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ITEM: (d) 2.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

Memorandum

TO: SMART CITIES AND SERVICE IMPROVEMENT COMMITTEE

FROM: John Ristow

SUBJECT: SAN JOSE ELECTRIC MOBILITY ROADMAP

DATE: November 25, 2019

Approved

Date 11-25-19

RECOMMENDATION

(a) Accept the report on the City's proposed Electric Mobility Roadmap.
(b) Cross-reference this item and the Roadmap for full City Council consideration at the January 14, 2020 Council meeting.

OUTCOME

The Electric Mobility Roadmap provides a strategic direction on how the City can move towards achieving its electrification goals.

BACKGROUND

In February 2018, the City Council adopted *Climate Smart San José*, a public declaration of the City's intent to meet the Paris Accord's greenhouse gas reduction targets. To achieve this, the City is focusing on its two largest sources of emissions: buildings and transportation. Of the two, transportation—and by extension our land use patterns—is the larger source, and the most difficult to get traction on, given the lasting effects of land use, community design, and transportation choices.

The San José Electric Mobility Roadmap (*Roadmap*) fulfills one of *Climate Smart's* transportation actions: to develop an electric vehicle strategy. During its development, the title of the report was changed to "*Electric Mobility Roadmap*" to reflect the broad range of elements within the transportation system that need to be electrified, including but not limited to passenger vehicles.

At the October 7, 2019 Transportation & Environment (T&E) Committee meeting, the Environmental Services Department presented a semi-annual status report on the City's implementation of *Climate Smart San Jose*. The Department of Transportation (DOT) gave a presentation on the *Electric Mobility Roadmap* as part of that update. Staff was asked if a trigger

would be used to evaluate whether the City was reaching its electric vehicle adoption goals to determine if additional actions might be needed.

ANALYSIS

Consistent with *Climate Smart*, the *Electric Mobility Roadmap* employs a dual-prong strategy to reduce emissions from passenger vehicles—the single largest source of transportation emissions. First, it seeks to reduce the need to drive alone by expanding shared, electric mobility options, including public transit, fleet vehicles, and services such as ride-hailing, car-sharing and micro-mobility (e.g., shared bikes). Second, it aims to accelerate the adoption of electric vehicles for trips that require a car, SUV or truck.

Climate Smart recognizes that simply replacing existing vehicles with lower-emission versions will not suffice to reach the City's transportation emission reduction target: 90 percent by 2050. The City also needs to reduce the number of vehicles on our roadways. Other climate experts, including the California Air Resources Board (CARB), concur with this view. In a 2018 report, CARB concluded that "California cannot meet its climate goals without curbing growth in single-occupancy vehicle activity."

Part 1 of the *Roadmap* provides the context for the City's transportation electrification efforts: where the City currently stands in relation to its goals; the milestones it needs to meet; and the obstacles it needs to overcome to achieve its goals.

Part 2 lays out a two-year transportation electrification strategy. It summarizes the steps the City is currently taking and has committed to take. It also lays out additional proposed actions to electrify transportation more quickly while reducing vehicle trips and enhancing equity. The actions in Part 2 are organized into four subsections: 1) Infrastructure, 2) Fleet Vehicles, 3) Personal Vehicles, and 4) Shared Mobility. An appendix in the *Roadmap* provides a matrix summarizing all the actions cited in the report, organized by status, their relation to *Climate Smart*'s goals, and involved departments.

CONCLUSION

The *Roadmap* provides a foundation for a more comprehensive, five-year *Emerging Mobility Action Plan* DOT will initiate in 2020 with support from a Caltrans Sustainable Communities grant. That action plan, which will be developed in collaboration with the community, will identify ways to maximize the potential of electrification, automation, and shared mobility to achieve the City's environmental and transportation goals with a strong emphasis on equity.

EVALUATION AND FOLLOW-UP

Some of the actions acknowledged in the Roadmap are being undertaken as part of the American Cities Climate Challenge. The City's progress on these actions will be reported out via the Climate Challenge dashboard and staff's semi-annual Climate Smart report to Council. DOT will also report to the T&E Committee annually on the City's progress on its electrification goals with any suggested additional actions that should be considered.

CLIMATE SMART SAN JOSE

The recommendations in this memo aligns with one or more Climate Smart San Jose energy, water, or mobility goals.

PUBLIC OUTREACH

This memorandum will be posted on the City's Smart Cities and Service Improvement Committee's Agenda website for the December 5, 2019 meeting. The Roadmap was also presented to and discussed by the T&E Committee on October 7, 2019

COORDINATION

This memo was coordinated with the City Attorney's Office.

CEQA

Not A Project, File No. PP17-009, Staff Reports, Assessments, Annual Reports, and Informational Memos that involve no approvals of any City action.

/s/
JOHN RISTOW
Director of Transportation

For questions, please contact Laura Stuchinsky, DOT Emerging Mobility Program Lead, at (408) 975-3226.

Attachment: San José Electric Mobility Roadmap 2020-2022

San José Electric Mobility Roadmap 2020-2022

December 2019
Final

San José Electric Mobility Roadmap
2020-2022

Executive Summary

Transportation is the largest source of greenhouse gas emissions in California as well as San José. Given the lasting effects of prior land use and transportation decisions, it has been the most difficult to make progress on, despite the pressing and increasingly visible need to reduce carbon emissions.

Passenger-vehicles are the single largest source of transportation-related emissions. The City is seeking to tackle this problem through a two-pronged approach articulated in *Climate Smart San José (Climate Smart)*. First, reduce the need to drive alone by expanding other mobility options, including building more housing near transit nodes, improving bike and pedestrian facilities, and expanding public transit, shared bikes and scooter services. Second, accelerate the adoption of electric vehicles for trips that require a car, SUV or truck.

This approach is strongly supported by experts. Simply replacing existing vehicles with lower-emission versions won't be sufficient to reach our greenhouse gas reduction targets or to create the future San José's envisions for itself. We also need to reduce their number. *Climate Smart* anticipates San José will nearly triple the number of electric vehicles in the city by 2025 (from approximately 23,000 to 62,000), while taking approximately 30,000 vehicles off our roads through public or private shared mobility.

The *Emerging Mobility Roadmap* (Roadmap) is a short-term (two-year) strategic plan that seeks to focus and enhance the City's efforts to achieve its transportation electrification goals. The Roadmap incorporates related work the City is currently undertaking as part of the American Cities Climate Challenge (Climate Challenge), which concludes in December 2020. It also recommends strategies the City could pursue to build on that momentum.

In early 2020, the City will begin work on a more comprehensive, five-year *Emerging Mobility Action Plan* that will build on the *Roadmap*. The *Emerging Mobility Action Plan* will be developed in collaboration with the community. It will identify ways to maximize the potential of electrification, automation, and shared mobility to achieve the City's environmental and transportation goals, with a strong focus on equity.

The *Roadmap* is organized into four subsections: infrastructure, fleet, personal vehicles, and shared mobility services. In each area, it seeks to strategically advance the City's current efforts.

Infrastructure: Under the Climate Challenge, the City has committed to substantially increase the number of non-residential electric vehicle chargers that are available in the City. The Roadmap analyzes where electric vehicles are currently located in the City, determines the number that are needed to support *Climate Smart*'s growth targets, and identifies priority areas for locating additional chargers that would expand access to electric vehicles and facilitate the growth of electric-powered shared mobility services, such as car-share, bikes, and ride-hailing.

Fleet: Targeting fleet vehicles is a particularly effective strategy for San José to reach its electric vehicle growth targets given that these vehicles typically account for more vehicle miles traveled per year than the average passenger vehicle. Currently 57% of the City's non-police sedans are plug-in electric, either fully or plug-in hybrid. The remainder are either gas powered or gas-hybrids. They are also old; 29 of the City's gas-powered vehicles are more than 15 years old, and cost more than twice as much per mile to operate and maintain than the City's fully-electric vehicles. The Roadmap recommends that the City replace all (89 vehicles) non-police sedans that are more than ten years old to electric vehicles. Doing so would measurably reduce greenhouse gas emissions, reduce the City's operating costs, and demonstrate leadership.

Personal Vehicles: To meet its *Climate Smart* electric vehicle growth targets (approximately 62,000 plug-in electric vehicles by 2025), the City will need to overcome three major barriers to electric vehicle adoption: access to electric chargers, awareness about electric vehicles, and the cost to purchase them. The City is addressing the first two issues through Climate Challenge. It could tackle the third (cost) by, among other things, organizing a group buy or lease program to significantly reduce the bar for electric vehicle use. This would be particularly beneficial to lower-income families who own a car out of necessity, but bear a heavy financial burden to do so.

Shared Mobility: The City is making efforts to expand shared mobility services to provide more options for those who cannot or choose not to drive. Under the Climate Challenge the City is increasing the number and broadening the distribution of its e-scooter and bike-share programs, the latter of which now includes electric-assist bikes. The City also has shared vehicle options: Zipcar has offered its station-based car-share program in San José since 2012. As none of the company's 17 vehicles are electric, the Roadmap recommends encouraging Zipcar to include one or more electric vehicles in its fleet. The City should also reach out to other car-share companies that may be willing to offer a different type of car-share service that includes electric cars and discount membership and usage fees to low-income residents.

How we go about reducing our greenhouse gas emissions is fundamental to our success. The two-pronged approach taken by *Climate Smart*, and by extension the *Roadmap*, provides a pathway to achieve the City's transportation and environmental goals, which include reducing greenhouse gas emissions, air pollution, vehicle miles traveled, and single-occupancy vehicle trips.[i] It also offers an opportunity to overcome long-standing transportation inequities by prioritizing clean, affordable, efficient mobility for all.

San Jose's Electric Mobility Roadmap
2020-2022

Introduction

Transportation is the largest source of greenhouse gas emissions in California (40%) and San José (63%). Given the lasting effects of prior land use and transportation decisions, it has been the most difficult to make progress on, despite the pressing and increasingly visible need to reduce carbon emissions. Several recent major reports highlight the gravity of the issue:

- *"Major Climate Report Describes a Strong Risk of Crisis as Early as 2040"* – October 2018, *NY Times* on a special report issued by the United Nations' Intergovernmental Panel on Climate Change (IPCC). [ii]
- "*July 2019 was the hottest month on record for the planet,"* – August 2019, the National Oceanic and Atmospheric Administration monthly global climate report.[iii]
- *Climate Change Threatens the World's Food Supply, United Nations Warns* – August 2019, *NY Times* on a special report by the IPCC on Climate Change and Land.[iv]

Between 2016 and 2017, California's carbon pollution declined by 2%, according to the California Air Resources Board's 2019 inventory,[v] even while the economy grew by 3.6%. However, the transportation sector is running counter to that trend. Between 2016 and 2017, California's transportation-related emissions *increased* 1% due to increased fuel consumption, 6% since 2013.

