Friday, December 14, 2018 @ 9:00 – 11:00 am

Agenda

Metro Sustainability Council

LA Metro HQ
William Mulholland
15th Floor
One Gateway Plaza
Los Angeles, CA

Agenda

a. Welcome/Introductions: Chair (5 min)
   - Meetings ARC Update
   - Vacant Seat Nominations Update

b. Approval of Minutes: Chair (5 min)

c. CAAP Workshop Introduction: Evan Rosenberg (10 min)

d. CAAP Breakout Sessions (55 min)

e. Breakout Sessions Recap (15 min)

f. DRAFT EV Implementation Strategy: Andrew Quinn (10 min)

g. Action Items Log: Aaron (2 min)

Los Angeles County
Metropolitan Transportation Authority

Metro

Sustainability Council
FY19 DRAFT Meetings Arc
As of *December 5, 2018*

Meeting	Agenda Topics	Outcomes
September 21, 2018	*New Metro Role	*Bylaws amended to reflect new Metro role
	*Motion 57 Progress Update	*All participants leave meeting with a basic understanding of Metro's current progress related to Motion 57
October 12, 2018	*Introduce Climate Action Plan (CAAP) Update topic	*All participants leave meeting with a basic understanding of Metro's current practices related to CAAP, as well as best practices in this field (related to transportation projects), and challenges related to this topic. *Direction provided from the Council to Metro staff on developing initial recommendations on CAAP update; additional information needs identified
	*Oral Update on LRTP Outreach and Activities	*All participants leave meeting with a basic understanding of the LRTP development progress and provide feedback as part of the outreach effort.
November 9, 2018	*Introduce Resiliency Framework topic	*All participants leave meeting with a basic understanding of Metro's current practices related to Resiliency, as well as best practices in this field (related to transportation projects), and challenges related to this topic. *Direction provided from the Council to Metro staff on developing initial recommendations on a Resiliency Framework; additional information needs identified

	*Introduce Green Procurement Policy topic *CAAP Workshop Prep	*All participants leave meeting with a basic understanding of Metro's current practices related to Green Procurement, as well as best practices in this field (related to transportation projects), and challenges related to this topic. *Direction provided from the Council to Metro staff on developing initial recommendations on Green Procurement Policy; additional information needs identified * Distribute Council assignments to prepare for the December workshop discussion.
December 14, 2018	*CAAP Update: Introduce Candidate GHG Reduction Strategies *Draft EV Implementation Plan	*Direction provided from Council to Metro Staff on GHG reduction strategies in a workshop format *All participants will leave the Council meeting with a basic understanding of Metro's current practices related to EV charging, Metro's future EV charging goals, and challenges related to this topic.
January 11, 2019	*Present draft Candidate Climate Adaptation Strategies; continue discussions re: CAAP Update *Present draft Green Procurement Policy * GHG Inventory/Forecast *Final EV Implementation Plan	*Feedback provided by the Council to Metro staff on draft Candidate Climate Adaptation Strategies; CAAP Update *Feedback provided by the Council to Metro staff on draft Green Procurement Policy * Provide an update and receive feedback input on the methodology and results of GHG inventory *Consensus Comments received from the Council to Metro Staff on the draft EV Implementation Plan
February 8, 2019	*Adaptation & Resiliency Workshop *Presentation on LRTP Values Framework	*Feedback provided by the Council to Metro staff at the Workshop * All participants leave meeting with a basic understanding of the LRTP development progress, including the

	* GHG Reduction Analysis * County of Los Angeles Draft Sustainability Plan	Values Framework and provide feedback as part of the outreach effort. *Provide an update and receive feedback from Council on the GHG Reduction Strategies *Feedback provided by the Council on County Sustainability Plan
March 8, 2019	*Metro Sustainability Implementation Plan (MSIP) Update (Draft) - Motion 57 Progress Update *Receive & File Update of Motion 57 to the Metro Board	*Consensus Comments received from the Council to Metro Staff on draft Chapters 1, 2, and 5 of the CAAP Update *Consensus Comments received from the Council to Metro Staff on the draft Green Procurement Policy * All participants leave meeting with a basic understanding of Metro's current progress related to Motion 57 as outlined in the MSIP update.
April 12, 2019	*Adopt Green Procurement Policy	*Consensus Comments received from the Council to Metro Staff on draft Chapters 3, 4, and Executive Summary of the CAAP Update *Green Procurement Policy recommendations & metrics adopted by the Council
May 10, 2019	*Adopt CAAP Update *Adopt Resiliency Framework	*CAAP Update recommendations & metrics adopted by the Council *Resiliency Framework recommendations & metrics adopted by the Council
June 14, 2019	*Metro Board approval of CAAP Update & Resilience Policy *Draft FY20 Meetings ARC	*All participants discuss potential policy topics for FY20 cycle

Friday, November 9, 2018 @ 9:00 – 11:00 am

Agenda

Metro Sustainability Council

LA Metro HQ
University Conference Room
4th Floor
One Gateway Plaza
Los Angeles, CA

Agenda

a. Welcome/Introductions: Chair (5 min)

b. Approval of Minutes: Chair (5 min)

c. Meetings ARC Update: Stephanie (3 min)

d. Announce Vice Chair Vacancy: Chair (5 min)

e. Introduce Green Procurement Policy: Carolina (20 min)

f. Introduce Resiliency Framework: Andrina (20 min)

g. CAAP Workshop Prep – GHG Reduction Strategies: Stephanie (15 min)

h. Action Items Log: Aaron (5 min)

Los Angeles County
Metropolitan Transportation Authority

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MEETING MINUTES
Sustainability Council Meeting
Friday, November 9, 2018

a. Welcome/Introductions (Chair Small)
   - Council members self-introductions
   - Community member intros

   Chair Small: Announcement. Recent email sent announcing and inviting to the Training Day, National League of Cities; LA Commotion Festival next week.

   C. Liban: American society of engineers and other orgs doing events for international conference of sustainability infrastructure.

   Bruce Reznik: Announcement. Measure W ballot measure received above 2/3 thresholds for passing, can be leveraged for storm water, large parcel of money. Expect to find out the results in a week; everyone is feeling positive.

b. Approval of Minutes (Chair Small)

   No comments; Motion by Bruce Reznik, 2nd Motion; Minutes approved.

c. Draft Meetings ARC for FY19 (Bryan Pennington)

   Bryan Pennington: 'Colorful chart' will be modified when we have it updated next month; the progress of some of the items are moving ahead; included the EV Implementation Plan which aligns well with our priorities.

   Chair Small: Dominique (Hargreaves) is exiting the Vice Chair position; congratulations on her moving on to City of LA, nominate someone for vice chair to fill her position?

   Aaron Santos: Nomination form will be available on the website soon.

   C. Liban: Delineation of process- Council members discuss and can elect to nominate themselves for executive vice chair position; consistent with what we have done this last year. Members should think about moving up to the Vice Chair position and notify Aaron. We still have Bryn (Lindblad) as the other Vice Chair.

   Chair Small: Add this to agenda for next week. Aaron, is the nomination on the website? Those who want to nominate themselves- communicate with Aaron by email.

   Aaron Santos: Nomination form will be available on the website soon; and there are (9) Vacant Positions.

d. Green Procurement Policy Presentation (Carolina Coppolo and Craig Reiter); introduced by Cris Liban.

   <u>Feedback and Comments</u>

   Q: (Jack Sahl) I want to make a comment, is ISO14001 process superior in this scheme.

A: (C. Liban) You can read the overarching environmental policy, which is the overarching policy for the environmental management system (EMS) and the main tool for implementing everything we are doing here and future visioning of all projects.
A: (Ivan Page) Comment/clarification- Contractors have adopted this process and have not fought back.

A: (Selena) Elaborates on EV buses; 2021 first delivery of upgraded all electric buses, GCP has to be used for the whole new infrastructure.

Q: How are bus policies applied to contractors?
A: We are working on finding a way to transfer our strategies to the contractors also in terms of EVs.

Q: (Kimberly) Are you looking at how does procurement at Metro works? There is a tremendous amount of paperwork and a lot of agencies have electronic submittals. Paper vs electronic submittals, to reduce wasteful and redundant paperwork.
A: (Carolina) Absolutely- we are taking it under advisement; and are considering paperless opportunities; construction projects are challenging.
A: Ivan- One of the largest construction projects had 30,000 pages; now we put large RFPs on DVDs and not paper.

Q: Comment on eco-efficiency; What are the best technologies to mitigate GHGs (ex: lithium batteries can't be produced fast enough), are we considering the reach for the best technology, are you looking at cost and environmental impact of those technologies
A: (Carolina) Yes, we are looking at this and the impact that the technology has; the energizer bunny will be around for another 100 years; including batteries in the automotive industry; we are looking at this impact.

Comment: (Bruce Reznik) Workforce development- partnerships with community colleges or other organizations to find good employees. Also, Triple bottom line- challenges of higher costs- triple bottom line is a framing/bottom line according to most, but I don't agree. I think it's better to frame it as if we do good for the environment and community and it will lead to better economics vs we need to find this difficult challenging balance.

Comment: (Seth) Green procurement all the way down the supply chain; how to weigh all the information/what is most important. Members of supply chain saying you're important to us we will do it the way you want.

(Liban) We had surveys a few years back; we didn't do much with it until now; we will align those suppliers with what our aspirations are through this lens and come up with a path forward. We want to create a sense of balance.

Comment: Can you include in your assessment how Metro is an influencer, other agencies picking up policy, change that moves technology through supply chain.

Q: (Jennifer Kropke) Are we planning for the infrastructure of electric buses and involving opportunities to distribute resources for powering new electric fleet; are we allowing for conversations between contractors and workforce to create opportunities. Can our contractors engage in this effort?

A: (Selena) Currently our engineering staff is working alongside with utilities to have this infrastructure in place; where contractors are already working, and we want to keep them engaged in the new technology.

Comment (Chair Small) One observation of the transit-oriented community conference, Metro is so far out ahead of this; really important to get the word out; LA known to be #1 in traffic; but we want to remind them that we want to be #1 in green procurement.

e. Resiliency Framework Presentation (Andrina Dominguez)

Feedback and Comments

Q: Addressing leadership culture is very impressive, how are you tapping into the huge body of knowledge externally around this?

A: (Chair Small) An interesting point in resiliency culture- quote NY Transit after Katrina - some cultures are more prepared to hurricanes even though US has more resources.

A: (Andrina) We will look internally to understand policy plans and procedures for resilient capacity building; in terms of external knowledge we look to the work Cris (Liban) has been doing at the state and national level; looking broadly but welcoming any suggestions.

Comment: (Liban)- Referencing the handout in your packet; our focus is “continual improvement”; handout gives overall of the national scale of types of research that is available about resiliency and applicable to us (Metro). These give us the database from the rest of the world that we can fine from in the most practical way for our communities and projects.

A: (Andrina)- Yes, this can be a limitation, the tools are to facilitate communication, in the report we will delineate how different departments can utilize the tools.

Q: (Dr. Hilda Blanco) Less about how Metro is prepared to protect its infrastructure, and more about the community it serves; people’s ability to get out of areas during disasters; it would be fantastic to see how Metro is mobilizing its resources to help those communities that are in desperate need of transportation during disaster.

A: (Andrina) We are integrating this concept into the tool to help educate on how we are planning for natural disaster. Also, community-oriented preparedness and opening this kind of thinking and taking into account the “people” component. In addition to the fire response and systems.

Comment: In disaster, people need to get out of areas and roads cannot handle; Would like to see this plan indicate how Metro can help those communities handle transportation during crisis.

A: (Andrina) The plan will look at how Metro can assist and integrate its services for planning and readiness. More broadly, there is our responsibility for response; including training and workshops.

Comment: (Cris) We are really breaking down the silos through this lens. This puts so many issues together- we are facilitating communication, looking up to the departments to implement (most responsible department) and incorporate the tool.

f. Metro Climate Action and Adaption Plan (Evan Rosenburg)

Feedback and Comments

Q: How long have you been doing Inventory
A: (Evan) all data has been in our Energy and Resource Report over the last few years. The emissions number has dramatically decreased due to renewable energy and Metro operations.

Comment: (Liban) This must be put in context with an increasing rail system for which the energy is not as clean. (Evan) the numbers in the graph are not normalized, there are some different trends that are not captured.

Q: Are you doing projections for emissions for when you increase your electric bus fleet?
A: (Evan) Yes. The GHG forecast will include both cases defined by operational parameters (e.g. commitment to electric fleet, etc.) and you will see the impact from different operational changes.

Comment; (Evan) Next month we are bringing you 15 new GHG mitigation measures, which are categorized in a way that reflects our inventory; Please indicate on card what mitigation category you want to participate in for next month's workshop.

Q: (Bruce) Where do I fit in best for water?
A: (Evan) Probably buildings and facilities
A: (Liban) Other Resource Areas will also work; we hope to build a good team for Other Resources.

Q: Will there be any strategies that look at introducing new modes of transportation
A: (Evan) Not in the CAAP but being done at a Metro level by Planning through transit Corridors. We are mostly focused on our operations such as fuel use for what is existing and already planned (i.e. 11 bus facilities, 6 rail facilities, etc.).

Q: (Katie-City of LA) I am leading the CAAP for the City of LA. We are coordinating with the County of LA to use similar assumptions to see where we can be in 2050. Are you monitoring waste in the CAAP and Waste generation?
A: (Evan) Waste is not in our inventory right now; we don't incorporate that and it's not part of our methodology. We are looking to add scope such as emissions from employee commutes. We do track and monitor waste as part of our Energy and Resource Report data and publications.

g. CAAP Workshop Prep – GHG Reduction Strategies (Evan Rosenburg)

(Evan) We will be engaging all of you for this process and want to hear about opportunities and partnerships for this process; Forecast will go out to 2050. We want to align Metro's inventory of GHG with the timeline;

h. Action Items (Aaron Santos)
    - CAAP Workshop will be open to Primary and Alternate member and the public
    - Executive Vice-Chair Committee vacancy; if you are interested, email me (Aaron)
    - 9 Member vacancies; Nomination form has been updated and will be emailed to members to share with interested candidates. Current applications include Jennifer Kropke being reviewed by the Executive Committee.

10:59am Adjourned

ATTENDEE LIST

ATTENDED	COUNCIL MEMBER
Y	Joe Ablay
Y	Salem Afeworki
Y	Peter Meng
Y	Bruce Reznik
Y	Roy Thun
Y	Aki Luukkainen
Y	Thomas Small
Y	Salem Afeworki
Y	Doug Dietrich
Y	Hilda Blanco
Y	James Okazaki
Y	Rita Kampalath
Y	Mehran Mazari
Y	Berwyn Salazar
Y	Pavitra Rammohan
Y	Jack Sahl
Y	Patricia Menjivar
Y	Mark Kempton
Y	Kimberly Colbert

NOT ATTENDED	COUNCIL MEMBER
N	Anthony Brower
N	Belinda Faustinos
N	Bryn Lindblad
N	Carolyn Hull
N	Caryn Mandelbaum
N	Charles Favors
N	Cindy Montanez
N	Debra Avila
N	Elizabeth Rhoades
N	Emily Freund
N	Ghina Yamout
N	Joel Levin
N	John Williams
N	Kristen Torres-Pawling
N	Lauren Faber
N	Mark Hunter
N	Michael Samulon
N	Michael Swords
N	Mike Bagheri
N	Stephen Cheung
N	Steven Johnson
N	Will Wright

NON-MEMBERS:

ATTENDED	NON-MEMBERS
Y	Richard Clarke
Y	Aaron Santos
Y	Christine Marez
Y	Valerie Davis
Y	Carolina Coppola
Y	Linda Bybee
Y	Alvin Kusumoto
Y	Cris Liban
Y	Barbara Marquez
Y	Dilara Rodriguez
Y	Paul Backstrom
Y	Jessica Koon
Y	Andrina Dominguez
Y	Ros Kay
Y	Craig Reiter
Y	Preeti Verma
Y	Stacy Sinclair
Y	Leeor Alpern
Y	Rubi Rajbanshi
Y	Katie Goldman

NOT-ATTENDED	NON-MEMBERS
N	Stephanie Wiggins

SUSTAINABILITY COUNCIL QUESTIONS - SUSTAINABLE PROCUREMENT (11/09/18)

Question: Life cycle analysis is being continuously refined/enhanced. We should ensure that the related method Metro/consultants use is state-of-the-art

> **Response:** *Metro is utilizing an industry best practice Life Cycle Cost Analysis (LCCA) recommended from the National Institute of Building Sciences (WBDG) and customized for transportation systems. Use of the LCCA formula is outlined in the Sustainability Technical Specifications and has been applied to several metro projects. The Metro Environmental Compliance and Sustainability Department (ECSD) is developing LCCA and Triple Bottom Line (TBL) tools and training for Metro staff, contractors, and professional consultants for applied use of the LCCA on Metro projects.*

Question: Are you thinking about incorporating any monitoring process to track the performance of the Metro Green Procurement program? (Preeti Verma, preeti.verma@lsa.net)

> **Response:** *Yes. Included in the scope of the program is the development of a monitoring process for the policy implementation and achievement of Sustainment Procurement goals and targets to encourage continuous improvement and facilitate process efficiencies.*

Question: Green Procurement Policy - Consider extra emission reduction requirements for projects in communities especially impacted (high CalEnviroScreen scores).

> **Response:** *Metro will update the Sustainability Technical Specifications to augment the existing sustainable procurement requirements, such as contractor use of renewable diesel. As part of this process, Metro will evaluate opportunities to adopt additional measures to drive emissions reductions in areas with high CalEnviroScreen scores.*

Question: Eco-efficiency and sustainability should consider natural resources and GHGs generated to provide more efficient/greener technology. For example, lithium batteries require tremendous resources to create (Roy Thun).

> **Response:** *Metro will assure that eco-efficiency and sustainability are key criteria in the process for evaluation of efficient/greener technology as part of its sustainable procurement program.*

Question: Is green procurement a policy or a program? Would the final product include clear action items/plans or is it an open policy that gives flexibility to Metro staff and contractors?

Recommendation: clearly communicate early with vendors how it will influence doing business with Metro.

> **Response:** *The Metro Green Procurement efforts includes both a Policy and an implementable Program, which will include responsibilities for Metro program leaders, staff, and contractors to incorporate sustainable procurement best practices and prioritization strategies into procurement practices, project design and construction, material/product specifications, and other business processes.*

Question: Is metro investigating opportunities to utilize online (electronic) submittals during the project bidding process? Procurement and RFP process often generates hundreds if not thousands of pages of documents. By taking the process online for both bids and submittals it will greatly reduce paper and energy consumption. (Kimberly Colbert)

> **Response:** *The Metro Green Procurement scope includes an assessment of current bidding practices and recommendations for incorporation of sustainable practices.*

Question: On a recent training I've attended in Europe for electric buses, most of the speakers from agencies/organizations that have implemented electric buses in various parts of the world have indicated they have realized current electric bus technologies including production cannot meet their demand, and theirs is smaller than LA Metro's 2030 100% Bus Policy. Has this been considered in adopting the 100% conversion by 2030? (B. Salazar)

> **Response:** *As part of our master planning efforts, we will be considering any limitations (production, technology, etc.) of implementing Zero Emission Buses. We are deploying to Orange and Silver Lines since those are the best routes considering the state of current battery electric bus technology and will continue to assess the technology challenges including recharging infrastructure and implement solutions.*

Los Angeles County
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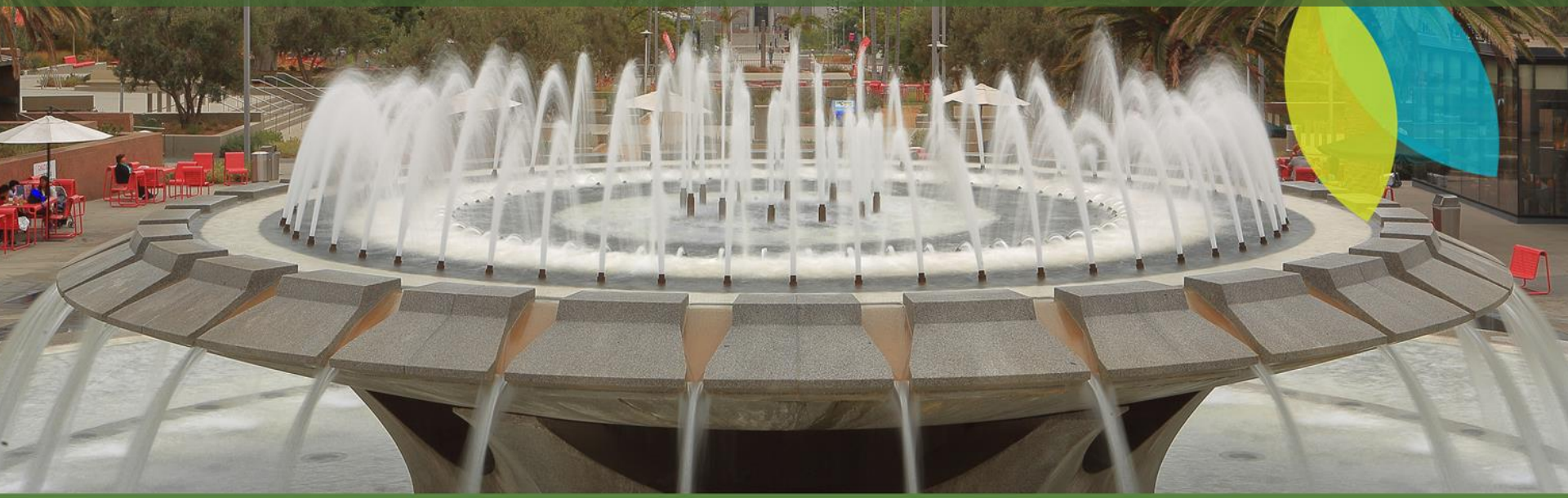
Metro Climate Action and Adaptation Plan

GHG Mitigation Workshop – Sustainability Council



Metro

December 14, 2018

CAAP Mitigation Goals and Progress

- **Update 2012 CAAP mitigation analysis with**
  - **New data from most recent inventory analysis**
  - **Incorporate recent Metro, local municipal, and state policies and initiatives**
  - **Updated costs and benefit**
- **Developed working list of mitigation measures**
- **Analysis started for key mitigation measures**
  - **Targeting vehicles, energy sources, and facilities – represents 97% of current Metro emissions**

Workshop Introduction

- Purpose of workshop: **Discuss candidate mitigation measures in terms of**
  - **Measure prioritization**
  - **Long-term, short-term planning implications**
  - **Goals and timelines**

Agenda for Today

Time	Activity
9:20	Current Project Schedule Introduction, Aims, and Objectives
9:30	Split into small groups
9:35	Small Group Discussions
10:20	Move from small groups to plenary
10:25	Small Group Reporting & Plenary Discussion
10:40	Next Steps and Close

Workshop Focus Questions

- What support activities exist for partnerships & implementation pathways?
- Is there any prioritization to maximize GHG emissions in the short or medium term (up to 2030)?
- What are the priority measures for the longer time scale as Metro approaches a carbon neutral goal (up to 2045/2050)?

Breakout Sessions

- **Energy Supply & Vehicles – East LA** (25th Floor)
- **Buildings & Facilities – Mullholland** (here)
- **Other Resource Areas – Inglewood** (25th Floor)

Please return to this room by 10:25am!

Plenary Discussion

- Breakout group reports:
  - Energy Supply & Vehicles
  - Buildings & Facilities
  - Other Resource Areas

Schedule and Next Steps

Month	GHG Inventory & Forecast	GHG Reduction Measures	Adaptation	Final CAAP
Dec	(-) Complete *final* inventory and forecast estimates	**(-) Hold Sustainability Council Workshop** (-) Complete *final candidate measures list*	(-) Complete *draft* vulnerability and criticality assessment	
Jan		(-) Complete *draft* measure analysis	**(-) Present *draft* to Sustainability Council**	
Feb		(-) Complete *final* measure analysis	**(-) Hold Sustainability Council workshop**	(-) Complete *draft* CAAP
Mar			(-) Complete *final* vulnerability and criticality assessment	**(-) Present *draft part 1* to Sustainability Council**
Apr				**(-) Present *draft part 2* to Sustainability Council**
May				**(-) Present *final* to Sustainability Council**

Thank you!

