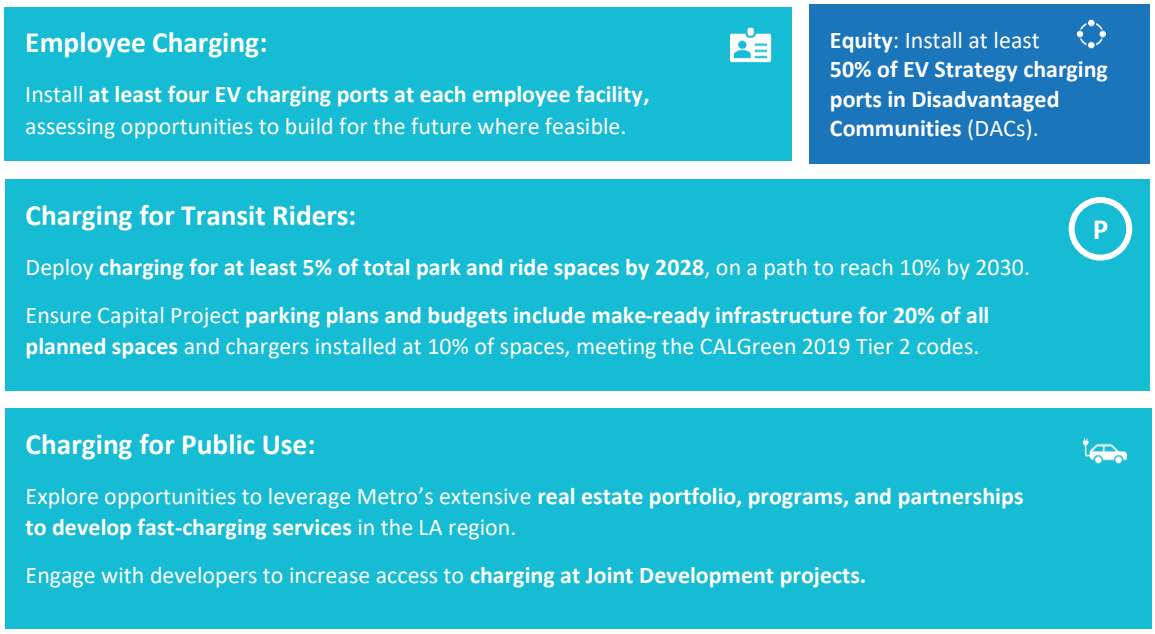


Twenty non-revenue (NR) fleet chargers are deployed across seven Metro facilities, with half of these installed at Union Station Gateway. Other divisions and locations have one to three chargers installed. These chargers support 21 BEVs that are active in the NR fleet, including 20 Chevy Bolt sedans and one Kia Niro SUV. While the 10 chargers at Gateway do not report usage data, the other 10 chargers logged 288 sessions per month between July and October 2021, or approximately 1 session per charger per day. Average charging sessions for the month were between 11-17 kWh or 35-55 miles per session. Metro does not currently have charging stations installed for employee commuting use. A 2020 survey indicated that at least 17 employees commute via electric vehicle to nine different Metro facilities.

EV Parking Strategy Objectives

Metro has established five-year deployment goals for the three segments of the EV Parking Strategy: Employee, Transit Rider, and Public Charging. These targets are intended to align with the goals set by Metro in the 2019 CAAP and 2020 MBS Plan. Underlying each of these goals, we aim to complete the EV Parking Strategy equitably, installing a majority of chargers in Disadvantaged Communities.

Figure 3. EV Strategy Goals by Charging Segment



Meeting the objectives of the EV Parking Strategy will require close coordination between the Office of Sustainability, internal Metro stakeholders, and external parties. These entities and their roles are listed in Appendix A.

While the EV Parking Strategy is designed to span 2023-2028, additional activities and investments will be needed after these five years to continue supporting EV adoption and usage among riders and employees. The EV market is only 10 years old but has seen significant technological advancement and growth during that time. By carefully monitoring future market conditions, Metro can remain responsive and adaptable to this new and evolving market.

EV Parking Strategy Development Outreach

The Office of Sustainability conducted extensive internal and external outreach and coordination in support of the development of the EV Parking Strategy.

Internal Stakeholders

> Local Division Leadership: As sites are evaluated for utility incentive programs, engaged Division staff to identify local conditions and any on-the-ground challenges to deploying employee infrastructure.

> Parking Operations: Confirmed shared interest in developing EV charging for P&R patrons and reviewed prioritized P&R locations to validate the feasibility of charging deployment (and target number of charging spaces) at each site. Reviewed parking utilization and identified potential challenges at priority sites.

> Equity Liaisons: Reviewed overall EV Parking Strategy and collected feedback on rapid equity platform assessment, which was incorporated into the Plan. Discussed impacts of EV Parking Strategy deployment on equity groups.

External Stakeholders

- Sustainability Council: Previewed the EV Parking Strategy with Council and collected feedback on the draft EV Parking Strategy, which was incorporated into the final Plan.
- Utilities: Previewed Metro's overall plans and priority sites with SCE account representative and program managers from the utility's "Charge Ready" incentive program to validate plans for utility program applications. Confirmed strategies for long-term planning on light-duty vehicle charging and medium-/heavy-duty vehicles and charging. Similar conversations occurred with the Los Angeles Department of Water and Power (LADWP) account representative to engage on their program offerings.
- California Department of Transportation (Caltrans): Confirmed agencies' shared interest in developing charging at Caltrans-owned sites and reviewed expectations of Plan implementation. Collaborated on prioritized site lists and outlined required steps and approvals from Caltrans to approve charging installations on sites they own.
- Energy Resiliency Series & EV Workshop: Gathered sustainability and climate action leaders from across the region for the resiliency series; hosted EV advocates, utilities, and vendors for an EV workshop. Shared initial vision and goals of EV Parking Strategy, collected feedback, and incorporated into plan format and structure, including prioritization of sites.
- EV Charging Providers: Conducted EV RFI to identify products and services currently on the market that would align with Metro's EV Parking Strategy for each segment.

Plan Organization

The EV Parking Strategy is organized around the four segments of EV charging outlined in the objectives above:

- **Section 2** defines the plan and prioritization of Employee charging locations
- **Section 3** defines the plan and prioritization for Transit Rider charging, including both existing sites and yet-to-be-developed capital projects
- **Section 4** defines the areas of focus for Metro to explore developing Public Charging
- **Section 5** outlines the high-level cost estimates for the five-year program and incentives that are currently available to offset EV Parking Strategy deployment costs
- **Section 6** details the near-term activities staff will undertake to plan for a successful implementation of the EVPSP
- **Section 7** reviews long-term actions considered as part of the EVPSP
- **Section 8** summarizes the recommendations of the EV Parking Strategy and lists measures of success

2. Employee Charging

Metro's sustainability commitment extends beyond our facilities to address impacts from employees – including their daily travel to and from work. Metro can support zero-emission commuting among employees by providing access to EV charging at employee parking facilities, installing charging at each of the Agency's employee locations by 2028 and a longer-term target of electrifying 10% of total employee parking spaces.

Overview of Employee Charging

Metro employs 9,800 individuals across the region, approximately 75% of which drive to work.[17] According to the 2020 survey for Southern California Air Quality Management District's (SCAQMD) Rule 2202, Metro had 17 employees across nine locations who responded that they commuted via zero-emissions vehicle, though the actual number of EV drivers is likely higher. Increasing access to charging at workplaces would accelerate performance with Rule 2202 to reduce emissions from employee commuting[18] and be in alignment with the U.S. Department of Energy's national Workplace Charging Challenge, launched in 2013.[19]

Access to workplace charging can double the effective electric range of EV commuters who charge at home. Employee charging can also break down barriers to EV adoption for employees without access to charging at home, either because they rent, live in multi-family dwellings, or park on-street. Improved charging access can help employees ultimately decide to purchase an EV and feel comfortable commuting with the vehicle's limited range compared to a gas vehicle. The visibility of workplace charging can also help improve awareness of electric vehicles among employees.

"I have always wanted to buy an EV but cannot due to the fact that I would not be able to charge my car at work."

– Survey response from Metro Equipment Maintenance Employee

Employee Charging Infrastructure Requirements and Approach

Metro's approach to installing EV charging is guided by two principles:

> Provide charging at each facility by 2028, so that all employees who want to drive an electric vehicle and charge at work have the opportunity to do so; and

> Assess the long-term needs for employee charging, targeting 10% of employee parking spaces by 2030, enabling more employees to charge their vehicles at work as the population of EV drivers grows over the decade.

Metro plans to install Level 2 charging for employees. Because workplace dwell times are typically eight hours or longer, slower Level 1 charging could suffice for many employees. However, as EV battery ranges continue to improve, drivers can rely less on daily "top-up" charging, and instead use workplace charging every few days or weekly, allowing more drivers

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[17] *According to a 2017 Metro employee survey (conducted in accordance with Rule 2202 of the South Coast Air Quality Management).*

[18] *South Coast Air Quality Management District. Rule 2202 – On Road Motor Vehicle Mitigation Options Employee Commute Reduction Program Guidelines. February 5, 2016.* http://www.aqmd.gov/docs/default-source/rule-book/support-documents/rule-2202/rule-2202-employee-commute-reduction-program-guidelines-(ecrp).pdf?sfvrsn=10

[19] *U.S. Department of Energy Alternative Fuels Data Center (2021). Workplace Charging for Plug-In Electric Vehicles. Accessed 6/27/2021.* https://afdc.energy.gov/fuels/electricity_charging_workplace.html

to use fewer chargers over a typical week. Utilizing Level 2 chargers will reduce the total number of required workplace charging stations per site and increases cost-effectiveness compared to the costly trenching, conduit, and cabling distances associated with installing Level 1 chargers more ubiquitously across parking lots. Metro will be able to leverage charging management software to reduce power draws of level 2 chargers to limit demand and mitigate higher electric costs and potential strain on the electric grid. Metro may further evaluate the need for additional types of charging at employee and P&R locations throughout this Plan and may install additional Level 1 charging to complement planned Level 2 chargers in future phases. Charging equipment procured by Metro will continue to be OCPP compliant to allow for future flexibility around charging services and providers.