San José is also making headway on reducing its greenhouse gas emissions. Based on the City's 2017 Community Greenhouse Gas inventory (released in mid-2019), between 2014 and 2017 the City reduced its carbon pollution by 17%. The greatest reductions were in residential, commercial and industrial energy use, and the disposal of solid waste. Transportation-related carbon pollution declined modestly, but increased as a share of the total.

At both the state and city level, passenger-vehicles are the single largest source of emissions within transportation. The City is seeking to tackle this problem through a multi-pronged approach articulated in *Climate Smart San José,* the City's Paris Accord-aligned climate action plan. First, it seeks to reduce the need to drive alone by expanding other mobility options, including building more housing near transit nodes, improving bike and pedestrian facilities, and expanding public transit, shared bikes and scooter services. Second, it aims to accelerate the adoption of electric vehicles for trips that require a car, SUV or truck.

This approach is strongly supported by experts. Simply replacing existing vehicles with lower-emission versions won't be sufficient to reach the *Climate Smart*'s transportation emission target: 90% reduction by 2050. We also need to reduce the number of cars on the City's roads. "…California will not achieve the necessary greenhouse gas emissions reduction to meet mandates for 2030 and beyond without significant changes to how communities and transportation systems are planned, funded and built," the California Air Resources Board

(CARB) concluded in its 2018 Progress Report on California's Sustainable Communities and Climate Protection Act "Specifically, CARB's 2030 Scoping Plan Update identifies reduction in growth of single-occupancy vehicle travel as necessary to achieve the statewide target of 40 percent below 1990 level emissions by 2030."[vi]

Researchers at UC-Davis' Institute of Transportation Studies concur. They point to three transportation "revolutions" currently underway-- electrification, automation (driverless vehicles), and shared mobility--that, in combination, could significantly reduce greenhouse emissions, beyond that which any of one or two of these revolutions could achieve.[vii] Although electrification and automation of transportation can reduce GHG emissions and improve safety, "without a corresponding shift towards shared mobility and greater use of transit and active transport, those two revolutions could significantly increase congestion and sprawl, while also increasing the likelihood of missing climate change targets."

The City will be developing a comprehensive, five-year *Emerging Mobility Action Plan* in collaboration with the community that will identify ways to maximize the potential of electrification, automation, and shared mobility to achieve the City's environmental and transportation goals with a strong emphasis on equity. Work on this plan will begin in early 2020, with support from a Caltrans Sustainable Communities grant. The *Electric Mobility Roadmap (Roadmap)* is a modest, first step, with a scope limited to two years. It addresses one of the revolutions—accelerating the electrification of transportation: private and shared.

Part 1 of the *Roadmap* provides the context for the City's transportation electrification efforts: where the City currently stands in relation to its goals; the milestones it needs to meet; and the obstacles it needs to overcome to achieve its goals.

Part 2 lays out a two-year transportation electrification strategy. It summarizes the steps the City is currently taking and has committed to take. It also lays out additional proposed actions to electrify transportation more quickly while reducing vehicle trips and enhancing equity. The actions in Part 2 are organized into four subsections: 1) Infrastructure, 2) Fleet Vehicles, 3) Personal Vehicles, and 4) Shared Mobility. An appendix in the *Roadmap* provides a matrix summarizing all the actions cited in the report organized by status, their relation to *Climate Smart*'s goals, and involved departments.

Part I: Making the Shift to Electric-Powered Vehicles

California plans to register five million zero-emission vehicles (electric and hydrogen fuel-cell) in the state by 2030 and to install 250,000 electric vehicle chargers by 2025. Achieving this would significantly reduce the state's emissions. According to the Union of Concerned Scientists[viii], switching from a gasoline-powered vehicle to an electric one today in California reduces emissions by 75% (from 4.9 metric tons per year to 1.2 metric tons).[ix] This takes into consideration that approximately half of the state's electricity is generated from carbon neutral sources, including renewable energy, hydro and nuclear power.[x]

California's relatively clean electricity also reduces the number of miles an electric vehicle must be driven before it reaches the "break-even" point, where its lower operating emissions compensate for its higher production emissions. In California, that's 4,900 miles for a Nissan Leaf and 19,000 miles for a Tesla Model S. In comparison, production-related emissions for gas-powered vehicles are lower than for electric vehicles. Gas vehicles never reach a "break-even" point because their operating emissions are ongoing. The break-even point for plug-in electric vehicles will quicken as both California and San Jose continue to make progress towards their 100% carbon-neutral electricity goal. California is targeting 2025; San José, 2021.

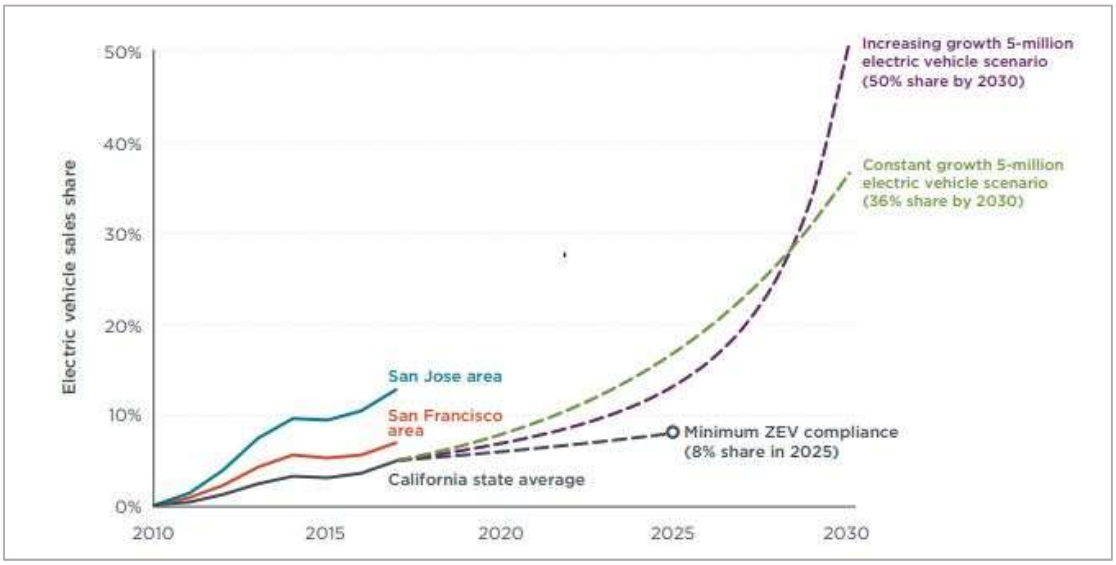
California is spending billions to achieve its zero emission vehicle goals. For example, as of June 2019, the State had issued more than $720 million in rebates since 2009 through its Clean Vehicle Rebate Project for the purchase or lease of electric vehicles. In 2018, the California Public Utility Commission approved $738 million worth of electric vehicle infrastructure programs that will be delivered by the state's largest utilities over the next five years. And, as a result of a 2016 settlement the State reached with the Volkswagen Group, the company is investing $800 million in California over ten years to expand EV charging infrastructure and access to electric vehicles.

Given its aggressive efforts to promote electric vehicles, it's not surprising that California has the largest electric vehicle market share (percent of new electric vehicles sold relative to all new light duty vehicles) in the nation: 7.84% in 2018.[xi] In 2017, 12% of San Jose's new vehicle sales were electric vehicles. While San Jose's rate exceeded the state average, the City ranked 28 out of 40 California cities with the largest electric vehicle market share that year. The top six cities are located in Santa Clara County.[xii]

The electric vehicle market has grown steadily over the last ten years, with a steeper rise in 2018. That year, sales of fully-electric vehicles in California increased by 81% and plug-in hybrid electric vehicles by 40%.[xiii] Most of the increase was driven by sales of Tesla's Model 3. Nearly 8% of new car sales were plug-in electric (5% fully-electric and 3% plug-in hybrids). Gasoline-powered vehicles still constituted 82% of all new vehicle sales in the state. (The remainder are diesel, fuel cell, hybrid and gasoline-ethanol vehicles.) While electric vehicle sales are projected to exceed 100,000 in 2019, that's still only one-fifth of California's 2030 target.

The graph that follows illustrates how sharply the State will need to boost sales to realize its 2030 electric vehicle goal and several trajectories the State could take to get there. The International Council on Clean Transportation (ICCT), which created the graph, included the San José and San Francisco metro areas for comparative purposes.[xiv]

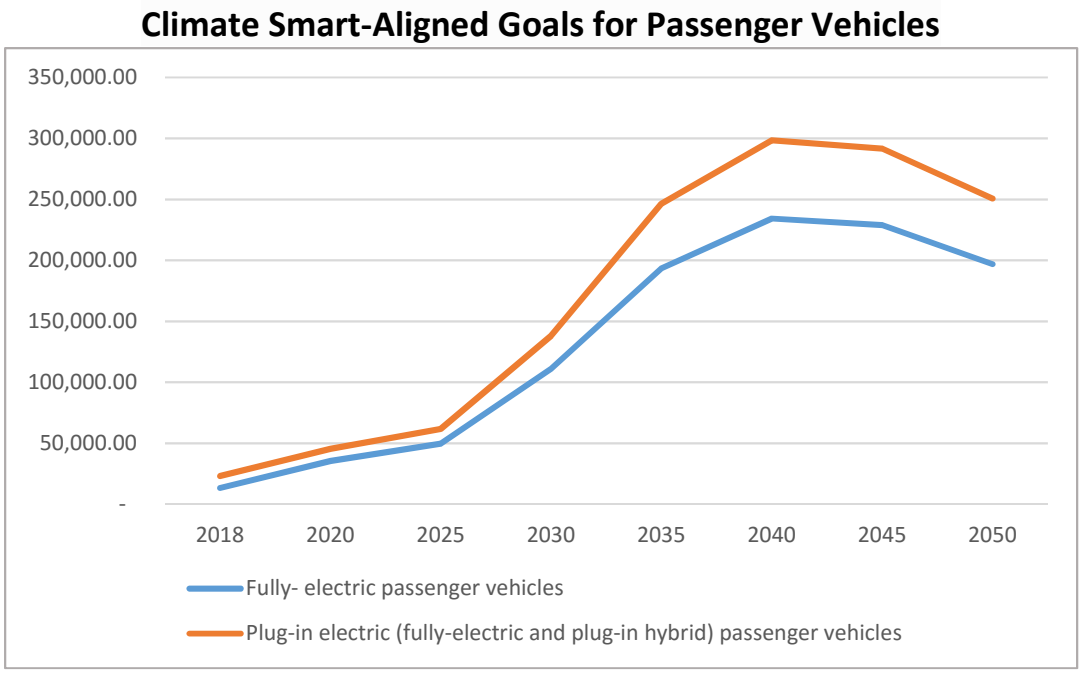
California's Electric Vehicle Market Development



Source*: California's Continued EV Market Development*, 2018, ICCT

To achieve its Paris-accord aligned emission targets, the City will need to substantially increase the number of electric vehicles registered in San José. As of October 2018, there were approximately 23,000 plug-in electric vehicles (fully-electric and plug-in hybrids) registered in the city, or 3% of all registered vehicles, based on California Department of Motor Vehicles (DMV) data.[xv] If you consider only fully-electric vehicles, the percentage was .6% or 13,297 vehicles.