CAAP Workshop

East LA Conference Room	William Mulholland Conference Room	Inglewood Conference Room
25th Floor	15th Floor	25th Floor

Energy Supply/Vehicles	Buildings & Facilities	Other Resources Areas
Hilda Blanco - Primary	Bruce Reznik - Primary	Aki Luukkainen - Alternate
Mark Kempton - Alternate	Jennifer Kropke - Public	Barbara Marquez - Public
Preeti Verma - Public	Joe Ablay - Alternate	Doug Dietrich - Primary
Salem Afeworki - Primary	Kimberly Colbert - Alternate	Jack Sahl - Alternate
Berwynson Salazar - Primary	Mehran Mazari - Alternate	Joel Farrier - Public
Rita Kampalath - Alternate	Pavitra Rammohan - Alternate	Lynda Bybee - Public
Joel Levin - Primary		Roy Thun - Alternate
Kristen Torres Pawling - Primary		
Patricia Menjivar - Primary		
Peter Meng - Alternate		

***Filtered by 1st Choice**

Draft Candidate Mitigation Measures (Sustainability Council December Workshop)

	Sector	GHG Reduction Mitigation Measure	Current Impact to Metro GHG Emissions	Current Metro Progress and Measure Feasibility
High-Impact Measures	Vehicles	Replace all directly operated buses with battery electric buses (BEBs) by 2030 as part of the Metro Zero Emission Buses plan (subject to implementation scenario selected for adjusted BAU scenario in Inventory Forecast)	Directly operated fleet fuel consumption makes up 60% of Metro's GHG emissions currently	Metro already pursuing as part of Zero Emission Buses goal
	Vehicles	Replace all contracted buses with zero-emission buses by replacing fleet with CNG (with renewable NG) and battery electric buses	Contracted bus fuel consumption is 5% of emissions	Barriers to implementation through coordination with contractors
	Vehicles	Replace vanpool vehicles with battery electric vehicles (BEVs)	Vanpool fuel consumption is 5% of emissions	No adopted Metro goals, would require investments in purchasing and infrastructure. Metro has purchased 10 BEVs for the Non-Revenue Fleet and is currently developing an EV Implementation Plan with aspirational goals to increase the number of BEVs.
	Vehicles	Replace non-revenue vehicles with BEVs	Non-revenue fuel consumption is 2% of emissions	
	Energy Supply	Expand use of renewable energy (electricity and natural gas) through power purchase agreements (PPAs), or engagement with a Community Choice Aggregation (CCA) provider.	Energy related emissions (includes bus and other vehicle fuel consumption) are 83% of total emissions	State goals driven by SB100 for 100% renewable by 2045. Other public transit agencies (BART) have had success through PPAs.
	Net-Zero Buildings	Installing photovoltaics on-site at facilities	Photovoltaics on-site would contribute to overall renewable energy goals	Photovoltaic potential assessment already completed by Metro, quantifying total potential for installations in current facilities. Can estimate potential expansion for future facilities.
	Net-Zero Buildings	New designs or retrofits of low-water sanitary fixtures that require less water and energy	Less than 1% of emissions, but aligned with Metro's water conservation goals	Metro is already pursuing and assessing these goals as part of the Water Action Plan
	Net-Zero Buildings	Installing non-potable recycled water systems		
Low-Impact Measures	Vehicles	Installing Wayside Energy Storage Substations (WESS) to store energy from decelerating railcars	Rail electricity consumption is 16% of total emissions, but unclear the potential WESS implementation	Metro has pilot project for WESS, but it is unclear what feasibility for expansion of installations are.
	Net-Zero Buildings	Replacing lighting fixtures	Facility energy consumption represents 11% of total emissions	Metro has already pursued lighting efficiency upgrades, could continue to pursue in retrofits and new constructions.
	Net-Zero Buildings	Installing electric heating and cooling systems		Electrification of HVAC and appliances could be linked with new construction and retrofit efforts throughout Metro.
	Net-Zero Buildings	Replacing appliances with more efficient electric appliances		
	Employee Commute *(Other Resource Area)*	Install EV charging infrastructure at Metro facilities and implement employee EV outreach plan	Less than 1% of total emissions	Charging stations could be installed to encourage employee commuting, could link this with local utility EV expansion plans
	Offsets *(Other Resource Area)*	Purchasing offsets may be invested in a range of GHG reduction programs that may include forest management or renewable energy expansion	Not currently purchased	An option for eventually achieving Metro's carbon neutral goals

EV Implementation Strategy

Metro

Metro's EV Experience

- First chargers installed in 2013
- Over 100 smart, networked Level 2 EV chargers for public, employee, and fleet use
- Public and employee users are charged $1 per hour, maxing out at $3
- CAAP strategy: over 125 metric tons of GHG emission reductions every year

Metro

Metro's EV Experience

- EV fleet launched in 2017 with 20 Chevy Bolts
- 7000 all electric miles per month
- Monthly VMT in line or exceeding existing hybrids
- 58% reduction in CO2e emissions compared to existing Toyota Camry Hybrids
- CAAP strategy: 10 metric tons of GHG emission reductions every year

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EV Challenges

- Funding
  - Public/employee EV chargers cost $40k to install
  - Fleet chargers cost $25k
- Interoperability
  - Many competing EV charger networks in LA County
- Evolving market
  - GE and Eaton, two Metro EV charger suppliers, exited the market
  - Battery and charger technology is developing rapidly
- No dedicated staff or overarching strategy

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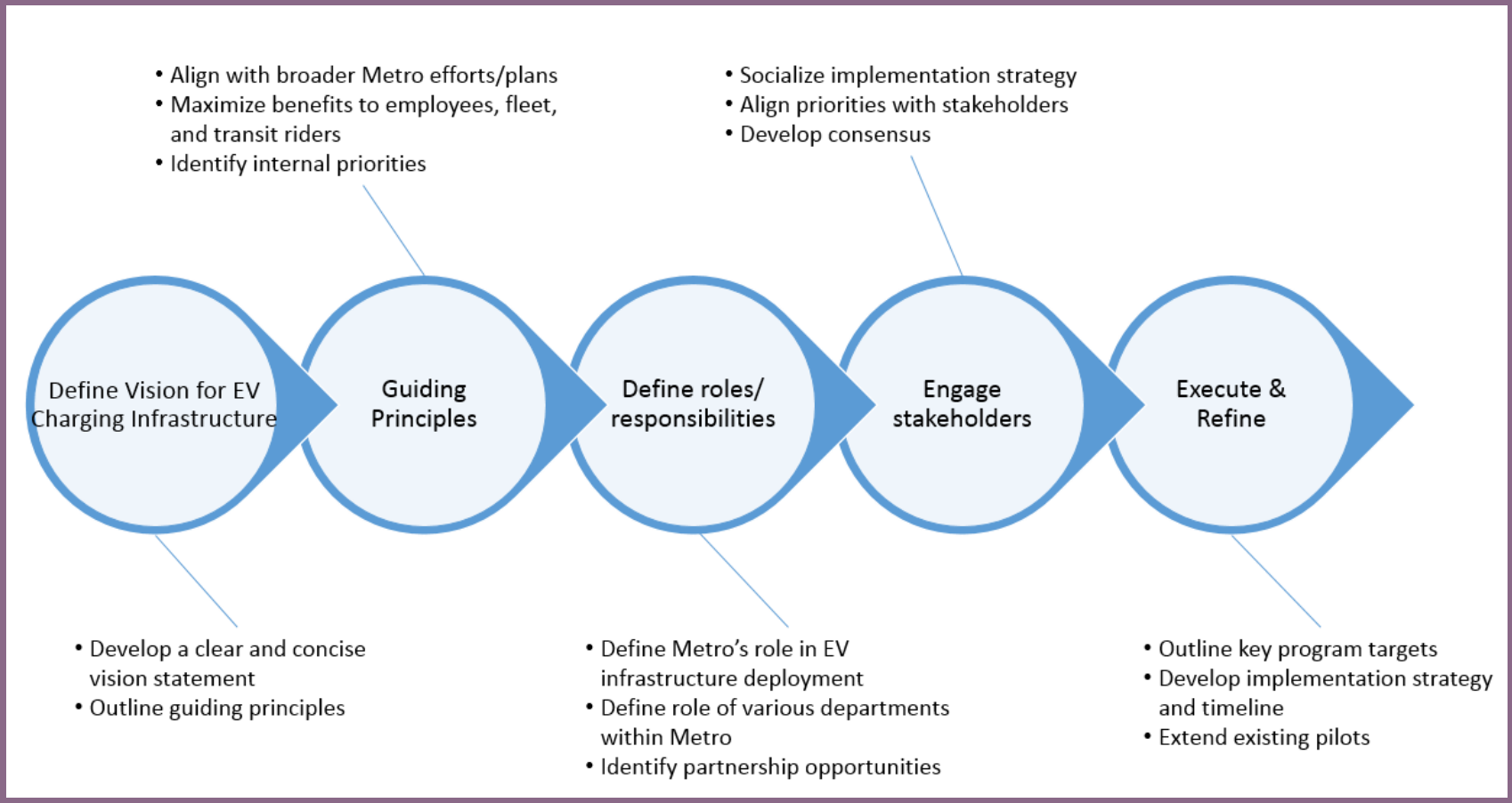
EV Opportunities

- More than 30,000 public and employee parking spaces owned and operated by Metro across LA County
- 7,500 employees driving to work
- 1,200 service vehicles across more than 30 locations
- LA is home to ~25% of all CA EV's (100,000) and about 33% of all EV chargers (5,000)
- State and local priority
  - CA goal of 250,000 EV chargers by 2025
  - City of LA goal of 10,000 public EV chargers by 2023
  - LACI regional goal of 60-130,000 EV chargers by 2028

Metro

Strategic Planning Process



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Project Schedule

Date	Milestone
Nov-18	Draft EV Implementation Strategy
Dec-18	Seek Sustainability Council preliminary feedback
Jan-19	Finalize EV Implementation Strategy with Sustainability Council
Apr-19	Present EV Implementation Strategy to Metro Board

Metro

EV Vision

- Metro seeks to deploy EV charging infrastructure cost-effectively across its service territory to ensure access for Metro employees, Metro's non-revenue service vehicles, and transit users.

EV Guiding Principles

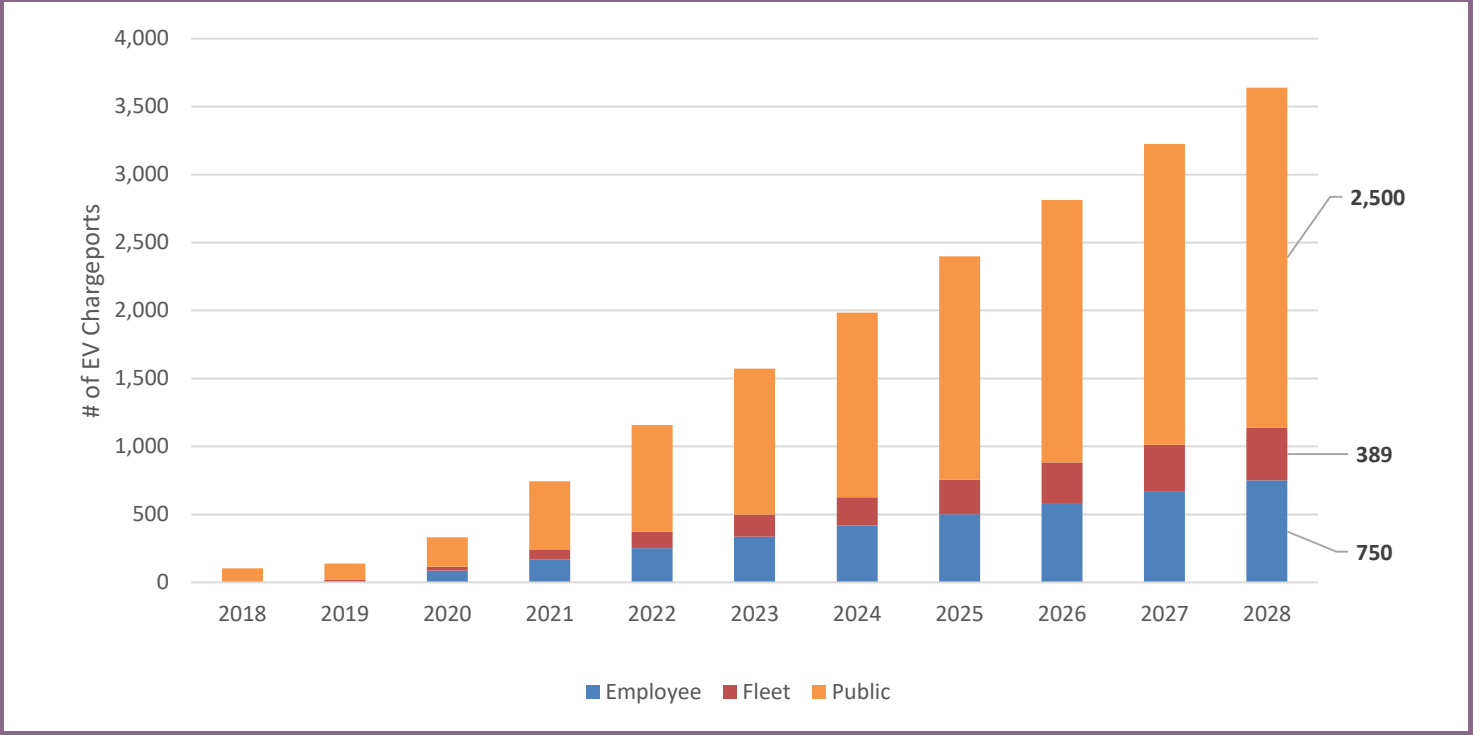
- Emphasize positive consumer experience
- Align with Metro's internal objectives
  - CAAP: reducing GHG emissions
  - Vision 2028 Plan: improving mobility in LA County
  - Improving air quality
- Allocate resources efficiently
- Integrate and align with initiatives by other stakeholders
  - LACI Transportation Electrification Partnership
  - LADWP
  - SCE

Metro

EV 2028 Goals

- Install Level 2 charging stations for 10% of Metro employees who currently drive alone to work
  - 750 Employee EV Chargers
- Install Level 2 charging stations for 70% of Metro's light duty Non-Revenue Fleet
  - 389 Fleet EV Chargers
- Install Level 2 charging stations at 10% of Metro-owned public parking spaces
  - 2,500 Public EV Chargers
- Goals were identified to maximize emissions reductions, minimize costs, and surpass voluntary CALGreen measures

Projected EV Charger Deployment



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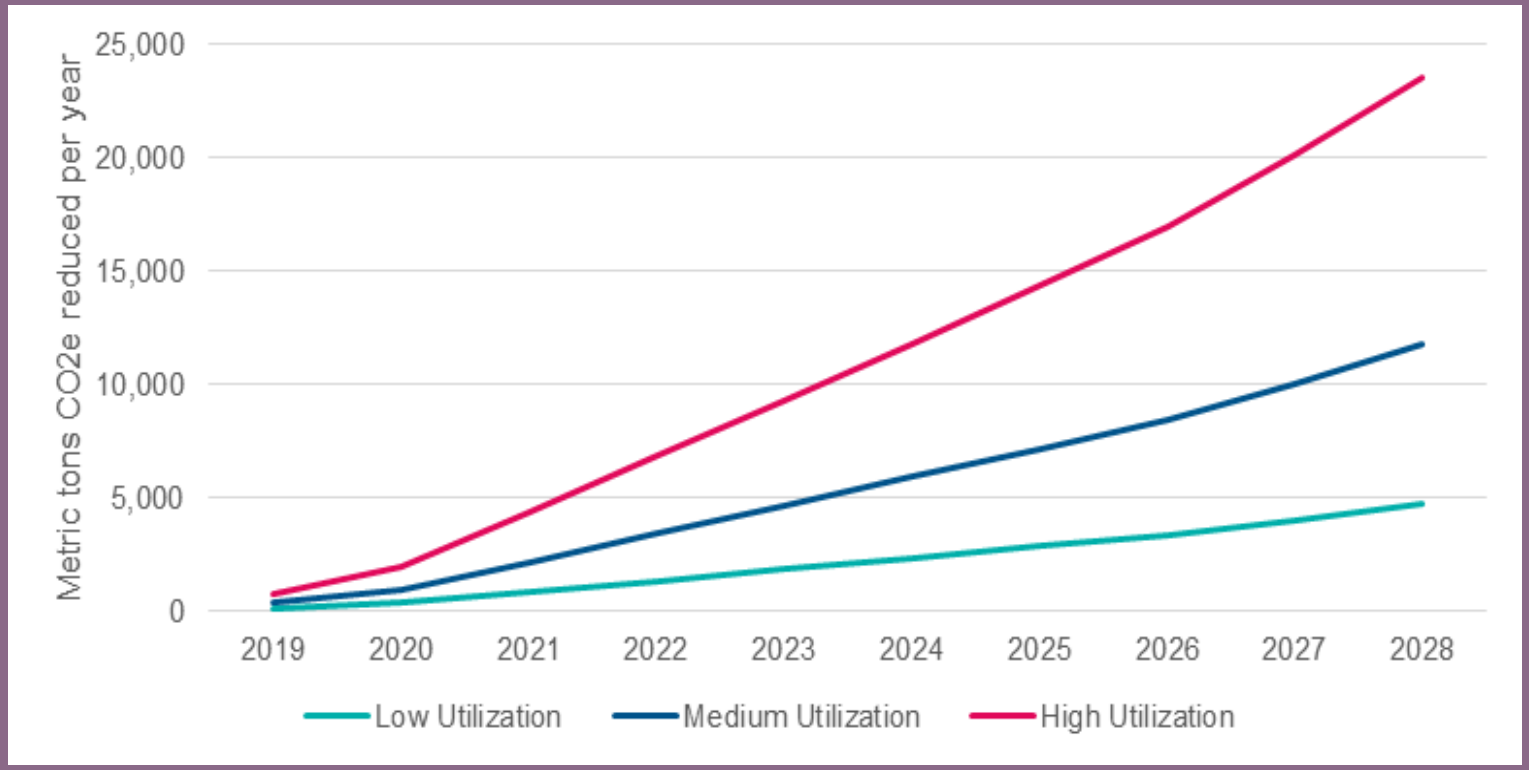
Projected Emissions Reductions



Metro

Costs and Benefits

- Minimum of 1.5 FTE to lead strategy implementation
- $175 million in capital construction costs
  - Grants and partnership agreements could partially defray
- Lower lifecycle costs for vehicles
- Revenue potential
  - Charging employees and public $.25/kWh could yield $10-40 million over 10 year timeline
  - LCFS credit revenue between $2.5-12 million

Discussion

- Are the goals appropriate for Metro and its role in the LA region?

- Metro seeks to increase its EV charging prices to $.25-$.50 per kWh. $.50 per kWh would allow Metro to achieve full cost recovery for EV charging operations. What level is acceptable?

Metro

EV Charging Fee Survey

Charging Market Segment	Fee Schedule (12/2017)	Fee Type
Workplace	$0.20/kWh, $5/h after 4h	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$1.50/h	Time-based
Destination Center	$0.25/kWh	Energy-based
Destination Center	$0.50/kWh	Energy-based
Destination Center	$2/h	Time-based
Destination Center	$0.50/h for first 3h only	Time-based
Destination Center	$1.25/h for 4h, $2.50/h thereafter	Time-based
Destination Center	$1/h for first 4h	Time-based
Multi-unit dwelling	SCE energy fee + $1/h	Combination

Metro

Metro

DRAFT

Electric Vehicle Charging Infrastructure Implementation Plan

November 2018

Submitted to:
Metro
Submitted by:
ICF

Contact: Philip Sheehy
Philip.Sheehy@icf.com
415-385-4160

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Executive Summary

The Los Angeles County Metropolitan Transportation Authority (Metro) is the planner, designer, builder, and operator of public transportation for one of the country's largest, most populous counties. Beyond operating bus and rail transit services, Metro provides local bike and pedestrian improvements, supports countywide sustainable transportation planning, and is a leader in implementing alternative fuels and emissions controls. Metro is committed to sustainability and has made marked improvements to the efficiency and emissions of its operations, as well as that of its service region. Metro is also committed to making continual innovations to first and last mile challenges. The deployment of electric vehicle (EV) charging stations for use by transit riders, Metro's non-revenue (NR) fleet, and employees is one of many strategies Metro is pursuing to reduce its environmental footprint and provide excellence in mobility service to the Los Angeles community.

Electric vehicles and the deployment of EV charging infrastructure are in line with Metro's broader sustainability initiatives, with a stated mission of providing leadership in sustainability within the Los Angeles County region without compromising its core mission of moving people efficiently and effectively. As a leader in sustainability and clean technology initiatives, Metro is the first transit agency in the nation to integrate EV charge stations at its Park & Ride lots. The Level 2 charging stations allow riders with EVs to conveniently charge their cars while using the Metro system. Despite being in its early stages, Metro has deployed nearly 100 EV charging stations across its service territory and has focused on providing access to charging infrastructure for transit riders, Metro employees, and non-revenue fleet vehicles. Metro has also supported the non-revenue fleet in the deployment of EVs.

Metro's Environmental Compliance and Sustainability Department (ECSD) has assumed a leading role in the efforts to deploy charging infrastructure to date, including securing funding, designing and building charging stations, and managing various processes critical to maintaining the charging stations.

Why Metro Needs a Plan for EV Charging Infrastructure

Metro has demonstrated its ability to deploy EV charging infrastructure at various facilities to support Metro's employees, the NR fleet, and transit riders; and they have demonstrated this with only a modest allocation of capital and staff resources. Moving forward, Metro will continue to deploy EV charging infrastructure that will help to meet the expected increase in demand for charging by Metro users and employees. In order to navigate the path forward, Metro conducted a review of its existing processes to deploy EV charging infrastructure and identified areas for improvement. Generally speaking, Metro has deployed EV charging infrastructure effectively, especially considering the limited resources that have been dedicated to the initiative thus far. Despite this progress, however, the processes have been ad-hoc and opportunistic. There are a variety of key areas for improvement with respect to deploying EV charging infrastructure that should be implemented to help Metro achieve its goals, with a focus on processes for deploying charging infrastructure, the operations and maintenance of the equipment, identifying funding opportunities for EV charging infrastructure, deploying EVs in the non-revenue fleet, and improving marketing and outreach.

Metro's Vision for EV Charging Infrastructure Deployment

Metro seeks to deploy EV charging infrastructure cost-effectively across its service territory to ensure access for Metro employees, Metro's non-revenue service vehicles, and transit users.

1. Metro will seek to install Level 2 charging stations for 10% of Metro employees who currently drive alone to work.
2. Metro will seek to install Level 2 charging stations for 70% of its light duty Non-Revenue Fleet by 2028.
3. Metro will seek to install Level 2 charging stations at 10% of Metro-owned public parking spaces by 2028.

The realization of this vision will result in the deployment of more than 3,500 charging stations by 2028.

Metro's Guiding Principles

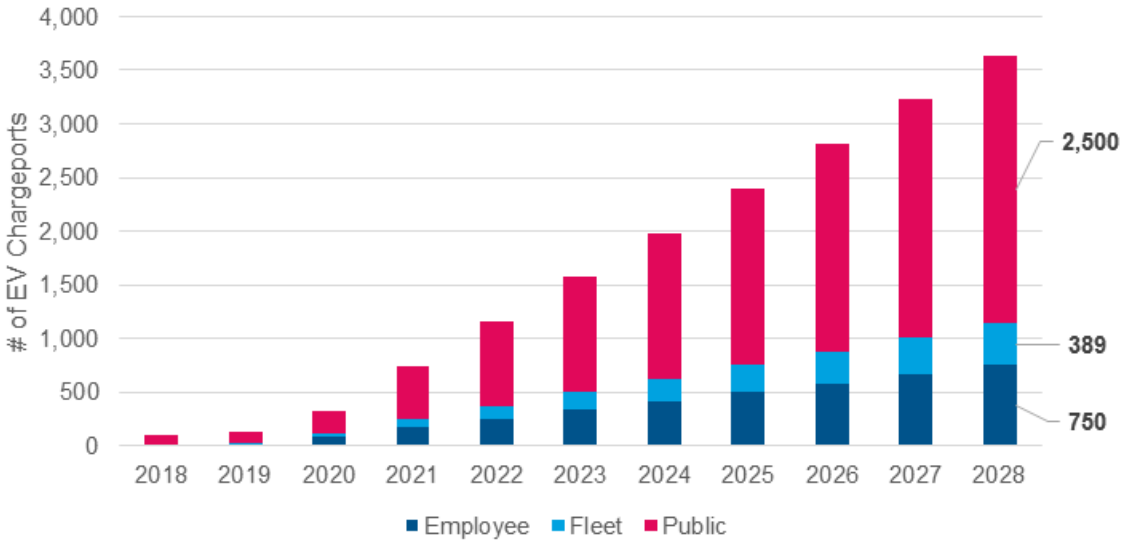
Metros' guiding principles with respect to deploying EV charging infrastructure include:

- **Emphasize positive consumer experience**. EVs are an emerging technology and a seamless consumer experience at charging stations (especially in public places) will help boost consumer confidence.
- **Align with Metro's internal objectives**. Metro's EV Implementation Plan will align with internal objectives, including those that are dedicated to: Improving mobility and minimizing environmental impacts (e.g., GHG emissions).
- **Allocate resources efficiently**. Metro will balance the costs of expanding charging infrastructure at existing parking facilities and ensuring that new facilities have EV charging infrastructure. Metro will ensure that key Metro departments are allocated sufficient resources to support EV charging infrastructure deployment. Metro will identify funding opportunities to defray the costs of deploying EV charging infrastructure.

- **Integrate and align with initiatives by other stakeholders**. Metro will work with SCE and LADWP where feasible to coordinate EV charging infrastructure deployment. Metro will work with other public agencies at the local, regional, and state level to coordinate where feasible.

Designing an EV Charging Infrastructure Program for Metro

Metro's EV vision and program goals will be implemented in a phased approach over the next ten years, with the goal of deploying more than 3,600 EV chargers by 2028. The figure below presents Metro's implementation timeline for achieving their EV deployment goals.



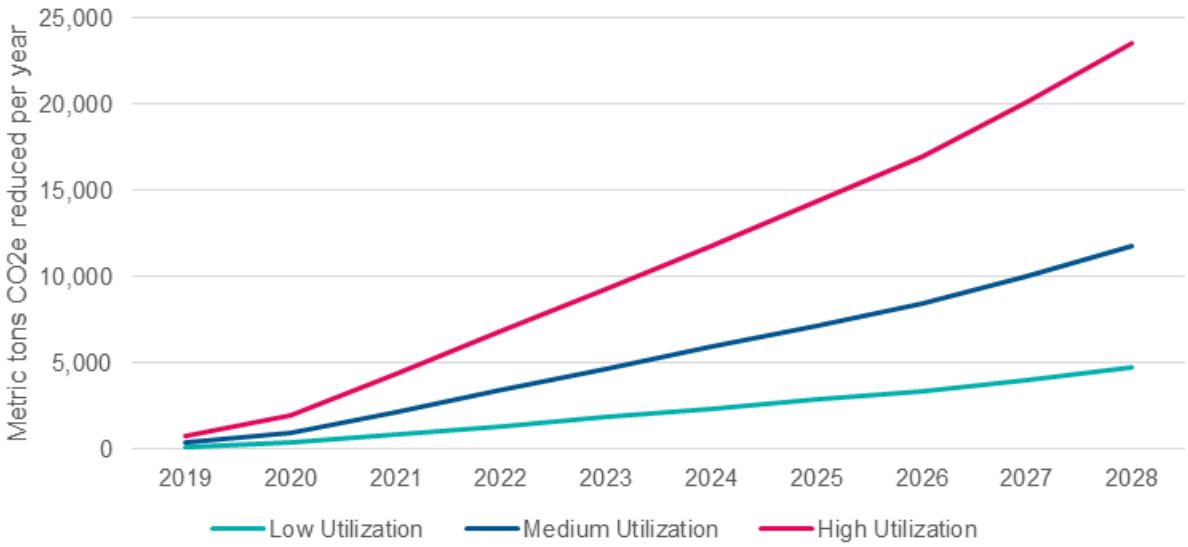
For employees, Metro will seek to install a total of 750 chargers for 10% of the 7,500 Metro employees who currently drive alone to work,[1] and this represents as much as 25% of Metro owned employee parking spaces. For Metro owned non-revenue fleet vehicles, the goal is to install enough EV charging stations for 70% of the light-duty passenger fleet by 2028, with a focus on providing charging infrastructure for sedans in the fleet and some for passenger SUVs—this leads to the deployment of nearly 400 chargers. For public charging stations, Metro seeks to electrify 10% of the estimated 25,000 parking spots at park and ride facilities by 2028, adding another 2,500 charging stations to the total.