Proactively anticipating changing employee needs will enable Metro to adapt and evolve these charging requirements over time. The COVID-19 pandemic demonstrated how quickly commuting patterns can change, and its long-term impacts on office work are still unclear. Additionally, commuting distances may be impacted by the high cost of housing, as more employees live further away from work. Metro plans to conduct employee research (e.g., surveys or focus groups) to better understand current levels of interest and expected needs for workplace charging.

Site Prioritization Plan and Charger Needs

Metro's 2023-2028 prioritization plan for employee charging infrastructure is summarized in Table 2 below. Metro's site-based approach prioritizes locations for employee chargers based on the following criteria:

- **Locations within Disadvantaged Communities:** Census tracts designated by the State of California as DACs often lag in investments in clean energy technologies, and Metro can support earlier investment in these areas.
- **Availability of Utility Incentives:** Utility incentives and other grant opportunities help reduce the upfront capital costs of the site development, and Metro prioritizes sites with more valuable incentives. See Section 5 for more detail on utility incentive programs.
- **Parking Lot Size, Type, and Layout:** Larger parking lots provide more flexibility in locations for charging installation without disrupting users. The EV Parking Strategy also considers garages over surface lots, where possible, due to typically lower costs and ease of installation in parking structures.

Metro will evaluate each site's employee parking, driver usage, and future site plans to determine the appropriate level of charging, targeting at least four chargers at each site as feasible. Metro may revisit this prioritization based on other facilities' projects that align with charging installation.

Table 2. Employee charging facilities installations by year

Prioritization		Facility			
Priority	**Fiscal Year**	**Metro Property**	**DAC**	**Lot Type**	**Utility**
1	2023	Loc 99	No	Garage	LADWP
2		Div 18	DAC	Lot	SCE
3		Div 7	No	Garage	SCE
4		Div 4	No	Lot	SCE
5		Loc 60	DAC	Lot	SCE
6		Div 10	DAC	Lot	LADWP
7	2024	Div 15	DAC	Lot	LADWP
8		Loc 30	No	Garage	LADWP
9		Div 1	DAC	Lot	LADWP
10		Div 13	No	Garage	LADWP
11		Div 5	DAC	Garage	LADWP
12		Loc 84	No	Lot	LADWP
13	2025	Div 3	DAC	Garage	LADWP
14		Loc 64	DAC	Garage	LADWP
15		Div 21	DAC	Lot	LADWP
16		Div 2	DAC	Lot	LADWP
17		Div 8	No	Lot	LADWP
18		Div 9	DAC	Garage	SCE
19	2026	Div 20	DAC	Lot	LADWP
20		Div 16	DAC	Lot	LADWP
21		Div 24	DAC	Lot	SCE
22		Div 11	No	Lot	SCE
23		Loc 63	DAC	Lot	LADWP
24		Loc 62	DAC	Lot	LADWP
25	2027	Div 14	DAC	Lot	SCE
26		Div 22	No	Lot	SCE
27		Loc 34	No	Lot	Vernon
28		Loc 66	DAC	Lot	SCE
29		Loc 110	DAC	Lot	SCE
30		Loc 55	DAC	Lot	LADWP

Employee Charging Implementation Considerations

Alignment with NR Infrastructure Planning

For sites where employee and non-revenue parking are nearby, Metro will consider opportunities to deploy charging infrastructure for both uses in conjunction to take advantage of economies of scale. Several initial applications to Southern California Edison's EV charging infrastructure incentive program include both employee and non-revenue chargers to improve candidate sites' viability for program funding. Parking and charging may also be shifted between employee and non-revenue use depending on the demand for the charging over time. For example, if a location has a high demand for employee charging but has not been assigned significant NR EVs, chargers could be allocated to employee use until the NR EV population increases and additional chargers are installed. This will allow existing chargers to be used more efficiently and delay the need to budget for and install additional employee chargers. These arrangements will be considered on a case-by-case basis to ensure employee parking does not impact NR fleet operations.

Charging Management and Access

The employee charging network will require active management to ensure reliability for employees and oversee service contracts and maintenance. Metro will require at least one full-time employee to oversee the network systemwide, as well as local liaisons within facilities at each Division to respond to local issues or questions as they arise. Employees will request access to the charging network from the employee charging program manager, who will also provide onboarding materials to educate users on the charging equipment, costs, and best practices to share with colleagues. Metro will explore opportunities to intelligently control charging loads, reduce usage and demand during peak time-of-use electricity hours, and increase participation in demand response programs, reducing costs and strain on the grid. These components of employee charging load management should only be enacted if employees can be guaranteed sufficient range to complete their driving needs.

"There need to be enough chargers to make this practical, remembering that many employees will park for 8 hours and never move their vehicles, even after they are fully charged."
– Survey response from Metro RFS Employee

Local liaisons will need to work with the population of EV users at their locations to ensure fair and equitable access. If demand for employee charging outstrips the available number of ports, guidelines may need to be established or modified for each location based on the work patterns at each site or other local constraints. Metro will also consider the potential to implement reservation systems that can be accessed via mobile app or internet so that employees can book a charging window in advance and plan their charging needs more confidently.

Charger Pricing Structure

Metro will establish a pricing structure for employee use, consistent with California state regulation which requires EV charging to be based on $/kWh pricing, and clearly show any additional charges or fees. Requiring payment for charging avoids concerns of providing benefits (free charging) to EV owners that are not available to non-EV employees. Pricing for employee charging also encourages efficient charger usage: if employee charging is free or lower cost than home charging, employees will opt for the cheaper option and create unnecessary demand for

the potentially limited supply of charging at Metro locations.[20] Metro will aim to establish fair market pricing for use of its chargers and has no intention of overcharging employees or public users. Pricing may need to be adjusted regularly based on utility rate schedules or changes in usage patterns by employees. Moving forward, Metro will work in concert with the Board to approve new pricing rates as they are updated in the future.

The pricing structure will also consider more dynamic pricing options to improve the efficient use of chargers. Strategies may include using time-of-use prices to align with utility rate costs or idle fees, which add an additional charge (e.g., $/hour) for the time employees remain in a charging space after their vehicle has completed charging and a reasonable grace period has passed. This encourages employees to move their cars and allow another employee to charge, improving the utilization of chargers.

Education and Engagement

In addition to providing a service to employees driving EVs, workplace charging creates an opportunity to improve employees' understanding of and interest in electric vehicles. As employee charging stations open across Metro facilities, Metro will conduct employee engagement activities to promote the new access to convenient, reliable workplace charging and to raise awareness about EVs and their benefits among non-EV driving employees. For example, in conjunction with charger openings, Metro could host ride-and-drive events with local dealerships, vehicle OEMs, and non-profit organizations to allow employees to experience driving an EV and see the variety of model offerings available on the market.

Metro will also develop communication plans for employees at each site to broadcast information about new charger availability, tips for shared use among employees, the pricing structure, and how to gain access to the employee charging network.

Key Recommendations for Employee Charging

- Develop employee charging at prioritized locations, pursuing utility incentives to deploy sites cost effectively.
- Conduct additional employee research to understand and inform long-term charging needs.
- Develop employee engagement plans for new charging sites to increase awareness of EV charging and benefits.

[20] *For simplicity and the purposes of the EV Parking Strategic Plan Cost and Revenue Modeling, Metro has assumed a charging price consistent with an estimated average cost of electricity.*

3. Transit Riders Charging

Transit Riders Charging will increase access to charging for Metro riders through chargers installed at Metro's P&R locations. Like employee charging, improving charging availability for transit riders can increase the likelihood that P&R users will consider an electric vehicle. P&R charging can double the effective range of an EV if drivers charge at home. It can also serve as a primary point of charging for riders without access to home charging who use P&R lots regularly for their transportation needs.

Overview of Transit Riders Charging

Installation of public charging at new P&R facilities is required by Title 24 CALGreen codes; Metro has gone beyond this requirement and committed to adding charging at existing P&R facilities. Based on the CALGreen codes, Metro will target the installation of charging stations at 5% of total P&R spaces by 2028, on track to electrifying 10% of spaces by 2030.

Metro currently operates nearly 50 P&R locations, several with multiple lots, totaling over 19,000 spaces in the P&R inventory. This inventory is dynamic and changes over time as needs shift or as parking properties are developed for other uses. While Metro owns most P&R locations, some properties are owned by Caltrans and operated under joint-use agreements. Metro's Capital Planning includes the addition of 14 P&R locations at planned future stations over the next decade. These would add over 8,600 additional parking spaces and will be subject to the CALGreen EV charging requirements at the time of their development. The EV Parking Strategy divides P&R charging plans between existing sites ("retrofit") and future capital projects ("new construction").

Charging Infrastructure Requirements and Approach

Metro's P&R charging approach is driven largely by Title 24 CALGreen requirements for EV charging at public parking facilities. The CALGreen codes have been updated based on a triennial cycle since 2009, with the most recent 2019 codes enforced as of July 1, 2021. The state has proposed 2022-cycle codes that, if adopted, would be effective January 1, 2023. Current codes require only a certain percentage of total parking spaces to be "EV capable" – meaning spaces are identified for EV charging and make-ready infrastructure is in place so that a Level 2 charger could be more easily installed in the future. LA County's codes also require a percentage of those spaces to have an EV charger installed, an approach adopted by the proposed 2022 State codes.

Table 3. Comparison of 2 CALGreen EV charging requirements for EV capable parking spaces

Code Tier	CALGreen 2019 (Currently in effect)	CALGreen 2022 (Draft)
Mandatory	10% of total spaces	20%
Tier 1	15%	30%
Tier 2	20%	45%

Per the MBS Plan, Metro has elected to design and build 100% of its capital projects in compliance with the 2019 CALGreen Tier 2 requirements, which include developing sites with 20% of parking spaces identified and made ready for EV charger installation. Based on the 2020

City of Los Angeles' Green Building Code, Metro will also install Level 2 EV charging stations at 10% of parking spaces. While this requirement only applies to new construction, Metro will use the 10% figure as a goal across the P&R system through 2030, and as an informal target for each location where charging is added.

Metro will consider how proposed 2022 code-cycle updates impact current plans and align with expected needs. The proposed Tier 2 EV requirements would more than double the number of EV-capable spaces required under the current 2019 codes, and additionally require that 15% of spaces (one-third of EV-capable spaces) have charging stations installed. These requirements would add significant costs beyond initial EV Parking Strategy plans for capital projects and may ultimately provide more charging capacity than is needed based on P&R driving patterns.