By 2040, *Climate Smart* calls for nearly 13 times as many plug-in electric passenger vehicles in the city (298,446) and nearly three times as many (61,758) by 2025 .[xvi] The numbers begin to decline after 2040 reflecting an anticipated shift from privately-owned and operated vehicles to autonomous electric vehicles, both shared and personal. The graph that follows assumes that the current ratio of plug-in hybrids (43%) to fully-electric vehicles (57%) remains constant through 2050, which may not be the case.



Barriers to Electric Vehicle Uptake

Achieving these goals will require overcoming obstacles inhibiting rapid adoption of electric vehicles, principally cost, access to chargers, and awareness.

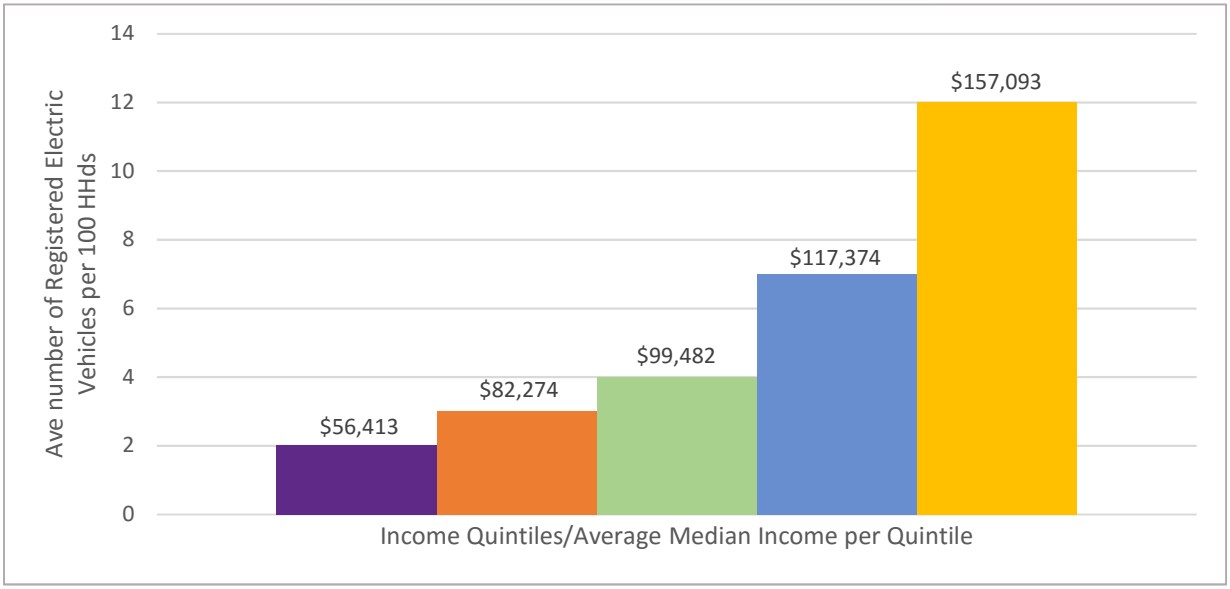
1. Cost and Concentration of Electric Vehicles

While the cost of operating and maintaining electric vehicles is much lower than conventional cars (less than half in California[xvii]), the upfront cost to buy them has been higher. So much so that both the federal and State government have offered financial incentives to make electric vehicles more cost-competitive. The federal government offers tax credits ranging from $2,500 to $7,500, depending on the size of the vehicle and its battery capacity. As of December 2019, California's Clean Vehicle rebate program offers buyers $2,000 to purchase a new fully-electric car; $1,000 for a plug-in hybrid. But, both programs have limitations. The federal tax credit declines sharply once a manufacturer has sold 200,000 electric cars, which happened to Tesla and General Motors in 2018. And, the California rebate program is so popular that it regularly runs out of money.

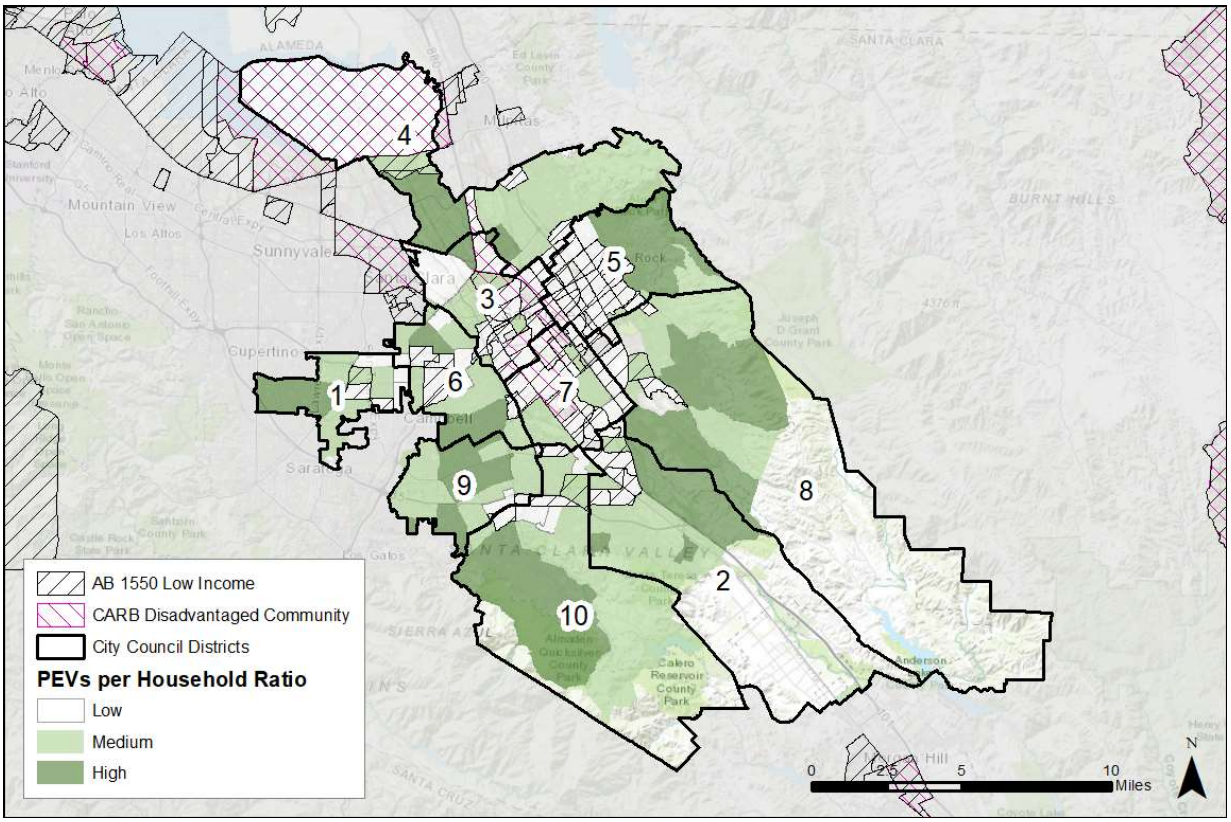
To date, electric vehicle purchases have been concentrated in higher income households. A 2017 UCLA study produced for the State on factors affecting electric vehicle sales found that between 2010 to 2014, "neighborhoods ranked in the top 25% by socio-economic status had purchased over 10 times more PEV [plug-in electric vehicles] than neighborhoods in the bottom 25%, a divergence that appears to be widening over time."[xviii] In 2017, three years later, that pattern was still evident. ICCT, a non-profit research institute, found that California cities with the highest rates of new electric vehicle sales, 15% or more, were generally among the wealthiest in the state.[xix] In 2017, Palo Alto had the highest electric vehicle share in California with 30% of the market, Saratoga had 24%, Los Altos had 22%. In contrast, 12% of new vehicle sales were electric in San José, a city that is more socioeconomically diverse. However,

distribution of electric vehicles *within* San José mirror the pattern ICCT observed between California cities.

Average Number of Registered Electric Vehicles in San José per 100 Households by Income Quintile



Ratio of Registered Electric Vehicles per Household



2. EV Infrastructure

Access to charging also inhibits the size and breadth of the electric vehicle market. Installing an electric vehicle charger is more easily accomplished in a single-family, owner-occupied home with a garage—the predominant housing stock in the City (64%)—than a multi-family and/or rental property. The 2017 UCLA study[xx] found that "Households' income, housing value, and the presence of single family homes have a very large and positive correlation with PEV sales. Other household characteristics that are positively correlated with PEV sales include household fleet sizes, the ability to charge at home, and commuting distance. On the flipside, a neighborhood's proportion of multi-family homes exhibited a negative correlation with PEV sales."

Thirty-one percent of San José's housing stock comprises multi-family (residential properties with two or more units, such as apartments, townhouses and condos); 43% are rental properties.[xxi] There are numerous obstacles to installing chargers in multi-unit dwellings, particularly those that are rental properties, including the cost of purchasing, installing and operating the charger, the cost to upgrade electrical capacity, space limitations in the electrical service room, and insufficient parking spaces.[xxii] For rental properties, there are additional complications, such as who should pay for the initial improvement and ongoing costs and where should the charger should be located: in a designated or shared parking space. Yet, electric vehicles would be a tremendous financial and environmental boon to low- to moderate-income families who own a car and live in these relatively more-affordable homes.