The deployment of EV charging infrastructure to support employees, the NR fleet, and Metro's transit riders will require significant investments—including for the infrastructure, ongoing operations and maintenance, the electricity delivered to vehicles, and revenue from the sale of credits from the Low Carbon Fuel standard and/or revenue from a fee charged to EV drivers. With the deployment of each charging station costing as much as $30,000 and a lifecycle cost (over an assumed 20 year period) as much as $60,000 on a net present value basis, the program is expected to cost between $160 million and $172 million to implement, without accounting for charging revenue. These program cost estimates include a variety of assumptions, and there are several ways in which costs can go up or down, as summarized here:

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

- **Energy charges and demand charges**. The program costs can be impacted significantly by facility-level energy charges and demand charges. Many Metro facilities are on time of use (TOU) rates; and that number is likely to increase significantly over the next five years as utilities move more towards TOU rate structures. The impacts of EV charging at these types of facilities could increase the electricity bills considerably depending on when the charging occurs and its coincidence with the TOU rate structure. The potential for higher demand charges at specific facilities will also impact the program's overall cost; however, this is difficult to determine because it is a function of each facility's current maximum demand, the rate structure, and the timing of EV charging.
- **Collecting a Site Host Fee.** Metro can recover some costs by charging employees and the public a fee to access the EV charging network. Information from other sources indicate that some site hosts provide charging free of charge; however, others charge upwards of $0.25 per kWh. If Metro were to collect a fee of $0.25/kWh, that could decrease the overall program cost by as much as $40 million; however, it is also important to note that the fee assessed will impact the utilization of the facility, whether it be for employees or for the general public.
- **Managed charging for the fleet.** Where possible, Metro can seek to shift NR fleet EV charging to overnight periods when rates are lower (assuming those facilities have TOU rates). The electricity costs can be reduced by as much as $2 million over the course of the program.
- **Identify funding opportunities**. Metro can seek out incentives and other grants to defray the capital costs of charging equipment and associated installation. For instance, LADWP offers up to $5,000 for the installation of charging equipment for commercial customers. If Metro is able to reduce the costs of installing charging infrastructure by $5,000 per EVSE installed, we estimate that overall program costs will be reduced by nearly $30 million. Apart from specific incentives, there are other programs that are in place to help defray the costs of deploying EV charging infrastructure. Most notably, there are two major initiatives to deploy EV charging infrastructure as a result of legal settlements: The Newhall Settlement Agreement and the Volkswagen Settlement. In both cases, Metro has an opportunity to defray the costs of its program considerably by partnering with such entities to bring charging infrastructure to their facilities.
- **Higher Low Carbon Fuel Standard (LCFS) credit prices.** If LCFS credit prices remain in the current range (in excess of $180/ton) for the duration of the program, then Metro estimates that this would generate additional revenue up to $11.4 million over the course of the program.
- **Americans with Disabilities Act (ADA) accessibility may increase costs.** ADA accessibility requirements have the potential to increase the costs of publicly accessible EV charging infrastructure installations. Metro does not have to fulfill ADA requirements in specific areas, including bus parking and dedicated NR fleet parking areas, with one exception: manager vehicle parking.

The program will yield significant greenhouse gas (GHG) savings because EVs reduce emissions compared to gasoline used in conventional vehicles. Depending on charger utilization, Metro estimates that over the course of ten years, the implementation of the EV Implementation Program is expected to reduce between 22,000 and 110,000 metric tons (MT) of CO_2e.



These GHG reduction curves are representative of Metro deploying more than 3,600 EV chargers by the end of 2028. The range of results varies between low, medium, and high utilization, to take into account the uncertainty regarding how much each charging station will actually be used in the future.

The overall GHG mitigation costs of the program ranges from $1,550 to $7,870 per metric ton of CO_2e. These figures are representative of the range of cumulative program costs, revenue brought in by charging customers for using the stations ($0.25/kWh), and the cumulative GHG reduced (22,000 – 110,000 MT CO2e).

In addition to the costs outlined previously, Metro will need to consider additional staffing requirements to meet the deployment targets outlined in the plan. There are a variety of staffing and competency requirements that Metro must address to achieve the objectives of the EV Implementation Plan. Most importantly, the current number of staff dedicated to managing EV charging infrastructure deployment is inadequate to manage the level of growth envisioned. Similarly, the services that have been outsourced, namely the operations and maintenance of the EV charging equipment, have been inadequate at times over the course of the existing contract. We estimate that the implementation of the plan will require a minimum of 1.5 full time equivalent staff (FTE) at ECSD; the NR fleet will require at a minimum of an additional 0.5 FTE to support the NR fleet manager within the next two years; the Facility Maintenance Department will require at a minimum of 1 FTE by 2020 as the number of charge ports available across the Metro network approaches 1,000; and we anticipate another 1 FTE will be required by 2025 to support the next 2,000 charge ports to be deployed. This Plan also recommends a 0.5 FTE as an immediate need to support a) the impending changes to the operations and maintenance contract and b) preparation for the implementation of this Plan and the corresponding ramp up in activity. Lastly, the marketing team will require at a minimum of 0.5 FTE in the near-term future to help coordinate outreach and educational initiatives that are borne out of this Plan. The demands of the Marketing team are likely to fluctuate over time, and that may present challenges with respect to continuity and timely resource allocation.

There are a variety of other competencies that Metro must consider in the implementation of this Plan—most notably the design, installation, operation, and maintenance of the EV charging

infrastructure equipment. Metro's current processes have the agency executing separate agreements to fulfill these requirements—soliciting bids from qualified contractors for installation and soliciting bids from qualified EV service providers to operate and maintain EV charging stations.

Moving forward, Metro should weigh the possibility of using the integrated procurement model, referred to as the Design-Build-Operate-Maintain (DBOM) model. This type of model has the potential to limit Metro's cost exposure over the course of the Plan's implementation.

Metro's Implementation Strategies for the EV Charging Program

The following are the key implementation strategies for the EV charging program:

- **Align Metro's Internal Departments**. The management of a robust EV charger program at Metro will involve leadership by ECSD that is bolstered by support from multiple Metro departments. Each stage of the EV charger program–from developing policy and planning, procuring, contracting, installing, maintaining, and managing equipment–will require different Metro departments to understand and fulfill their roles and responsibilities.
- **Engage Strategic Partners**. Metro will have a variety of strategic partners as part of the implementation of this Plan. We focus on three types of strategic partners: third party service providers, utility providers, and other public agencies. Generally speaking, Metro has established itself as a willing partner, and has been actively engaged in discussions with each of the partners identified above. For the most part, this aspect of the plan's implementation needs to focus on maintaining these partnerships or relationships.
- **Deploy EV Charging Infrastructure Cost-Effectively**. The costs of deploying EV charging infrastructure are significant; however, there are a variety of ways that Metro can reduce the costs of deploying infrastructure, while maximizing revenue generation potential. Unfortunately, it will be difficult to reduce the high installation costs for EV charging infrastructure at Metro facilities, largely because of where the EV charging equipment is located with respect to electrical service. On a per EVSE basis, Metro expects to continue facing costs in excess of $30,000 per installation—and there is only so much that can be done to limit these installation costs. First and foremost, there are a variety of incentive programs—offered by state agencies, utilities, and other stakeholders—that can help defray the costs of EV charging infrastructure. Outside of that, however, it is important that Metro does what it can to deploy charging infrastructure in areas that will have high utilization (e.g., upwards of 10,000 kWh per year). While higher utilizations are not the sole objective of this Plan, it is important that it at least be a consideration to mitigate Metro's cost exposure. It is also critical that Metro retain ownership of LCFS credits to the extent feasible as part of the deployment of EV charging infrastructure. The revenue potential of LCFS credits represents as much as 12.5% of total program costs. There are a variety of contractual agreements that may limit Metro's ability to retain LCFS credits; however, in this case, it is critical that Metro be compensated monetarily to reflect the value of the foregone credits.

  Metro developed an EV charging infrastructure siting analysis as a resource to support Metro's EV Implementation Plan. The siting analysis is a web-based tool that characterizes the demand

for EV charging infrastructure at different locations based on a combination of socioeconomic indicators for EV ownership and travel patterns in and around Los Angeles County. The charging infrastructure siting tool is designed to help Metro prioritize the deployment of EV charging infrastructure; however, it should not be misconstrued as a resource to preclude investment in one region or another. The siting tool seeks to characterize demand, with the assumption that this anticipated demand will lead to sufficiently high utilization (as measured in kWh per chargeport) to warrant investment. However, Metro seeks to develop an EV charging network that provides critical support to its employees, the NR fleet, and Metro's transit riders. As such, high utilization of assets immediately upon deployment may be infeasible. Furthermore, there are on-the-ground conditions that should ultimately dictate the scope of investment at a given facility.

- **Conduct Dedicated Outreach**. Metro is already taking steps to promote EV adoption and the use of charging infrastructure internally and externally. Metro's plans to deploy EV charging infrastructure for its employees, the NR fleet, and for Metro riders will require effective marketing strategies to improve general EV awareness and the availability of EV charging infrastructure. There are a variety of reasons that consumers do not purchase EVs today: lack of familiarity with EVs; misperceptions around EVs and their capabilities; reluctance to disrupt a known way of traveling; and uncertainty about charging and the associated costs. Metro needs an effective marketing strategy that will use engaging messaging and imagery that the target audiences can relate to, that will raise the public and employees' awareness of the availability of EV charging infrastructure, and promote the benefits of EVs.
- **Track Program Performance**. Metro will track program performance over time across specific metrics, and incorporate these into a robust evaluation. The evaluation will address the impacts of the program, the processes used to deploy EV charging infrastructure, the program costs, and the broader market effects of the program's implementation.
- **Maintain Flexibility to Market Changes**. Metro's prioritized access to Level 2 EVSE for its employees, its NR fleet, and transit riders aligns with Metro's existing facilities and the potential use cases at these facilities—including workplace and fleet charging. The demand for EV charging, however, will change considerably over the next 5-10 years, and Metro should seek to incorporate flexibility into the implementation of this Plan, to the extent feasible, with the objective of ensuring that Metro is a proactive market participant moving forward. Some of the potential market changes include mobility hubs, emerging technologies, and understanding consumer demand for EVs. This Plan explicitly avoids taking definitive positions on these nuanced issues related to potential market developments, and the corresponding implications for the demand on EV charging infrastructure. Rather, this Plan recognizes that the market will change, and that Metro must be prepared to be responsive to it, to the extent appropriate.

1. Introduction

Background

The EV and EV charging infrastructure markets in California are poised to see significant growth over the next ten years. Through Executive Order B-48-18, signed in January 2018, Governor Brown called for a target of 5 million zero-emission vehicles (ZEVs) in California by 2030.[2] To support these ZEVs, he also set the goal of deploying 250,000 EV charging stations, including 10,000 DC fast chargers, by 2025. In support of these goals, the administration has proposed a $2.5 billion, eight-year initiative to continue clean vehicle rebates and fund more infrastructure investments.

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Electric vehicles and the deployment of EV charging infrastructure are in line with Metro's broader sustainability initiatives, with a stated mission of providing leadership in sustainability within the Los Angeles County region without comprising its core mission of moving people efficiently and effectively.

Metro's Progress to Date

As a leader in sustainability and clean technology initiatives, Metro is the first transit agency in the nation to integrate EV charge stations at its Park & Ride lots. The Level 2 charging stations allow riders with EVs to conveniently charge their cars while using the Metro system. Despite being in its early stages, Metro has deployed nearly 100 EV charging stations across its service territory and has focused on providing access to charging infrastructure for transit riders, Metro employees, and non-revenue fleet vehicles. Metro has also supported the non-revenue fleet in the deployment of EVs.

[2] Executive Order B-48-18. January 26, 2018. https://www.gov.ca.gov/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/.

Metro's Environmental Compliance and Sustainability Department (ECSD) has assumed a leading role in the efforts to deploy charging infrastructure to date, including securing funding and day-to-day oversight and management of various processes critical to maintaining the charging stations.

Fig

EV Charging Installations

Metro has installed charging stations at park and ride, employee, and fleet parking facilities. They currently have 92 charging stations in total with 104 chargeports. Table 1 below presents the number of electric vehicle supply equipment (EVSE) and chargeports at each Metro location. All of Metro's charging stations are Level 2. Eighteen (18) of these stations (26 ports) serve Metro's non-revenue fleet. Public charging is located at 10 Metro Park & Ride lots.

Over the next year, Metro plans to install 24 more charging stations, the majority of which will serve employee parking.

Table 1. EV Charging Infrastructure Installed at Metro Location, as of June 2018

Location	Type of Charging	No. of EVSE	No. of Chargeports
Arcadia	Public	3	3
Atlantic	Public	6	6
Azusa	Public	3	3
Canoga	Public	3	3
Chatsworth	Public	3	3
CMF	Fleet	2	2
Division 13	Fleet	5	5
Division 18	Fleet	1	1
Duarte	Public	3	3
El Segundo	Public	4	4
Expo/Sepulveda	Public	6	6
Irwindale	Public	3	3
La Cienega/Jefferson	Public	4	4
Monrovia	Public	3	3
Norwalk	Public	4	6
Redondo	Public	4	6
Sierra Madre	Public	4	4
Union	Public & Fleet	23	31
Universal City	Public	4	4
Willow	Public	4	4
Total		**92**	**104**

Design Guidelines & Specifications

EV charger pre-wiring provisions are included in Metro's recently updated agency wide design specifications (Metro Rail Design Criteria). The policy states that "provisions shall be made for EVSE when parking facilities are included." Charging stations must conform to the California Green Building Code (CALGreen) Standards for design, including accessibility requirements. The total number of EV charging stations included at each site must follow CALGreen's Voluntary Tier 2 requirements (which is higher than the mandatory minimum).

ECSD has developed a list of minimum requirements for EVSE hardware procurements. This includes requirements for networking, power output, connector compatibility, testing standards, cable management and other accessibility features, monitoring, weather conditions, QR code and RFID card activation, and interoperability (OCPP v1.5[3] or higher).

Internal Processes/Responsible Parties

Metro's ECSD has led and managed the program to date, working with facilities, fleets, and other Metro departments. ECSD is in charge of the following activities:

- Obtain grant funding and capital project funding
- Assemble bid packages for EVSE installations

[3] The Open Charge Point Protocol (OCPP) is an application protocol for communication between EV charging equipment and a centralized charging station network.

- Publicize procurements and generate vendor interest
- Lead education and outreach initiatives and liaise with Metro's internal marketing/designers
- Managing contracts with vendors, such as EV Connect
- Analyzing station usage data to ensure issues are being addressed (that have not already been reported to EV Connect)

Metro's in-house engineers develop site drawings and specifications to ensure compliance with building code requirements, that the facility will meet ADA accessibility requirements, that key EV readiness basics with respect to design are accounted for, and that, where appropriate, it is incorporated into new project design.

EV Charging Infrastructure Operations and Maintenance

The operations and maintenance (O&M) of Metro's EV chargers is split between various internal and external groups. Metro's ECSD has currently contracted EV Connect to monitor, manage, and fix issues directly related to the charging equipment, including but not limited to the hardware and any networking or software issues. However, there are times that EV Connect requires support from Metro's Facilities and General Services (GS) departments for site access or support for on-site electrical issues (e.g., access to the electrical panel at the facility).

There have been issues with the EV charging equipment over the last couple of years. For instance, between December 2017 and May 2018, at least six stations were inoperable. When issues occur with the equipment or infrastructure, responses and action have taken longer than might be expected due to the need for Metro's Facilities department to have 48 hours notice to commence work. Similarly, during on-site interviews, Metro's parking management noted that there have been issues with EV drivers not being able to use and pay at the stations because of limited cell phone connectivity. As Metro transitions to TAP card integration, this should help alleviate some of the issues associated with payment due to poor connectivity; however, it will not remedy all of these issues.

Parking Management and Enforcement

In on-site interviews, Metro's parking management communicated that it is difficult to implement parking enforcement at Metro stations. For instance, parking management will issue a ticket and corresponding fine to non-EVs parked in spots designated for EV charging only; however, they have been lenient with respect to EVs that are parked in the designated spot, but not actively charging. Ultimately, the extent to which parking issues are managed and enforced varies between different facilities.

Funding for EV Charging Infrastructure

Metro's ECSD successfully obtained CEC funding for 25 chargers at 5 locations ($492,000 in CEC funding, matched by $292,000 in Metro funding). In prior years, Metro has obtained South Coast Air Quality Management District (AQMD) funding for Level 2 chargers and is working on an agreement with AQMD for KEBA chargers for fleet use. ECSD has applied for and received Metro capital funding and have also used internal sustainability funds to expand the EV charging infrastructure program.

Internal Processes/Responsible Parties

ECSD has led all funding initiatives to date.

Deploying EVs in Non-Revenue Fleet

Metro has not yet defined or set any goals around the deployment of EVs in their non-revenue (NR) fleet. Although it is not codified in an official plan, the NR fleet seeks to reduce annual maintenance costs and reduce the GHG and criteria pollutant emissions of its vehicles.

EV Deployments

Metro procured 20 Chevrolet Bolts in 2017/2018 and has plans to add 10 more in 2019. The purchase costs for each Chevy Bolt is around $38,400, compared to the standard $30,000 the fleet manager generally budgets for each light-duty vehicle replacement. However, Metro has conducted total cost of ownership (TCO) calculations with actual mileage data and fuel costs that show the TCO for the Bolt is lower than conventional hybrid gasoline-electric vehicles. Of the 10 initial Bolts deployed, three have been assigned to managers and the other seven are included in vehicle pools. Mileage data indicates that the EVs are used as much as or more than other NR fleet vehicles. Some pooled EVs have lower average mileage but that is a function of their general usage and travel needs (regardless of vehicle type).

Potential EV Use Cases

Metro has identified a segment of their fleet, referred to as driver relief (DR) vehicles, as a strong use case for EVs. DR vehicles are pooled vehicles used by Metro bus and rail operators to get to and from their driving routes. There are currently 163 DR vehicles in Metro's NR fleet used by bus drivers, all of which are Toyota Camrys. DR vehicles have predictable, short trips and are used frequently. For instance, in 2017, the average DR vehicle was driven around 16,000 miles compared to an average of 11,000 miles for other NR fleet vehicles. One drawback of electrifying DR vehicles is the potential for damage. Due to the pressure of their schedules, DR drivers tend to have different driving habits. For instance, DR drivers are more likely to have higher rates of acceleration and speeding, and typically have higher accident rates than other Metro employee drivers. As a result of this driver behavior, Metro's fleet management has been hesitant in the past to deploy EVs for use as DR vehicles. However, three EVs were recently assigned to the DR vehicle pool as a pilot program.

There are also 394 light duty vehicles (294 sedans and 100 passenger SUVs) that are assigned to managers or within pools at Metro, many of which may also have suitable duty cycles for electrification.

Replacement Policy

Metro has a defined NR vehicle replacement policy[4] that provides criteria and thresholds for replacement. For light duty vehicles, if a vehicle meets any of the three criteria listed in Table 2 below (age, mileage, condition) then the vehicle may be replaced. Condition is qualitative and assessed case-by-case by the NR fleet manager.

Table 2. Metro's Non-Revenue Unit Types and Replacement Criteria

NR Unit Type	Years	Miles	Condition
Sedans	6-10	150,000	Yes
SUVs	7-10	150,000	Yes

The replacement policy does not guarantee that a vehicle will be replaced if it meets these criteria. The overall replacement budget for all NR vehicles and equipment is a limiting factor. For instance, in years when more expensive diesel equipment needs to be replaced, those units are prioritized because they directly support the revenue fleet.

Fleet Management

Metro does not utilize a fleet management software system. Given the concerns around driver behavior and safety, more management and accountability of the DR vehicles may be needed.

Internal Processes/Responsible Parties

Metro's non-revenue fleet manager manages the vehicle procurement and EV rebate process, whereas ECSD funds the EV charging infrastructure.

Marketing and Outreach

Metro has developed a public-facing marketing/outreach webpage of EV charging that includes information on station locations, pricing, how to sign up for an EV Connect account, benefits of EVs, and frequently asked questions.

For employee vehicle pools, ECSD developed a detailed PowerPoint training that drivers must review in order to reserve an EV. The presentation reviews the vehicle and charger technology, use, safety considerations, parking, and how and when to charge.

Internal Processes/Responsible Parties

Actions and progress is led by ECSD, who is supported by Metro's internal designers to develop the signage, fact sheets, and web design.

[4] Section 1.02 of Metro Non-Revenue Maintenance Standard Operating Procedures: Preparation of Non-Revenue Vehicles and Equipment To-Be-Sold (TBS)

Other Initiatives in the Los Angeles Region

The Los Angeles region is anticipating and planning for a significant amount of funding for EV charging infrastructure over the next ten years from state, regional, and local sources. Metro's EV charging program complements a variety of other EV-focused initiatives in and around Los Angeles. The text below summarizes other major initiatives in the region and corresponding stakeholders and provides valuable context with respect to Metro's plans moving forward.

Los Angeles Zero Emissions 2028 Roadmap

The Los Angeles Cleantech Incubator (LACI) formed the Transportation Electrification Partnership in May 2018 to accelerate progress toward transportation electrification and zero emissions good movement in the Greater Los Angeles region before the 2028 Olympic and Paralympic Games. The Partnership Leadership Group is composed of the California Air Resources Board (CARB), the City of Los Angeles, County of Los Angeles, Metro, the Los Angeles Department of Water and Power (LADWP), and Southern California Edison (SCE). The Partnership developed the Zero Emissions 2028 Roadmap with the goal of an additional 25% reduction in greenhouse gas emissions (GHG) and air pollution, through accelerating transportation electrification. The Roadmap set targets for 20-45% of all light-duty private vehicles on the road to be electric and for there to be 60,000-130,000 public chargers installed throughout the region by 2028. One of the three guiding principles of the plan is to ensure that first and last mile electric options complement the region's public transit network. [5] The Roadmap calls for 60,000-130,000 public chargers and 10,000-100,000 zero emission chargers installed for goods movement by 2028.[6]

In addition, there are various state and utility programs in place to support the EV and charging infrastructure investments in California, including:

California Energy Commission (CEC), California Electric Vehicle Infrastructure Project (CALeVIP)

The CEC funds the CALeVIP to address regional EV charging needs and support the state's goals of improving air quality, mitigating climate change, and reducing petroleum use. CALeVIP develops and implements EV charging infrastructure incentive projects for Level 2 and DC fast chargers. As of September 2018, there are CALeVIP projects in Fresno and Southern California (including Los Angeles, Orange, Riverside, and San Bernardino Counties). CALeVIP is currently funded for more than $39 million, with the potential of up to $200 million.[7] The CALeVIP projects seek to fill gaps observed between current EV charging infrastructure deployment and projections developed at the County level.[8] In the case of Southern California, for instance, the CALeVIP project is going to focus on deploying DC fast charging (DCFC) equipment—rebates are available for up to $70,000 per DCFC at new sites and up to $40,000 per DCFC replacement or make-ready sites; if the installation is located in a designated disadvantaged community (DAC), then the rebate for a new DCFC can be up to $80,000.

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[5] LACI Zero Emissions Roadmap. http://roadmap.laci.org/.

[6] LACI Zero Emissions Roadmap. http://roadmap.laci.org/.

[7] CALeVIP. https://calevip.org/.

[8] Bedir, Abdulkadir, Noel Crisostomo, Jennifer Allen, Eric Wood, and Clément Rames. 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025. California Energy Commission. Publication Number: CEC-600-2018-001. Available online at https://www.nrel.gov/docs/fy18osti/70893.pdf.

SCE, Charge Ready

SCE launched the Charge Ready program in 2016 to support its clean energy vision of 7 million EVs on state highways by 2030.[9] Charge Ready increases the availability of charging for passenger EVs by installing and maintaining EV charging infrastructure, as well as providing rebates to participants who choose to own, operate, and maintain charging stations. Funded charging infrastructure is located at workplaces, fleet sites, multi-unit dwellings, and destination centers, such as hotels or sports venues.

After the success of the pilot program, SCE has filed a plan with the California Public Utilities Commission to expand the program to support 48,000 charging ports over four years, with a proposed budget of $760 million.[10] As part of the second phase, the Charge Ready program will focus more on multi-unit dwelling charging. It has also set the goal of installing 30% of charging stations in communities that are disproportionately affected by pollution and economic hardship.

LADWP, Charge Up LA!

LADWP supports electric transportation through the Charge Up LA! Program. Charge Up LA! provides rebates for Level 2 stations of up to $500 for residential customers and up to $5,000 for commercial customers. Commercial customers can receive an extra $750 per additional charge port. Eligible commercial locations include workplaces, multi-unit dwellings, and public parking lots, and the number of rebates an applicant may receive varies based on the number of parking spaces.[11]

Electrify America and Volkswagen (VW) Environmental Mitigation Trust

CARB approved the first of four plans by VW to invest in zero-emission vehicle (ZEV) infrastructure, public outreach, and access to EVs and charging infrastructure for residents of disadvantaged communities. The funds will be invested by Electrify America, a subsidiary of VW created for that purpose, in four installments of $200 million each over the next 10 years (a total of $800 million). The Cycle 1 plan will invest in ZEV infrastructure, education, and access activities to support California's effort to increase ZEV adoption in five major metropolitan areas including Los Angeles, San Francisco, San Jose, Sacramento, and Fresno.[12]

In addition to the $800 million that Electrify America will invest, California also received $423 million of the VW Environmental Mitigation Trust. CARB approved the final Beneficiary Mitigation Plan in June 2018, which describes how the funding will be used to mitigate excess NOx.[13] The Plan has allocated $5 million of the trust to fund public, workplace, and multi-unit dwelling charging stations.

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[9] SCE Charge Up! Program. https://www.edison.com/home/innovation/electric-transportation/charge-ready-a-plan-for-california.html

[10] SCE Charge Ready 2 Proposal. https://www.edison.com/content/dam/eix/documents/innovation/electric-transportation/charge-ready-2-ev-charging-infrastructure-proposal.pdf.

[11] LADWP. Charge Up LA! Program. https://www.ladwp.com/ladwp/faces/ladwp/residential/r-gogreen/r-gg-driveelectric.

[12] Electrify America. June 29, 2017. Supplement to the California ZEV Investment Plan Cycle 1. https://www.arb.ca.gov/msprog/vw_info/vsi/vw-zevinvest/documents/california_zev_investment_plan_supplement_062917.pdf.

[13] State of California Beneficiary Mitigation Plan. June 2018. https://www.arb.ca.gov/msprog/vw_info/vsi/vw-mititrust/documents/bmp_jun2018.pdf.