While Metro considered slower, low-power Level 1 charging in the development of the Plan, adding greater numbers of Level 1 charging was determined to be less cost-effective than installing Level 2 chargers, which also can dynamically change power demand based on driver and/or grid needs. Charger installation costs are typically driven by factors including trenching, conduit, and cable distances. Installing more Level 1 chargers would increase these distances, adding to project construction costs. Metro may further evaluate the need for additional types of charging at employee and P&R locations throughout this plan and may install additional Level 1 charging to complement planned Level 2 chargers in future phases. For more information, see Appendix B. Charging equipment procured by Metro will continue to be OCPP compliant to allow for future flexibility around charging services and providers.

Additionally, Metro has developed a set of prioritization criteria to identify existing P&R sites for EV charging installation during the Plan period, described in Appendix B. These criteria were selected to maximize the impact and amount of charging that could be deployed, including prioritizing sites that will align with utility incentive program design. Metro also incorporated qualitative data in its prioritization based on feedback from internal partners, including Parking Operations, which identified locations that would be potential best fits for the addition of EV charging.

Table 4. Considerations for prioritizing P&R sites for the development of EV charging

Criteria	Priorities
Community Impact	> Identified locations most negatively impacted by pollution caused by transportation, including economic, environmental, and health concerns > Metro-prioritized locations in disadvantaged communities (DACs) > Sites located in DACs often receive increased incentives and help meet utility program targets
Structure Type	> Garages, due to lower installation costs than surface lots, less required trenching, ability to use wall-mounted equipment, and the likelihood of meeting utility program cost thresholds

Total Number of Parking Spaces	> Sites with more spaces to accommodate chargers, increasing site cost-effectiveness and increasing locational flexibility to identify lowest cost site options
Location	> End-of-line locations with more customers who frequently leave vehicles for 6+ hours, 4-5 days a week and connect with modes of transportation including bike and Metro Micro
Traffic Analysis Zones (TAZ)	> Use of Metro's residential and commercial Traffic Analysis Zones scores for each station based on likely residential EV ownership and routes used to commute to/from work
Available Real Estate	> Allows for the option to install solar parking canopies and battery storage in the future to help offset the additional energy required to power EV charging > Onsite generation and storage to provide backup power for charging
Utility Incentives	> Sites with the highest available incentives to offset capital costs, understanding that utility incentive value and availability may be variable over time

Site Prioritization and Charger Needs

Based on these above assumptions and criteria, as well as qualitative assessments, Metro has developed a prioritized list of P&R sites for the development of EV charging. To identify charging ports per site, Metro targeted 10% of parking spaces to align with plans for new construction sites, and the 2020 City of Los Angeles' Green Building Code. Metro's Parking Management organization reviewed the proposed charging space targets and provided suggested modifications based on on-site utilization constraints and another local site context. Metro will submit these sites for utility incentive programs as they become available based on the prioritization below in Table 5. The estimated charging station counts are preliminary and may be revised based on parking utilization or other local factors.

Table 5. Prioritized P&R sites and estimated charging needs

Prioritization		P&R Location			Parking and Chargers		
Priority	**Fiscal Year**	**Metro Property**	**DAC**	**Utility**	**Lot Type**	**Parking Spaces**	**Charging Stations**
1	2023	Willow St.	**DAC**	SCE	**Garage**	689	65
2		Norwalk	**DAC**	SCE	Lot	300	10
3		Irwindale	**DAC**	SCE	**Garage**	350	35
4		Lakewood Blvd	**DAC**	SCE	Lot	531	40
5		Chatsworth	**No**	LADWP	Lot	609	58
6		Universal City/ Studio City	DAC	LADWP	Lot	782	74
7	2024	Arcadia	No	SCE	**Garage**	270	25
8		Atlantic	**DAC**	SCE	**Garage**	268	20
9		Monrovia	**DAC**	SCE	**Garage**	350	35
10		Long Beach	**DAC**	SCE	Lot	635	65
11		Expo/ Sepulveda	No	LADWP	**Garage**	260	20
12		La Cienega/ Jefferson	**No**	LADWP	**Garage**	494	45
13		Expo/Crenshaw	**No**	LADWP	**Garage**	450	45
14		Expo/Bundy	**No**	LADWP	Lot	217	22
15		Sherman Way	**DAC**	LADWP	Lot	207	20

Some P&R locations are operated under a Joint Use Agreement with Caltrans and require special considerations for charging development. Metro has conducted initial conversations with Caltrans staff, enabling the agencies to work together to meet shared objectives for charger installation at these facilities. Caltrans staff have noted several policies that must be factored into site development, particularly when applying for utility incentive programs. At this time, these policies include stipulations that do not allow profit from EV charging services on Caltrans-owned sites, and the inability to grant utility easements for EV charging infrastructure. Caltrans is reviewing their policies and considering changes to allow for the integration of EV charging at Metro-leased locations. These sites will require additional review by Caltrans and approval through Caltrans' Airspace procedure during site planning. The Norwalk, Lakewood, and Long Beach lots prioritized above may serve as pilot opportunities to work through the joint planning and approval process.

Additionally, Metro's Capital Projects plan includes three new P&R facilities that would be developed within the EV Parking Strategy period – the Foothill Gold Line extension in 2025 will open new stations in Glendora, La Verne, and Pomona with parking structures. Table 6 below identifies the number of EV-ready spaces per CALGreen Tier 2 requirements and the target number of charging stations installed at each site. The EV-ready space construction costs are

expected to be covered by capital project budgets, while the charger installations and operations would be funded through the EV Parking Strategy.

Table 6. New P&R Stations with EV-Ready spaces and targeted EV charger installation

New P&R Station	Parking Spaces	20% EV-Ready	10% EV Chargers	Opening Year
Glendora	420	84	42	2025
La Verne	600	120	60	2025
Pomona	980	196	98	2025

As part of these new construction projects, Metro will develop standardized technology and construction specifications for capital project EV charging installations. These specifications will help clarify requirements for vendors or others designing and constructing sites with EV charging. Standard criteria will include specifications of Metro's selected charging equipment, elements for electrical components to meet the National Electric Code (e.g., transformer and panel sizing, conduit, and wire specifications), Americans with Disabilities Act (ADA) accessibility requirements for EV charging, guidance for siting of charging to minimize costs and improve driver experience, required signage, lighting, and other safety measures.

Implementation Considerations for Transit Rider Charging

As the network of charging at P&R locations is deployed, Metro and partners will need to monitor and maintain a network of hundreds of charging stations across dozens of locations, including the enforcement of parking rules and revenues from rider charging.

Internal Coordination

Given limited EV charging spaces and increasing demand as more EVs are sold each year in California, Metro will need to maintain parking enforcement for EV charging spaces. Metro's parking ordinance 8-05-340 establishes policies for EV charging station spaces, which prohibits non-electric vehicles from parking in marked EV spaces and requires EVs to be plugged in and or charging while parked in a marked space. Metro's fee schedule, Section 20, also establishes a $53 fine for violations of the EV parking code. Metro's Parking Management organization should continue to enforce these regulations to keep EV parking spaces available to drivers that rely on them. Per state regulations, Metro will mark and maintain signage for public (and employee) EV charging so that EV owners can easily locate the stations and so that non-EV owners do not park in spaces illegally.

Figure 4. Standard EV parking signage

Charging Maintenance and Access

Through our contracting for EV hardware and services, Metro will ensure reliability standards for charger uptime (the percentage of time that the charger is functioning and available for driver

use). This will include monitoring the network for issues, prompt response for hardware or software issues, and regular preventative maintenance. Metro's charging provider(s) will also manage customer service for users to aid with any access, payment, or other troubleshooting.

Metro will also work with charging network providers to enable TAP card integration to seamlessly pay for charging sessions, in addition to complying with any state regulation for payment access.

Charger Pricing Structure

At Metro's existing P&R charging stations, the agency has historically charged users $1 per hour of usage, capped at $3 per day, plus a $0.25 transaction fee per charge. Metro will establish a uniform pricing structure for transit rider use, consistent with new California state regulations which require EV charging to be based on $/kWh pricing and clearly show any additional charges or fees.[21] Requiring payment for charging encourages efficient charger usage: if charging is free or lower cost than home charging, users will opt for the cheaper option and create unnecessary demand for the potentially limited supply of charging at Metro locations.[22] Metro will aim to establish fair market pricing for use of its chargers and has no intention of overcharging public users. Pricing will be communicated to drivers both via Metro's website and via signage on-site. Pricing may need to be adjusted regularly based on utility rate schedules or changes in usage patterns by transit riders. Moving forward, Metro will work in concert with the Board to approve new pricing rates as they are updated in the future.

The pricing structure will also consider more dynamic pricing options to improve the efficient use of chargers. Strategies may include using time-of-use prices to align with utility rate costs or idle fees, which add an additional charge (e.g., $/hour) for the time vehicles remain in a charging space after their vehicle has completed charging and a reasonable grace period has passed. This encourages users to move their cars and allow another user to charge, improving the utilization of chargers. Given that P&R locations are long-dwell, and where drivers are not near their car to move it once finished charging, Metro will not plan to include idle fees for drivers who do not move their vehicle after the car is finished charging. However, Metro may consider fees for drivers parked longer than extended periods (e.g., 12-16 hours) to ensure spot turnover daily and increase access for more drivers.

Interoperability of Charging Networks

As EV charging infrastructure has developed across the US over the last decade, a key frustration of many early drivers was the lack of "roaming" or interoperability between various charging network providers. Drivers would need to maintain accounts and memberships with any charging network or service provider that they used to be able to access and pay for charging at various stations. In recent years, major charging networks have begun to establish bilateral or multi-party agreements to allow for more seamless roaming between their networks and improve the experience for drivers charging in public. In the development of the EVPSP network, Metro staff will work with our charging partner to ensure the Metro network is also engaged with these national and regional charging networks to join in roaming agreements and enable

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[21] Electric Vehicle Fueling Systems Specifications in the CCR Title 4, §§ 4001 and 4002.11 Final Regulation (https://www.cdfa.ca.gov/dms/pdfs/regulations/EVSE-OAL_EndorsedLetter-and-FinalText.pdf) and Statement of Reasons (https://www.cdfa.ca.gov/dms/pdfs/regulations/EVSE-FSOR.pdf)

[22] For simplicity and the purposes of the EV Parking Strategic Plan Cost and Revenue Modeling, Metro has assumed a charging price consistent with an estimated average cost of electric.

this type of interoperability to allow for a more seamless and simple charging experience for transit riders.