Within San Jose, 92% of households located in "disadvantaged communities"[xxiii] own a car, compared to 96% in the city at large. [xxiv] Disadvantaged communities are neighborhoods where residents face disproportionately higher economic, health and environmental burdens. Despite the additional cost, having a car can be the difference between having a good-paying job and not. Numerous studies have found that greater access to a car is associated with increased probability of employment and greater income.[xxv] However, low-income households generally own cars that are older, less reliable, less fuel efficient, and emit more pollution than vehicles owned by middle- and upper-income households.[xxvi]

Electric vehicles also produce no tailpipe pollutants, which is significant given that, African American, Latino, Asian and low income Californians are disproportionally exposed to more particulate matter from cars, trucks, and buses than other demographic groups, according to a recent study by the Union of Concerned Scientists.[xxvii] The science advocacy organization noted that "Californians living in households without a personal vehicle are also exposed to much higher levels of vehicle pollution than other households because they tend to live in urban areas surrounded by vehicle traffic."

Recognizing this inequity, the State has sought to target its policies and programs to expand access to electric vehicles, by, among other things, directing California's electric vehicle rebates exclusively to moderate and low income car buyers, increasing the rebate for lower-income buyers, offering buy-back incentives for older, high-polluting cars that can be used to buy or lease used or new EVs (or obtain transit passes), and installing EV infrastructure in disadvantaged communities. Despite all this, millions of California residents remain largely uninformed about electric vehicles.

3. Lack of Awareness

"The excitement among policymakers, automakers, and advocates as more PEV models enter the market place, more charging is installed, and more PEVs are sold each successive year is utterly lost on the vast majority of the car-buying public—even in California, touted as being among the global PEV market leaders," wrote UC-Davis researchers Ken Kurani and Scott Hardman in a blog post summarizing their recently published study on the state of electric vehicle markets.[xxviii] Their observations were drawn from five surveys of car-owning California households they conducted between June 2014 and June 2017 to assess consumers' awareness of plug-in electric vehicles (PEVs). "Californians are not deciding they don't want PEVs. Rather, they remain to a great extent unaware of PEVs and anything about them."

The solution, say Kurani and Hardman, is to measurably improve and expand efforts to inform potential electric vehicle buyers through social media, hands-on exposure to electric vehicles through means such as ride and drive events, incorporating electric vehicles into shared and rental vehicle services, and automobile dealer education and motivation programs.

The section that follows discusses the strategies the City is currently pursuing, and could pursue, informed by this analysis, to accelerate the electrification of transportation in a manner that extends its benefits to more San José residents.

Part 2: The Roadmap

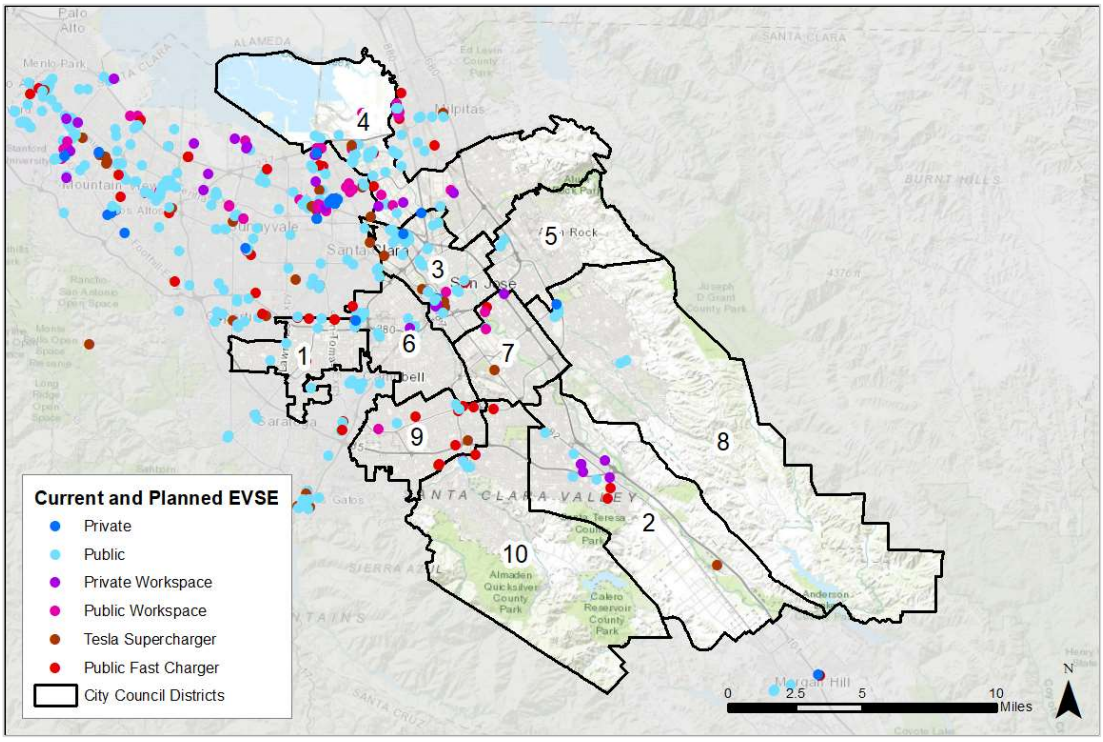
San José is already taking or has committed to take steps to promote the electrification of transportation. The data and strategic focus provided in this report seek to enhance those efforts.

A. Charging Infrastructure

Access to charging is essential to the growth of the electric vehicle market, whether personally-owned or shared, passenger or freight vehicles. Most owners who can charge at home, given its convenience and lower cost. For these drivers, non-residential charging (chargers located at workplaces, retail outlets, and at public facilities) reduce range anxiety, allow drivers to drive more miles powered by electricity, and to drive longer distances. For would-be electric vehicle drivers who don't have access to charging at home, non-residential chargers are a potential game changer. The value of non-residential charging may also increase with new electrical rate coming online.

The map below shows the current distribution of the City's 1,204 non-residential charging ports: 900 existing and 304 committed, but not yet installed. Ports are counted, rather than chargers, as many chargers have more than one port. The charging ports are either Level 2 (240 volt) or fast chargers (480 volt and higher).[xxix] The inventory is divided into six categories: private, public, private workplace, public workplace, fast charging ports, and Tesla's proprietary charger network.

San José Current and Planned Electric Vehicle Charger Ports

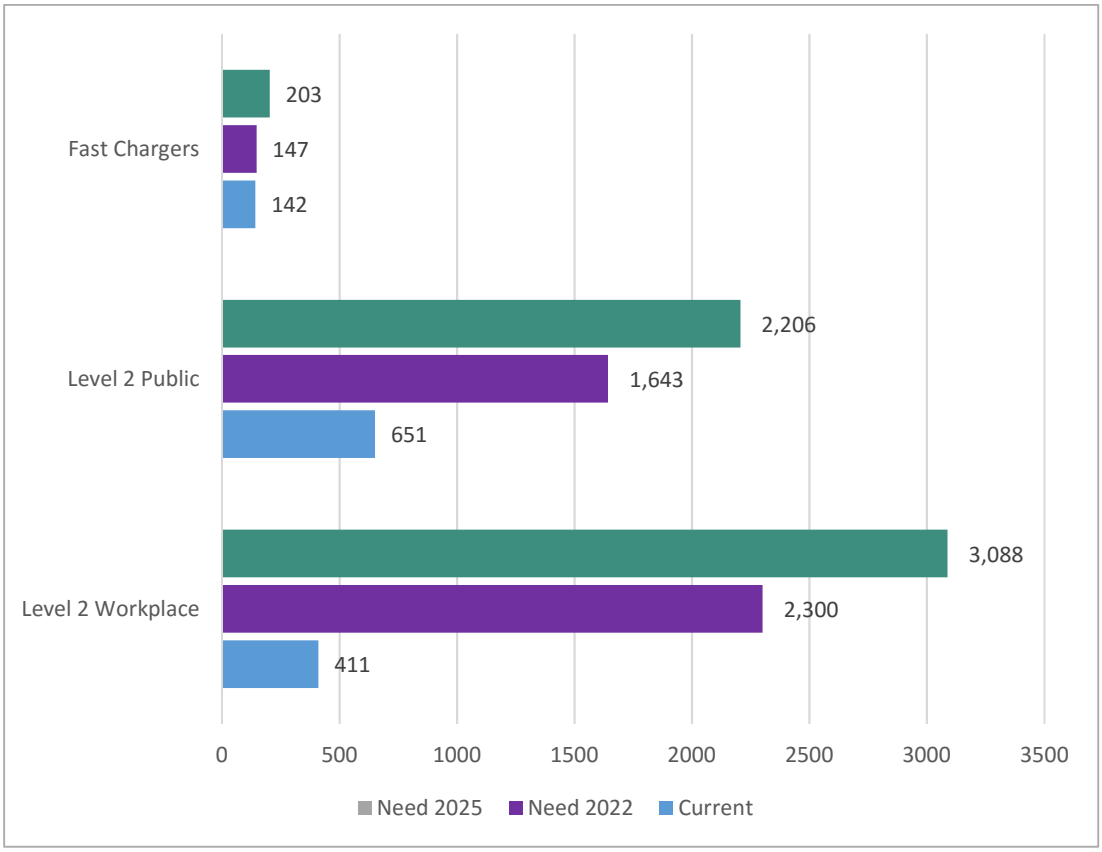


Source: Created by the Shared-Use Mobility Center using data primarily derived from DOE's Alternative Fuels Data

For Level 2 public chargers, the City's current ratio of electric plug-in vehicles (fully-electric and plug-in hybrid) per charger ports is 30 to 1. For fast charger ports, it is 105 to 1 if Tesla proprietary fast chargers ("Superchargers") are included; 359 to 1 if they are not.

Expert opinion varies on the ideal ratio of vehicles to charger ports. Using a conservative estimate developed by the California Energy Commission,[xxx] the City would need approximately one Level 2 workplace charger port per 20 plug-in electric vehicles and one Level 2 public charger port per 28 plug-in electric vehicles. Using ICCT's more recent and nuanced projections for fast chargers,[xxxi] the City would need one fast charger port per 245 fully-electric vehicles. Based on these ratios, the City needs a total of 5,496 charging ports by 2025 and 4,091 by 2022.

San José Projected Charger Ports Need by Type



These projections are based on the assumption that most charging will continue to occur at home. However, Pacific Gas and Electric (PG&E) and San Jose Clean Energy, are about to adopt electrical rates that may make daytime, non-residential charging more attractive.