The Need for a Plan

Metro's ECSD has demonstrated its ability to deploy EV charging infrastructure at various facilities to support Metro's employees, the NR fleet, and transit riders; and they have demonstrated this with only a modest allocation of capital and staff resources. Moving forward, Metro will continue to deploy EV charging infrastructure that will help to meet the expected increase in demand for this equipment. In order to navigate the path forward, Metro reviewed its existing processes to deploy EV charging infrastructure and identified areas for improvement. Generally speaking, Metro has deployed EV charging infrastructure effectively, especially considering the limited resources that have been dedicated to the initiative thus far. Despite this progress, however, the processes have been ad-hoc and opportunistic. The table below reviews Metro's key areas for improvement with respect to deploying EV charging infrastructure that were identified in its review.

Action Area	Gap
EV Charging Infrastructure Deployment	• Metro lacks an inventory for the number of spaces that could become charging stations at park and ride lots. There are 25,000 public parking spaces and it would be beneficial to understand how much of that could host EV charging stations cost-effectively (without undue amounts of trenching). • The program lacks defined targets or milestones to work towards and energize around. • Scaling will require more formal internal processes and defined roles.
EV Charging Infrastructure Operations + Maintenance	• Interoperability of the charging station hardware and software systems for monitoring is an important issue that Metro has been addressing through replacing older GE chargers with new models that have an open charge point protocol (OCPP). OCPP compliance allows for flexibility with service providers and streamlines the consumer experience in terms of billing systems (e.g., TAP integration) and a robust customer experience. • Metro currently lacks an integrated maintenance plan for their charging infrastructure. More formal processes may be needed in the short term (and certainly for scaling long-term) to ensure charging stations are operating and serving customers and employees. For example, formal processes to report issues with equipment, timely submittal of facilities requests and fulfillment of O&M work.
Funding for EV Charging Infrastructure	• Funding will be a continual challenge but opportunities are growing. As more prospects arise for partnerships, Metro should define their intentions and goals for such partnerships.
Deploying EVs in Non-Revenue Fleet	• The process for choosing which vehicles to replace has been ad hoc to date. • There is an opportunity for growth (Metro purchases about 100 non-revenue vehicles per year) but there is a lack of defined targets or goals to work towards. • Additional staff is needed in the non-revenue fleet department to manage growth in EV procurement. • Since there is no fleet management software, trouble shooting, tracking and reporting of issues and impacts is difficult.
Marketing & Outreach	• Metro lacks formally defined marketing and outreach objectives or goals. • There are some resource constraints within the internal marketing and design department (requests can take a long time).

2. Strategic Vision and Guiding Principles

Metro's strategic vision with respect to EV charging infrastructure is meant to be a future-oriented declaration of the agency's purpose and aspirations. The vision statement is meant to be brief, while serving as the point from which the balance of the implementation strategy flows. The guiding principles are effectively strategic objectives that provide more detail to the vision statement.

Vision

Metro seeks to deploy EV charging infrastructure cost-effectively across its service territory to ensure access for Metro employees, Metro's non-revenue service vehicles, and transit users.

1. Metro will install Level 2 charging stations for 10% of Metro employees who currently drive alone to work.
2. Metro will install Level 2 charging stations for 70% of its light duty Non-Revenue Fleet by 2028.
3. Metro will install Level 2 charging stations at 10% of Metro-owned public parking spaces by 2028.

Guiding Principles

Metro's guiding principles with respect to deploying EV charging infrastructure include:

- **Emphasize positive consumer experience**. EVs are an emerging technology, and a seamless consumer experience at charging stations (especially in public places) will help boost consumer confidence.
- **Align with Metro's internal objectives**. Metro's EV Implementation Plan will align with internal objectives, including those that are dedicated to: Improving mobility and minimizing environmental impacts (e.g., GHG emissions).
- **Allocate resources efficiently**. Metro will balance the costs of expanding charging infrastructure at existing parking facilities and ensuring that new facilities have EV charging infrastructure. Metro will ensure that key Metro departments are allocated sufficient resources to support EV charging infrastructure deployment. Metro will identify funding opportunities to defray the costs of deploying EV charging infrastructure.
- **Integrate and align with initiatives by other stakeholders**. Metro will work with SCE and LADWP where feasible to coordinate EV charging infrastructure deployment. Metro will work with other public agencies at the local, regional, and state level to coordinate where feasible.

3. Program Design

Program Timeline

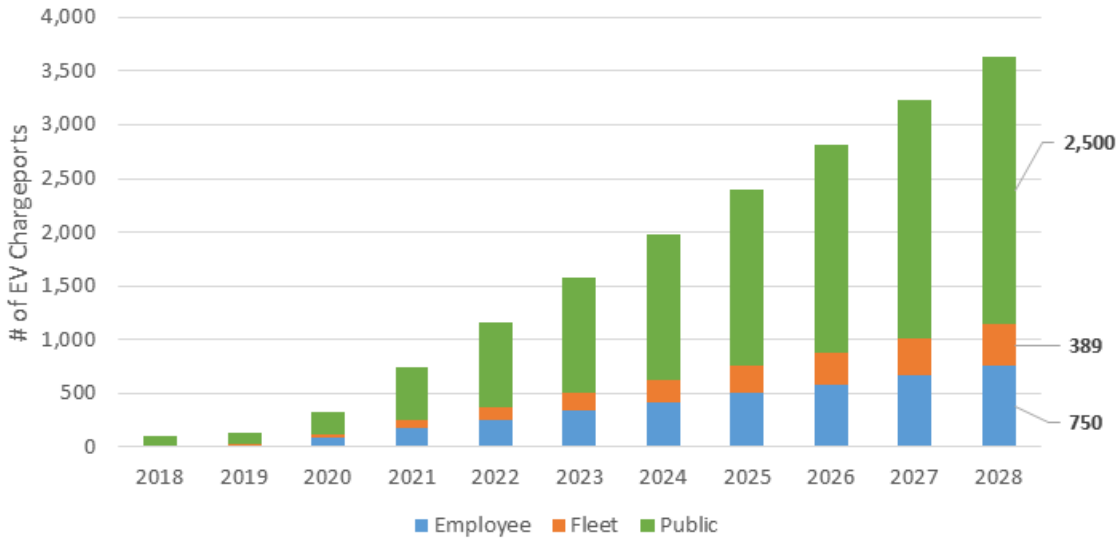
Metro's EV vision and program goals will be implemented in a phased approach over the next ten years. While the overall path to meeting 2028 targets may vary from what is outlined here, such variance should be tracked and assessed annually to identify implementation setbacks and successes.

Figure 2 below presents Metro's implementation timeline for achieving their EV deployment goals. Some of the key assumptions are summarized here:

- For employees, Metro is installing four dedicated EV chargers in 2019. Metro estimates that there are between 3,000 and 4,000 Metro owned employee parking spaces. By 2028, Metro will seek to install a total of 750 chargers for 10% of the 7,500 Metro employees who currently drive alone to work.[14]
- For Metro owned non-revenue fleet vehicles, the goal is to install enough EV charging stations for 70% of the light-duty passenger fleet by 2028. Currently, there are 457 sedans and 100 passenger SUVs in Metro's NR fleet. We assume that all 163 driver relief sedans, 80% of remaining administrative sedans, and 20% of passenger SUVs can be replaced by EVs by 2028. Near term procurement plans for Chevy Bolt EVs will require deployment of 20 or so charging ports, followed by 100 in 2020 and a linear progression from there on out to meet the 2028 goal.
- For public charging stations, Metro assumes there will be a linear implementation path to electrifying 10% of the estimated 25,000 parking spots at park and ride facilities by 2028, after two years of program ramp up with a slower progression.

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

Figure 2. EV Chargeport Deployment Goal Timeline (Cumulative Installations to 2028)



Program Costs

The deployment of EV charging infrastructure to support employees, the NR fleet, and Metro's transit riders will require significant investments. These investments are characterized as:

- **Infrastructure:** This is inclusive of the EV charging hardware and the corresponding installation costs.
- **Operations & Maintenance:** Includes networking and maintenance associated with the hardware.
- **Electricity:** The cost of electricity at Metro facilities.
- **Potential Revenue:** Metro can earn revenue by charging a fee associated with EV charging and also earn revenues by generating LCFS credits.

Metro developed program cost estimates by estimating the costs on a per EVSE installation basis, with each EVSE being dual port. The table below summarizes the costs estimates employed on a per EVSE basis:

Table 3. Installation Cost Parameters for Level 2 EVSE Deployment

Cost Parameter	Estimated Costs	
	Employee & Public	Fleet
Site Preparation	$4,230	$2,115
Demolition	$480	$240
Excavation: Trenching/ Concrete	$540	$270
Landscape	$180	$90
Concrete / Paving	$3,250	$1,625
Site Work	$540	$270
Signage / Striping / Bollards	$1,150	$575
Electrical	$10,880	$5,440
Contractor Fees	$4,040	$2,020
Total per Level 2 EVSE	**$25,290**	**$12,645**
Total per Chargeport	**$12,645**	**$6,320**

Detailed cost information provided in response to a request for bids that Metro staff issued for 27 EVSE to be deployed at six different locations was used to inform the estimated costs. These EVSE were to be deployed for public use. We assumed that the costs for EVSE deployment for employee use would be the same cost, and that EVSE deployments for fleets would be half as much as the costs for public-facing infrastructure. Metro faces higher EV charging infrastructure installation costs than what is readily available in the literature in part because of the location of their facilities, and the placement of EVSE. Park and ride facilities, for instance, tend to be far from electrical service, which requires significant trenching and cutting, as well as the costs of connecting electrical service to the EVSE hardware.

Metro assumed that a dual port Level 2 EVSE will cost about $4,700 based on market research. This yields a total turnkey cost of $29,990 per EVSE dedicated to employee and public charging and $17,345 per EVSE for equipment dedicated to fleet charging.

Table 4 summarizes the other cost assumptions that we employed in our analysis, including those for operations and maintenance (O&M), electricity consumption, and any revenue generated from LCFS credits. For electricity costs, Metro reviewed electricity bill amounts (in dollars) and electricity consumption (in units of kWh) from more than 350 facilities in the service territories of SCE and LADWP, representing more than 22 different rate schedules, 10 of which are time of use (TOU) rates. The electricity bills are inclusive of the various element of electricity consumption—including the energy charge, the customer charge (e.g., billed on a per meter per day basis), and the demand charge. Metro calculated the average rate in units of dollars per kWh for each facility and then developed low, medium, and high estimates for electricity charges for use in the modeling. The medium value represents the weighted median electricity charge across the more than 350 facilities; the low value represents the median electricity charge across the 120 facilities with the lowest cost per kWh; and the high value represents the median electricity charge across the 110 facilities with the highest cost per kWh.

Table 4. Cost Parameters for EV Charging Program Cost Analysis ($2018)

Cost Parameter	Est Cost
Operations & Maintenance	
Networking ($/month)	$75
Maintenance ($/month)	$25
Electricity ($/kWh)	
Low	$0.136
Medium	$0.162
High	$0.200
LCFS Credit Revenues ($/ton)	
Low	$40
Medium	$110
High	$180

Table 5 summarizes the estimated lifecycle costs of operating a dual port EVSE at Metro for employees or the public and for Metro's fleet. The costs were developed assuming a 20 year period and presented as the net present value using a 5% discount rate. We also assumed that the hardware or the EVSE itself would need to be replaced twice over the assumed 20 years, in year 7 and again in year 14. The values are presented for different levels of utilization (low, medium, and high), assuming the medium electricity charge of about $0.16/kWh and the medium LCFS credit price of $110/ton. The values in red are a cost, and the values in black represent revenue generation.

Table 5. Estimated Lifecycle Cost of Operating EVSE at Metro

Cost Parameter	Employee or Public	Fleet
Capital	$36,000	$23,400
O&M	$15,700	$15,700
Electricity		
Low	$4,200	$4,200
Medium	$10,600	$10,600
High	$21,200	$21,200
LCFS Credit Revenues		
Low	$2,200	$2,200
Medium	$5,400	$5,400
High	$10,800	$10,800
Net	**$53,700—$62,100**	**$41,100—$49,500**

Table 6 summarizes the costs of the entire program (on a real, non-discounted basis using 2018 dollars) distinguishing between the type of charging as employee, NR fleet, or public. All values are presented in millions and represent the total costs for deployment out to 2028. The values are presented for different levels of asset utilization (low, medium, and high), assuming the medium electricity charge of about $0.16/kWh and the medium LCFS credit price of $110/ton. The values in red are a cost, and the values in black represent revenue generation. Metro estimates that the program will cost between $160 million and $172 million to implement, without any revenue accounted for from charging.

Table 6. Estimated EV Charging Infrastructure Costs for Program Implementation, 2018-2028 ($2018, millions)

Cost Parameter	Employee	Fleet	Public
Capital	$31.2	$11.5	$103.4
O&M	$2.25	$1.49	$7.47
Electricity			
Low	$1.21	$0.81	$4.03
Medium	$3.03	$2.02	$10.09
High	$6.06	$4.04	$20.17
LCFS Credit Revenues			
Low	$0.62	$0.42	$2.06
Medium	$1.55	$1.04	$5.15
High	$3.10	$2.08	$10.31
Net	$34.0—$36.4	$13.4—$15.0	$112.8—$120.7
Program Total	$160.2—$172.1		

It is important to note that these estimates have two inter-related and uncertain aspects: the electricity charge and the impact of charging on demand charges at facilities.

- As noted previously, Metro reviewed electricity costs at more than 350 Metro facilities on more than 20 different rate tariffs. The energy charge (in units of $/kWh) has only a modest impact on the overall program implementation costs: When we replace the medium value of $0.16/kWh with the high value of $0.20/kWh, the range of overall program costs increases from $162 million to $179 million. However, the program costs will be impacted significantly by facility-level energy charges and demand charges. With respect to facility-level energy charges, there are about 115 Metro facilities that are on TOU rates; and that number is likely to increase significantly over the next five years as utilities move more towards TOU rate structures. The impacts of EV charging at these types of facilities could increase the electricity bills considerably depending on when the charging occurs and its coincidence with the TOU rate structure. In some TOU rate structures, the on-peak energy charge can be upwards of $0.40/kWh, more than double the “high” energy charge used in this analysis.
- The demand charge is linked to the highest demand for electricity usage over a specific time interval. The electrical grid is designed to ensure that electricity supply can meet maximum demand (in units of kW), and the demand charge enables utilities to recoup the costs of

ensuring that the system is sufficiently built out to achieve that design criteria. Metro facilities serve a diverse range of purposes, and that is reflected in the maximum demand, ranging from less than 5 kW of demand to more than 4,300 kW. The demand charge increase that specific Metro facilities will face is dependent on the facility's current maximum demand, the rate structure, and the timing of EV charging.

Higher energy charges, linked to TOU rates and coincident EV charging with peak periods, and demand charges can change the program costs significantly; however, this is impractical to quantify at this point because we do not know where the more than 3,500 charging stations will be deployed. Fortunately, there will be ways to mitigate this potential increase in costs as utilities engage more substantially in the area of transportation electrification. With EVs being identified as a major component of California's decarbonization strategy, utilities will continue to seek out ways to reduce the impacts of EV charging on the grid and to ratepayers—this includes, but is not limited to novel TOU rate structures, demand response programs, managed charging opportunities, and defraying the costs of installing EV charging infrastructure to customers.

Just as there is potential to increase the overall program costs, there are also a variety of ways to reduce the overall program costs. Most notably:

- Metro can recover some costs by charging employees and the public a small fee to access the EV charging network. Information from other sources indicate that some site hosts provide charging free of charge; however, others charge upwards of $0.25 per kWh. Charging just the general public a fee of $0.25/kWh would yield revenues of $6.2—$31.1 million over the course of the program; a similar fee for employees would yield additional revenues of $1.9—$9.4 million over the course of the program, depending on the utilization of the charging assets. It is important to note that the fee assessed will impact the utilization of the facility, whether it be for employees or for the general public.

Site host fee schedules for EV charging can vary considerably—most notably, site hosts can charge a fee based on the time that an EV driver is connected to the charging equipment (time-based), a fee for the amount of energy delivered while connected to the charging equipment (energy-based), or some combination thereof. The fee schedules in Table 7 below are based on information reported by SCE from its Charge Ready program from December 2017, representing 16 site hosts that are collecting charging fees. SCE also notes that as of December 2017, another 20 site hosts are *not* collecting fees from charging station users. As shown in the table, the $0.25/kWh (an energy-based fee) assumed in the revenue generation example presented previously is in line with what SCE reports for its limited sample of site hosts that do impost a fee on EV users.

Table 7. Charge Ready Site Host Fee Schedules as of December 2017

Charging Market Segment	Fee Schedule (12/2017)	Fee Type
Workplace	Unknown, avg $0.25/kWh	Unknown
Workplace	$0.20/kWh, $5/h after 4h	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$0.25/kWh, plus $0.25/h inactive	Combination
Workplace	$1.50/h	Time-based
Destination Center	$0.25/kWh	Energy-based
Destination Center	$0.50/kWh	Energy-based
Destination Center	$2/h	Time-based
Destination Center	$0.50/h for first 3h only	Time-based
Destination Center	$1.25/h for 4h, $2.50/h thereafter	Time-based
Destination Center	$1/h for first 4h	Time-based
Destination Center	Unknown, avg $0.56/kWh	Unknown
Destination Center	Unknown, avg $0.35/kWh	Unknown
Multi-unit dwelling	SCE energy fee + $1/h	Combination
Multi-unit dwelling	Unknown, avg $0.15/kWh	Unknown

- Where possible, Metro can seek to shift NR fleet EV charging to overnight periods when rates are lower (assuming those facilities that have TOU rates). The electricity costs can be reduced substantially. We estimate that overnight charging would reduce the electricity costs for fleet charging by $0.4 to $1.9 million over the course of the program.
- Metro can seek out incentives and other grants to defray the costs of charging equipment and associated installation. For instance, LADWP offers up to $5,000 for the installation of charging equipment at commercial installations. If Metro is able to reduce the costs of installing charging infrastructure by $5,000 per EVSE installed, we estimate that program costs will be reduced by nearly $30 million.
- Apart from specific incentives, there are programs that are in place to help defray the costs of deploying EV charging infrastructure. Most notably, there are two major initiatives to deploy EV charging infrastructure as a result of settlements: The Newhall Settlement Agreement and the Volkswagen Settlement. The former is linked to the settlement reached between parties with regard to the Newhall Ranch development in Santa Clarita valley, and requires the developer to deploy 25,000 EV chargers in the development and around Los Angeles County.[15] The latter

[15] Settlement Agreement, September 2017. Available online at https://www.biologicaldiversity.org/programs/urban/pdfs/Newhall_Settlement_Agreement.pdf.

refers broadly to the various settlements resulting from the discovery that Volkswagen was using defeat devices during emissions testing; we focus here on Electrify America, a subsidiary of Volkswagen that was created out of the settlement and is required to spend $2 billion deploying EV charging infrastructure. In both cases, Metro has an opportunity to defray the costs of its program considerably.

- If LCFS credit prices remain in the current range (in excess of $180/ton) for the duration of the program, then it is estimated that this would generate additional revenue of between $2.3 and $11.4 million.
- ADA accessibility requirements have the potential to increase significantly the costs of EV charging infrastructure deployment. Metro does not have ADA requirements in specific areas, including bus parking and dedicated NR fleet parking areas, with one exception: manager vehicle parking. If Metro creates a new manager vehicle parking space, it is important to ensure that there is an appropriate number of accessible parking spaces in that parking lot. It is important for Metro to meet ADA requirements where required; however, if there are areas in which they do not have to incur the additional expense, then they may be able to reduce costs significantly.

Staffing and Competency Requirements

There are a variety of staffing and competency requirements that must be addressed if Metro is to achieve the objectives of this EV Implementation Plan. Most importantly, the current number of staff dedicated to managing EV charging infrastructure deployment is inadequate to manage the level of growth envisioned here. Similarly, the services that have been outsourced, namely the operations and maintenance of the EV charging equipment, have been inadequate at times over the course of the existing contract. The next section focuses on aligning Metro's various internal departments and divisions to ensure that the objective of this Plan can be achieved. In this subsection, we outline the full time equivalent (FTE) positions that we recommend should be committed to the implementation of this Plan; where appropriate, we have indicated the timing of the staffing need.

- ECSD will require at a minimum 1.5 FTE to lead the implementation of this Plan. This need is time critical and will have a significant impact on the ability of Metro to achieve its targets.
- The NR fleet will require at a minimum of an additional 0.5 FTE to help implement this Plan. As it stands the NR fleet manager is resource constrained, and is reliant on other divisions (e.g., ECSD) to support electrification. Moving forward, the NR fleet will require this support within the next two years.
- The Facility Maintenance Department will require at a minimum of 1 FTE by 2020 as the number of charge ports available across the network approaches 1,000; and we anticipate another 1 FTE will be required by 2025 to support the next 2,000 charge ports to be deployed. We are also recommending a 0.5 FTE as an immediate need to support a) the impending changes to the operations and maintenance contract and b) preparation for the implementation of this Plan and the corresponding ramp up in activity.
- The Marketing team will require at a minimum of 0.5 FTE in the near-term future to help coordinate outreach and educational initiatives that are borne out of this Plan. The demands of

the Marketing team are likely to fluctuate over time, and that may present challenges with respect to continuity and timely resource allocation.

- All other departments and divisions that are likely to be involved in the implementation of this Plan in some capacity—including Procurement, Parking Management Unit, Grants, and Countywide Planning—should have sufficient existing capacity to support the implementation of this Plan.

There are a variety of other competencies that Metro must consider in the implementation of this Plan—most notably the design, build or installation, operation, and maintenance of the EV charging infrastructure equipment. Metro's current processes have the agency executing separate agreements to fulfill these requirements—soliciting bids from qualified contractors for installation and soliciting bids from qualified EV service providers to operate and maintain EV charging stations.

Moving forward, Metro should weigh the possibility of using the integrated procurement model, referred to as the Design-Build-Operate-Maintain (DBOM) model. This type of model has the potential to limit Metro's cost exposure over the course of the Plan's implementation.

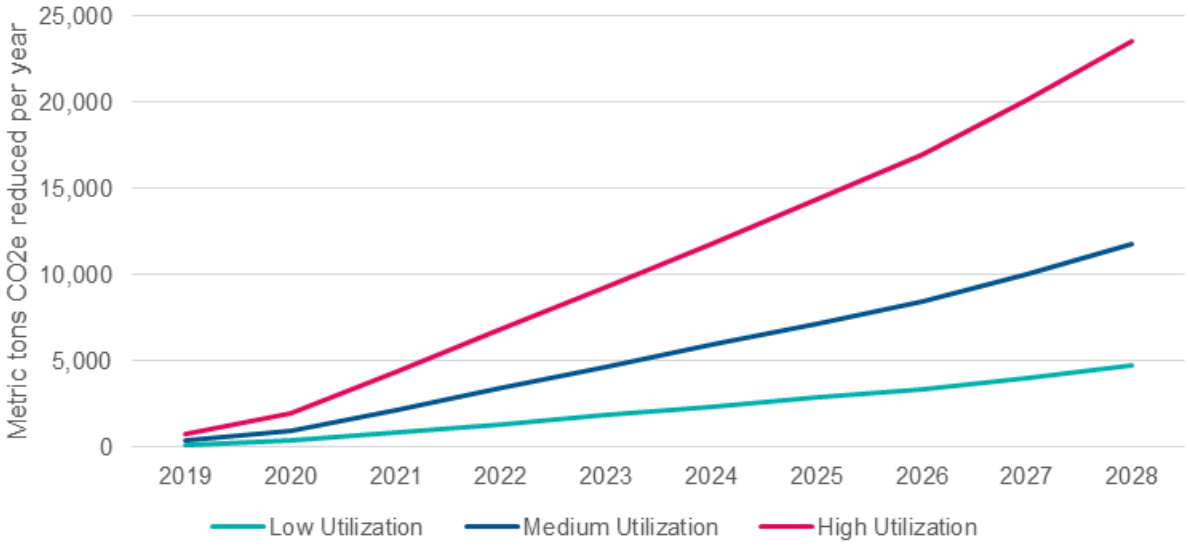
The DBOM model is typically viewed as a type of public-private partnership (P3). In that vein, it is important to recognize that deploying EV charging stations at different Metro facilities might present some challenging or odd contractual requirements. For instance, if Metro chooses to develop any future transit lines through a P3, it will be important to ensure that the EV charging infrastructure deployment is distinguished separately and/or appropriately (regardless of the contract structure for maintaining the rest of Metro's charging network). Metro's ECSD, as the recommended lead for the implementation of this plan should consider these type of arrangements on a case-by-case basis through discussions with any P3 project managers during project development; to the extent appropriate, these conversations should also include any contractor that Metro has retained to operate and maintain the EV charging equipment.

Program Impacts

Battery electric vehicles emit zero tailpipe emissions. However, their use does emit so-called upstream GHG emissions associated with the production of electricity. To estimate the potential emissions reductions from Metro's EV program goals through 2028, three scenarios based on various levels of charger utilization were developed. Using the implementation path shown in Figure 2 above, we assumed a low, medium, and high charger utilization, which correspond to annual consumption of 2,000, 5,000 and 10,000 kWh, respectively. These assumptions were developed based on Metro's existing EV charger utilization. The GHG reduction calculations are based on the amount of electricity supplied by Metro's chargers to power EVs. We assumed that in the baseline or business-as-usual scenario, the miles driven by the EVs powered by Metro's dispensed electricity would have been driven by a conventional gasoline vehicle. Metro used the average California light-duty gasoline vehicle fuel efficiency from the CARB's EMFAC model for the current and future years, which takes into consideration increasingly stringent fuel economy (or tailpipe GHG emission) standards. Then well-to-wheels (i.e., lifecycle) emissions factors were applied to the volume of fuel consumed in the baseline (gasoline) and project scenarios (electricity). A full list of the assumptions and data sources used in our GHG analysis is provided in Table 8 below.

Figure 3 presents the range of estimated annual GHG emissions reductions attributable to Metro's EV program goals and implementation path, as described in this Plan. Cumulatively, over the course of ten years, the program is expected to reduce between 22,000 and 110,000 metric tons (MT) of CO_2e.

Figure 3. Estimated Annual CO2e Emissions Reductions from Metro's EV Implementation Program



These GHG reduction curves are representative of Metro deploying a total of 3,639 EV chargers by the end of 2028. The range of results varies between low, medium, and high utilization, to take into account the uncertainty regarding how much each charging station will actually be used in the future. When utilization is high, more electricity is dispensed and therefore more petroleum and GHGs are reduced. If we assume the average car gets about 25 miles per gallon and is driven 10,000 miles per year, the cumulative GHGs reduced by the program is equivalent to taking 4,770 to 23,840 cars off the road for a year.