Costs

While EV-capable charging spaces are required for new construction per the CALGreen codes, Metro will experience significant savings by installing charging infrastructure in new construction as opposed to retrofitting sites after they are built. An analysis from the California Electric Transportation Coalition found that an office with 150 parking spaces installing charging infrastructure for 10% (15) EV ready spaces would pay less than a quarter of the cost per EV space of a standalone site retrofit. As shown in Table 7 below, significant cost savings are achieved through raceway installation, reduced trenching needs, and fixed costs like permitting, inspection, and construction management.[23]

Table 7. EV charging installation costs in retrofits vs. new construction

Cost Component	Stand Alone Retrofit	New Construction
Electrical Panel	$8,477	$6,486
Raceway	$7,269	$4,107
Electrical Components	$1,151	$959
Trenching	$1,657	$413
Demolition	$22,966	
Asphalt & Concrete	$9,223	
Permitting, Inspection, etc.	$8,792	$1,560
Construction Management	$2,781	$90
Total per Site	**$62,316**	**$13,615**
Number of EV Spaces	15	15
Cost per EV Charging Space	**$4,155**	**$907**

Education and Engagement

The addition of new public charging will significantly benefit EV drivers in the region and will help those interested, choose to go electric – but only if drivers are aware of the charging availability at their preferred P&R locations. Metro will plan to conduct outreach to P&R customers and riders to raise awareness of charging location openings and build education about their use, prices, and the general benefits of going electric. Metro will also develop communications plans for customers who are concerned about the loss of general parking spaces to those dedicated for EV drivers only. Metro will also work with charging network operators to ensure that P&R stations are accurately displayed on public charging locator maps, such as PlugShare.com and the Department of Energy's Alternative Fuels Data Center.

[23] *California Electric Transportation Coalition, Plug-in Electric Vehicle Infrastructure Cost Analysis Report for CALGreen Nonresidential Update. September 16, 2019. https://caletc.aodesignsolutions.com/assets/files/CALGreen-2019-Supplement-Cost-Analysis-Final-1.pdf*

Key Recommendations for Transit Rider Charging

- Pursue charging at prioritized P&R sites through utility incentive program applications.
- Complete solicitation for charging hardware, software, and maintenance services.
- Develop specifications for Capital Projects parking designs to ensure consistent, cost-effective EV deployment at future P&R lots; Monitor future CALGreen code changes for impacts on P&R site plans.

4. Charging for Public Use

As a multi-modal, regional transportation agency, Metro's support for the adoption of electric vehicles expands outside of our employees and transit riders. Through the implementation of the EV Parking Strategy, Metro will also seek opportunities to develop public charging more broadly, which will support our vision and goals – and the broader regional and state objectives to decarbonize the transportation system.

Specifically, in addition to the public charging for transit riders at P&R locations, Metro will seek opportunities to develop fast-charging services for public use where feasible. Before developing projects, staff will first explore market needs, analyze geographic gaps in public charging aligned with Metro's system and properties and evaluate operating models that may align with Metro's strengths and regional roles. Appendix C presents details regarding two preliminary opportunities related to joint development sites and Metro Micro vehicles.

Metro may also evaluate opportunities for partnerships with EV car sharing providers, such as the City of Los Angeles' BlueLA program, or other private shared mobility providers to identify options for how Metro's various charging options can support greater access to EV mobility for all Angelenos.

5. Program Cost Estimates and Potential Revenue Sources

Metro has identified several potential funding sources and mechanisms for capital budgets to develop charging locations and operations budgets to support their ongoing maintenance. EV charging also provides revenue sources from employees' and transit riders' charging, in addition to Low Carbon Fuel Standard (LCFS) credits generated by EV charging, which can be sold for additional program revenue. As previously noted, costs and revenues, and other savings may accrue to different organizations' budgets within Metro, and staff will work to identify these interdependencies and impacts of the EV Parking Strategy on future budgeting. Finally, there are current utility incentives and potential future grant opportunities that can help offset both capital and operational costs, which Metro will pursue to reduce budget needs associated with the EV Parking Strategy. Cost estimates are broken into three sections below: 1) The near-term needs to maintain and operate the existing charging network until a long-term contract for the EVPSP is executed, 2) The capital costs to install 246 chargers planned in FY23 through the Charge Ready program from Southern California Edison, and 3) the long-term capital and operating costs to deploy and manage the full network envisioned in the EVPSP.

Current and Near-Term Operations Costs

As described further in Section 6 below, Metro's current Operations and Maintenance contract for the existing 108 level 2 chargers is due to expire in August 2022. Metro plans to extend this agreement for up to 24 months until a long-term contract is executed for the deployment and operations of the network envisioned in the EVPSP. To meet this near-term need for O&M of the network, Metro will need to allocate $250,000 for the extension of the current contract.

Table 8. Near-Term Operations Budget Requirements

Near-Term Operations Budget	Cost/Month	24-Month Extension Cost
> Monthly Network Operations	$7,000	$168,000
> Field Maintenance & Repairs	$3,417	$82,000
Near-Term Operations Total		**$250,000**

Anticipated Charge-Ready Installation Costs

Metro has begun coordinating with Southern California Edison on the utility's Charge Ready program, which will offset significant costs of EV charging installations for public and workplace sites (see more information in the Utility Incentive Programs section below and in Section 6: Current Activities). Staff have submitted numerous applications to SCE for both employee and Park and Ride facilities, with seven sites in conceptual design phases with SCE and expected to be installed during FY23. These sites total 246 new charging ports for employee or transit rider use. While SCE funds the make-ready infrastructure for each site, Metro will be responsible for the procurement of charging station equipment and installation of that equipment at the make-ready site. Metro will use FY23 capital for the deployment of these 246 chargers. The anticipated costs for these chargers are outlined below:

Table 9. Charge Ready FY23 Installation Budget

FY23 Charge Ready Installation Budget	Unit Cost	Units[24]	Total Cost
> Charging Equipment (per port)	$2,771	246	$681,666
> Installation, Commissioning, and Project Management (per port)	$188	246	$46,248
Charge Ready Installation Total			**$727,914**

The operations costs for these chargers are included within the Table 8 near-term budget requirements.

EVPSP Costs

Charging infrastructure deployment costs are highly site-specific and difficult to estimate without developing initial site plans. The below EV Parking Strategy high-level capital cost estimates are based on industry research and average charging installation costs. Similarly, Metro estimated operational costs based on historical values or industry averages, including estimating energy costs and typical vehicle usage. Metro estimated electricity costs and potential revenue from charger-generated LCFS credits. A summary of the five-year cost estimation is shown in Table 10.

Table 10. Estimated Five-year EV Parking Strategy Capital and Operating Costs

Estimated Cost / Revenue Source Capital Estimate	$ (M)	Estimated Charging Units
> Employee	$4.0	125
> P&R	$44.1	1725
EVPSP Capital Total	**$48.1**	
Potential Utility Incentives	-$13.4	
Operations Estimate	**$ (M)**	**Estimated Charging Units**
> Employee	$2.1	125
> P&R	$14.8	1725
> Program Management	$1.5	
EVPSP Operations Total	**$18.4**	
Potential LCFS Revenues	-$4.8	
Potential Charging Revenues	-$6.9	

[24] *Note: Some chargers installed at Metro Divisions and Locations through the Charge Ready program will be designated for non-revenue fleet use to support electrification of those vehicles.*

These costs and revenues include assumptions based on deployment timing, vehicle procurement, electricity rates, incentives, and market prices, which may have high variability over the Plan period and should be used as initial estimates at this time. For additional information on revenues from charger usage, see Chapter 3 section on Implementation Considerations for Transit Rider Charging.

Notably, costs and revenues will be budgeted from multiple different organizations within Metro, and the Agency will need to track how the costs and benefits accrue to different groups and their budgets. For example, construction costs for Capital Planning on new P&R may increase from CALGreen charging installation requirements, but those sites may also generate LCFS credits from the use of charging that could offset future costs. Metro plans to map these interdependencies to identify expected budget impacts and accurate capital and operational needs.

Available Funding Sources for EV Charging

The EVPSP will be implemented during a period of unprecedented funding sources for EV deployment that will support and accelerate the growth of charging in Los Angeles and around the country. Between current utility incentive programs, state and federal grants, and revenues from Low Carbon Fuel Standard revenues (see the section below), there are billions of dollars available and set to be allocated in coming years that will support Metro and its partners in realizing the bold goals of the EVPSP.

Utility Incentive Programs

Metro recognizes the significant impacts of the COVID-19 pandemic on capital and operational budgets. As a result, third-party sources of funding will be critical to deploying infrastructure for the EV Parking Strategy in the near term, and Metro has therefore crafted the EV Parking Strategy to prioritize funding availability from utility programs and other potential future incentive sources. SCE's Charge Ready program and LADWP's Commercial EV Charging Station Rebate program will provide the primary utility funding for the near-term EV Parking Strategy. Key elements of these programs are defined below in Table 11.