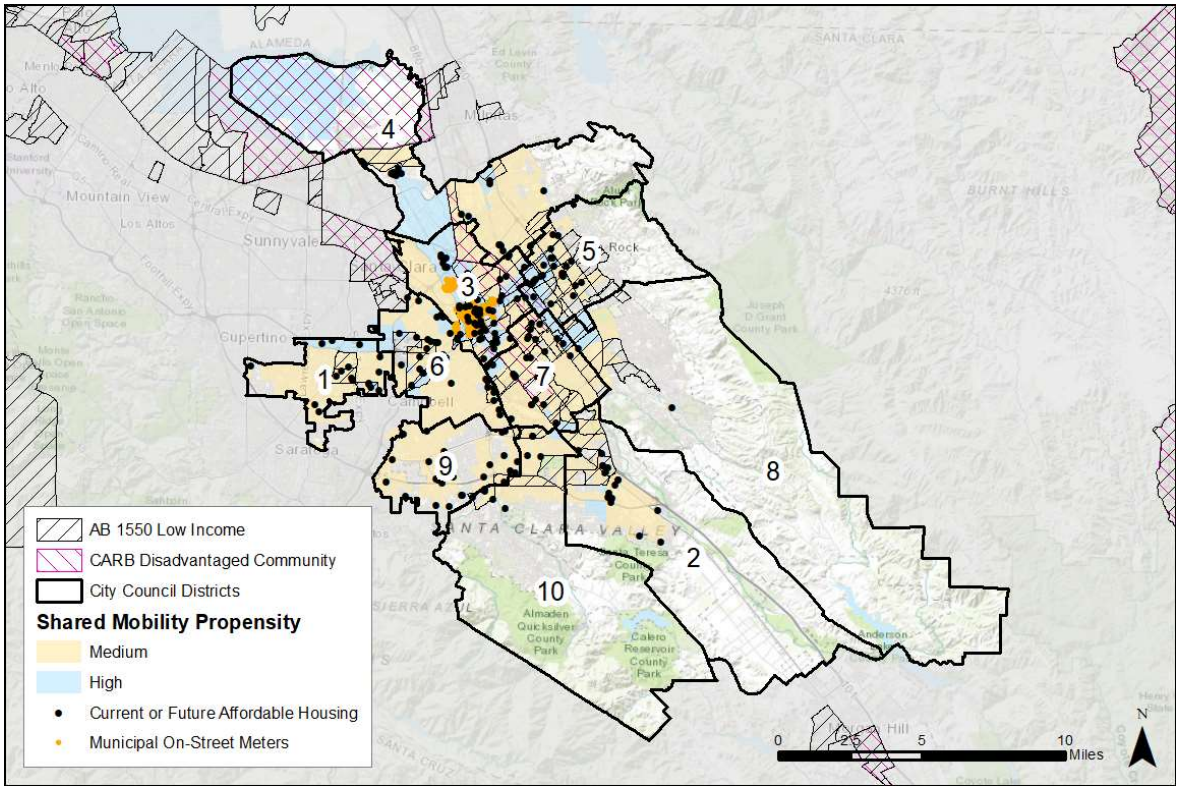
At the direction of the State, starting in late 2019 PG&E began implementing new rates that shift the peak period—when electricity is most expensive to generate, and hence buy—from afternoon (noon to 6 pm) to evening (4 pm to 9 pm). Off-peak (the cheapest electrical rates) will be between 9 pm and 4 pm for residential customers; 11 pm and 2 pm for non-residential customers.

The change was instituted to encourage residents to change their electricity consumption habits. Currently, electrical demand surges in the early evening when most residents come home from work and flip on the lights, turn on their air conditioner, do laundry, and charge their electrical devices, including their electric vehicles. The demand occurs just as renewable energy resources, such as solar, typically go off line. This sharp surge in demand strains the grid and increases costs for utilities and ultimately their customers. By reducing rates in the late evening hours and during the day, the utility, and the CPUC which approved the rates, hopes to reduce peak demand in the early evening hours and make better use of its expanding supply of solar energy during the day.

The new rates are likely to make non-residential chargers (those located at workplaces, retail businesses, and public facilities) competitive with home rates, which could significantly expand options for those unable to charge at home---so long as there are enough chargers, of the right type, in the right places.

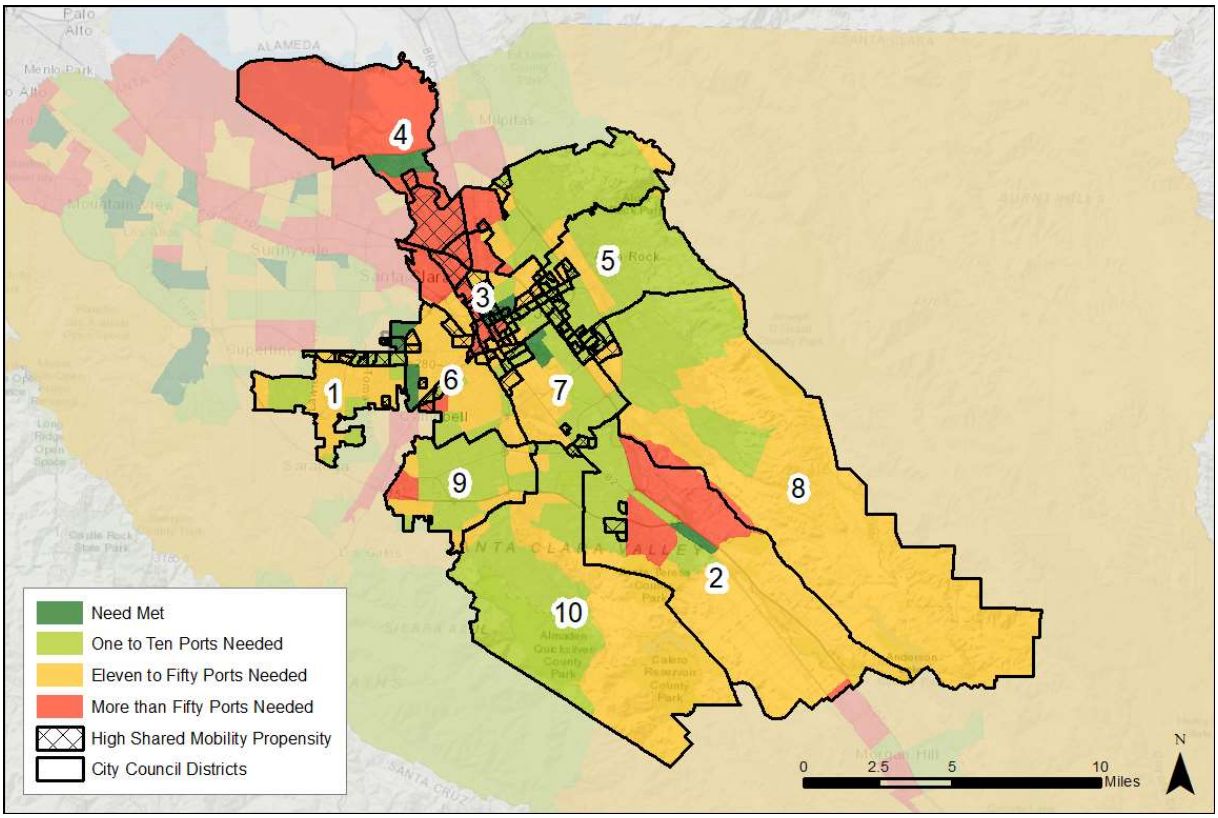
The following maps identify areas in San José where there is strong potential for shared mobility services and where more non-residential, Level 2 charging ports are needed to expand access to electric vehicles.

San José Shared Mobility Propensity



Source: Shared-Use Mobility Center. Projections based on estimated commute-related charging demand.

2025 Projected Demand for Non-Residential L2 Charging



Source: Shared-Use Mobility Center

ACTIONS: CHARGING INFRASTRUCTURE

Currently Underway

Funding: Electric Vehicle Charger Network program

The City is participating in PG&E" Electric Vehicle Charger Network (EVCN) program, which will result in the installation of 112 electric vehicle charger "ports" at five City facilities: Happy Hollow Park & Zoo, two San Jose Police Department parking lots, the Mabury Service Yard, and the South Service Yard. Under the EVCN program, PG&E will pay the costs required to provide power to clusters of Level 2 chargers installed at these facilities as well as a portion of the cost for the City to purchase the chargers. Construction is expected to begin in early 2020.

1. Partnerships: Electrify America

As part of its 2016 diesel emissions settlement with the State of California, the Volkswagen Group of America agreed to invest $800 million over 10 years to support EV adoption in California. In its first 30-month investment plan (Jan. 2017-June 2019), Electrify America, a Volkswagen affiliate managing execution of the settlement agreement, installed 17 EV chargers at five sites in San José. Three fast chargers (50 kW or 150 kW) were installed at each of the locations; two sites also included one Level 2 charger. In its second 30-month investment plan

(July 2019-Dec. 2021), Electrify America intends to install more charging clusters in the San José metro area. The company has said it will likely install more fast chargers in the city, but the location and number have not yet been made public.

2. Electric Vehicle Reach Code

It is much less expensive—by some estimates 50-80% less[i]—to install the infrastructure needed to support electric vehicle charging when a new building is built, rather than retrofitting it afterwards. To begin to address this, on September 17, 2019, San José's City Council approved an electric vehicle reach code—one that goes beyond the state's basic requirements—that requires new residential and non-residential construction to provide for the immediate or eventual installation of electric vehicle chargers.

Under the new code, builders would need to provide one electric vehicle "ready" space for every dwelling unit in single-family, duplex, and townhouses. Ready parking spaces have all of the electrical equipment and wiring installed to support an electric vehicle charger, but the charger has not yet been installed. The only exception will be for homes that have a detached private garage without electrical services. In non-residential developments, builders will be required to install everything including the electric vehicle chargers for 10% of the on-site parking spaces. Forty percent of the remaining parking spaces will be required to be electric vehicle charging "capable." In other words, the builder would lay the groundwork for future installations by providing sufficient physical space in the building's electrical service panel for circuit breakers and installing appropriately-sized conduit between the service box and the parking space through which wires could later be run. All new multi-family buildings must include: 70% electric vehicle capable spaces; at least 20% electric vehicle ready spaces: and at least 10% electric vehicle supply equipment spaces. The code provides a hardship exemption for permanent supportive housing and housing built for up to 30% area median income. The electric vehicle reach code is part of a larger set of Building Code revisions that will go into effect on January 2020.