[Include infographic of GHG emissions and equivalent savings when report goes to graphic design]

The overall GHG mitigation costs of the program ranges from $1,550 to $7,870 per metric ton of CO2e. These figures are representative of the range of cumulative program costs, revenue brought in by charging customers for using the stations ($0.25/kWh), and the cumulative GHG reduced (22,000 – 110,000 MT CO2e).

Table 8. GHG Emissions Calculation Inputs and Assumptions

Variable (units)		2019	2028	Data Source
Battery electric motor efficiency (kWh/mi)		0.35	0.28	• LCFS Program • Assumed that EVs become more efficient over time
Fleet average LDV fuel economy (MPG)		28.97	37.67	CARB EMFAC model
Gasoline Carbon Intensity (gCO2e/MJ)		99.44	99.44	LCFS Regulation, Table 1. LCFS Carbon Intensity Benchmarks for 2011 to 2030 for Gasoline and Fuels Used as a Substitute for Gasoline[16]
EV Charger Deployment	SCE	33%	33%	Metro estimate based on existing usage
	LADWP	67%	67%	
Electricity Carbon Intensity (gCO2e/MJ)	SCE	131.53	85.67	• CA GREET Model 3.0 • Renewable energy targets for future years
	LADWP	179.22	74.58	

[16] Low Carbon Fuel Standard, Final Regulation Order, 2018. Available online https://www.arb.ca.gov/regact/2018/lcfs18/fro.pdf

4. Program Implementation Strategies

The following subsections review the key strategies required to implement the Plan and achieve its stated objectives.

Align Metro's Internal Departments

The management of a robust EV charger program at Metro will involve leadership by ECSD that is bolstered by support from multiple Metro departments. Each stage of the EV charger program–from developing policy and planning, procuring, contracting, installing, maintaining, and managing equipment–will require different Metro departments to understand and fulfill their roles and responsibilities. The sub-sections below summarize the Metro departments that can help ensure the EV Charger Implementation Program achieves its stated objectives.

Environmental Compliance and Sustainability Department

EV charging infrastructure deployment is consistent with ECSD's focus on minimizing the environmental, social, and financial impacts from the planning, design, construction, operation and maintenance of the agency's facilities and operations. ECSD has developed expertise and valuable experience over the last several years deploying the first tranche of EV chargers across Metro facilities, and is positioned to lead the implementation of this plan moving forward.

Role: Oversee the Metro-wide EV charging program.

Responsibilities

- *Serve as the organizational leader and clearinghouse for internal and external EV charger-related communications, issues, and plans*. This is effectively a continuation of ECSD's current role; however, it is more formalized, and includes explicit direction to ECSD to implement this plan. This also formalizes ECSD as the point of contact for the EV charging network for external strategic partners (e.g., utilities or infrastructure providers).
- *Serve as the lead for infrastructure development.* Again, this is similar to ECSD's current role, but is more explicitly stated and formalized. Furthermore, it codifies the role of ECSD in managing the process of planning for EV charging infrastructure deployment and ensuring successful execution of the Plan.
- *Manage financial aspects of EV charging infrastructure implementation*. ECSD will seek and secure funding for EV charging infrastructure expansion, including grant opportunities, through strategic partnerships, and internal funding. ECSD will also be responsible for managing any revenues that are generated from ancillary aspects of EV charging, such as credits generated in the LCFS program.
- *Provide design and engineering specifications to support procurement bids for EV charging infrastructure*. ECSD staff have a deep understanding of various requirements for EV charging infrastructure deployment.
- *Monitor and evaluate program metrics*. ECSD will be responsible for monitoring key metrics associated with the EV charging infrastructure program. These metrics might include, but are

not limited to charger utilization, environmental impacts (GHG emission reductions and criteria air pollutant emission reductions), and average cost per port installation.

Non-Revenue Fleet

Metro has a modest-sized NR fleet, with upwards of 800 light-duty vehicles and more than 1,200 vehicles total. As noted previously in this plan, the NR fleet has some experience with EVs already, and is well-positioned to prioritize additional EV deployment over the next decade. However, the NR fleet will continue to look to other parts of Metro to deploy EV charging infrastructure required to support its EV purchases.

Role: Procure and manage EVs within the light-duty non-revenue fleet.

Responsibilities

- *Develop a prioritized list of vehicles for EV replacement based on designated criteria*. Although the NR fleet does not have fleet management software, a simple set of criteria can be implemented to prioritize the vehicles that are best suited for EV replacement. This can be based on factors such as, but not limited to, average trip distances, terrain, annual miles traveled, etc.
- *Develop guidelines for tracking EV performance within the NR fleet*. EVs have the potential to reduce O&M costs for the fleet. To help bolster the case for accelerated turnover of selected vehicles in the NR fleet, the fleet manager should continue to track EV performance, while also formalizing internal guidelines for tracking performance.
- *Apply for EV purchase incentives*. Fleet vehicle purchases are eligible for both the federal tax credit (valued at up to $7,500) and the California state rebate (valued at up to $2,500). To date, the NR fleet has taken advantage of the state rebate, but not the federal tax credit. The federal tax credit does require that Metro work with a savvy dealer. Although most tax credit recipients are personal car owners, the Internal Revenue Service (IRS) does allow an exception for the seller of the vehicle (i.e., the dealer) to claim the credit (with some disclosure provisions).[17] This tactic was employed via fleet purchasing in the San Francisco Bay Area.[18]
- *Train drivers for EV and charging infrastructure use*. The NR fleet will need to ensure that the many drivers of EVs understand how to charge EVs, and communicate the importance of charging vehicles when not used.
- *Train maintenance personnel*. Fleet maintenance should be trained on electric vehicle preventative maintenance, servicing, and fueling process.

[17] See IRS Form 8936, available online at https://www.irs.gov/pub/irs-pdf/f8936.pdf.

[18] Capturing the Federal EV Tax Credit for Public Fleets, April 2017. Available online at https://www.georgetownclimate.org/files/report/Capturing-the-Federal-EV-Tax-Credit-for-Public-Fleets.pdf.

Procurement

Metro's Procurement department plays a pivotal role across the organization by managing requests for services from vendors and contractors, while ensuring that the contract specifications are in line with Metro's broader requirements.

Role: Procure EV charging infrastructure and service contracts

Responsibilities

- *Develop and solicit bids for EV charging equipment and services*. The procurement department will work with ECSD to ensure that all EV charging infrastructure related procurements, most notably for the charging equipment or hardware and the installation thereof, as well as the operations and maintenance of the network of charging stations.

Facility Maintenance Department

The Facility Maintenance Department provides critical support to ensure that Metro facilities are operational and maintained according to internally defined standards.

Role: Maintain Metro's property and provide access to Metro facilities.

Responsibilities

- *Respond to requests from EV charger maintenance, provide on-site access to contractors*. Although Metro can seek to outsource the O&M of its network of EV charging stations, the service provider will still require access to Metro's facilities. And in many cases, access to Metro facilities goes through Facilities Management. To ensure that Metro maintains a superior customer experience at charging stations deployed, it is important that ECSD and Facilities Management identify a way to prioritize access to Metro facilities when needed.

Parking Management Unit

Metro created the Parking Management Unit in 2014, and the unit manages the planning, enforcement, and operations of the parking system. With the expansion of EV charging infrastructure at Metro parking facilities for its transit riders a primary focus of this plan, the Parking Management Unit is an ideal partner for ECSD.

Role: Support with EV charging infrastructure integration at new and existing parking facilities.

Responsibilities

- *Incorporate EV charging into parking management considerations*. Metro initiated a major change in its approach to parking and park and ride facilities in 2016, with a Supportive Transit Parking Program Master Plan approved by the Board in early 2018. Unfortunately, the Plan makes no explicit mention of EV charging infrastructure. As the Parking Management Unit implements the various strategies identified in the Master Plan, they should work with ECSD to incorporate EV charging infrastructure where appropriate. More specifically, this will include developing enforcement protocols for parking spots with access to EV charging and improving wayfinding.

Grants

Metro applies for and receives a myriad of grant funding from federal and state entities. The Grants team is in charge of coordinating Metro's applications for grant funding and managing grants that are received.

Role: Applies for and helps implement grants

Responsibilities:

- *Support grant applications to defray costs of EV charging infrastructure*. Metro anticipates identifying several opportunities in the near- to mid-term future to help defray the costs of EV charging infrastructure. In some cases, these opportunities will require Metro to submit grant applications. Further, ECSD will continue to look to the Grants team to understand the burden of different grant programs, and help weight the managerial risks associated with pursuing a particular grant opportunity. It is important that ECSD and the Grants division work together to recognize formally how EV charging infrastructure deployment aligns with Metro's broader strategic direction of Metro's grant efforts.

Marketing

Metro's Marketing team is responsible for communicating the benefits of Metro's work to internal and external audiences.

Role: Implement a dedicated marketing effort to advertise the benefits of Metro's efforts to improve EV charging infrastructure accessibility.

Responsibilities

- *Implement marketing and outreach strategies to improve awareness of Metro employees and Metro transit riders.* The Marketing team should work with subject matter experts within ECSD to develop EV marketing and outreach collateral. These collateral should help communicate to target audiences the benefits of EVs and Metro's efforts to expand EV charging infrastructure.

Countywide Planning

Metro's Countywide Planning provides leadership for the implementation of a regional transportation system that supports mobility, a cleaner environment and a thriving economy. They seek to achieve the greatest possible community and environmental benefits from Metro's various projects and services.

Role: Integrate EV planning into Countywide planning

Responsibilities

- *Coordinate with ECSD regarding EV charging infrastructure deployment.* The Countywide Planning team should seek to coordinate with ECSD to ensure that the deployment of EV charging infrastructure is incorporated into broader planning initiatives, and where possible, enhances those initiatives (e.g., mobility hub planning).

Engage Strategic Partners

Metro will have a variety of strategic partners as part of the implementation of this Plan. Metro notes that these strategic partners are external stakeholders, as the internal partners were outlined in the previous sub-section. We focus on three types of strategic partners:

- Third Party Service Providers: The most obvious strategic engagement that Metro will have is with respect to any third party procurement to manage its existing network of EV charging stations, or as it relates to a more integrated DBOM procurement. Metro has maintained an open dialogue with EV service providers preceding and during the development of this plan.
- Utility Providers: SCE and LADWP are making significant investments in EV charging infrastructure. As one of the largest employers in Los Angeles, and with access to so much parking (for transit riders), Metro is a natural partner for both utility providers. It will be important that Metro maintain a strong relationship with both SCE and LADWP throughout the Implementation of this Plan, particularly because utility investment may defray Metro's costs to deploy EV charging infrastructure.
- Other Public Agencies: Public agencies have a critical role to play in EV charging infrastructure deployment, particularly as it relates to coordination and planning. There are many public and private efforts to increase EV charging infrastructure accessibility. Despite these efforts, there is still a lack of coordination at the regional and County-level regarding the deployment of EV charging infrastructure. As EV adoption increases, it is important that public agencies understand that regional EV charging infrastructure is a critical infrastructure asset that needs to be developed, maintained, and strengthened. The recognition of EV charging infrastructure as a critical asset will help enable improved mobility, support EV adoption, and deliver criteria pollutant and GHG emission reductions. To that end, Metro must continue to seek strategic partnerships with other public agencies to ensure that EV charging infrastructure is recognized as a critical regional asset.

Generally speaking, Metro has established itself as a willing partner, and has been actively engaged in discussions with each of the partners identified above. For the most part, this aspect of the plan's implementation need focus on maintaining these partnerships or relationships.

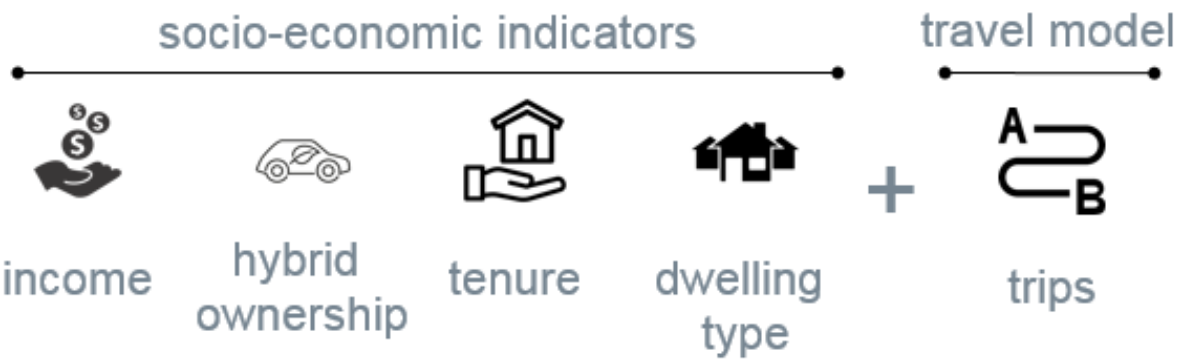
Deploy EV Charging Infrastructure Cost-Effectively

As noted previously, the costs of deploying EV charging infrastructure are significant; however, there are a variety of ways that Metro can reduce the costs of deploying infrastructure, while maximizing revenue generation potential. Unfortunately, it will be difficult to reduce the high installation costs for EV charging infrastructure at Metro facilities, largely because of where the EV charging equipment is located with respect to electrical service. On a per EVSE basis, Metro expects to continue facing costs in excess of $30,000 per installation—and there is only so much that can be done to limit these installation costs. First and foremost, there are a variety of incentive programs—offered by state agencies, utilities, and other stakeholders—that can help defray the costs of EV charging infrastructure. Outside of that, however, it is important that Metro does what it can to deploy charging infrastructure in areas that will have high utilization (e.g., upwards of 10,000 kWh per year). While higher utilizations are not the sole objective of this Plan, it is important that it at least be a consideration to mitigate Metro's cost exposure.

It is also critical that Metro retain ownership of LCFS credits to the extent feasible as part of the deployment of EV charging infrastructure. The revenue potential of LCFS credits represents as much as 12.5% of total program costs. There are a variety of contractual agreements that may limit Metro's

ability to retain LCFS credits; however, in this case, it is critical that Metro be compensated monetarily to reflect the value of the foregone credits.

EV charging infrastructure siting analysis was developed as a resource to support Metro's EV Implementation Plan. The siting analysis is a web-based tool that characterizes the demand for EV charging infrastructure at different locations based on a combination of socioeconomic indicators for EV ownership and travel patterns in and around Los Angeles County. The figure below summarizes the approach that was used to characterize the demand for EV charging infrastructure, and Appendix A presents the methodology and data sources in more detail.



The data on income, tenure, and dwelling type are retrieved from the American Community Survey, an ongoing survey conducted by the United States Census Bureau. Hybrid ownership data were derived from motor vehicle registration information provided by IHS Markit. These information help characterize the likelihood that a particular region will adopt EVs—all regions are expected to adopt EVs, this analysis simply quantifies the likelihood of EV adoption based on our current understanding of EV ownership. The likelihood of EV adoption is paired with origin-destination trip information extracted from the SCAG's trip-based transportation model.[19] This particular analysis is focused on the areas that are the most likely to be destinations for home-based work trips. In principle, the analysis seeks to overlay the likelihood that a home-based work trip is completed by EV owners with areas that include Metro facilities.

The charging infrastructure siting tool is designed to help Metro prioritize the deployment of EV charging infrastructure; however, it should not be misconstrued as a resource to preclude investment in one region or another. The siting tool seeks to characterize demand, with the assumption that this anticipated demand will lead to sufficiently high utilization (as measured in kWh per chargeport) to warrant investment. However, Metro seeks to develop an EV charging network that provides critical support to its employees, the NR fleet, and Metro's transit riders. As such, high utilization of assets immediately upon deployment may be infeasible. Furthermore, there are on-the-ground conditions that should ultimately dictate the scope of investment at a given facility.

[19] More information is available online at http://www.scag.ca.gov/DataAndTools/Pages/DataTools/Modeling.aspx.

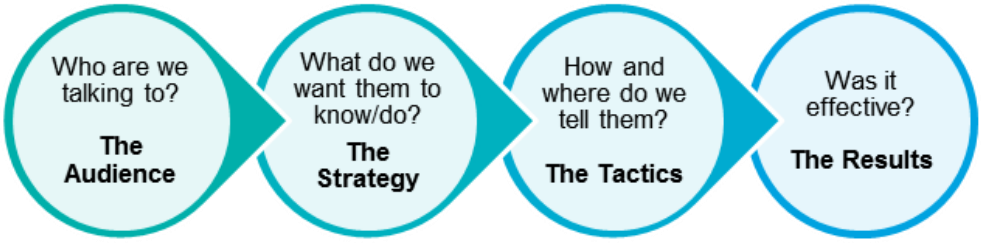
Conduct Dedicated Outreach

Metro is already taking steps to promote EV adoption and the use of charging infrastructure internally and externally. There is a public-facing webpage dedicated to EV charging. It includes information on station locations, pricing, how to sign up for an EV Connect account, benefits of EVs, and frequently asked questions. Metro employees who drive non-revenue fleet vehicles are trained before they can reserve an EV for transport between facilities. The training process includes presenting information on vehicle and charger technology, use, safety considerations, parking, and how and when to charge. Metro also develops, designs, and distributes information on EVs via signage, facts sheets, and website content.

Metro's plans to deploy EV charging infrastructure for its employees, the NR fleet, and for Metro riders will require effective marketing strategies to improve general EV awareness and the availability of EV charging infrastructure. There are a variety of reasons that consumers do not purchase EVs today: lack of familiarity with EVs; misperceptions around EVs and their capabilities; reluctance to disrupt a known way of traveling; and uncertainty about charging and the associated costs. Metro needs an effective marketing strategy that will use engaging messaging and imagery that the target audiences can relate to, that will raise the public and employees' awareness of the availability of EV charging infrastructure, and that will promote the benefits of EVs. Included within this report, in Appendix B, is a detailed EV Marketing and Outreach Plan that focuses on four key steps:

- **Informing** outreach through research to identify past successes and lessons learned, reviewing the market environment, and then creating a plan to achieve program objectives.
- **Building** the outreach components using messages, visual concepts, and innovative platforms to share information in meaningful ways.
- **Engaging** audiences using thoughtful execution and ongoing feedback.
- **Evolving** Metro's approach through identifying new insights to refine tactics and approaches to deliver against defined measures of success.

The goal of the marketing plan is to improve awareness of accessible EV charging infrastructure at Metro facilities. In doing so, it will also help draw attention to Metro's broader sustainability initiatives. The plan follows the process below to ensure it is audience-centric, fully-integrated, and in line with Metro's goals and objectives.



The following section includes the key aspects of Marketing and Outreach Plan. The full Plan is included in Appendix B of this report.

The Audience

Audience segmentation is an essential first step to understanding target groups' distinct needs, motivations, and behaviors. Messages can then be tailored to each segment to facilitate better engagement. Metro has three distinct audience groups to market to:

Audience 1: Transit Riders

Recent surveys of transit riders, recorded in Metro's Supporting Transit Parking Program Master Plan and its associated appendices, provide relevant information on transit rider demographics. The table below presents the key observations and marketing takeaways of transit rider survey results.

Characteristic	Observation	Takeaway
Age	Those aged 50-64 comprised the largest group of riders (27%), followed closely by those aged 35-49 (26%), and the 25-34 bracket (22%).	The age ranges indicate that the marketing team will need to use both traditional and digital/social channels to get the message out.
Ethnicity	LA County is diverse, which is reflected by the ridership demographics of those surveyed.	The marketing team should create culturally-aware materials and messaging, and develop collateral in multiple languages.
Gender	More men (53%) than women (47%) responded to the survey.	Include messaging towards both men and women during outreach.
Travel patterns	Most survey respondents (40%)—who drive and park at a station lot or garage—noted they live within 2-5 miles from their preferred station, followed by 1-2 miles (22%), and 5-10 miles (19%).	The range of EVs is greater than the daily drive of most commuters who use park and ride. Messaging should focus on providing a more sustainable (and convenient) first- and last-mile connection. It should also target those who live in multi-unit dwellings which have limited or no residential chargers available.
Behavior	• When it comes to transportation choices, around half of those arriving at a Metro station choose to drive and park at the station lot (50.4%). They are followed by those who take the bus (18.6%), those who walk (17.8%), and those who drive and park outside the station lot (6.2%). • Among those who park, most use the Metro station parking facility 4-5 times a week. Most arrive between 7-8 a.m. and a majority park for 4-10 hours.	• Asked in a multiple-choice question about why they choose to park and ride transit, respondents said it saves them money (50%), it's convenient (49%), it's good for the environment (47%), there's a high cost of parking at the destination (42%), it saves time (36%), there's no parking at the destination (15%), and other reasons (9%). • Audience priorities align well with advantages from charging their EVs at Metro facilities. The messaging in the marketing plan should highlight these benefits.

Audience 2: Metro Employees

Metro's employees are a critical audience for EV marketing efforts. Two major segments exist: Employees who commute to and from work alone or in vehicle pools, and employees who use non-revenue fleet EVs to travel between Metro worksites/facilities.

- Office-bound employees: A 2017 Metro employee commute survey showed that 33 employees currently drive ZEVs (the number of employees driving plug-in hybrid EVs is unknown). The

majority of employees (75%) drive alone to work, while 5% carpool. Messaging should target those who drive alone and those who carpool to and from work as they form 80 percent of the total workforce.

- Employees using NR fleet vehicles: NR fleet vehicles are used as pooled vehicles that are assigned to divisions, and can be reserved as needed. They serve as driver relief vehicles and are sometimes assigned directly to managers. This becomes a public relations opportunity for Metro to promote its corporate sustainability story. When Metro encourages the public to use EV chargers, it can demonstrate that it also walks the walk. Outreach materials can show a before-and-after comparison, showing how cost savings and reduced environmental footprint resulted from replacing conventional cars with EVs in the non-revenue fleet.

Given the diversity of roles at Metro, messaging should be informed by the nature of employees' work. For example, staff at headquarters may be at their desks for most of the day; they can be contacted via channels such as the company intranet or an eblast. Others in the field could be contacted via a mobile app or materials in break rooms.

Metro currently uses a variety of outreach channels to engage employees, all of which are a good fit to promote EV-related information. These include the company intranet, periodic eblasts focused on trainings, employment opportunities, facility updates, and events; Adobe Connect webinars; posters in elevators and lobbies; ads/videos on in-house lobby TV screens; newsletters; and mailers.

The Tactics

Campaign tactics are specific actions taken to carry out the strategy and achieve goals. The tactics will help to carry the message forward to target audience groups. The table below summarizes the tactics, each of which are discussed in more detail in Appendix B.

Tactic	Summary
Enhance program website	• If an employee or a member of the public is looking for information on EV charging at Metro facilities, the program website is likely to be their first point of contact. This could either be a branded, community-facing webpage or a SharePoint or intranet page. • The heuristic evaluation, included in Appendix 2 suggests steps that can be taken to enhance the public-facing website. Suggestions include adding interactive content and tightening copy.
Develop a suite of marketing collateral	• Compelling collateral pieces amplify message reach. Collateral should focus on information gaps and audience needs, and should be created for a variety of online and in-person platforms. • Metro should seek to: maximize reach by being multi-use—print, electronic, and social; draw audience attention with highly visual, easy-to-understand content; and tell stories about EV users and their charging experiences, in order to spur others to take similar steps. • See Appendix 8 for visual asset maps (VAMs), which are a great starting point for developing collateral.
Conduct campaign launch	• Metro should plan to use tactics that fall under the following four categories: organization media; interpersonal outreach; news media; and advertisements. • A list of community events for participation is included in Appendix 3). Metro should choose news media for outreach (Appendix 4), and identify budgets for ad placements. The goal is to strategically integrate charging information into planned content and release schedules. It is also important to ensure all stations are listed in commonly-used mobile apps (Appendix 6).
Conduct a	• The cost effectiveness and granular targeting capabilities of online platforms make them key

Tactic	Summary
targeted paid media campaign (See Appendix 5)	drivers of this marketing campaign. Using search engine and paid social media marketing will help increase reach, frequency, and message retention, resulting in the likelihood of more people visiting the website (or taking other desired actions). • Metro should consider paid search via Google and reach users by identifying key search terms. E.g. "Electric car parking near Union Station." Paid campaigns on Facebook and LinkedIn, targeting users by geographic location, job titles, interests, gender, and date of birth is also a good near-term strategy. Because users themselves share information about their interests, education level, and more, targeted campaigns have a higher degree of accuracy.
Promote Metro's EV initiatives at events	• Metro should participate in community events to further inform and educate audiences about its sustainability initiatives. Promotion activities before, during, and after the event can create steady interest in the program. See Appendix 3 for a list of events. Metro can also target its internal audiences at company-wide events. It can piggy back on existing events, or create its own to generate buzz around EV initiatives. • A number of EV-related associations (both formal and informal) are present in the area (see Appendix 7). Metro should foster relationships with these groups by sharing promotional materials. These EV enthusiasts can serve as valuable promoters of the program in the future.
Conduct email marketing	• Metro should develop a series of email campaigns targeted to internal and external audiences. In order to develop and grow the list of recipients, Metro should create an email sign up form on the public-facing EV webpage.

The Results

Assessment of the marketing strategies and tactics outlined in this plan will inform future approaches. Tracking audience exposure to Metro's channels and messages can help establish trends over time, as well as identify how particular products reach specific audiences. Metro should gather metrics for all current outreach-related activities, as this will help establish the baseline and will help in evaluating the success of the marketing plan. For example, understanding traffic to the EV webpage, reviewing EV charging station data, looking at performance of eblasts and newsletters within the company.

Track Program Performance

Metro will track program performance over time across specific metrics, and incorporate these into a robust evaluation. The evaluation will address the following dimensions:

- **Impact Evaluation**: This component will verify performance of the Program; document activity and technology benefits; and quantify progress toward various state and regional policy goals and targets. The impact evaluation will address both the environmental and economic goals of the program. Metro will also include a review of the equity impacts of the program by reviewing the impacts on disadvantaged communities (DACs).
- **Process Evaluation**: Metro will characterize how each project is performing from both program and participant perspectives and identify potential process improvements. This includes issues related to financial performance, targeting, and awardee and market participant satisfaction.
- **Cost Assessment**: Metro will assess the viability of its investment activities in deploying more EV charging infrastructure. This will involve comparing the relative costs and benefits of the program, the cost-effectiveness, and describing any additional costs and benefits that are difficult to capture or quantify but are likely to exist.
- **Market Effect Evaluation**: To the extent feasible, Metro should seek to understand how the program has impacted or changed the EV market. The use case will be defined narrowly (workplace charging or fleet charging), but the market effect evaluation will extend beyond the scope of the project and will determine the extent to which a scaling of the program might yield market transformation. The market effect evaluation will be conducted in the context of the lessons learned from the program. In other words, we will seek to identify how certain outputs and outcomes may inform Metro's ongoing commitment to deploying EV charging infrastructure as part of its broader sustainability goals.