Table 11. Utility funding for EV infrastructure installations

	SCE Charge Ready	LADWP EV Charging Station Rebate Program
Total Funding	$437 million	$12 million (per annual funding allocation)
Program Design	Utility-designed, -constructed, and -owned make-ready infrastructure, plus rebates for the purchase of customer-owned chargers	Rebate for the purchase and installation of charging station(s)
Incentive Amount	> Covers full make-ready cost (Approx. $12,000/port) > EVSE rebate: $725/port or $2,900 for DACs	> $4,000 for first charging station; $5,000 for DAC (+500 for dual port) > One additional rebate per every four parking spaces electrified

	SCE Charge Ready	LADWP EV Charging Station Rebate Program
Minimum and Maximum Ports	> Minimum: Four per site > No maximum	> Minimum: One per site (two spaces) > Maximum: 40 rebates/site (138 spaces)
Requirements	> Requires SCE crew and contractors to perform make-ready construction; C-10 licensed electrician must install the charger > Separate metering for EV installation > TOU rate and demand response program enrollment > Charging equipment operational for 10 years > Chargers and software must be from SCE approved product list	> Licensed electrical contractor performs installation > Level 2 charger listed by the nationally recognized testing lab (NRTL) > Charging equipment operational for two years > Requires final Los Angeles Department of Building and Safety permit inspection
Additional Detail	> Site plan subject to SCE costs > Easement required for utility-owned infrastructure > Sites with prohibitive cost per port may be put on hold > Option for Metro to build make-ready infrastructure and receive an incentive for 80% of estimated costs	> May apply for rebate reservation; can complete charging installation within 12 months of reservation approval > Program allows for retroactive applications, meaning charger reservations typically fill up with completed or pre-designed projects within hours or days of funding availability.
Timing	> Launched July 2021; expected 5-year program or until funding is reserved	> Next Funding cycle opens in late June 2022.[25]

There are advantages to each program's design and funding levels. SCE's program incentives are greater, with no maximum per site, and long-term funding certainty (an estimated 30,000-40,000 chargers to be deployed over the five-year program). SCE's program also covers the design, permitting, contracting, and construction process of the make-ready installation, requiring fewer resources from Metro. However, some sites may be rejected or held due to cost constraints, and SCE will propose site plans based on make-ready costs, leaving less flexibility for

[25] *Because LADWP's program allows for retroactive project funding between rounds of program allocations, Metro needs to have completed or "shovel-ready" projects that can be completed within the 1-year timeline for funding reservation. Metro will continue to seek program funding with future LADWP funding cycles as available.*

Metro. SCE also offers a rebate model that provides up to 80% of the make-ready project costs for customer-built infrastructure (instead of utility-built infrastructure). This option could be preferable for sites that are rejected by SCE's make-ready program, but this option would require Metro to oversee and execute all aspects of projects, instead of SCE. LADWP's rebate model provides more flexibility to Metro with regards to siting chargers at any location but offers significantly lower incentives: after the first two parking spaces, rebates are only paid for each four parking spaces, reducing the value per port significantly. LADWP's program funding is also not guaranteed long-term, and as funding allows for retroactive applications, it may be hard to predict funding availability.

A slight majority (54%) of charging stations planned in the EV Parking Strategy are at facilities served by LADWP. The EV Parking Strategy assumes these utility incentive programs are available to a majority (~2/3) of sites, while the other sites may be ineligible, rejected, or funding may not be available at the time of site development. Smaller public utilities also offer rebate programs, including Pasadena Water and Power and Burbank Water and Power. Both utilities operate similar incentive programs for medium- and heavy-duty vehicle charging infrastructure which is currently open for applications; each requires proof of purchase of vehicles to qualify for incentives.

State, Federal, and Local Grant/Capital Funding

As additional funding opportunities arise, the EV Parking Strategy roll-out will pursue any possible grants or other funds to reduce the capital or operational costs of completing the EV Parking Strategy. Examples of potential funding sources are summarized in the table below.

The Infrastructure Investment and Jobs Act (IIJA), signed into law on November 15, 2021, includes over $30 billion eligible for electric vehicle funds, including $2.5 billion for charging and fueling infrastructure grants and $5 billion in a National Electric Vehicle Formula Program for EV charging, among several other relevant EV appropriations.[26] As of February 2022, the Department of Transportation is working to establish the grant program requirements, which will be eligible to states, local jurisdictions, metropolitan planning organizations, and public authorities with a transportation function – like Metro. These grants are expected to be implemented later in 2022.

California also funds EV infrastructure grants that may be available to Metro, though the current CALeVIP program is fully subscribed. The California VW Mitigation Trust, which funds clean transportation investments resulting from the Volkswagen emissions settlement, provided $5M for light-duty zero-emission electric infrastructure in 2021, with an undetermined second installment in future years. This grant program would cover 100% of charger installation costs at publicly accessible government sites, and 60% of costs at workplace (employee) sites.[27] The Infrastructure Investment and Jobs Act also provides $384 million to California in formula funds for EV charging along designated alternative fueling corridors.

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[26] *Atlas Public Policy. EV Hub, Infrastructure Investment and Jobs Act (H.R. 3684), November 17, 2021. https://www.atlasevhub.com/materials/invest-in-america-act-h-r-3684/*

[27] *The VW Mitigation Trust funding is not applicable for site also funded by SB 350 (i.e., SCE Charge Ready Program) but could be combined with LADWP program funding.*

Table 12. Grants and Other Funding Sources

Program	Funding Agency	Size	Details
Alternative Fuel Corridor grant program (IIJA)	U.S. Dept. of Transportation	$2.5B (5 years)	> Details under development, grant implementation expected in late 2022 > For deployment along with designated Alt. Fuel Corridors, and possibly in other publicly accessible locations > Intended to facilitate long-distance travel, priority for rural or low- and moderate-income neighborhoods, and multifamily communities with low access to parking
National EV Formula program (IIJA)	State of CA	$384M (CA)	> $5B national program, with funding to be made available to states on a highway formula funding basis
Surface Transportation Block Grants	U.S. Dept. of Transportation	$72B	> Funded through IIJA, funds states and local governments to use the funding to best address local needs > Newly allows installation of EV Charging as eligible project types
CALeVIP and Light-Duty EV Charging Infrastructure	California Energy Commission	$270M (2021-2022)	> From 2018-2021, Southern California funding reserved for DC Fast Chargers > Up to $80,000 per DCFC, 80% of project costs > Existing funding exhausted in 2021

Low Carbon Fuel Standard Credit Revenues

California's Low Carbon Fuel Standard (LCFS) represents a potentially valuable revenue stream for the EV Parking Strategy, which will offset costs over the life of charger assets. Metro generates LCFS credits for electricity used to charge electric vehicles at Agency facilities. Metro can then sell those credits on California Air Resources Board's regulated market. While these credit prices are variable, in recent years they have ranged between $150 and $200 per credit. Current credit futures point to a price range declining from $150 to $120 between 2022 and 2027.[28]

The value of a kWh of energy used depends on the type of vehicle charging, but for light-duty vehicles, at futures values, Metro estimates a value of $0.11 - $0.13 per kWh – or slightly less

[28] *Based on Values provided to Metro by SRECTrade, Inc. in November 2021.*

than the cost of electricity to charge that vehicle. Over hundreds of thousands of miles, the revenue from these credit sales is expected to reach millions of dollars for Metro and should be funneled back into the EV Parking Strategy to ensure long-term investments in clean transportation. Metro should also ensure in any contracting with EV vendors that the agency retains control over the LCFS credits generated from Metro-owned charging stations.

Public-Private Partnerships

Metro will explore potential public-private partnerships that could reduce the upfront or long-term investments required for the EV Parking Strategy. These partnerships could include innovative financing, ownership, or revenue models that would help accelerate investments to increase access for charging at Metro's employee and public facilities. This will include several steps such as creating a scope of work and industry outreach, soliciting proposals and developing a pre-delivery agreement, onboarding a partner, and transitioning the existing charging network in conjunction with future charger deployments. While a P3 agreement may help accelerate the deployment of chargers as outlined in the EVPSP, it may also have risks. Private charging providers may not see a rapid enough return on investment for the types of locations Metro plans to deploy, limiting their interest in pursuing Metro's solicitation. Charging providers may also seek to only prioritize certain sites that due appear financially viable, leaving other sites under-developed. And finally, a P3 could turn over valuable long-term revenue streams that Metro would have otherwise retained ownership of, including LCFS credits or charging user revenues. Metro will evaluate these factors alongside the benefits of pursuing a P3 to determine the best delivery option for the EVPSP.

Key Recommendations for Program Costs and Revenues

- Identify potential budget sources for initial charging installations; utilize initial projects to further refine long-term program cost estimates and map budget interdependencies between internal groups.
- Pursue incentive and grant opportunities to offset costs as available.
- Develop employee and P&R charger usage pricing plan to match charging revenues with electricity and operational costs.
- For charging installations, claim LCFS credits: when credits are monetized, re-invest LCFS revenues back into EV Strategy for future deployments and operational costs.
- Pursue a P3 solicitation to accelerate the deployment of EVPSP and assess long-term benefits and drawbacks of such an agreement vs. other delivery methods.

6. Current Activities

To ensure a successful rollout of the EVPSP, Metro has begun preparing for the expansion of its existing network and identifying mechanisms for implementation to address upfront and long-term funding needs. These current and near-term activities are detailed below:

Extension of Current Installation, Operations, and Maintenance Contract

Metro currently contracts with Axxera to install, operate, and maintain the 108 chargers active across its network today. The existing contract with Axxera extends through August 2022, and without an extension of this agreement, Metro will face a gap in EV charging services for the 7,000 unique customers that utilize the charging network. Metro will require an additional $250,000 to continue operations of the charging network beyond August 2022 as a bridge toward the award of a potentially long-term contract that funds the build-out and operations of the network outlined in the EVPSP.

Plan Delivery Methods and Using a Public-Private Partnership (P3)

There are a variety of delivery methods that Metro could leverage to execute the EVPSP over the coming years, each of which provides varying levels of upfront costs, long-term resource commitment, and overall control of the Plan implementation and operations to Metro. Metro has experience with each of these delivery approaches particularly in major capital projects, renewable energy programs, and others. An overview of the potential delivery options is included below:

- **Option 1 – Separate Contracts / A La Carte (current network approach):** Under this delivery method, Metro retains most contract responsibilities, including design and engineering of sites, installation of charging infrastructure, operations, and maintenance of the network and equipment following any warranty period. Metro can elect to contract with one or multiple service providers on an as-needed basis and would retain overall oversight of the Plan implementation based on the terms of each contract. This is the approach Metro has taken for the initial deployment of 108 level 2 chargers comprising its existing network.
- **Option 2 – Charging-as-a-Service**: Metro would pay an all-inclusive per-kWh or per charger-month fee to a selected service provider that would incorporate the cost of financing and other infrastructure costs, as well as ongoing operations and maintenance. Metro transfers all operation of charging infrastructure responsibilities to the private sector, including any project financing. This is a relatively new approach offered by some EV charging service providers, though is a common approach in clean energy projects such as solar PV power purchase agreements (PPAs).
- **Option 3 – Pre-Development Agreement / P3:** A Pre-Development Agreement (PDA) is a progressive delivery approach that would allow Metro to contract with the private sector for the planning and development stages of the process. In doing so, Metro would be able to accelerate program design elements and negotiate risk transfer for certain scope elements (i.e., Build, Operations, Maintenance, and Finance) at a later stage of the process. PDAs are a form of collaborative contracting for the project (single division) or program delivery, where Metro would work collaboratively with private sector parties to mitigate project pre-development risks such as program and scope definition, key approvals, and competitive tension, and commercial or financial feasibility within available public resources. Complex projects derive the most benefit from such contracts (i.e., projects with potential issues like technical challenges, large size, those outside core agency competencies, lengthy or unclear

permitting). PDAs can be structured to initially require developers to deliver value at key project development milestones (e.g., technical studies or value engineering) followed by an open-book pricing and risk mitigation process that leads to a commercial arrangement and associated risk allocation that mirrors most traditional P3s. Metro is currently engaged in a PDA approach for the Sepulveda Pass Transit Corridor where Metro received proposals for different technology solutions for the project and is working with private partners to develop the final project delivery solution.