3. Streamlining Review Process

In accordance with AB 1236, which was signed into State law in 2015, the City adopted an ordinance, drafted by the City's building division, that specified requirements for electric vehicle charging stations and streamlined the permitting process. As a result, residents can complete the entire permitting process for an electric vehicle charger online. While companies seeking to install chargers on commercial/industrial or multi-family properties do not have that option, many plans can be approved over the counter and those that cannot, get an expedited review. The City's streamlined permitting and plan review process is highlighted in a May 2019 bulletin, Electric Vehicle Charging Stations,[xxxii] that clarifies what information the City needs to issue a permit.

Committed, But Not Completed

1. Adopt Time of Use Rates

In fall 2019, San José Clean Energy (SJCE) secured City Council approval to implement residential time-of-use (TOU) rates that mirror those adopted by PG&E earlier in the year. SJCE is currently analyzing PG&E's more commercial TOU rates to determine whether to request the Council's approval to adopt it as well. That rate was made available to PG&E customers on an opt-in basis in November 2019.

2. Engage community to identify appropriate locations within priority areas to install chargers.

A number of the priority areas identified in the SUMC analysis are in disadvantaged communities, communities that are predominately low-income and people of color. Increasing the share of electric vehicles in these neighborhoods, which are frequently located next to congested roadways, would significantly reduce air pollution and associated adverse health impacts, such as asthma and cancer, which disproportionately impact these communities. However, care will need to be exercised to ensure that the installation of chargers does not exacerbate displacement and that the chargers and services they support meet the needs of area residents. To accomplish this, staff intends to conduct extensive community engagement in the City's communities of concern, beginning in 2020, with the support of Caltrans' Sustainable Communities grant.

3. California Electric Vehicle Infrastructure Project (CALeVIP)

In October 2019, San José Clean Energy (SJCE) secured Council approval to participate in the state's California Electric Vehicle Infrastructure Project (CALeVIP). SJCE -- along with Silicon Valley Clean Energy, Peninsula Clean Energy, City of Palo Alto Utilities, and Silicon Valley Power-- submitted a proposal to CALeVIP in February 2019 to create a regional electric vehicle charger incentive program. CALeVIP, which is funded by the California Energy Commission (CEC), works with local partners to develop and implement EV charger incentive projects that meet regional needs for Level 2 and Direct Current (DC) fast chargers. The five local entities provided matching funds to leverage the State's greater resources to fund the regional program. In August 2019, the CEC approved the region's proposal. Together with the City's $4 million match, San José secured $14 million from the program to support the installation of electric vehicle charging equipment. In Spring 2020, owners of office buildings, shopping centers, apartment buildings, condo and townhouse complexes in San José will be able to apply for funding to install chargers on their properties. The funds cannot be used to install chargers in single-family homes. The City also plans to seek funding to install chargers on public properties to expand access to charging to more residents.

Recommended Actions

1. Adopt and Implement Electric Vehicle Electrical Rate

The California Public Utility Commission (CPUC) is considering a commercial electric vehicle rate proposed by PG&E that would eliminate demand charges. This would significantly reduce the City's operating costs for its chargers. Assuming the CPUC approves the new rate, SJCE will likely seek Council approval to adopt a similar rate. If adopted, the City should determine which facilities would be most advantageous to switch to the new rate and exercise that option. The City should also educate other non-residential property owners about the availability of this rate as part of its efforts to install more chargers in priority locations.

2. Designate City Electric Mobility Infrastructure Leads

The Department of Transportation and Public Works will coordinate future City electric vehicle charger installations, in consultation with other City departments, to ensure that installations align with the priorities identified in the *Roadmap*.

3. Establish an Electric Vehicle Charger Fund

The City currently owns and manages 63 electric chargers that are used by the City's fleet, employees, and the public. Given that usage of these chargers is increasing, power upgrades and additional chargers will be needed. The CALeVIP program will be an invaluable to help meet that demand. However, there are funding limits under this program. The program provides up to approximately $4,000 per port for all costs associated with purchasing and installing Level 2 chargers. There will be instances when the City will need to augment those funds to install chargers in priority locations where costs are higher than the CALeVIP allotment due to necessary power upgrades or extensive trenching. For the next two years, during the term of the CALeVIP program, staff recommends that the City establish a budget for this purpose.

4. Explore opportunities to establish charging hubs for micro-mobility services

Explore the possibility of establishing electric bike charging docks at ideally 10% of the City's stationary bike share stations, or approximately eight of its stations. This would eliminate the laborious process of swapping out the bike batteries as they are exhausted. Look for opportunities to work with the City's e-scooter companies to site electric charging e-scooter parking corrals. The corrals could be located in an underutilized areas near building entrances, next to existing bike racks or in a re-purposed parking space. Creating a clear, visible parking place for the scooters would reduce the number left in locations that impede walking or create hazards for people with disabilities. It would also reduce the need for operators to regularly collect and take the scooters off-site to charge them.

5. Monitor and Improve Electric Vehicle Reach Code

The City should review its Electric Vehicle Reach Code at the end of 2020 to determine how well the code is working and if revisions are warranted. The City could also consider the possibility of extending its requirements to include property owners who make major renovations to their buildings. The electric vehicle reach codes adopted by Santa Monica and San Francisco require building owners who make major renovations to their buildings to meet the standards applied to newly constructed residential and commercial buildings.

6. Provide Technical Assistance

Many small businesses, landlords, and low-income homeowners might be interested in installing an electric vehicle charger, but don't know how to go about it and what grant funding might be available to help them. The City should explore the possibility of establishing a technical assistance program, perhaps in partnership with other organizations, to help building managers and homeowners install electric vehicle chargers.

7. Establish More Private Partnerships

The City should partner with private firms interested in expanding the supply of electric vehicle chargers to ensure that chargers are installed in high priority areas where the City does not own property.

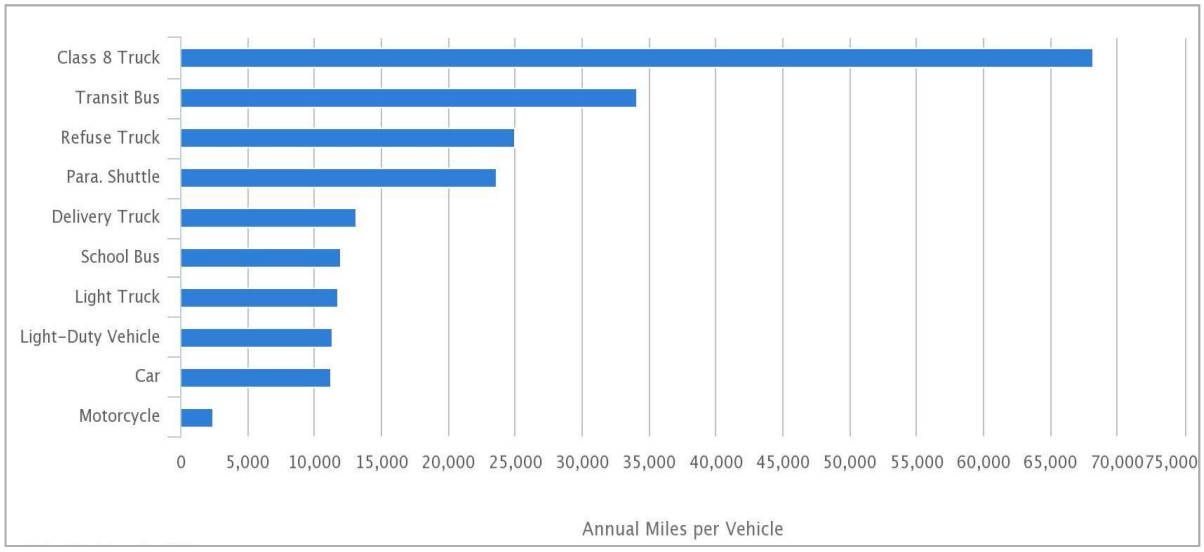
8. Wayfinding

Develop wayfinding/branding and signage standards for electric vehicle charging infrastructure.

B. Fleet electrification

Passenger vehicles are an important area of focus given that they represent a significant portion of the total vehicle stock. However, fleet vehicles--which include school buses, transit buses, shuttle buses, public and private fleets, taxis, and freight vehicles-- account for far more vehicle miles per year than the average passenger vehicle, as illustrated in the figure below.

Average Annual Vehicle Miles Traveled by Major Vehicle Categories



Source: US DOE Alternative Fuels Data Center

There are several factors that make converting fleet vehicles simpler than passenger vehicles, so long as there are vehicle models on the market that meet operators' needs. For example, fleet purchases are typically made by people who have the expertise, responsibility, and time to

learn about new technologies, such as electric vehicles, that might improve their organization's operations. Their purchasing decisions are likely to involve large numbers of vehicles. And, their decisions are typically driven by economic factors. Although cost is a factor for individual buyers, experts have found that consumers' purchasing decisions are powerfully influenced by their emotions, environmental clues, and how options are represented to them.[xxxiii]

California has made public and private fleet conversions a priority. In December 2018, the California Air Resources Board adopted a first-of-its-kind regulation that requires public transit agencies around the state to transition to 100 percent zero-emission bus fleets by 2040. The same year, the CPUC authorized the state's largest utilities to offer programs to help fleet operators in their territories convert their medium and heavy duty vehicles to zero emission vehicles. Private businesses and public agencies can also get rebates from the California Clean Vehicle Rebate program to convert conventional fleet vehicles to a plug-in electric or fuel cell vehicle. San José has taken advantage of this program to replace a number of its gas-powered fleet vehicles.

In fact, for more than a decade, San José has taken proactive steps to green its fleet as a means of reducing greenhouse gas emissions. In 2007, the City adopted its Green Fleet Policy, which committed the City to purchase vehicles and heavy duty equipment powered by lower emission fuels, such as natural gas, propane, ethanol, biodiesel and electricity. The City's *Green Vision*, a 15-year sustainability plan adopted later that same year, committed the City to, among other things, "Ensure that 100 percent of public fleet vehicles run on alternative fuels." By early 2018, when the City adopted *Climate Smart*, 45% of the City's fleet was "alternatively fueled." An increasing proportion of the mix had shifted from compressed natural gas, bio-diesel and gas-hybrids to plug-in electric vehicles. As of August 2019, 53% of the City's 215 non-police sedans were electric—either plug in hybrid electric or fully-electric. The City's standard replacement for sedans and SUVs are now fully-electric models.

Other fleet operators are also switching to electric vehicles.