Maintain Flexibility to Market Changes

Through this Plan, Metro has prioritized access to Level 2 EVSE for its employees, its NR fleet, and transit riders. This prioritization aligns with Metro's existing facilities and the potential use cases at these facilities—including workplace and fleet charging. The demand for EV charging, however, will change considerably over the next 5-10 years, and Metro should seek to incorporate flexibility into the implementation of this Plan, to the extent feasible. Some of the potential market changes are discussed here, with suggestions for how Metro's Plan can adapt. This discussion is largely illustrative in nature, and there are other aspects of the EV ecosystem that will change in the near- to long-term future. Regardless of these changes, the objective is to ensure that Metro is a proactive market participant moving forward.

- Mobility hubs are areas where people can make connections between public transit and other options—typically considered as pedestrian access, bicycle access, and vehicle access. With respect to EVs, mobility hubs are often considered a potential centralized location for EV charging. To the extent that this Plan covers dedicated EV charging for people that drive to transit stops, there is overlap with mobility hub planning. However, the issues are more nuanced when one considers the growing role of shared mobility via ride hailing apps and

carsharing companies. In this case, mobility hubs may be ideal locations for DC fast charging equipment. Metro is engaged in mobility hub development across Los Angeles and will consider EV deployment as appropriate.

- Emerging technologies have the potential to change the way vehicles are charged, and improve the value proposition of the EV charging infrastructure network. For instance, the co-location of renewable power generation (e.g., solar PV) has the potential to reduce the carbon intensity of EV charging considerably—which can also yield increased revenues from LCFS credits and improve the program's financial standing. Other technologies, like wireless EV charging, have the potential to reduce installation costs for EV charging infrastructure. Metro's ECSD and its internal partners should seek to stay abreast of these types of emerging opportunities and technologies.
- Consumer demand for EVs is likely to increase over the next several years. There have been dramatic reductions in battery pricing over the last decade or so, in part due to increased supply driven by anticipated demand in the vehicle sector. As EV adoption increases over the next several years, it will be important for Metro to keep an eye on the vehicle architecture and battery size that consumers gravitate towards. Today, the EV market is effectively split between plug-in hybrid EVs and battery EVs—both of which can utilize Level 2 EVSE. However, if the market transitions towards one architecture or another over time for EVs, then Metro should consider the potential corresponding impacts on the demand for EV charging.

This Plan explicitly avoids taking definitive positions on these nuanced issues related to potential market developments, and the corresponding implications for the demand on EV charging infrastructure. Rather, this Plan recognizes that the market will change, and that Metro must be prepared to be responsive to it, to the extent appropriate.

5. The Path Forward for Metro's EV Charging Program

The need for EV charging infrastructure to support transportation electrification is clear. The CEC and the National Renewable Energy Laboratory (NREL) used the EVI-Pro model to estimate that between 26,192 and 36,777 Level 2 charge ports are needed at workplaces and in public places by 2025 in Los Angeles County.[20] Today, there are about 4,350 Level 2 charge ports deployed in the County, about 3,500 of which are publicly accessible.[21]

Metro's commitment to sustainability, and its commitment to implement innovative solutions to first and last mile challenges makes the deployment of EV charging infrastructure a clear strategy to pursue. And given the task at hand, Metro has an important role to play—as the public transportation provider for the region and as one of the County's top 20 employers.[22] Furthermore, EVs and the deployment of EV charging infrastructure are in line with Metro's broader sustainability initiatives, with a stated mission of providing leadership in sustainability within the Los Angeles County region without compromising its core mission of moving people efficiently and effectively.

Despite the natural fit between deploying EV charging infrastructure and Metro's commitment to sustainability, Metro has made only modest strides over the past several years in this area. The progress has been limited in part because Metro has lacked a clear vision, strategy, and implementation plan to deploy EV charging infrastructure. Furthermore, Metro has not dedicated sufficient resources—dollars or staff time—to deploy charging infrastructure at a more rapid rate. The learning curve for Metro with respect to deploying EV charging infrastructure has been steep; however, the lessons learned to date leave the agency poised to assume a more proactive role in in the region as a leader in the transportation electrification space.

This plan codifies Metro's intent on making a significant contribution to the region's network of EV charging infrastructure to support anticipated EV deployment. Metro has established a clear need for this plan, developed a strategic vision for implementing the plan, outlined the guiding principles for implementation, committed to robust program design, and identified innovative program implementation strategies. Metro's vision is appropriately bold: If Metro achieves the goals laid out in this plan, then by 2025 they will have contributed 7-9% of the Level 2 charge ports that the CEC and NREL forecast are needed to support anticipated EV adoption. With sufficient resource allocation and dedicated planning, this plan will help Metro deliver on its commitment to sustainability.

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[20] Bedir, Abdulkadir, Noel Crisostomo, Jennifer Allen, Eric Wood, and Clément Rames. 2018. California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025. California Energy Commission. Publication Number: CEC-600-2018-001. Available online at https://www.nrel.gov/docs/fy18osti/70893.pdf.

[21] Based on analysis of the data from the Alternative Fuels Data Center, retrieved November 2018. Available online at https://afdc.energy.gov/stations.

[22] Based on information from the Los Angeles Almanac, available online at http://www.laalmanac.com/employment/em21e.php.

Appendix A. Infrastructure Siting Analysis

As part of the EV Charging Infrastructure Implementation Plan project, an EV charging infrastructure demand analysis was conducted to assess the areas in the Los Angeles metropolitan region, and Metro's service areas, that are most likely to experience increased demand for EV charging. The following section provides information on how to use and access the web map, along with a description of the methodology and data sources used for the analysis.

Introduction

The purpose of the analysis is to employ a flexible methodology that can be updated and used to understand where EV drivers will likely live, work, and visit within Los Angeles. It is best to consider the results of the analysis as a useful guide to coordinate and prioritize investments in charging infrastructure at a high level for engaged stakeholders.

The demand analysis is an analytical exercise that looks at key EV ownership indicators and regional travel patterns to identify areas where there will likely be demand for charging infrastructure in the near to mid-term (approximately 5-15 years). The results can be used to identify areas where the deployment of chargers is predicted to be most cost effective, as chargers located in an area where EV drivers are most likely to travel will be utilized more. Research by Idaho National Laboratory, for instance, demonstrated that charging equipment deployed in areas that fell within a planning process experienced nearly 90% greater utilization (as measured by charging events per week) compared to charging equipment deployed in unplanned locations.[23] It is important to note that the results of the demand analysis are useful in planning for infrastructure, but they should not be the only determining factor when deciding on the location and quantity of charging stations to install.

Accessing and Interpreting the Map

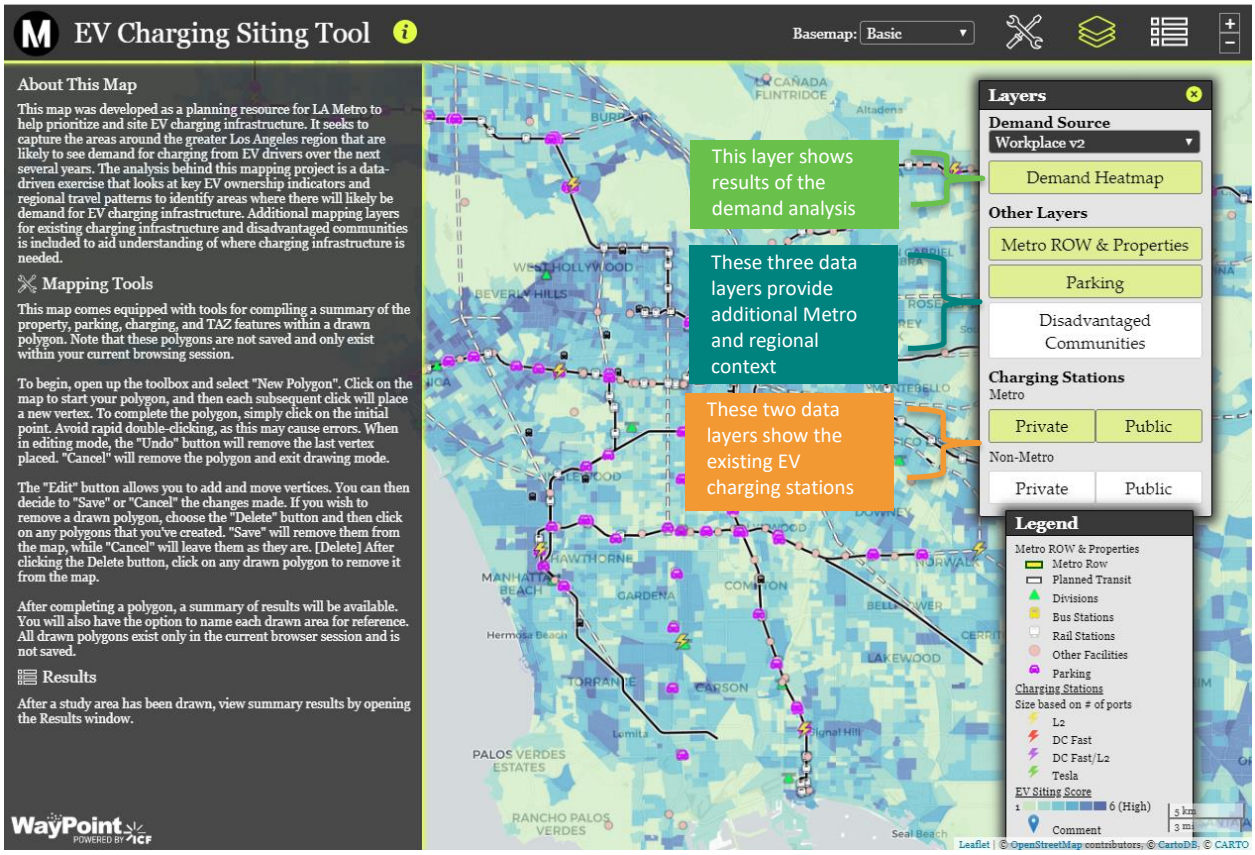
The charging infrastructure demand analysis results were mapped online for Metro to access via the hyperlink below.

- Link: https://ecosystems.azurewebsites.net/LA_Metro/ev_charging/default.aspx
- User Name: ICF_User
- Password: WayPoint1234
- *Note that the map works best in Chrome and not all features are available when viewing in Internet Explorer.*

[23] Idaho National Laboratory. April 2015. How Does Utilization of Non-Residential EVSE Compare Between those Installed in Oregon in Planned versus Unplanned Locations? Available online: http://avt.inl.gov/pdf/EVProj/UtilizationOfNonResEVSEInstallationVsPlan.pdf

Below is a screenshot of the map. To change which set of data is presented, click on the demand source dropdown in the top right corner and select the data you would like to view via the toggle button.

- The **first data layer** shows the results of the charging demand analysis. A description of what these three drop down options represent is provided below, after the map figure.
- The **next three data layers** provide additional regional context and show Metro right of ways and properties, park and ride lots, and disadvantaged communities. A description of what these four data layers represent is provided below, after the map figure.
- The **last two data layers** are the locations of existing charging stations, both for Metro owned stations and all other, non-Metro stations. Turning on the "Public" layers will show all charging stations that are generally open to the public for use. Turning on the "Private" layers will show the stations that are not open to the general public for use (e.g., workplace or fleet chargers). The location of charging stations that include direct current (DC) fast chargers are indicated by red symbols on the map, Level 2 (L2) chargers are indicated by yellow symbols, locations with both DC fast chargers and L2 chargers are indicated by purple symbols, and Tesla stations are indicated by green symbols. This information is also included on the map, within the legend in the bottom right hand corner. Charging stations are classified as being Metro owned or non-Metro owned.



The three drop down options showing the charging demand analysis results include:

- **Residential** – highlights areas in Los Angeles that will likely experience high demand for residential charging. Because residential charging takes place at home, these are locations in areas where likely EV adopters live.
- **Workplace**– highlights areas that will likely experience high demand for workplace charging—areas where likely EV owners work or where vehicles are parked for several hours during the day for work related trips, including transit riders who park at Metro lots.
- **Opportunity**– highlights areas that will likely experience high demand for public access charging—areas where likely EV owners shop, dine, and visit.

The three additional data layers include:

- **Metro Right of Ways, Planned Transit, and Properties:** Metro Right of Ways are show on the map, highlighted as black lines. Metro properties are distinguished by rail stations, bus stations, divisions, and other facilities. These are indicated on the legend. Metro Right of Ways and property data was obtained from Metro's GIS department.
- **Parking:** Shows the location of Metro's park and ride lots.
- **Disadvantaged Communities:** Disadvantaged communities are included on the map, as defined by Cal EnviroScreen 3.0. Areas that are in the 50-75th percentile are shown in green and areas that are in the 76-100th percentile are shown in red.

The map also includes charging stations located in the Los Angeles region. Stations are classified as private or public and separated into metro-owned stations and non-metro owned stations. Non-Metro charging station information was collected from the U.S. Department of Energy's Alternative Fuels Data Center Station Locator in August 2018.

The mapped results of the analysis broken out by Traffic Analysis Zones (TAZs). The demand analysis ranks each TAZ on a scale from 1 to 6, with 1 being the lowest likely demand and 6 being the highest likely demand. It is important to note that charging stations will need to be deployed in areas with low demand to provide adequate coverage, but this analysis highlights the areas where charging stations are most likely to be in demand and utilized.

Methodology and Data Sources

Residential

The analysis first identified where EVs owners are most likely to live, which required identifying the most likely EV adopters. Based on published survey research, key indicators for EV ownership were identified. The team then used these key indicators to develop a scoring methodology that estimates the likelihood of EV adoption in a given TAZ. The following parameters were selected for further consideration, with corresponding weighting factors highlighted below:

- **Income:** Research suggests that households with higher incomes are more likely to purchase an EV. Because EVs tend to have higher upfront costs, income can also be a limiting factor. In other words, individuals with low income might not be able to afford an EV.
- **Hybrid Electric Vehicle (HEV) Ownership:** In addition to correlating with income, HEV ownership correlates well with influencing factors such as environmental stewardship and price sensitivity to gasoline, both of which have proven to play a significant role in the level of interest in EVs.

- **Home Ownership:** Households who own their property are more likely to adopt an EV than those who rent. Home ownership reduces both financial and non-financial barriers to charging infrastructure deployment. The influence of home ownership will likely change considerably over time; however, in the near future, it will be a significant driver. There is already some correlation between home ownership and income, so the weighting for this parameter is designed to distinguish between census block groups that are already likely to include EV adopters based on the income profile. Only TAZs that had both an income greater than median income for the region and home ownership greater than the median level of home ownership for the region were considered.
- **Dwelling Type:** Dwelling type (e.g., single-family detached, single-family attached, or multi-unit) is an important parameter because drivers are expected to charge their vehicles at home. It was assumed that consumers with a single-family detached home generally have fewer barriers to EV adoption. Only TAZs that were above the median income and above the median percentage of single-family residences were considered for the residential analysis.

Statistics about the EV ownership indicators were obtained from census data from the American Community Survey (ACS), an ongoing statistical survey that samples a percentage of the population every year. For the purposes of this exercise, it was determined that the most complete datasets for census block groups were the 5-year estimates; using data for years 2011-2016. Demographic data on income, home ownership, and dwelling type by census block group were extracted in Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties. Vehicle registration data from IHS Markit from January 2018 was analyzed to establish hybrid vehicle ownership rates by census block group. The team then mapped census block groups to their corresponding TAZs to generate EV indicator data at the TAZ level.

Workplace Charging

Workplace charging is, as the language suggests, charging infrastructure provided by an employer for employee use while at work. To identify likely areas for workplace charging, data from the SCAG Regional Travel Demand Model (RTDM) was used to identify the origin-destination pairs for home-based work trips made between various TAZs.

Similar to the residential charging analysis, ACS demographics on income, home ownership and dwelling type, as well a hybrid ownership rates, were used to weight the trips on EV likelihood.

Public Charging

Public charging covers a wide range of situations where an EV driver could potentially charge when away from home or work. Unlike residential and workplace charging, where vehicles are parked for long enough that they achieve a significant charge even with Level 1 charging, public access charging will take place at locations where drivers are parked for varying times; therefore, the level of charging bears much greater consideration when siting public charging. Table 9 shows the preferred charging method based on the available charging time at different venues.

Table 9. Recommended Charging Level for Different Venues

Typical Venue	Available Charging Time	Charging Level (Primary/Secondary)
Shopping Centers	0.5–2 hours	Level 2/DC Fast
Other	< 1 hour	Level 2/DC Fast
Street/Meters	1–2 hours	Level 1/Level 2
Parking Garages	2–10 hours	Level 2/Level 1
Hotels/Recreation Sites	8–72 hours	Level 2/Level 1

To identify likely areas for public charging, data from the Southern California Association of Governments (SCAG) was used to identify the origin-destination pairs for non-work related trips, such as home to shopping and home to social or recreational activity.

Using the areas that have the most likely EV adopters, trips were weighted based on the likelihood that it would be completed with an EV.

Results: Site Prioritization for Charging Infrastructure

Coupling the results of the charging demand analysis with the location data of Metro's rail stations in the web mapping tool enables Metro to prioritize sites – namely, park and ride lots – for potential charging station deployments. Since the target audience is transit users who park and ride the Metro to work, sites were prioritized based on the workplace demand scoring. Note that in SCAG's travel demand model, which is a large driver of the siting results, the destination of trips for the purpose of work includes both places of employment as well as transit stations. For example, a trip that starts at home and ends at an office would be considered a work trip, as well as a trip that starts at home and ends at the transit station where the driver then changes modes to train to finish their commute to work.

Table 10 presents a list of all park and ride lots, the number of existing charging stations, number of park and ride spaces, and two charging demand scores. Since the charging demand analysis scores each TAZ, we included both the score of the TAZ where the station is located, as well as the average score of the TAZs within a quarter mile of the station location. The average score is to account for cases where you may have a station lying within a TAZ that is getting a medium score, but is surrounded by areas where the score is much higher. The station with the highest likely EV demand is Del Mar, with 610 park and ride spaces and no charging stations installed to date. While the Douglas station scores highly, there are only 30 parking spots onsite. Canoga and Union station score highly as well, but may be prioritized slightly less due to the fact that Metro has already installed charging stations at those lots. Culver City, Westlake/MacArthur Park, Exposition/Bundy, Van Nuys, and the Sherman Way stations also stands out as a good candidate locations, with ample parking and high likely demand for EV charging.

Table 10. Prioritized List of Rail Stations for EV Charger Deployment

Station Name	Number of Existing Metro Charge Ports	Number of Park and Ride Spaces	Average Workplace Charging Demand Ranking of TAZs within 0.25 miles of station	Workplace Charging Demand Ranking of TAZ where station is located
Del Mar Station		610	5.3	6.0
Douglas Station		30	5.3	6.0
Canoga Station	3	498	5.2	5.0
Union Station	31	1,860	5.0	5.0
17th Street/Santa Monica College Station		65	4.9	5.0
Lake Station		22	4.9	5.0
Culver City Station		818	4.9	5.0
Exposition/Sepulveda Station	6	520	4.8	5.0
Westlake/MacArthur Park Station		118	4.8	5.0
Chatsworth Station	3	609	4.8	4.0
Exposition/Bundy Station		434	4.5	5.0
Van Nuys Station		726	4.4	5.0
Sherman Way Station		207	4.4	5.0
El Segundo Station	4	93	4.3	5.0
Fillmore Station		155	4.2	5.0
Universal City Station	4	828	4.2	3.0
La Cienega/Jefferson Station	4	494	4.0	3.0
North Hollywood Station		1,077	4.0	4.0
Willow Station	4	853	4.0	6.0
Florence/La Brea Station		100	3.8	3.0
Sepulveda Station		1,205	3.8	5.0
Aviation Station		390	3.8	4.0
Sierra Madre Villa Station	4	965	3.7	4.0
Carson Station		143	3.6	3.0
Duarte Station	3	125	3.6	4.0
Arcadia Station	3	300	3.5	5.0
Cernshaw/Expo Station		516	3.5	4.0
Expo/Crenshaw Station		325	3.5	4.0
Monrovia Station	3	350	3.5	4.0
Lincoln/Cypress Station		94	3.4	3.0
Reseda Station		522	3.3	3.0
Atlantic Station	6	284	3.2	3.0
Artesia Station		298	3.0	3.0
Azusa Station	3	437	3.0	4.0
Del Amo Station		399	3.0	4.0
Manchester Station		239	3.0	3.0

Station Name	Number of Existing Metro Charge Ports	Number of Park and Ride Spaces	Average Workplace Charging Demand Ranking of TAZs within 0.25 miles of station	Workplace Charging Demand Ranking of TAZ where station is located
S. Pasadena (Mission) Station		142	3.0	2.0
Slauson Station		150	2.8	3.0
Hawthorne Station		362	2.7	2.0
Indiana Station		42	2.6	3.0
Wardlow Station		89	2.6	1.0
103rd Station		69	2.6	3.0
Florence Station		115	2.5	2.0
Irwindale Station	3	350	2.5	1.0
Rosecrans Station		338	2.5	4.0
Willowbrook Station		234	2.3	2.0
Heritage Square Station		129	2.3	3.0
Florence/West Station		120	2.2	2.0
Long Beach Station		646	2.2	1.0
Norwalk Station	6	1,720	2.2	1.0
Pierce College Station		392	2.2	1.0
Balboa Station		273	2.0	1.0
Lakewood Station		299	2.0	2.0
Vermont Station		155	2.0	2.0
Harbor Station		252	1.9	2.0
Harbor Transit Station		980	1.9	2.0
Avalon Station		160	1.8	1.0

Appendix B. Marketing and Outreach Plan

Table of Contents

Setting the Stage

In California, the transportation sector is among the largest contributors to greenhouse gas (GHG) emissions, responsible for 39 percent of GHG emissions in 2015.[24] The Metro transit system—which provided 1.25 million weekday bus and train rides in 2017[25]—is vital to the mobility, accessibility, economic prosperity, and quality of life for LA area residents and businesses. As Metro moves toward a sustainable future, electric vehicles (EVs) with their environmental, fuel, and cost-saving benefits, will offer a viable alternative to conventional automobiles and play a key role in enhancing mobility for its customers and its employees.

California already leads the consumer EV market in the US, thanks to substantial charging infrastructure investments and key legislation that has contributed to growing EV adoption and penetration in the state. Through May 2017, nearly 300,000 EVs have been sold in California, accounting for around half the number of such vehicles in the country.[26] A necessary evolution to supporting EV adoption is California's growing network of EV charging infrastructure, which represents 31 percent of U.S. public vehicle charging infrastructure.[27]

Los Angeles stands out as a leader in the U.S. EV market. EVs make up 1 percent of the national light-duty vehicle market; however, sales reached 5 percent in Los Angeles, putting it in the top three U.S. EV markets (others being San Jose and San Francisco) when looking at sales share and annual sales volume. In 2017, the City of Los Angeles had nearly 12,000 new EV sales—a 17 percent increase from 2016.[28]

The primary state legislation driving this market growth and increased adoption is the Zero Emissions Vehicle (ZEV) Program, which mandates that 15 percent of light duty vehicles sold in California be ZEVs by 2025. In addition to progressive legislation, Governor Jerry Brown recently established a new, more ambitious Executive Order that set an aggressive goal of 5 million ZEVs on the road by 2030. The current

[24] https://www.arb.ca.gov/cc/inventory/data/data.htm

[25] http://isotp.metro.net/MetroRidership/Index.aspx

[26] http://www.energy.ca.gov/renewables/tracking_progress/documents/electric_vehicle.pdf

[27] https://www.theicct.org/sites/default/files/publications/CA-cities-EV-update_ICCT_Briefing_30052017_vF.pdf

[28] https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf

legislative and incentive landscape presents a timely marketing opportunity for Metro, its customers and its employees.

Metro is already taking some steps to promote EV adoption and use of charging infrastructure:

- There is a public-facing webpage dedicated to EV charging. It includes information on station locations, pricing, how to sign up for an EV Connect account, benefits of EVs, and frequently asked questions.
- Metro drivers are trained before they can reserve an EV for transport between facilities. The training process includes presenting information on vehicle and charger technology, use, safety considerations, parking, and how and when to charge.
- Metro develops, designs, and distributes information on EVs via signage, facts sheets, and web design.
- Metro is conducting an EV needs assessment and a charting infrastructure siting analysis, with the ultimate goal of providing improved access to charging infrastructure to reduce regional greenhouse gas emissions and air pollutants..

Metro is planning to increase Level 2 charging stations at its owned parking facilities (for the public and for its employees) and for its light duty non-revenue fleet. This is a complex effort that requires effective marketing strategies to overcome the barriers that govern the behavior of the target audience. There are several underlying challenges that can lead to a resistance to EV adoption:

- Lack of familiarity with EVs
- Misperceptions around EVs and their capabilities
- Reluctance to disrupt a known way of traveling
- Uncertainty around the charging process and associated costs

In addition, in 2017, Metro conducted a survey of its employees, to get an understanding of their commute distances and modes of travel. This survey revealed:

- 33 of Metro employees are EV commuters
- Most employees drive alone, followed by those using commuter rail and carpools

Metro needs an effective marketing strategy that will use engaging messaging and imagery that the target audiences can relate to, that will raise the public and employees' awareness of the availability of EV charging infrastructure, and promote the benefits of EVs. The marketing plan that follows will include four steps:

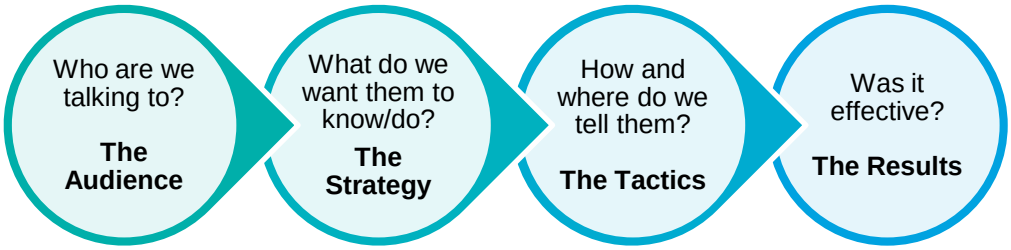
- **Informing** outreach through research to identify past successes and lessons learned, reviewing the market environment, and then creating a plan to achieve program objectives.
- **Building** the outreach components using messages, visual concepts, and innovative platforms to share information in meaningful ways.
- **Engaging** audiences using thoughtful execution and ongoing feedback.