Given the scale of the upfront costs for deploying charging infrastructure, third-party funding sources will be critical to deploying infrastructure at the scale planned for the EVPSP. As shown in the tables above, available utility incentives and charging revenues are only expected to offset 27% of capital costs and 64% of operating costs for the five-year plan. Through outside funding sources, Metro can accelerate EV charging deployment beyond what would be otherwise available and help align our existing facilities charging with current CALGreen codes for new construction. These external funding sources will also help prepare Metro to meet expected requirements for the transition of non-revenue fleet vehicles to EVs.

Metro plans to pursue the P3 option that will reduce the upfront or long-term investments required for the EV Parking Strategy. This partnership could include innovative financing, ownership, or revenue models that would help accelerate investments to increase access for charging at Metro's employee and public facilities. The P3 will finance, fund, and implement the Strategic Plan, including the installation of up to 3,000 chargers, which could support charger installation beyond the initial 5-year Strategic Plan. The EVPSP identifies several incentives, grants, and revenue-generating sources that would fund the capital and operating costs of the P3. Staff will continue to seek additional financing opportunities to fully fund the installation and operation costs for all of the EV charger commitments in the strategy.

If feasible, and until a P3 contract is issued, and the existing network is transferred to the selected partner, Metro will continue to operate its public and fleet charging stations through the existing network solution provider to allow for a seamless experience for the 7,000 unique users that rely on Metro's current charging network.

As a next step, Staff will develop the scope of the P3 with an anticipated solicitation in January 2023. This would allow Metro to contract with and onboard a selected partner by July 2023. The anticipated milestones and timeline for the execution of a P3 contract are shown below:

Table 13. P3 Milestones and Timing

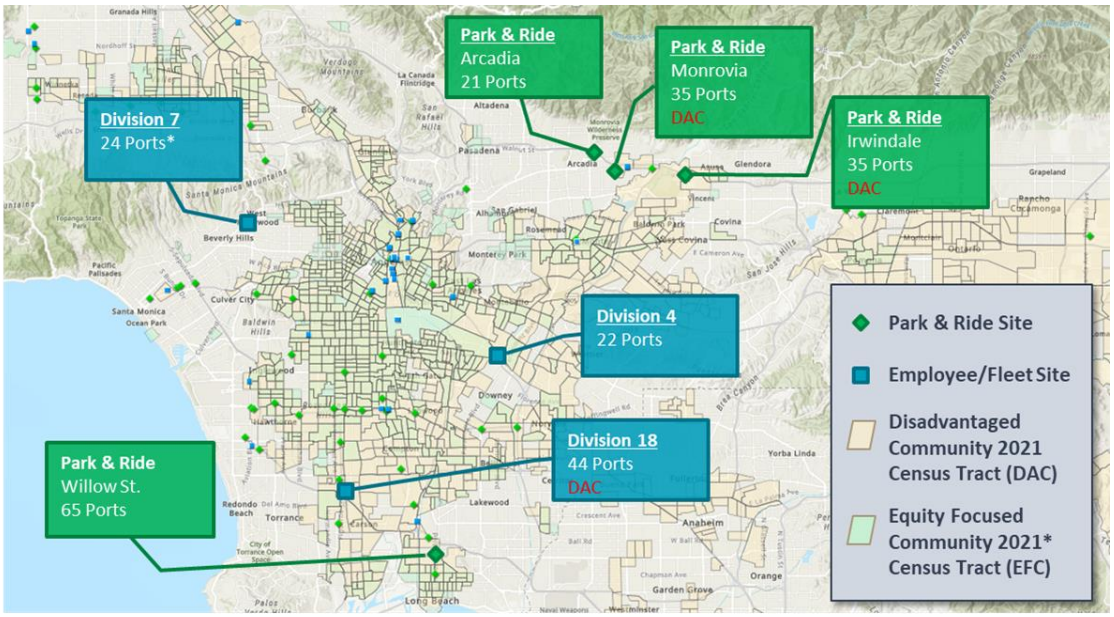
Milestone	Expected Timing
Development of P3 scope	July - December 2022
Industry outreach	September - December 2022
RFP solicitation and evaluation	January - April 2023
Contract negotiation	May - June 2023
P3 onboarding and charging network transfer	July - December 2023

Integration with SCE Charge Ready Program

Over the last year, Metro has been in regular coordination with SCE regarding the significant incentive funding available from the Charge Ready program and Metro's interest in participating. SCE has already provided preliminary review and feedback on several sites and identified potential candidates, as well as locations that do not meet cost-effectiveness thresholds.

Based on these conversations, Metro has identified an initial set of EVPSP locations that it plans to pursue installation in FY 2023 to ensure the Agency does not miss out on this opportunity to install charging infrastructure at significant cost savings from SCE's support. As such, Metro plans to install 246 chargers at employee and Park & Ride facilities identified in the EVPSP as soon as possible beginning in FY 2023, using existing budgeted funds. This includes four Park & Rides and three Divisions across the service area. Three locations are within disadvantaged communities. These preliminary sites are highlighted in the map below, along with markers for the full set of EVPSP locations.

Figure 5. Map of Preliminary SCE Charge Ready Locations



**EFC areas based on pre-updated (2021) values.*

The estimated ports per site shown in the Figure above may change based on SCE's review of site feasibility and costs.

Key Recommendations for Current Activities

- Develop and solicit potential P3 agreement to establish a long-term funding and financing mechanism for EVPSP deployment.
- Extend existing Metro EV network solution provider contract for up to 24 months while P3 is in development to allow for seamless experience for current users.
- Continue pursuing initial Charge Ready locations through current budget to achieve quick wins in expanding Metro's EV charging network.

7. Long-Term Planning and Actions

As Metro drives into the future, the following items should be considered in long-term planning for the EVPSP:

- **Workforce Development:** Metro will work together as an agency to develop training and education for its employees and partners to integrate and understand new technologies related to EVs and EV charging. The scale of the EVPSP and the charging network Metro plans to deploy will create opportunities to train the next generation of EV industry experts, including Metro's employees. These activities will help our current and potential workforce learn about these critical technologies and how they benefit our system, as we have historically done with previous projects and pilots, such as Solar PV installations and others.
- **Energy Reliability**: The growth of the EV market will have implications on the electricity grid. EV chargers will require additional grid capacity to generate and deliver additional energy, especially during peak demand times. Pairing EV charging stations with photovoltaics (PV) and energy storage offers a potential solution for deploying EV charging stations in areas where the grid is constrained to offset costly infrastructure upgrades and can add a measure of resiliency in the event of power disruptions. Additionally, these distributed energy solutions can be used to offset peak demand charges for the EV charging load. Co-deployment of PV and battery storage with EV charging infrastructure should be considered in site evaluations, especially as costs of storage systems decrease over time.
- **Vehicle Grid Integration:** The Joint Agencies of California, including the California Public Utilities Commission, California Energy Commission, CARB, and California Independent System Operator (CAISO), jointly created a working group to develop policies that support vehicle-grid integration (VGI). The VGI Working Group developed a set of 92 individual recommendations for policy actions that California state agencies, utilities, community choice aggregators, and CAISO could undertake to advance VGI in the short-term (2020-2022), medium-term (2023-2025), and long-term (2026-2030). Emerging VGI technologies allow for dynamic charging management and potential future bidirectional power flows from EVs back to the facility or distribution system, so EVs can become a grid asset. Vehicle batteries can use energy during downtime, charging when clean energy is abundant on the grid and returning energy to the grid in the afternoon and evening as solar production fades away. Metro will monitor market development for these technologies to identify when and how EV charging stations can best take advantage of these developments.
- **2028 Olympics:** The 2028 Summer Olympic Games will be hosted in Los Angeles and may create an opportunity for Metro to showcase their support of California's and Los Angeles' ambitious EV goals. P&R locations near Olympic venues and events should be prioritized and Metro should explore collaboration with local, regional, and national partners to deploy EV chargers at these sites.

8. Measuring Success and Recommendations

Metro has compiled a list of preliminary metrics that can be considered to measure the success and health of the EV Parking Strategy's progress. A brief description of these metrics is listed below. Following these measures, the report concludes with recommended next steps to begin implementation of the Plan.

Table 14. Deployment, Operations, Customer, and Impact Metrics for Measuring EV Parking Strategy Success

Measure Category	Name	Details
Deployment	The site and port deployment progress	> Number of employee and P&R sites and ports completed > % of employee sites with charging access > Geographic dispersion of P&R sites
	DAC deployment	> % of ports in DACs by EV Parking Strategy segment
	Average cost per port installed	> Average costs by EV Parking Strategy segment > Analysis of cost drivers
	Leveraged funding	> Utility incentives > Grant funding > Private funding
Operations	Charging station usage	> kWh consumed > Number of charging sessions > Number of individual users > Charger utilization rate > Charger idle time while occupied > Level of access for EV drivers
	eVMT	> Electric miles enabled by EV Parking Strategy segment
	Charging station reliability	> Uptime > Time to repair
	Charging costs and revenues	> Average rate costs by utility > Revenues from employees, P&R users
	Charging load shapes	> Hourly charging load and demand by EV Parking Strategy segment > Alignment with utility renewable generation and time-of-use rates
	Maintenance costs	> Average maintenance and repair costs per port

	Parking enforcement	> Incidence of EV parking enforcement citations
Customer Satisfaction	Customer feedback on accessibility, payment, and functionality	> User satisfaction survey > Focus group feedback > Non-user research
Impacts and Environmental Commodities	Carbon reduction	> GHG emissions avoided through electric miles enabled by EV Parking Strategy charging
	LCFS credit revenue	> LCFS credits generated and sales revenue
	Employee EV adoption	> Rate of EV adoption and commuting by employees

Summary of Recommendations and Next Steps

Table 15 below, categorizes the proposed next steps to begin executing the EV Parking Strategy. These are grouped between near-term activities and long-term research and planning actions.