- In 2018, the Valley Transportation Authority purchased five new, fully-electric buses, consistent with California's requirement that all transit fleets gradually transition to zero emission by 2040.
- In May 2019, the San José Mineta International Airport commissioned a fleet of 10 electric shuttle buses. The free shuttles transport passengers and their luggage between the airport parking lots, rental car garage, and terminals.
- U.S. is far behind Europe and Asia in electrifying goods movement, but there are signs that U.S. freight haulers are beginning to take notice of electric freight trucks as their costs have declined to the level of conventional trucks. In the last year, UPS, Amazon, Walmart, and PepsiCo have all placed orders for electric freight trucks.

The City will want to monitor and encourage this trend, at minimum by serving as an example.

ACTIONS: FLEET

Currently Underway

1. Electric Shuttles at San José Mineta International Airport

The Airport's 10 electric shuttle buses are transporting passengers and their luggage between the airport parking lots, rental car garage, and terminals. The electric shuttle fleet is the first at a California airport and among the largest at a U.S. airport. The Airport intends to expand its electric shuttle bus fleet in 2020.

2. Partnering to Expand Valley Transportation Authority (VTA)'s Electric Fleet

To help accelerate VTA's efforts to go electric, the City and two affordable home developers, in partnership with VTA, secured two grants from the Affordable Housing and Sustainable Communities (AHSC) program in 2019. Each awarded grant includes $2 million to enable VTA to purchase four more electric buses. The buses are one of a number of improvements, including bikeway, pedestrian and urban greening projects, that the City and its partners will make to reduce emissions and build affordable housing developments. The benefits of VTA's electric bus purchases include lower operating cost for the agency, cleaner air, and less noise for those who ride or live along its bus lines, and the potential for new employment opportunities associated with this growing industry. All of VTA's first batch of electric buses have been deployed on Route 77, which runs on King Road between Eastridge Mall in east San José and the Great Mall in Milpitas, serving a number of lower-income neighborhoods.

3. Caltrain Electrification, California High Speed Rail and BART extension

Caltrain is well into its process of electrifying the heavily-utilized commuter rail line between San Francisco and San José's Tamien Station. Electric trains are expected to begin service in 2022; the entire electrification process is expected to be completed by 2040. The conversion offers a number of benefits: it will reduce greenhouse gas emissions and noise pollution, and improve overall system performance by enabling Caltrain to offer more frequent, faster train service. Currently, Caltrain operates four trains an hour during the peak periods, between San Francisco and Diridon station. By 2022, when the electric trains come on line, Caltrain staff have projected an increase to five trains an hour. By 2040, staff anticipates that will increase to eight trains per hour during the peak, six during off-peak. The improvements also support the ability of California's High Speed Rail system to share Caltrain's tracks, as that system is also electric-powered. The two train services will offer a blended service between San José and Tamien, and possibly Gilroy, depending on the outcome of negotiations currently underway between California High Speed Rail and Union Pacific Railroad. The railroad owns the tracks Caltrain uses south of Tamien Station. San José staff have been deeply involved in the Caltrain and High Speed Rail planning process since their inception, given the importance of increased transit

service to San José as well as the physical impact of the proposed improvements to Diridon Station and the neighborhoods surrounding it. The planned BART extension to downtown San José will also bring more electric-powered trains to the City, starting with the anticipated opening of the Berryessa Station in late 2019. The City will continue to be a key player in all of these projects as they progress.

Committed, But Not Completed

1. Electrify and Expand Regional Rail

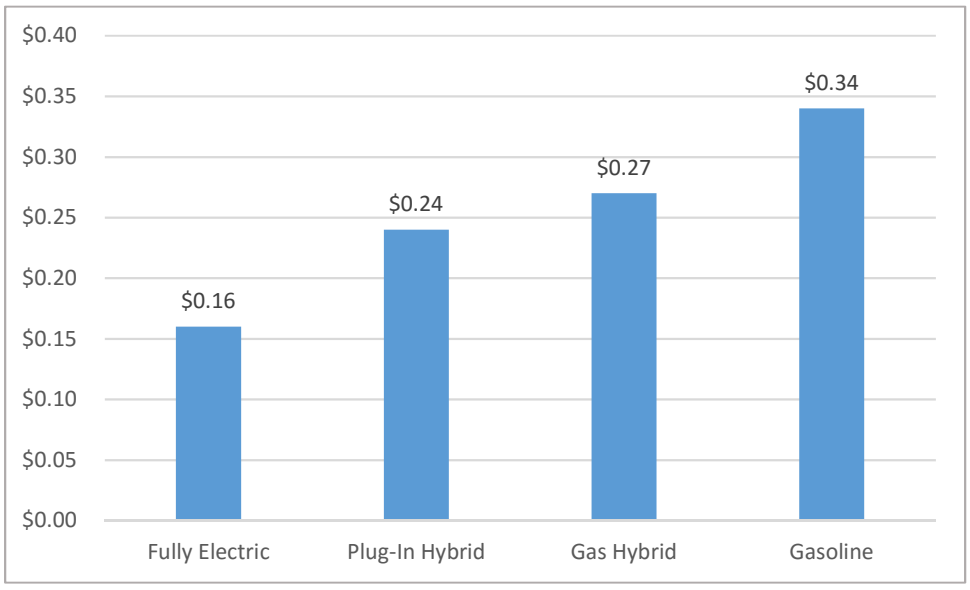
San José plans to create a Rail Corridor Plan with its regional rail partners: VTA, California High Speed Rail, Caltrain, Altamont Commuter Express, and Capital Corridor. The Plan would determine where additional railroad track, railyards, and grade separations are needed to improve commuter rail service frequency and speed, as well as interfaces with and improvements to neighboring communities. The City intends to initiate this effort in 2020.

Recommended Actions

1. Convert the Remainder of San José's Non-Police Fleet to Electric

The cost per mile to operate and maintain the City's fully-electric vehicles is less than half that of its gasoline-powered sedans. The disparity is due to the higher operating efficiency of electric vehicles as well as the high percentage of older vehicles in the City's fleet: replacements deferred as a result of a decade of General Fund budget shortfalls. Twenty-nine, or 13%, of the City's 215 non-police sedans are more than 15 years old; standard industry practice is to replace vehicles after ten years of service. Not only are these older vehicles less fuel-efficient, they are also less reliable and harder to maintain as parts are more difficult to acquire.

San José Cost Per Mile by Vehicle Type



A wide variety of electric sedans currently on the market can meet the City's non-police fleet requirements, with more to come in 2020. By 2021, the City should replace all of its non-police sedans that are 10 years or older. That would include all 32 of its gas-powered sedans as well as 57 of its 61 gas-hybrid Prius': a total of 89 vehicles. Doing so would make 98% of the City's non-police sedans[xxxiv] plug-in electric, 69% of those fully-electric.

The cost of making the conversion, assuming an average cost of $35,000 per car with an average rebate of about $2,500 per vehicle would be $2.9 million. That's nearly twice the $1.5 million allocated for general fleet replacement in the 2019-20 budget. However, that cost estimate could be reduced through a bulk purchase, possibly through the Climate Mayors Electric Vehicle Purchasing Collaborative or one the City could organize. First-year operational and maintenance savings would be $79,000.

The City will need to expand its charging infrastructure to support this expansion of its electric vehicle fleet. A portion of the need may be satisfied through the PG&E Electric Vehicle Charger Network and the CALeVIP programs.

2. Develop an Emergency Response Strategy for the City's Electric Fleet

San José is in the process of developing a Power Vulnerability Plan to prepare for PG&E public safety power outages. As part of its overall emergency planning efforts, the City should conduct a thorough assessment of how the City's expanding electric fleet could pose risks as well as create opportunities to boost the City's resilience. For example, the City should investigate the possibility of installing solar power and battery storage back-up systems and connecting the City's chargers to existing emergency generators in strategic locations. As more of the City's larger vehicles – shuttle buses and heavy-duty trucks—are replaced with electric versions, the City could use these vehicles, and their large battery packs, as mobile electric backup generation sources for the City's critical load facilities.

3. Battery Recycling Pilot

Until recently, recycling and repurposing electric vehicle batteries simply wasn't economical. But a global boom in electric vehicle sales in the last two years has inverted that calculus. Between 2016-2018 the price of lithium tripled and cobalt quadrupled. New green chemistry extraction methods are making it cleaner and easier to extract these and other valuable materials. Companies have started to invest in recycling and repurposing EV batteries. Instead of 3-5% of batteries being recycled, experts are anticipating 58% will be recycled in 2019.

Batteries for electric cars typically need to be replaced after 10 years. However, these batteries still have 60-80% of their charge left at that point. Energy storage, and particularly for renewable energy, is one of the primary uses being tested for repurposing these batteries. But companies, universities and public agencies are pursuing a variety of other creative applications, including backup power for elevators and streetlights; as a peak shaver for large

facilities, such as stadiums; and electric bike batteries. The City should explore opportunities to test repurposing vehicle batteries for critical applications, such as providing back up power for emergency services during a public safety power shut-off or blackout.

4. Seek to Accelerate the Electrification of Urban Freight

In the short term, experts say short-haul, urban routes are the best places to start replacing conventional freight vehicles with electric ones. There are resources available to facilitate this effort, including PG&E's EV Fleet program. Under the program, PG&E will cover the cost to upgrade power and a portion of the cost for fleet operators to install chargers to help them convert their medium and heavy duty vehicles to electric vehicles. The Bay Area Air Quality Management District is also offering a variety of incentive programs to encourage the purchase or lease of light and heavy-duty fleet vehicles. The City could reach out to local fleet and freight operators to ensure they are aware of these programs and to determine if there are other obstacles that stand in their way that the City could help address.

5. Promote Electric-Powered Cargo Bikes

The City could also promote the use of electric-powered cargo bikes in the City's more urban areas as a more efficient and less-intrusive alternative to large trucks or automated drones and/or robots. In October 2018, UPS and the City of Seattle launched an e-cargo bike pilot in the city's downtown, the first of its kind in the nation. In April 2019, the United Kingdom's Department for Transport announced a new $2.6 million fund to help companies invest in electric cargo bike for last-mile deliveries.

6. Update the City's Green Fleet Policy

Update the City's Green Fleet policy to reflect the City's current goals, particularly as they relate to *Climate Smart.*

7. Pilot Test New Electric Vehicle Fleet Applications

Continue to monitor the market for new varieties of electric vehicles and pilot test those that might be able to meet the operational requirements of the City's medium and heavy-duty fleet and its approximately 800 police vehicles. Make use of programs such as PG&E's medium and heavy duty charging infrastructure program to support those replacements.

8. Private fleet conversion

Reach out to private fleet operators to identify ways the City might encourage private fleets to convert to zero emission vehicles.