- **Evolving** Metro's approach through identifying new insights to refine tactics and approaches to deliver against defined measures of success.

The Goal

The goal of the marketing plan is to improve awareness of accessible EV charging infrastructure at Metro facilities. In doing so, it will also help draw attention to Metro's broader sustainability initiatives.

The plan follows the process below to ensure it is audience-centric, fully-integrated, and in line with Metro's goals and objectives.



Who Owns EVs?

Hybrid and electric-vehicle sales account for less than 3 percent of the U.S. market,[29] making EV buyers a niche group. Early EV adopters are mostly male and wealthy: 93.5 percent of owners are male and 58 percent have an annual household income of more than $100,000.[30] Further, more than 88 percent of owners indicated their income was above $50,000 per year.

EV owners also span across a variety of age ranges, from Millennials and Generation Xers to Baby Boomers; however, 88 percent of owners are over 30 years old.[31] Research shows that compared to the average owner of a regular Ford Focus (who is on average 46 years old and has a household income of $77,000 per year), the average owner of a Ford Focus Electric is younger and wealthier: 43 years old with an average income of $199,000.[32]

Geographically, the majority of EV owners live on the West Coast, in California, Oregon, and Washington, followed by Mid-Atlantic States such as Maryland, Delaware, Pennsylvania, and Virginia. More than 70 percent of EV owners have a bachelor's degree or higher,[3] and 37.5 percent of EV drivers have home solar panels.[2] Owners reportedly chose to purchase an EV for environmental reasons,

[29] https://www.detroitnews.com/story/business/columnists/daniel-howes/2017/07/06/howes-government-drives-electrifying-autos-market/103488542/
[30] https://cleantechnica.com/2016/01/25/who-you-are-ev-enthusiast-profile/
[31] https://www.carmax.com/articles/hybrid-electric-2017-survey-results
[32] https://www.dmv.com/blog/electric-car-buyers-younger-and-richer-than-those-who-buy-hybrids-or-conventional-cars-521541

financial savings, because they love new tech, the driving benefits of electric cars, and convenience.[4] Additionally, EV drivers prefer to charge their cars at home or work. More than half of EV owners prefer to charge their cars at home exclusively, and the owners who charge their cars away from home prefer to use less than three charging locations, one of the locations being at work.[33] In fact, on work days, 98 percent of EV charging is done at home or at the workplace.

In short, according to published survey research, an EV owner is more likely to be:

- Male
- Higher income
- Living on the West coast
- Educated
- Environmentally conscious
- Charging their EV at home or at work

The Audience

Step 1: Who Are We Talking To?

Audience segmentation is an essential first step to understanding target groups' distinct needs, motivations, and behaviors. Messages can then be tailored to each segment to facilitate better engagement. Finally, creative concepts can be developed that integrate their lifestyle and media preferences.

Three distinct audience groups are served by this outreach plan:

External audience: Transit riders

- Rail and bus park-and-ride commuters

Internal audience: Metro employees

- Office-bound employees
    - Individuals
    - Vehicle pools
- Employees who use non-revenue fleet vehicles to travel either between Metro worksites/facilities

Audience 1: Transit Riders

What does a typical Metro transit rider look like? Recent surveys of transit riders, recorded in Metro's Supporting Transit Parking Program Master Plan and its associated appendices, share relevant information. The transit rider outreach was focused on understanding user needs and priorities as they related to Metro parking facilities and other travel modes for accessing transit stations. Two rounds of surveys open to all transit riders were conducted, with an emphasis on those who drive and park.

[33] https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf

Findings relevant to this marketing plan are listed below.

Age

Transit is used by people of a wide range of ages.

Those aged 50-64 comprised the largest group of riders (27%), followed closely by those aged 35-49 (26%), and the 25-34 bracket (22%).

→ Takeaway: The age ranges indicate that the marketing team will need to use both traditional and digital/social channels to get the message out.

Ethnicity

LA County is diverse, which is reflected by the ridership demographics of those surveyed:

- 44% White
- 21% Latino
- 17% Asian/Pacific Islander
- 10% Black
- 1% American Indian
- 7% Other

→ Takeaway: The marketing team should create culturally-aware materials and messaging, and develop collateral in multiple languages.

Gender

More men (53%) than women (47%) responded to the survey.

→ Takeaway: Include messaging towards both men and women during outreach.

Distance between home and preferred station

Most survey respondents (40%)—who drive and park at a station lot or garage—noted they live within 2-5 miles from their preferred station, followed by 1-2 miles (22%), and 5-10 miles (19%).

→ Takeaway: The range of EVs is greater than the daily drive of most commuters who use park and ride. Messaging should focus on providing a more sustainable (and convenient) first- and last-mile connection. It should also target those who live in multi-unit dwellings which have limited or no residential chargers available—in such cases, messaging can center on how Metro facilities act like workplace chargers. (It is more likely that single family units will have access to residential charging facilities).

Behaviors

When it comes to transportation choices, around half of those arriving at a Metro station choose to drive and park at the station lot (50.4%). They are followed by those who take the bus (18.6%), those who walk (17.8%), and those who drive and park outside the station lot (6.2%).

Among those who park, most use the Metro station parking facility 4-5 times a week. Most arrive between 7-8 a.m. and a majority park for 4-10 hours.

→ Takeaway: A significant potential audience exists to conduct messaging around EV charging.

Asked in a multiple-choice question about why they choose to park and ride transit, respondents said it saves them money (50%), it's convenient (49%), it's good for the environment (47%), there's a high cost of parking at the destination (42%), it saves time (36%), there's no parking at the destination (15%), and other reasons (9%).

→ Takeaway: Audience priorities align well with advantages from charging their EVs at Metro facilities. The messaging in the marketing plan should highlight these benefits.

Message Strategy: Transit Riders

Step 2: What do we want them to know/do?

There is already some awareness around the availability of EV charging at Metro because those parking spots are currently being used (Appendix 1). With this plan, we want to ensure consistent, high utilization of all available chargers. We also want broader public awareness around the availability of charging stations, so more people are incentivized to use this option now and in the future.

From a transit rider's perspective, it's important they have all the necessary information at their fingertips (e.g. the number of available spots at each station, location within the parking lot, how long they can park, and cost to charge), that their questions are fully and promptly addressed, and that they feel very comfortable using the actual charger and paying for it. Due to the limited number of EV parking spots available currently, transit riders may also want to know when spots become available (e.g. real-time updates on an app).

The Metro EV website is a central resource for the public, and a great tool to continue disseminating information. The heuristic evaluation (Appendix 2) provides ideas to enhance the user experience. It is important to periodically update the website because the call-to-action will drive the audience to this resource hub. The website must be supported by a range of tactics that target the audience where they live and work.

Metro also uses a blog The Source: Transportation News & Views to share information with the public.

The table below provides the messaging strategy for this segment.

Exhibit 1. Message Strategy – Transit Riders

What do transit riders believe? (Barriers)	What should they know? (Strategy)	What should they do next? (Next Steps)	How will we tell them? (Sample Tactics)
• I am unaware of any facilities to charge my EV at Metro • I'll never find a spot available—there are only a few EV parking spots at my station • This process is too complicated: I have a different charger I am used to OR the payment process looks difficult • I live fairly close to the station. This facility is not particularly helpful as I don't run out of charge • Charging at Metro will cost me about as much as it would to charge at home OR it's more expensive • I will never own an EV so this doesn't apply to me	• Public charging is located at 10 park-and-ride lots • Information about peak usage times and availability of parking spots is available at your fingertips • Metro plans to expand its EV charging program • We have resources available to help you become familiar • Have you thought about times when you may suddenly find yourself out of charge? This is a convenient option available on your commute • Do you reside in an apartment with limited or no charging facilities? Do you carpool? With a fixed rate of $3 for the entire day, Metro offers a cost-effective and convenient charging option • Here are some fun facts about EVs: Driving an EV is eco-friendly, they have quick acceleration and great handling, they meet federal safety standards, and incentives or rebates for purchase may be available • An EV may not be on the cards now, but you consider it in the future. Your community already is: LA residents purchased more than 38,000 new EVs in 2017, constituting more than one-fifth of the entire U.S. EV market[34]	• Visit the program website	• Social media • How-to videos • Media outreach • Targeted native online search ads • Testimonials featuring EV owners using the charging facilities (print and video) • 'Get started' downloadable/interactive toolkit • Community events (pop-ups, booths) • Posters in stations

[34] https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf

Audience 2: Metro Employees

Americans charge their cars mostly at home and ***at work***.[35] Access to workplace charging brings several benefits. It makes EVs viable for employees without access to home charging. "Range anxiety" is alleviated, as drivers are less likely to worry they will run out of charge. Charging at work can also extend the range of an EV, allowing the employee to make a sudden trip or handle unexpected changes in their daily schedules.

For employers, offering EV charging enhances their reputation as a sustainable organization committed to improved air quality for their employees, customers, and communities. It also provides another avenue to further their own sustainability commitments. It can help recruit and retain employees, and improve employee satisfaction.

Metro's ~10,000 employees are a critical audience for this marketing plan. An important sustainability initiative at the organization is reducing the environmental footprint of non-revenue fleet and employee vehicles. Two major segments exist: Employees who commute to and from work alone or in vehicle pools, and employees who use non-revenue fleet EVs to travel between Metro worksites/facilities. Given the diversity of roles at Metro (table below), messaging should be informed by the nature of employees' work. E.g. Staff at headquarters may be at their desks using a computer for most of the day. They could be targeted via the company intranet or an eblast. Others in the field could be targeted via a mobile app or materials in break rooms.

Metro Personnel[36]

Operations	
Operators: Full and part-time Metro Bus/Rail Operators	4,397
Mechanics and Maintenance	2,370
Clerks	849
Bus and Rail Transportation and Maintenance Supervisors	748
Security Guards	90
Metro Full-Time Staff	
Represented Employees	8,454
Non-represented Employees	1,363

[35] https://avt.inl.gov/sites/default/files/pdf/arra/PluggedInSummaryReport.pdf

[36] https://www.metro.net/news/facts-glance/

All employee chargers are currently located at Union Station. They are open to the public as well. In the next year, Metro has plans to install four employee-only chargers at four of its rail divisions.

Metro currently uses a variety of outreach channels to engage employees, all of which are a good fit to promote EV-related information.

These include:

- Company intranet
    - Gap: The Environmental Compliance and Sustainability Division does not have a dedicated page currently
- Periodic eblasts focused on trainings, employment opportunities, facility updates, and events
- Adobe Connect webinars
- Posters in elevators and lobbies
- Ads/videos on in-house lobby TV screens
- Newsletters
- Mailers

Office-Bound Employees

A 2017 Metro employee commute survey showed that 33 employees currently drive ZEVs (the number of employees driving plug-in hybrid EVs is unknown). From the table below, it is clear that although the current EV adoption rate is small, there is potential for future growth. Messaging should target those who drive alone and those who carpool to and from work as they form 80 percent of the total workforce.

Commute Mode	Number of Employees	Average Commute Distance (Miles)
Drive alone	7,568	16.73
Bicycle	86	7.63
Carpool	521	26.84
Commuter Rail	987	24.26
Motorcycle	102	20.02
Public Bus	441	17.63
Vanpool	351	43.75
Walk	34	5.71

Employee demographics should be taken into account during strategic targeting. A good starting point could be “Section III: Who Owns EVs?”

Employees Using Non-revenue Fleet Vehicles

Currently, Metro has around 800 standard and hybrid light-duty sedans and SUVs that serve as non-revenue fleet vehicles. Ten Chevy Bolt ZEVs have been purchased, with plans to add 20 more.

Non-revenue fleet vehicles are used as pooled vehicles that are assigned to divisions, and can be reserved as needed. They serve as driver relief vehicles and are sometimes assigned directly to managers.

There are currently 168 driver relief vehicles in Metro's non-revenue fleet used by bus operators, all of which are Toyota Camrys. EVs would be a good fit for driver relief, as distances tend to be predictable and short.

This becomes a public relations opportunity for Metro to promote its corporate sustainability story. When Metro encourages the public to use EV chargers, it can demonstrate that it also walks the walk. Outreach materials can show a before-and-after comparison, showing how cost savings and reduced environmental footprint resulted from replacing conventional cars with EVs in the non-revenue fleet.

Message Strategy: Metro Employees

Step 2: What do we want them to know/do?

To effectively target Metro employees, the first step is to raise awareness. Initial phases of outreach may focus more on Metro sharing out information, but as the campaigns get underway, it is important to facilitate two-way communication for continuous improvement.

Employees need:

- To be familiar with EVs, understand their benefits, and have misconceptions addressed
- Information around Metro's EV-related initiatives, shared with them consistently on company outreach channels that they view or use the most
- To know the various pathways available for them to participate, and accompanying information such as company rules and costs
- A space to ask questions and get clarifications promptly, to interact with other current and potential EV drivers, and to give feedback

The table below explores messaging strategy to reach employees:

Exhibit 2. Message Strategy – Metro Employees

What do employees believe? (Barriers)	What should they know? (Strategy)	What should they do next? (Next Steps)	How will we tell them? (Sample Tactics)
• I am not fully aware of my company's efforts in the EV space • I own an EV, but I don't know of any company benefits around this • I'll never own an EV, so this information is not useful to me • I've never driven an EV. I am anxious about using one at work. What happens if something goes wrong? • It's great that we have charging spots at Union Station, but how will I know if one is available when I need it?	• EVs are here to stay • Information on getting started is available in one location • EVs are not difficult to drive; they are similar to a regular vehicle • By using EVs you are contributing to making Metro a sustainable organization	• Visit the ECSD page on the company intranet	• Resources on intranet page (how-to guides, FAQs, videos, forums) • Newsletters • Eblast • Breakroom posters • External signage at workplace facilities

The Tactics

Step 3: How and where do we tell them?

Campaign tactics are specific actions taken to carry out the strategy and achieve goals. The tactics will help to carry the message forward to target audience groups.

Enhance program website

If an employee or a member of the public is looking for information on EV charging at Metro, the program website is likely to be their first point of contact. This could either be a branded, community-facing webpage (currently https://www.metro.net/projects/ev/) or a SharePoint or intranet page.

The goal with both websites is to:

- Create a centralized resource hub
- Proactively provide content that address top-of-mind questions
- Provide "how-to" guidance to demonstrate ease of use; when possible, using interactive techniques (videos, animations)
- Share case studies, success stories, or testimonials that build confidence by showing that others are already using the facilities

All collateral and outbound messages must carry the website hyperlink. The websites have to be optimized for mobile and tablet screens, so readers can access information at any time, on any device (the public-facing page already does this).

Near-term actions:

- The heuristic evaluation (Appendix 2) suggests steps that can be taken to enhance the public-facing website. Suggestions include adding interactive content and tightening copy.
- Create an EV-specific page on the intranet

Evolve: Over the long-term, consider creating an "EV Champion" page on the intranet (perhaps behind a login), that provides talking points, sample content, collateral, templates, and branding elements. The goal is to help key staff members remain on message as they promote the initiative on Metro's behalf to internal and external audiences. These EV champions are knowledgeable about the initiative and have up-to-date information. They are critical, trusted, sources for staff and the public. Over time, goals should be set to grow this group.

Beyond sharing out information, Metro must consider creating an online space where employees can engage with each other and with the organization. Potential uses of this space include surveying the members, providing a way for them to find other members for EV-carpools, message testing/collateral testing, and more. The goal is to ensure employees understand they are a part of Metro's sustainability initiatives, but are instrumental in driving them forward.

Develop a suite of marketing collateral.

Compelling collateral pieces amplify message reach. Collateral must focus on information gaps and audience needs, and must be created for a variety of online and in-person platforms.

Strategy for these pieces includes:

- **Maximizing reach** by being multi-use—print, electronic, social.
- **Drawing audience attention** with highly visual, easy-to-understand content.
- **Telling stories** about EV users and their charging experiences, in order to spur others to take similar steps

See Appendix 8 for visual asset maps (VAMs), which are a great starting point for developing collateral.

Near-term actions:

Metro should build out its collateral toolbox by creating the following materials:

A marketing suite should include:

	Purpose
How-to Videos	Demystify the EV charging process with short videos on the website and social media.
Fact sheet	Targeted informational resource that uses data to address common concerns and misperceptions.
Infographic	Highly visual, data-driven piece suitable for sharing on social media.
Ads	Capture attention as audiences actively search for terms related to EV charging.
Leave-behind	Reinforce messages and provide next steps.
Poster	Visually arresting piece with key messages highlighted.
Campaign image library	Approved, high-resolution images for use across the marketing suite. It helps create a consistent look-and-feel. This should align with recommendations in the VAMs.
Social media plan	Messages that raise awareness, share resources, and contain strong calls-to-action. Strategy on sharing highly engaging content (images, infographics, short videos, animations).

Evolve: Over the long-term, to allocate resources to the most relevant materials, Metro should use performance data to understand which pieces are facilitating audience engagement and action (see The Results section). An annual design and content review and refresh will keep materials current. Metro should also scan the environment to see if new mediums can be leveraged to disseminate messages. Materials must be distribute to locations where EV users go—dealerships selling used and new EVs, repair shops etc.

Conduct a campaign launch

Before campaign launch, Metro should plan to use tactics that fall under the following four categories:

- Organizational media: Use Metro's internal communication platforms to get messages out to employees.
- Interpersonal outreach: Interact face-to-face interaction with target audiences (see Appendix 4 for list of upcoming community events).

- News media: Reach large audiences via newspapers, magazines, radio, television, and other channels.
- Advertisements: Use paid ads on social media, print, radio, and other channels to reach target audiences.

Near-term actions:

Identify list of community events for participation (see Appendix 4), choose news media for outreach (see Appendix 5), and identify budgets for ad placements. Take inventory of organizational media channels, and review their editorial calendars. The goal is to strategically integrate charging information into planned content and release schedules. Ensure all stations are listed in commonly-used mobile apps (Appendix 6).

Evolve:

Create a media advisor position for an EV champion and provide information on the website. Articles, op-eds, and periodic press releases are other ways to keep the campaign messages fresh.

Conduct a targeted paid media campaign

The cost effectiveness and granular targeting capabilities of online platforms make them key drivers of this campaign. Using the options listed below will help increase reach, frequency, and message retention, resulting in the likelihood of more people visiting the website (or taking other desired actions).

Search Engine Marketing: Reaches key audiences at a time when they are requesting information via a search query, using relevant keywords. It also results in high-quality web visits because the user is actively looking for information. They tend to have longer web sessions, view more pages per session, and convert at higher rates. Undertaking search engine optimization also pushes Metro to the top of search results.

Near-term actions:

Consider paid search via Google and reach users by identifying key search terms. E.g. “Electric car parking near Union Station.”

Evolve:

In the long-term, consider expanding to Yahoo and Bing.

Paid Social:

Near-term actions:

Consider near-term paid campaigns on Facebook and LinkedIn, targeting users by geographic location, job titles, interests, gender, and date of birth. Because users themselves share information about their interests, education level, and more, targeted campaigns have a higher degree of accuracy.

Evolve:

Over the long-term, scan the social media environment to identify and leverage emerging platforms.

Use social media to drive awareness

See Appendix 5.

Promote Metro's EV initiatives at events

Metro should participate in community events to further inform and educate audiences about its sustainability initiatives. Promotion activities before, during, and after the event can create steady interest in the program. See Appendix 3 for a list of events.

Metro can also target its internal audiences at company-wide events. It can piggy back on existing events, or create its own to generate buzz around EV initiatives.

A number of EV-related associations (both formal and informal) are present in the area (see Appendix 7). Metro must foster relationships with these groups by sharing promotional materials. These EV enthusiasts can serve as valuable promoters of the program in the future.

Near-term actions:

Based on staff and budget, identify annual events that Metro should participate in. For immediate participation, create quick handouts and print available fact sheets for distribution. Check with partner organizations for promotion opportunities.

Evolve:

Create a marketing process for events. This process could include steps such as:

- Set specific goals for each event
- Modify program collateral to align with specific events
- Provide talking points and train staff who will attend on Metro's behalf
- Promote before, during, and after events, particularly on social media
- Gather business cards or sign people up to an email distribution list
- Send out post-event communications
- Identify people who can be featured in success stories/case studies
- Evaluate success

Conduct email marketing

Develop a series of email campaigns targeted to internal and external audiences. In order to develop and grow the list of recipients, create an email sign up form on the public-facing EV webpage.

The following categories are helpful during campaign planning:

- General informational eblast to raise awareness
- Targeted eblast with messages specific to audience segment
- Seasonal or theme-based eblasts
- Deadline or countdown-based eblasts
- Retargeting eblasts to connect with those who may have shown interest but not taken action

Near-term actions:

Add a newsletter/eblast sign up on the public EV page. Send a periodic digest of EV news to transit riders and employees.

Evolve:

Align with schedules of internal newsletters and emails, and provide content to the marketing department. Create and execute email campaigns based on the categories listed above.

The Results

Step 4: Was it effective?

Assessment of the marketing strategies and tactics outlined in this plan will inform future approaches. Tracking audience exposure to Metro's channels and messages can help establish trends over time, as well as identify how particular products reach specific audiences.

Metro must gather metrics for all outreach-related activities right away—this will help establish the baseline and will help in evaluating the success of the marketing plan. For example, understanding traffic to the EV webpage, reviewing EV charging station data, looking at performance of eblasts and newsletters within the company etc.

Answering the following questions will help Metro evaluate the marketing process and the outcomes.

Process evaluation:

Implementation of outreach activities:

- What collateral or marketing materials were produced?
- What activities were completed?

Improving outreach communications:

- What marketing materials and channels were effective? Which ones were ineffective?
- What did Metro not consider doing or what activity was left incomplete?

Outcome evaluation:

Message retention:

- Are internal and external audiences aware of Metro's sustainability initiatives?
- Did they promote it to others?

Audience action:

- How many people visited the webpage? The intranet page?
- How many clicked on resources?
- How long did they spend on the page?
- Over the long-term, has:
    - The number of individuals taking relevant actions increased?
    - The number of individuals who are aware of Metro's EV initiatives increased?

Key Performance Indicators

Sample KPIs are seen below:

Tactic	Terms	Definition	Use
Media Outreach	Coverage	Number of published pieces	Coverage and reach measure how effectively the program is able to use media to reach its audiences.
	Reach	The number of people a piece may be seen by, sometimes referred to as circulation	
Website	**Traffic sources**		Traffic sources show how users are led to a site and provide critical information about how the website is promoted.
	▪ Organic search	Search traffic derived from unpaid search engine results (e.g., Google, Bing)	
	▪ Email	Links embedded in an email	
	▪ Referrals	Linked from another website	
	▪ Direct	Accessed via a favorited/bookmarked page, or URL typed in address bar	
	▪ Social	Linked from a social account (e.g., Facebook, Twitter)	
	Site usage overview		Site usage statistics inform site and page performance.
	▪ Number of sessions	Number of times a user visits a website (users who leave the site and return within 30 minutes are counted as part of the original session)	
	▪ Users	Visitors to a site	
	▪ Total page views	Total number of pages within the website viewed (repeated views of a single page are counted)	
	▪ Pages per session	Pages per session (average page depth) is the average number of pages viewed during a session (repeated views of a single page are counted)	
	▪ Average session duration	Period of time a user is active on a site (averages the session time of all users)	
	▪ Bounce rate	Percentage of single-page visits (i.e., visits in which a user left a site from the entrance page without interacting with the page)	
	▪ Top visited pages	Pages on website with the most page views	Used to determine which pages earn the most traffic. When examined alongside other metrics, this can inform elements of page design or promotional strategy.
Program e-blasts	**Number of subscribers and open rates**		Used to identify the success of email program engagement.
	▪ Open rates	Percentage of users who open the email	
	▪ Click-through rates	Number of unique clicks in an email divided by the number of emails successfully delivered	

Tactic	Terms	Definition	Use
	▪ Subscriber growth	Percent change in subscribers over a period of time	
	▪ Forwards	When a user forwards the email to another address	
	▪ Bounces	When an email is undeliverable due to an incorrectly provided email address	
	▪ Spam reports	When the email is reported as spam (measures email's reputability)	
	▪ Unsubscribes	When a previously subscribed user opts to no longer receive messages	
	▪ Engagement Rate	Number of unique email recipients who opened an email or clicked on a link in an email over a period of 90 days, divided by total number of email recipients who received an email during that time period. Industry standards for state and local government: 49% engagement rate	
Social Media	Amplification	When content is shared or retweeted; retweets/shares amplify (extend) the life of digital content	Used to identify the success of the social media plan.
	Appreciation	Series of social media interactions in which a user positively responds (e.g., likes, favorites, thumbs-up)	
	Engagement	Measures a user's interaction with content (e.g., comments)	
	Tweet impressions	Number of times a tweet is delivered to users' Twitter streams or Facebook post is seen in users' newsfeeds	
	Use Facebook Insights for		Find aggregate information about page interactions and audience geography, demographics, purchase behavior and more.
	▪ Actions on page	Number of clicks on a page's contact information and call-to-action button	
	▪ Reach	Number of people a post reached, plus likes, comments, shares, and more	
	▪ Post engagements	Number of times people engaged with a post through likes, comments, shares, and more	
	Use Twitter Analytics for		The audience insights dashboard contains information about your followers. Track follower growth over time and learn more about followers' interests and demographics.
	▪ Impressions	Number of times a tweet is delivered to users' Twitter streams	
	▪ Engagements	Includes clicks, likes, retweets, and replies	
	▪ Engagement rate	Engagements divided by impressions	
	▪ Link clicks	Number of times a user clicks on a link contained in a tweet	

Tactic	Terms	Definition	Use
	▪ Detail expands	Clicks on an in-stream tweet to view the full details	
	▪ Audience insights	Includes follower growth, followers' interests, followers' demographics, and sometimes consumer behaviors, lifestyles, and mobile devices	

Marketing & Outreach Plan Appendices

Appendix 1: EV Connect Usage Data

The below table presents an analysis of data from EV Connect regarding the utilization of Metro's EV charging stations over the six month period December 2017 to May 2018. Metro's charging infrastructure utilization and usage varies by station location and by charge port within the same location. Many of the stations along the Gold Line have high utilization (Arcadia, Monrovia, Sierra Madre Villa). However, the Irwindale, Citrus and Atlantic stations, also along the Gold line, have much lower usage. El Segundo has the highest overall utilization, with three charge ports 100%+ utilized and oddly, one that is rarely used (7% utilized). The below table shows key statistics on each of Metro's EV charging locations.