Table 15. Categorized near- and long-term actions for the EV Parking Strategy

Charging Deployment	
Near-term	> Identify preferred charging hardware, and network solutions, and engage in contracting > Submit utility program applications for prioritized Employee and P&R sites > Initiate site review and design for LADWP-served sites
Long-term	> Pursue all grants, rebates, incentives, and other funding sources as soon and as aggressively as possible > Include long-term electric capacity needs in site development plans > Adopt standardized specifications for new capital project parking designs
Operations	
Near-term	> Establish program management and maintenance team/partner network to manage service at all charging station locations > Establish service level agreement targets for uptime and customer service > Draft policy and procedures for public/employee charging stations, including dwell penalty, charging/energy management, surveillance, and enforcement
Long-term	> Provide educational and promotional materials for all customers, specifically currently income challenged areas, to increase EV adoption and help all customers understand LA Metro EV policies and procedures
Planning	

Near-term	> Field employee survey to understand long-term needs for charging > Conduct community outreach to targeted segments identified by the EV Parking Strategy's priorities to understand long-term charging needs beyond 2028
Long-term	> Work with local, regional, and national partners to help further expand charging network capabilities (e.g., Olympics, LA County, TNCs) > Develop a fast-charging strategy based on market needs, analyzing geographic gaps in public charging aligned with Metro's system and properties and operating models that may align with Metro's strengths and regional roles > Further research on opportunities for public charging through TNCs like Metro Micro and at Joint Development sites
Funding	
Near-term	> Allocate LCFS credits generated through EV chargers to fund future program costs > Look at options to provide internal funding for projects and/or identify new procurement processes and partnerships to leverage more private funding
Long-term	> Map out the budget interdependencies of implementation and identify internal funding sources as needed

Launching this EV Parking Strategy represents an important step in preparing Metro for the future of mobility in Southern California. Increasing access to EV charging for employees, transit riders, and the public will allow Metro to meet the growing interest in EVs from drivers across the region and prepare the agency for a mass-market transition from gasoline and diesel vehicles over the coming decade. Together, these elements of the EV Parking Strategy will help us meet our organizational commitments to improved sustainability and environmental stewardship towards achieving our overall climate change goals, short and long-term.

Definitions

Battery Electric Vehicle (BEV): A type of electric vehicle that uses only electricity for propulsion, stored in an onboard battery.

Charge Ready Program: A utility-funded incentive program from Southern California Edison that helps supports the deployment of public and workplace electric vehicle charging stations by reducing upfront costs of installing charging stations through rebates and utility-owned make-ready infrastructure.

Disadvantaged Communities (DACs): The top quartile (worst scoring) census tracts, as ranked by the California Environmental Protection Agency's (CalEPA) "CalEnviroScreen," a mapping tool that helps identify California communities that are most affected by many sources of pollution and where people are often especially vulnerable to pollution's effects. The tool uses environmental, health, and socioeconomic information to produce scores for every census tract in the state. High-scoring communities are the most highly burdened by pollution and other socioeconomic factors. Utility incentive programs for EV charging provide greater monetary support for locations based in DACs.

Direct Current Fast Charger (DCFC): A high-power type of EV charger requiring three-phase power at 480 volts. DCFCs are typically capable of recharging an EV's battery to 80% state-of-charge in under one hour and are typically publicly accessible and used for long-distance travel or as a charging option for those that lack access to regular home or workplace charging.

Electric Vehicle: Also called plug-in electric vehicle (or PEV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles, and the like, is primarily powered by an electric motor that draws current from a rechargeable storage battery, which is recharged from an external power supply, such as the electric grid. Plug-in hybrid electric vehicles (PHEV) and Battery electric vehicles (BEVs) are the two classes of electric vehicles. For this document, Fuel Cell vehicles are not considered electric vehicles.

Equity-Focused Communities: A geographic designation and mapping tool developed by Metro to identify census tracts where at least 40% of households are low-income and either 80% of households are non-white or 10% of households do not have a personal car. These communities represent 30% of the County of Los Angeles' population. The EVPSP used the Equity Focused Community designations available as of 2021.

EV Ready: A designation used by California's CALGreen code to identify parking spaces in a new construction that must be designated for future installation of EV charging stations. This includes building adequate capacity in electrical panels and installing the raceway to allow building owners to more easily add EV charging circuits and install charging equipment at a later date.

EV Charger: Also referred to as EV Supply Equipment (EVSE), the EV charger is the off-board equipment installed at a parking space, used to recharge the battery of an electric vehicle. EV chargers often have one or two charging connectors or ports, which couple with the vehicle's charging port. EV chargers are typically designated as Level 1, Level 2, or DC fast chargers, indicating the power level and speed of charging, from slowest to fastest, respectively.

Internal Combustion Engine Vehicle (ICE): A vehicle powered solely by the internal combustion of gasoline or diesel. For this document, traditional hybrid vehicles, which do not recharge from an external power source, are considered ICE vehicles.

Make-Ready: The "make-ready" includes all of the equipment and construction required to install an EV charger up to, but not including the charger itself. This includes any upgrades to facility electrical equipment (transformers, panels), safety equipment, surface trenching, installation of conduits and cables, and concrete pads, up to the "stub-out" out where a charging station would be bolted on, connected, and installed. Utility EV programs, such as Southern California Edison's Charge Ready program, sometimes fund the construction of the "make-ready" infrastructure to reduce the upfront cost of charging installation for customers.

Level 1 (L1): A low-power level of EV charging, typically at 15-20 amps on the 120-volt circuit (also called slow charging or trickle charging), often via a standard electrical outlet. Drivers can use portable charging equipment provided with most electric vehicles to Level 1 charge. Level 1 charging generally provides three to five miles of range per hour of charging.

Level 2 (L2): A higher level of EV charging, typically at 30-40 (or up to 100) amps on a 240-volt circuit. L2 stations are typically fixed in place, and chargers provide 15-25 miles of range per hour of charging, for typical EVs.

Low Carbon Fuel Standard (LCFS): A regulatory carbon trading program, designed and operated by the California Air Resources Board. LCFS promotes the reduction of the carbon intensity of transportation fuels in California by requiring high-carbon fuel producers to purchase credits from low-carbon fuel producers to comply with the regulation. Electricity is a low-carbon fuel under the regulation, and commercial EV charging station owners can claim LCFS credits for electricity sold to fuel vehicles. As an EV charging station owner, Metro generates LCFS credits for the electricity used to fuel employees, fleet, and customer-owned electric vehicles. Metro can then sell these credits on the LCFS market as a revenue stream.

Plug-in hybrid Electric Vehicle (PHEV): A type of electric vehicle that combines both electric and internal combustion.

Transportation Electrification (TE): Transportation Electrification refers to the broad, ongoing shift in our transportation system from internal combustion engine vehicles to those powered by electricity.

Vehicle Grid Integration (VGI): A broad term that encompasses the many ways in which a vehicle can provide benefits or services to the grid, to society, the EV driver, or parking lot site host by optimizing electric vehicle interaction with the electrical grid. VGI includes both active management of electricity (e.g., bi-directional management, such as vehicle-to-grid [also known as V2G] or unidirectional management such as managed charging [also known as V1G]) and/or active management of charging levels by ramping up or down charging power rates, and passive management via electricity rates or general education.

Abbreviations

CAAP: Climate Action and Adaptation Plan

CARB: California Air Resources Board

DAC: Disadvantaged Community

EV: Electric Vehicle

eVMT: Electric Vehicle Miles Traveled

EVSE: Electric Vehicle Supply Equipment

kWh: Kilowatt-hour

LACI: Los Angeles Cleantech Incubator

LADWP: Los Angeles Department of Water and Power

LCFS: Low Carbon Fuel Standard

MBS: Moving Beyond Sustainability

MSA: Metropolitan Statistical Area

NR Fleet: Metro's Non-Revenue Fleet

P&R: Park and Ride Station

SCAQMD: South Coast Air Quality Management District.

SCE: Southern California Edison

TNC: Transportation Network Company

VGI: Vehicle Grid Integration

Appendix A. EV Parking Strategy Stakeholders and Interdependencies:

Table A16. EV Parking Strategy stakeholders and interdependencies

Metro	
EV Parking Strategy Stakeholder	**Project Role**
Office of Sustainability	> Leads EV Parking Strategy development and coordination between stakeholders
Real Estate, Facilities, and Maintenance	> Site planning for Metro facilities > Coordination with facilities on developing and implementing charger maintenance plans
Engineering	> Support for site design and development
Parking Management	> Prioritization, planning, and construction of EV charging at P&R sites > Management of EV charging spaces and enforcement of EV charger use policies
Office of Management & Budget	> Capital and operational budget planning for charging and vehicle investments
Non-Revenue Fleet Operations	> Coordination on potential fleet and employee site planning for non-revenue infrastructure
Office of Extraordinary Innovation	> Coordination on new mobility projects, public-private partnerships, and concepts for public charging use
Planning and Program Management	> Analysis of long-term future needs for employee and public charging > Ensure that capital projects are designed for compliance with CALGreen Tier 2 standards
Vehicle Technology and Acquisition (ZEB)	> Coordination of electrical capacity and utility planning
Procurement and Grants Departments	> Procurement of installation services, charging stations, and management > Application for state/federal grant funding opportunities

External	
EV Parking Strategy Stakeholder	**Project Role**
Utilities and CPUC: LADWP, SCE, City of Vernon, Pasadena Water and Power	> Planning for charging capacity > Incentive program participation > Approval and oversight of investor-owned utility charging programs
California Department of Transportation (Caltrans)	> Coordination on the Caltrans-owned property
Local Governments and State Agencies	> Regional planning for EV charging access and growth > Identifying grant and incentive program opportunities
EV and Charging Industries, and Non-profit EV organizations	> Consulting with EV industry and non-profit leaders on best practices and future trends in the vehicle and charging technology and use > Identifying potential public-private partnership opportunities > Research partnership opportunities (e.g., UCLA, Transportation Network Companies, LA28) > Outreach partnership opportunities

Appendix B. EV Parking Strategy Methodology, Modeling, and Assumptions

Metro used internal operations data and publicly available industry research to inform all aspects of the proposed EV Parking Strategy deployment and estimated costs. We will continue to refine the data and assumptions underlying the EV Parking Strategy over time to reflect the most recent and accurate information, and these updates will continue to direct our strategic plans over time. The sections below contain an overview of the methodologies, modeling, and data assumptions used in Employee and P&R charging planning.