Metro Charging Location Usage Statistics (Dec 2017 through May 2018)

Location	Charge Duration (min)	Connected Duration (min)	Power Provided (kWh)	Adjusted Utilization (based on charge duration)[37]	Adjusted Utilization (based on connected duration)	Line
Universal City/Studio City Station	183,685	390,115	14,942	39.9%	84.7%	Red
Monrovia Station	102,036	160,171	8,323	29.5%	46.3%	Gold
El Segundo Station	106,826	162,363	8,883	28.6%	45.6%	Green
Union Station	254,098	576,835	12,636	20.1%	45.5%	Multiple
Willow St. Station	68,631	203,893	5,769	14.9%	44.2%	Blue
Sierra Madre Villa Station	95,889	144,237	7,429	27.7%	41.7%	Gold
CMF	9,312	88,005	595	4.0%	38.2%	n/a
Division 18	23,077	34,320	1,808	22.0%	32.1%	n/a
Arcadia Station	75,615	107,607	5,433	21.9%	31.1%	Gold
La Cienega/Jefferson Station	39,282	70,703	3,303	13.1%	24.1%	Expo
Norwalk Station	18,331	64,695	1,460	5.3%	18.7%	Green
APU Citrus Garage	19,334	57,661	1,339	5.6%	16.7%	Gold
Irwindale Station	24,942	45,543	1,357	7.2%	13.2%	Gold
Chatsworth Station	17,377	28,018	1,368	7.5%	12.2%	Orange
Duarte/City of Hope Station	21,915	35,431	2,294	7.9%	11.8%	Gold
Canoga Station	8,420	27,074	617	2.4%	7.8%	Orange
Atlantic Station	8,630	20,264	497	2.5%	5.7%	Gold
Expo/Sepulveda Station	5,470	7,719	310	1.9%	5.4%	Expo
Division 13	9,811	10,038	795	2.8%	2.9%	n/a

[37] Adjusted utilization assumes 20 works days per month and a 16 hour work day.

Appendix 2: Heuristic Evaluation

LA Metro Electric Vehicles Charge Stations: Website and User Experience Heuristic Review

Dara Pressley, User Experience Strategist
August 31, 2018

Appendix 3: EV-related Events

Metro should participate in local EV-related events, as they present an opportunity to promote messages to a broader, more engaged audience. Participation can occur in the form of a booth or table at the event, working with partners to ensure Metro's flyers are kept at their tables, sponsorships, and more.

Below is a list of EV events and community workshops.

EV Events in Los Angeles	
Recent Events	• Electrification 2018: Aug. 20 – 23, 2018 • 2018 Los Angeles National Drive Electric Week Event: Sept. 8 - 16, 2018 • Charge Up LA! (Part of LA National Drive Electric Week): Sept. 8, 2018
Upcoming Events	• EVs & The Grid: October 10 – 12, 2018 • NorCal Clean Technology Forum & Expo and West Coast Collaborative Partners Meeting: Oct. 16 – 18, 2018 • Los Angeles Auto Show: Nov. 30 – Dec. 9, 2018 • Advanced Clean Transportation Expo: April 23 – 26, 2019
Local/Community EV Events and Workshops	
Clean Vehicle Rebate Project	• Orange County International Auto Show: Oct. 4 – 7, 2018 • AltCarExpo- Santa Monica: Oct. 12 – 13, 2018

Appendix 4: Media List

The list below includes broader outlets that will reach transit riders. It also includes automotive publications. Metro should pitch to them when it has news to share about how it has increased its EV fleet, increased the number of employees who drive EVs, or increased the number of charging stations at its facilities.

Outlet Name	Outlet Type	Location
Al Borde	Online, consumer	Norwalk
Automotive Digest	Online, trade/industry	Manhattan Beach
Automotive Fleet	Magazine, trade/industry	Torrance
Automundo Magazine	Magazine, consumer	Los Angeles
Automundo Magazine Online	Online, consumer	Los Angeles
Autoproyecto	Online, trade/industry	Los Angeles
Business Fleet Magazine	Magazine, trade/industry	Torrance
Car Craft	Magazine, consumer	El Segundo
Chasing Clean Air	Blog, consumer	Los Angeles
Contacto Magazine	Magazine, consumer	Glendale
El Aviso	Newspaper, community	Huntington Park
El Clasificado	Newspaper, community	Norwalk
El Punto Semanal	Newspaper, community	Norwalk
El Salvador Dia a Dia	Newspaper, community	Los Angeles
El Show de Omar and Argelia - KLVE-FM	Radio program	Los Angeles
El Show del Mandril - KXOS-FM	Radio program	Burbank
Enfoque Los Angeles - KVEA-TV	Television program	Universal City
Environmental Directions	Radio program, national	Los Angeles
Fleet Financials	Magazine, trade/industry	Torrance
Fleet Management Weekly	Online, trade/industry	Manhattan Beach
Government Fleet	Magazine, trade/industry	Torrance
Green Fleet	Online, consumer	Torrance
Hoy Los Angeles	Newspaper	Los Angeles
Hoy Online	Online, consumer	Los Angeles
Impacto USA	Newspaper, community	Torrance
Inhabitat	Blog, consumer	El Segundo
KBEH-TV	Television station	Los Angeles
KBUA-FM	Radio station	Burbank
KBUE-FM	Radio station	Burbank
KEZY-AM	Radio station	Pasadena
KFOX-AM	Radio station	Los Angeles
KFTR-TV	Television station	Los Angeles
KFWB-AM	Radio station	Los Angeles
KGBN-AM	Radio station	Los Angeles
KHJ-AM	Radio station	Burbank
KJLA-TV	Television station	Los Angeles
KLAX-FM	Radio station	Los Angeles

Outlet Name	Outlet Type	Location
KLTX-AM	Radio station	Pasadena
KLVE-FM	Radio station	Los Angeles
KLYY-FM	Radio station	Los Angeles
KMEX-TV	Television station	Los Angeles
KMPC-AM	Radio station	Los Angeles
Korea Daily - Los Angeles	Newspaper	Los Angeles
Korea Times Los Angeles Edition	Newspaper	Los Angeles
KPFK-FM, The Car Show	Radio program	Placentia
KRCA-TV	Television station	Burbank
KRCD-FM	Radio station	Los Angeles
KRCV-FM	Radio station	Los Angeles
KSCA-FM	Radio station	Glendale
KSDX-TV	Television station	Burbank
KTAN-TV	Television station	Los Angeles
KTNQ-AM	Radio station	Los Angeles
KUCR-FM - Auto Talk	Radio program	Riverside
KUTY-AM	Radio station	Palmdale
KVEA-TV	Television station	Universal City
KWHY-TV	Television station	Los Angeles
KWKW-AM	Radio station	Los Angeles
KXOL-FM	Radio station	Los Angeles
KXOS-FM	Radio station	Burbank
KYAV-TV	Television station	Glendale
KYPA-AM	Radio station	Los Angeles
LA Car	Online, consumer	San Gabriel
La Maquina Deportiva - KWKW-AM	Radio program	Los Angeles
La Nueva Voz	Newspaper, community	Pomona
La Opinión	Newspaper	Los Angeles
La Opinión Online	Online, consumer	Los Angeles
La Prensa Hispana-L.A.	Newspaper, community	Glendale
Latin Heat	Magazine, consumer	West Covina
LAX Magazine	Magazine, consumer	Pacific Palisades
LCT: Limousine, Charter & Tour	Magazine, trade/industry	Torrance
Long Beach Business Journal	Magazine, trade/industry	Signal Hill
Los Angeles Business Journal	Magazine, trade/industry	Los Angeles
Los Angeles Daily News	Newspaper	Woodland Hills
Magazine of Santa Clarita	Magazine, consumer	Valencia
Malibu Magazine	Magazine, consumer	Malibu
Metro Magazine	Magazine, trade/industry	Torrance
Monterey Park Journal	Newspaper, community	Monterey Park
Motor Trend	Magazine, consumer	El Segundo
Parking Today	Magazine, trade/industry	Los Angeles
Planetizen	Blog, consumer	Los Angeles

Outlet Name	Outlet Type	Location
Reforma - Los Angeles Bureau	Newspaper	Marina del Rey
Santa Monica Daily Press	Newspaper	Santa Monica
Santa Monica Next	Online, consumer	Los Angeles
SEMA News	Magazine, trade/industry	Diamond Bar
Shortcuts	Blog, consumer	Los Angeles
So Cal Auto Blog	Blog, consumer	Los Angeles
Streetsblog LA	Blog, consumer	Los Angeles
Super Street	Magazine, consumer	El Segundo
The Los Angeles Times	Blog, consumer	Los Angeles
The New York Times - LA Bureau	Newspaper	Los Angeles
The Orange County Register	Newspaper	Anaheim
The Press-Enterprise	Newspaper	Riverside
The Source	Blog, consumer	Los Angeles
Transporte Latino	Magazine, consumer	Los Angeles
UCLA Blueprint	Magazine, trade/industry	Los Angeles
USA Today - Los Angeles Bureau	Newspaper	Los Angeles
Ventura County Star	Newspaper	Camarillo
Vida Nueva	Newspaper, community	Los Angeles
Wall Street Journal - Los Angeles Bureau	Newspaper	Los Angeles
WCHU-TV	Television station	Los Angeles
XEWW-AM	Radio station	Burbank

Appendix 5: Social Media Strategy

Social Media Landscape

Sixty-nine percent of all U.S. adults use at least one social media platform, according to Pew Research Center[38]. While the vast majority of users are between the ages of 18 and 29, all age groups are represented and are increasing every year, according to the same study. As such, social media has become an increasingly important tool for businesses to influence decision making, and the key to success is adaptability.

Today, the social media landscape can change on a dime. Facebook's newsfeed algorithm, for example, is in a constant state of flux. Roughly four months after rolling out a new "Trending News" feature, Facebook announced an update that would no longer prioritize posts from brands, marketers and news stories (among others). A drastic change like this forces any Facebook page administrator to rethink their strategy. A more nimble and adaptable organization, however, is able to make swift adjustments to their strategy by utilizing short-term tactics while focusing on long-term goals.

Short-Term Tactics

There are a variety of tactics that can help to increase awareness about EVs and engagement with Metro in the short-term. These tactics, discussed in more detail below, are trending in the current social media landscape and have been proven to yield results.

Videos and Animations

There is no doubt about the current state of video marketing. Roughly 100 million hours of video are consumed on Facebook every day, and over the past year, video consumption on Instagram has increased by 80 percent. A recent report by Cisco[39] states that by 2020, 75 percent of the world's mobile data traffic will be video. The good news is that producing short videos does not have to be a major investment and can still deliver significant results.

A great place to start is with "how to" videos or animations, focusing on any gaps in information that your target audience might have. For example, if consumers believe that the charging process is complicated or the payment process is difficult, that same audience group could potentially derive a lot of value out of a video that walks them through how to charge at an Metro charging station or how to make a payment. These videos, which should be no more than 30 seconds, fill an information gap among your target audience and can be consumed over a variety of mediums.

Tools such as PowToon, GoAnimate and Animaker are just a few among many low-cost video and animation creation platforms, starting as low as $19 a month for basic needs. Videos can be created in less than a couple of hours and immediately published to the medium of choice (i.e. Facebook, Twitter, YouTube, etc.).

Seasonal Campaigns

Piggy backing onto existing campaigns that the general public are already aware of is a great way to not only grow your audience base, but to increase awareness about a specific topic. For example, Earth Day

[38] http://www.pewinternet.org/fact-sheet/social-media/

[39] https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html

is a campaign that is celebrated across the globe and that aligns well with the mission of the Metro EV plan. Asthma Awareness Month, which occurs in May, is another great campaign that may not seem relevant at first. However, since air pollution is a major contributor to asthma, the connection is the emissions caused from gas powered vehicles. In this case, running a campaign around helping to reduce asthma or protect our loved ones from asthma would reach a larger audience than those who are only interested in Earth Day.

Cross-Promotion

Seasonal campaigns can overlap with the next tactic, which is cross-promotion. Using Asthma Awareness Month as an example, partnering with various related agencies or non-profits with large social media followings would allow your message and brand to cross over to audience groups that were historically difficult to reach. A cross-promotion relationship with an organization consists of an agreement to post or share content from the other organization. Using the California Department of Public Health as an example, after establishing a relationship with the CAPH, Metro would publish a post on Facebook that talks about the ways in which EVs can eliminate air pollution and improve asthma, making sure to tag or mention the CAPH Facebook account. As part of the terms of the relationship, the CAPH would share Metro's post to their followers, increasing the reach to potentially 15,000 more people.

Occasionally cross-promotion can occur organically without any interaction or relationship in place. The only necessary step is to tag a relevant party in a post. If they deem it relevant and "shareable", then they will share the post on their terms. This occurs more frequently, as it does not require many resources.

Testimonials

Word of mouth marketing is still one of the most effective forms of marketing. People trust their friends and family and are more likely to listen to them over a stranger or a paid ad in their newsfeed. Organizations can still achieve word of mouth marketing by sharing real stories of people who are advocates of EVs. Specifically focusing on members within the targeted audience group who have "converted" to driving an EV and using the Metro charging station.

Testimonials are one of the tried and true methods of marketing, digital or traditional, that may never lose its value. People want to know that other people like them are doing the things that they are considering before actually pulling the trigger. Testimonials can be portrayed in a number of ways, including videos, quotes on website or stories on social media with photos. Instagram stories, Facebook Live and various other "in the moment" applications allow for authentic stories that consumers are more likely to trust than a paid advertisement.

Long-Term Goals

In the current digital landscape, the short-term tactics outlined above are reliable methods for obtaining results. As digital trends inevitably change over time, so must the corresponding strategies and tactics. By focusing on long-term goal, Metro can create space for change.

Paid advertising, for example, has been a tried and true method in traditional and digital advertising for decades. Short-term goals usually associated with this strategy are almost always centered on increased awareness and conversion rates. In the case of Facebook's ever-changing algorithm, directing all of your resources to a single strategy can be detrimental if a drastic change like the one mentioned earlier is

implemented. By staying laser focused on the end goal (increased access and usage of EV charging stations) as opposed to the short-term goals, the program becomes more receptive to innovative ideas and strategies.

While paid advertising is an excellent and reliable method for increasing awareness, it may not always address the barriers to entry that members of the target audience face. In this case, access to a charging station, cost of charging, and the actual charging process are questions that may require additional details and information that an ad may not be able to answer. Understanding the different levels of questions and concerns the audience has opens Metro up to new ideas for addressing these concerns. A web-based "chatbot" has been used successfully in the customer service industry for years, allowing organizations to respond quickly to engaged users. While a fully dedicated chatbot would require significant resources to build and implement, there are low-cost enterprise solutions that could potentially meet Metro's needs. The point here is that a chatbot is not the first strategy that comes to mind when thinking about the short-term goal of increased awareness. When you consider that the long-term goal of the program is to increase usage of the charging stations, however, the barriers to adoption become crystal clear and solutions like the chatbot present themselves. Social media fits into the mix here as Facebook Messenger can integrate with third party chatbots (ChattyPeople, FlowXO, ChatFuel) lowering the barrier to entry and making for a swift implementation.

To summarize, positioning the program to be flexible and nimble in today's increasingly digital and mobile society is crucial to success. Understanding the digital landscape and the current and upcoming trends is a major factor to this, and can be achieved through frequent and ongoing environmental scans, explained below.

Environmental Scan

Another tactic to prepare for change is planning for frequent environmental scans and analysis. Environmental scans help organizations to identify trends, opportunities and threats by "scanning" the external environment in which they conduct business. In the case of Metro, this could mean understanding how other transit agencies are promoting EV programs to learn best practices in the field. It could also mean researching sentiments among its constituents around EVs to understand how to best message the program.

Appendix 6: EV Charging Station Phone Apps

Another opportunity to enhance awareness of Metro's charging infrastructure is through phone applications that EV owners use to find charging stations, which are listed below. This effort can be done by ensuring all of Metro's charging stations are featured on the apps. Metro should periodically review new apps in the marketplace and ensure its charging stations are reflected on their platforms.

PlugShare is a powerful mobile application and online tool that allows electric car owners to locate and optimize the use of EV charging stations. ChargeHub is another application with more than 100,000 users that aggregates data on all charging stations in North America in one, easily accessible place. Users can add private and public charging stations to the map through its website and mobile app, as well as modify information about a charging station. All Metro stations with EV charging infrastructure are listed on ChargeHub. As new charging stations are added, Metro should submit information to reflect that update.

Below is a list of the EV charging applications available to the public:

EV Charging Station/Parking Phone Applications	
• ChargePoint • PlugShare • Open Charge Map • ChargeHub EV Map • CarStations • Recargo • EVgo EV Chargers	• Google Maps • NEXTCHARGE – Charging Stations • GREENLOTS • EV & Tesla Charging Stations App • Supercharge for Tesla • LEAF EZCharge (for Nissan Leaf) • Blink

Appendix 7: EV Owner Associations

By targeting current EV owners through clubs or associations, Metro can reach an audience that is both engaged with EVs and has a need for charging infrastructure. Metro can reach these organizations by sharing content that the clubs or associations can distribute to their members. This can include email content or other promotional materials on Metro's offerings. Below is a list of EV clubs, associations, and informal meetups in the Los Angeles area that bring together a community of EV drivers.

EV Organizations in Los Angeles	
EV Clubs and Associations	• BMW i3 SoCal • EV Advocates of Ventura County • EVA of Southern California • SoCal TM Group • TeslaClubLA • Tesla Owners Club of Orange County • Tesla Owners of Ventura County
EV Informal Meetups	• Orange County Tesla Model 3 Syndicate • Electrify LA • Connected Car Los Angeles

Appendix 8: Visual Asset Map

STRAIGHTFORWARD

KEY TERMS

- Bold
- Direct
- Confident

TONE

- Instructive
- Believable
- Strong

Daily commute has never been as effortless. EV owners can now charge their car while the LA Metro gets them from point A to point B. Resources are available at many stations. Check your app. Drive to the spot. Get on the train and get on with your day.

FUTURE









KEY TERMS

- Modern
- Innovative
- Pioneering

TONE

- Forward-thinking
- Informative
- Empowering

Pathway to a sustainable tomorrow. Improved access to charging infrastructure for transit riders, including employees. One EV charging station at a time, LA Metro is building an intelligent future, today.

SMART COMMUTING









KEY TERMS

- Accessible
- Easy to use
- Convenient

TONE

- Simple
- Stress-free
- Intuitive

Travel seamlessly from home to metro to work. Check lot availability, tap key fob on the spot and charge your car while you take charge of the day. LA Metro ensures that EV experience is an easy experience.

Appendix 9: Environmental Scan

LA Metro:
Marketing Environmental Scan

August 31, 2018

SUSTAINABILITY COUNCIL MEMBERSHIP LIST

YEAR: 2018-19

As of December 3rd, 2018

			Department	Email
Metro Exec Staff	**3**	**Stephanie Wiggins**	CEO	WIGGINSS@metro.net
		Rick Clarke	Construction	ClarkeR@metro.net
		Bryan Pennington	Construction	PenningtonB@metro.net
Metro Staff	---	**Aaron Santos**	CEO	SantosAa@metro.net
		Cris Liban	ECSD	LibanE@metro.net
		Paul Backstrom	Planning	BackstromP@metro.net
		Debra Avila	Vendor/CM	AvilaD@metro.net
		Carolina Coppola	Vendor/CM	CoppoloC@metro.net

Main Category	No. Seats	Sub- Category	Classification	Member First Name	Member Last Name	Member Organization	Member Email	Member Phone	*Notes*
Local Gov't Public entities (COGs, cities, special jurisdictions)	3	City of Los Angeles	Primary	Lauren	Faber	City of LA	lauren.faber@lacity.org		
			Alternate	Michael	Samulon	City of LA	michael.samulon@lacity.org		
		County of Los Angeles	Primary	Kristen	Torres-Pawling	County of LA	kpawling@ceo.lacounty.gov		
			Alternate	Rita	Kampalath	County of LA	RKampalath@ceo.lacounty.gov		
		Other (Small Cities, etc.)	Primary	Thomas	Small	Small Cities	Thomas.small@culvercity.org	310-922-7286	
			Alternate	VACANT					
Environmental NGOs	7	Water Resources	Primary	Caryn	Mandelbaum	Leonardo DiCaprio Foundation	caryn@ldcfoundation.org	310-927-4914	
			Alternate	Roy	Thun	SuRF	roy.thun@GHD.com	805-501-3956	
		Water Quality	Primary	Bruce	Reznik	LA Waterkeeper	bruce@lawaterkeeper.org	619-851-9997	
			Alternate	VACANT					
		Energy	Primary	Joel	Levin	Plug-In America	jlevin@pluginamerica.org	213-935-1364	
			Alternate	Michael	Swords	LACI	mike@Laincubator.org	310-709-3543	
		Habitat /Natural Resources	Primary	Belinda	Faustinos	Nature For All	belinda@sangabrielmountains.org; belinda@lanatureforall.org	626-614-4990	
			Alternate	VACANT					
		Climate	Primary	VACANT					*Former Member: Fernando Cazares*
			Alternate	Cindy	Montanez	Tree People	cmontanez@treepeople.org		
		Materials and Resources	Primary	Bryn	Lindblad	Climate Resolve	blindblad@climateresolve.org	310-227-0184	
			Alternate	Peter	Meng	CEENGR	pmeng@ceengr.com		
		Air Quality	Primary	VACANT					
			Alternate	VACANT					
NGO Equity	1	Social, Environment Injustice (Equity)	Primary	VACANT					*Former Member: Omar Gomez as of 09/17/18*
			Alternate	VACANT					*Former Member: Wendy Ramallo as of 09/17/18*
Professional Associations (Architects and Engineers)	2		Primary	Ghina	Yamout	Alta Environmental	ghina.yamout@altaenviron.com	850-980-2078	
			Alternate	Joe	Ablay	ICI Engineering	joe.ablay@ICIengineers.com	909-967-0236	
			Primary	Patricia	Menjivar	Kleinfelder	pmenjivar@kleinfelder.com	(213) 610-0817	
			Alternate	Kimberly	Colbert	Colbert Group	kimberly@colbertgroup.com		
Landscaping and Infrastructure Design	1		Primary	Doug	Dietrich	Burns and McDonnell	ddietrich@burnsmcd.com	913-325-3632	
			Alternate	Charles	Favors	CBF XIERSCAPE DESIGNS LLC.	cfavors@yahoo.com	323-570-6261	
Local Labor Unions	1		Primary	VACANT					*Jennifer Kropke, IBEW Local 11, submitted an Application*
			Alternate	Carolyn	Hull	LA County Economic Dev Corp	carolyn.hull@laedc.org		
Public Health	1		Primary	Elizabeth	Rhoades	LA County Dept of Public Health	erhoades@ph.lacounty.gov		
			Alternate	Jack	Sahl	Jack Sahl & Associates	jack@jsahl.com		
Technical Advisory Committee (TAC)	1		Primary	Mike	Bagheri	City of Pasadena	mbagheri@cityofpasadena.net	626-744-7208	
			Alternate	Mark	Hunter		mhunter@santa-clarita.com	661-288-1460	
ransportation Business Advisory Council (TBAC	1		Primary	Berwyn	Salazar	Global ASR	berwyn@globalasr.com		
			Alternate	James	Okazaki	TBAC - AA/AEA	jokazaki@sbcglobal.net		
Associated General Contractors (AGC)	1		Primary	Emily	Freund	WSP	emily.freund@wsp.com		
			Alternate	Mark	Kempton	Kempton Strategies	mark@kemptonstrategies.com	408-431-7789	

Green Building and Services Industry	2		Primary	Salem	Afeworki	Value Sustainability	safeworki@valuesustainability.com	510-701-7056	
			Alternate	Pavitra	Rammohan	Deep Root Green Infrastructure	pavitra@deeproot.com	323-708-0360	
			Primary	VACANT					
			Alternate	John	Williams	Impact Infrastructure	john.williams@impactinfrastructur		
Real Estate Development Community	1		Primary	Anthony	Brower	Gensler	anthony.brower@gensler.com	213-337-3916	
			Alternate	Will	Wright	AIA Los Angeles	will@aialosangeles.com	310-309-9580	
Academic Institution	1		Primary	Hilda	Blanco	USC	hblanco@price.usc.edu		
			Alternate	Mehran	Mazari	Cal State LA	mmazari2@calstatela.edu	323-332-1823	
Foreign Organization	1	Foreign Entities	Primary	Stephen	Cheung	President World Trade Ctr	stephen.cheung@wtcla.org		
			Alternate	Aki	Luukkainen	Commissioner, Consulate General of Finland	aki.luukkainen@formin.fi	310-739-0832	
Future Memberships Voted by SAC	3		Primary						
			Alternate						
			Primary						
			Alternate						
			Primary						
			Alternate						
Total	30								

Action Items Log

Meeting Date:	Status	Council Member	Comment	Metro Response
12-Oct-18	Closed	Caryn Mandelbaum/Bruce Reznik/Belinda Faustinos	The EJ seats remain vacant. To receive better participation from the EJ group, can we explore possiblity on partication stipends.	DONE: Metro does not provide stipends to Council members but now that we have received two applications for the EJ vacancies, we have full primary participation in all categories from NGO's.
12-Oct-18	Open	Belinda Faustinos	Update on the RAMP/RCIS plan	Working to schedule an update on the plan's implementation on the ARC
12-Oct-18	Open	Michael Samulon	Encourages Metro to include an annual benchmarking against the updated path to reach numbers on the CAAP	Currently under consideration.
12-Oct-18	Closed	Joel Levin	Incorporation of LA Metro EV Implementation Plan on Meetings ARC	DONE: Has been added to the ARC for the 12/14/18 meeting.
12-Oct-18	Closed	Hilda Blanco	Thoughts on publishing the CAAP	DONE: Once CAAP is approved, it will be posted on Metro's website.
12-Oct-18	Closed	Caryn Mandelbaum	Request of a timeframe on Motion 57 updates	DONE: Motion 57 Progress Update is scheduled for the 3/8/19 meeting. We will provide monthly informal updates. Receive & File update will go to the Metro Board in March 2019.
12-Oct-18	Closed	Michael Samulon	Request to provide an LRTP Toolkit	DONE: Was sent to council members on 10/24/18.
12-Oct-18	Closed	Bruce Reznik	Request to provide Paul Backstrom's notes on LRTP Update	DONE: Notes attached to the Meeting Minutes for 10/12/18.
21-Sep-18	Closed	Bryn Lindblad	Request of a Meetings ARC	DONE: Provided Meetings Arc at the 10/12/18 meeting.