Employee Planning

While relatively few employees commute via EV today, Metro estimates our facilities will require approximately 10 Level 2 chargers per 100 employee parking spaces over the long term. This estimate is based on an average regional commuting distance of 21 miles per employee and assumes that not all employees with EVs will need or want to charge at work (due to access to home charging or shorter commutes that do not require workplace charging. Based on this modeling, Metro will aim to build capacity for the longer-term target of 10% EV charging spaces while initially deploying fewer chargers at all locations.

In an informal survey of Division and Facilities Managers, nearly two-thirds of the 39 respondents indicated no concerns about parking access or electrical installation if EV chargers were to be installed at their location. One in five respondents identified potential concerns, with several citing current limited parking availability at their location and concerns that EV charging would further reduce available spots.

"There are more than a few employees here, currently on different shifts, that would benefit from EV charging stations on the property."

– Survey Response from Division 13 Employee

Transit Riders Planning

P&R facilities serve as an important link in Metro riders' first and last-mile connection to the region, especially those who cannot access a Metro station by walking, biking, transit, or any other modes. Analyzing how drivers use P&R facilities and how those patterns align with future needs for charging can inform estimates of eventual charging needs. Data for Metro's Supportive Transit Parking Program Master Plan in 2017 found that 31% of Metro P&R users live within two miles of their preferred station and 71% live less than five miles away. Only 11% live more than 10 miles from their preferred station.[29] Assuming that nearly 90% of P&R users have a daily round-trip of under 20 miles, a Level 2 charger would replenish this round-trip range in just over an hour if charged daily. The Master Plan survey also found that 69% of drivers park for 4-10 hours, indicating that if drivers charged daily via a Level 2 charger, 75-90% of their time at an EV charging space would be spent plugged in but not charging, inefficient use of charging resources.

[29] *Metro (2017). Supportive Transit Parking Program Master Plan – Appendices, December 2017.* *http://libraryarchives.metro.net/DPGTL/parking/Metro%20STPP%20Report%20Appendix%2020180110.pdf*

However, data from chargers previously installed at P&R facilities[30] indicate EV drivers are more efficient in their charger usage. While drivers do spend a significant amount of time plugged in but not charging, the average charging time was three and a half hours versus six hours of total time occupying spaces. Analysis of charging data revealed just under half of EV charging users moved their vehicle within 20 minutes of completing a charge, which is to be expected if P&R users take transit to a different location and are not nearby to move their car. This variation from the Master Plan survey data indicates that EV P&R users either charge less frequently than daily or drive significantly further than the typical P&R population.

Both the Master Plan survey and charging station data indicate that most EV drivers at P&R locations likely could suffice with lower-powered Level 1 charging. However, the CALGreen codes require Level 2 charging, and given the need to trench and install networked charging stations, it is unclear if installing Level 1 chargers would yield any significant cost advantage. By providing Level 2 charging, drivers can use stations every few days or once per week and obtain the commuting range they require during the four to ten hours that they are typically parked; this allows for more efficient use of fewer charging stations.

Like employee charging, Metro will require networked charging stations at P&R locations to enable payment from EV drivers, track energy consumption for LCFS credit, monitor usage trends and maintenance issues, and for potential future load management or vehicle-grid integration activities.

Cost Modeling

The below sections include brief descriptions of the cost elements that informed the EV Parking Strategy estimates. Metro assumes a 3% annual escalation in costs over the EV Parking Strategy term, and a 10% contingency on capital and operational costs to account for potential site variability and other unplanned costs.

Each of the below-cost elements may be highly variable. Metro will monitor both internal costs and public literature to update cost assumptions as new or more accurate data becomes available.

Capital Costs:

- **Make-ready infrastructure:** Estimated at $17,024 per port for non-new-construction sites, based on industry literature review. Includes the design, materials, and construction costs for infrastructure from the utility service connection to the parking space.
    - For new construction P&R sites, make-ready costs are assumed to be included within site construction costs (as make-ready construction is required per code). As noted above in Section 3, make-ready costs for new construction are significantly lower than for retrofit sites.
- **Chargers:** Estimated at $4,444 per port, including installation and activation of the charger unit based on industry literature review, and assuming a regular charger replacement rate.
- **Utility incentives**: Includes funding for make-ready infrastructure and rebates for chargers at sites in SCE service territory, and rebates for chargers in LADWP service

[30] *Data analyzed was from Oct-Nov 2019, prior to Covid-19 impacts that may have shifted use of P&R lots and EV chargers.*

territory (see Section 5 for more detail about incentives). Additional grant funding opportunities may become available over the Plan period.

Operational Costs:

- **Charger O&M:** Estimated at $1,053 per port annually based on Metro historical data, includes annual maintenance fees, networking connectivity, and other service costs.
- **Electricity:** We assume an average rate of $0.16 per kWh for electricity to charge EVs. Rates vary significantly between utilities, and average costs will vary over time as rates change and as utilization at charging sites grows over time.
    - For P&R and employee charging, modeling assumes an initial utilization (10% load factor), growing with annual escalation each year.
- **Program management:** Assumes up to three full-time employee equivalents each to oversee the employee or P&R charger networks
- **LCFS Revenues:** Based on current futures prices for credits provided by SRECTrade in November 2021. These prices range from $120 - $150 per credit, equivalent to approximately $0.11 - $0.13 per kWh for light-duty charging.
- **Charging Revenues:** Assumes charging prices are roughly equal to electricity costs ($0.16/kWh) and uses the same charger utilization assumptions as electricity cost estimates. In reality, these values will likely not be equal.

Appendix C. Public Charging Preliminary Evaluation and Opportunities

As Metro evaluates opportunities to develop multi-modal charging solutions for public use, we have identified two initial opportunities to further investigate:

Supporting First-Mile/Last-Mile Electrification

New and growing modes of connection to Metro's transit hubs will enable more riders to complete fully zero-emission trips. Metro has set First Last Mile Strategic Plan Goals to address these challenges, which include expanding the reach of transit through infrastructure improvements, maximizing multi-model benefits and efficiencies, and building on the Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) and Countywide Sustainability Planning Policy and Implementation Plan. In identifying future deployment of EV chargers, Metro should consider how to centralize charging infrastructure within multimodal transportation hubs to facilitate transit uses, improve accessibility to stations, and promote transit services.

The EV Parking Strategy will explore opportunities to develop fast-charging stations at or adjacent to Metro properties that could be used by the Metro Micro service when electrified in the future. The Metro Micro service, which launched in December 2020, provides a ride-hailing service that serves targeted communities for essential trips and links customers to additional legs of their Metro journey. These stations could also be used for Transportation Network Companies (TNCs), whose fleets will be increasingly comprised of EVs over the next decade.

SB 1014, enacted in 2018, directs CARB and the Public Utilities Commission to reduce emissions per passenger mile driven by TNC vehicles and increase the adoption of electric vehicles among their drivers through a Clean Miles Standard. The proposed rule from CARB would require 30% of vehicle miles traveled to be electric by 2026 and 90% by 2030.[31] As of 2019, TNCs made up 2.5% of the vehicle population in California, which equates to hundreds of thousands of vehicles.[32] This rapid increase in electrification of rides provided by TNCs would drastically increase the demand for public fast charging. Both TNC and ride-hailing services have high daily mileage requirements and, even with longer-range electric vehicles available today, typically require fast charging to meet these daily driving needs. The chargers could also support market development for electrification of last-mile goods movement (i.e., delivery vehicles) within the region.

The higher upfront costs of fast charging installations, coupled with a long, uncertain payback based on utilization, have discouraged widespread private investment as the EV market expands. Metro may be positioned to leverage our long-term planning horizon, property, and connection to first/last-mile trips to efficiently develop fast-charging fueling hubs for internal and public use.

Joint Development Projects

Metro's Joint Development program helps build transit-oriented developments on Metro-owned properties. While these projects are focused on increased transit access and reduced dependency on auto use, they represent an opportunity for Metro to also increase access to EV charging for potential residents or businesses at future sites. Metro's recently adopted updated

[31] *California Air Resources Board, Proposed Clean Miles Standard Regulation – Appendix A. March 30, 2021.* https://ww2.arb.ca.gov/sites/default/files/classic/regact/2021/cleanmilesstandard/appa.pdf

[32] *California Air Resources Board, Proposed Clean Miles Standard Regulation – Base Year Emissions Inventory Report, December 2019.* https://ww2.arb.ca.gov/sites/default/files/classic/regact/2021/cleanmilesstandard/appb.pdf

Joint Development Policy[33] also requires that sites target 100% income-restricted housing units and limits the number of allowed parking spaces per bedroom in residential developments. The EV Parking Strategy will coordinate with Joint Development to identify opportunities to exceed CALGreen code requirements and offer greater access to EV charging for these developments. Coordination will also allow Metro to ensure Joint Development is also working to provide electric transportation options to the communities in which Joint Development projects are realized. For example, the EV Parking Strategy and Joint Development Program can help connect developers with utility incentives or grant programs, which have taken a strong focus on multi-unit dwelling charging access in California since 2015.[34]

[33] Metro, Board Report – Joint Development Policy Update (File # 2021-0192), June 16, 2021. https://metro-pdf-merger.datamade.us/document/2021-0192

[34] Southern California Edison's Charge Ready Program offers additional incentives and programmatic options to encourage development of charging at multi-family buildings, including a rebate for new-construction projects that is only available to multifamily sites.