C. Personal Vehicles:

Replacing passenger vehicles powered by fossil fuels with electric vehicles is a powerful means of reducing transportation-related greenhouse gas emissions. However, to date electric vehicle adoption rates have been relatively low and concentrated among those living in higher income households in single-family neighborhoods. Many lower-income families cannot afford a new car, let alone the higher price of an electric one. Yet, electric vehicles could have a powerful positive impact on low-income communities disproportionately impacted by harmful air pollution. The lower operating and maintenance costs of electric vehicles could also lighten the housing/transportation burden faced by many residents.

ACTIONS: PERSONAL VEHICLES

Currently Underway

1. Ride and Drive

In an effort to expand awareness about electric vehicles, San José Clean Energy (SJCE) is planning to organize at least one ride and drive event in fall 2019. If that is successful and budget is available, it will likely organize additional events in 2020. Ride and drive events are considered particularly effective at exposing more people to electric vehicles, enabling them to experience an electric vehicle and get their questions answered in a no-pressure setting.

2. Website

SJCE has posted information on its website (www.sanjosecleanenergy.org/ev) about electric vehicles, including existing incentives for purchasing a new or used electric vehicle and programs specifically targeting lower-income consumers. It also includes links to cost saving calculators designed to help would-be buyers determine what make and model of car, and electrical rate, would work best for their needs based on their budget and usage. SJCE intends to make this information available in multiple languages.

Committed, But Not Completed

1. Dealer Education Program

As the first point of contact for most electric vehicle buyers, auto dealerships are a key partner in San José's effort to increase electric vehicle uptake. Yet, studies have shown that many auto sales associates are uniformed about electric vehicles and thus are not in a position to answer buyers' questions about them. High turnover of sales associates and an incentive structure that rewards high sales volume, also inhibit electric vehicle sales, as these deals typically take much more time and effort to close.[xxxv] Staff plans to reach out to the City's auto dealerships and possibly auto manufacturers to explore the potential of partnering with them on an education, training, and incentive program that would boost electric vehicle sales.

Recommended Actions

1. Technical Assistance and Incentive Program for Low- and Moderate-Income Buyers

Currently, there are approximately 50 models of plug-in electric vehicles available from more than a dozen brands in a range of sizes, styles, and prices. Manufacturers are promising an even wider selection in 2020, including more SUVs and light duty trucks. More used electric vehicles are becoming available for lease or purchase. Sifting through all of the options can be overwhelming. Some communities are offering technical assistance to help potential buyers, particularly low- and moderate-income buyers, consider their options and determine the type of car that would best meet their needs, at a price point they can afford, and to secure favorable loan terms. For example, Peninsula Clean Energy partnered with Peninsula Family Service, a San Mateo County social service agency, to offer a $4,000 incentive and affordable loan terms to low- and moderate-income area residents to purchase a used plug-in hybrid electric vehicle. The City could explore the possibility of creating a similar program.

2. Discount group electric vehicle buy or lease program

Many local governments around the country are organizing group discount electric vehicle buy or lease programs to raise awareness about and promote the adoption of electric vehicles. These programs harness the buying power of the community to negotiate a time-limited discount from local car dealerships on the purchase or lease of electric vehicles. The lead agency coordinates a marketing and outreach campaign to educate the public about the benefits of electric vehicles and the availability of the discount.

The cost to mount a group buy is fairly-low, but the benefits can be significant. In 2015, several local governments in the Denver metropolitan area organized a group buy on solar panels and new electric vehicles. The agencies partnered with a Nissan LEAF dealership, which offered a deep discount on its vehicles. The program was offered for four months and resulted in a significant increase in Nissan sales; more than triple from the prior year in Boulder County, where the Nissan dealership was located. Based on a survey of program participants, only 28 percent of electric vehicle purchasers said they had already been planning to buy an EV before they heard about the program.[xxxvi] Sonoma County Clean Power has operated a similar program for the last three years that enabled their customers to receive "a combination of incentives, dealer discounts, and manufacturer discounts of up to $13,000 towards the purchase or lease of an electric vehicle or plug-in hybrid."[xxxvii]

D. Shared Mobility

As noted earlier in this report, the City will be unable to reach its greenhouse gas emission targets solely by shifting from conventional to electric-powered vehicles. To the extent that land use decisions continue to prioritize the movement of cars over people, it significantly constricts the City's ability to foster a more robust, affordable, and reliable transportation system that enables all to get where they want to go, when they need to get there, without requiring a car. It also perpetuates inequity. Those who own a private vehicle have access to greater opportunities: better paying jobs, health care and education. Those who don't, do not.

ACTIONS: SHARED MOBILITY

Currently Underway

1. Expanding E-Micro-mobility

San José offers shared bikes and scooters (shared micro-mobility), a significant portion of which are electric-powered. People have taken approximately three million trips on these services in San José to date.

- **Bike Share**: San José is a participant in a regional bike share program that launched in 2013. San José's program has grown from 16 stations (and 130 bikes) to 72 stations (800 bikes) as of August 2019, with plans to add another 11 stations by early 2020 (for a total of 1,000 docked bikes). The City is also adding dockless electric-assist bikes to its fleet. By late 2020, the City should have approximately 1,000 dockless e-bikes. The new electric-assist bikes make it easier for riders to ride longer distance s and up hills. A built in lock also allows riders to park the dock-less bikes outside of the bike stations, vastly increasing their flexibility of use. Lyft, which owns the bike share service, offers "Bike Share for All" —discounted membership and usage fees for those who are low income (a one-time $5 Annual Membership and $5/month in the second year). Membership allows users to ride free for the first 45 minutes of each trip. No credit or debit card is required to use the program and payments are Clipper card compatible.

- **E-Scooters**: E-scooters began appearing in San José in February 2018, which led the City to adopt a micro-mobility ordinance by the end of that year. The permit enables the City to monitor, manage, and evaluate the service being provided by the e-scooter companies permitted to operate in the City. As of September 2019, the City had issued micro-mobility permits to six companies to operate a total of 5,500 scooters in San José. As a condition of their permit, the companies are expected to place 20% of their scooters in disadvantaged communities and offer discounted memberships and usage fees to low-income residents. Scooter companies are also required to develop technology that can effectively prevent the scooters from being ridden on the sidewalk in high-pedestrian areas.

2. Better BikewaysSJ and bike network expansion

As of January 2018, the City had built 450 miles of on- and off-road bikeways and is on track to meet its 2020 bikeway goal of a 500-mile network. The City is also installing protected bikeways

on some of its roadways to make it even safer, more convenient, and more comfortable to bike and use a scooter. With simple design changes like protected bike lanes on wide streets, protected intersections at busy crossings, and traffic diverters on small streets, the City is encouraging people on bikes and scooters to get off the sidewalk and onto the bike lane, freeing up space for walking and reducing crashes and close calls.

Committed, But Not Completed

1. Electric-shared car or ride-hail mobility pilot program

Through its participation in the American Cities Climate Challenge, the City has committed to developing some type of electric, car-share or ride-hail mobility pilot in the next year. As of this writing, the City is still in the information-gathering stage and plans to initiate conversations with one or more neighborhoods in early 2020 to determine where, how and what type of service might be useful. The State has funded several e-shared mobility pilots that have already and will continue to provide useful insights. Three are testing ways to integrate electric vehicles into shared mobility programs geared toward lower-income residents and communities of color. The fourth is developing mobility hubs in affordable residential developments that will likely include share electric services of some kind:

- **Los Angeles E-car share:** Los Angeles' BlueLA is a fully-electric vehicle car-sharing program primarily offered in lower income neighborhoods in Central Los Angeles. Users pay a $5 monthly membership fee and 20 cents per minute to use the vehicles. Low income residents pay $1/month and 15 cents per mile.

- **Sacramento E-car share** (two models): In May 2017, Sacramento County launched a station-based community car share program that placed fully-electric vehicles in a handful of affordable housing complexes. That program became the model for a second station-based electric car-share program in the City of Sacramento supported with funding from Electrify America, the Volkswagen subsidiary managing the company's emissions scandal settlement funds in California. The new program serves 70 low-income apartment complexes with 140 fully-electric Volkswagen e-Golfs operated by Envoy Technologies. Electrify America also funded a second electric vehicle car share pilot in Sacramento as a free -floating (or one-way) program. This one is in partnership with GIG car share, a service offered by AAA Northern California, Nevada and Utah. The program will offer as many as 260 electric vehicles, depending on demand. Residents can pick up and drop off cars within a 13 square-mile "home zone" that includes the central city area as well as several neighborhoods to the south and east. More than 50 percent of Gig's Sacramento home zone falls within disadvantaged and low-income communities.

- **Huron Green Raiteros E-ride-share program:** Green Raiteros uses a shared fleet of electric vehicles and volunteer drivers or "raiteros" to provide a ride-hailing service that connects the predominantly Latino and farming city of Huron to services in Fresno, including the Community Regional Medical Center. Previously, the only available public transit option was a three-hour one-way bus ride to Fresno with infrequent service.

- **Bay Area E-shared mobility hubs**: TransForm, a Bay Area transportation advocacy and environmental justice organization, secured a grant from the California Air Resources Board to create electric shared-mobility hubs in three affordable housing developments. The projects are located in San José, Richmond and Oakland. The non-profit is currently conducting needs assessment in all three developments to see what combination of services, such as electric bikes, e-car-sharing, credit for ride-hailing rides to public transit, and transit passes, would best meet the needs of each community.

2. Adopt a Parking Management and Pricing Policy

Update downtown and citywide minimum and maximum parking requirements to allow for greater densities and encourage increased use of public transit and other alternatives. Evaluate demand based pricing and transportation demand management programs for city-owned parking garages. As long as parking is cheap and abundant, it will be difficult to encourage more people to use sustainable modes of travel and for the City to build a more balanced transportation network. To reduce single-occupancy vehicle trips and increase usage of shared mobility, the City must re-evaluate its parking and transportation demand management policies, especially in areas with high mode-shift potential. The City has initiated an analysis of the San José's existing parking policies and potential changes that could advance the City's General Plan and *Climate Smart* goals.

Recommended Actions

1. Expand and electrify car-share services

Zipcar has operated a car-share program in San José since 2012. Similar to bike-sharing, users pay an annual membership fee and a per hourly rate to use the cars. Reservations end when the user returns the car to the parking spot where the reservation began. This is called "station-based" car-sharing. At present, Zipcar has 17 vehicles stationed in San José, primarily in the Greater downtown and North San José. None of the cars are electric. Initially, the company had included one fully-electric car in its fleet. However, that car was replaced with a conventional vehicle within a year due to low usage. Limited battery range, reduced by the failure of many users to remember to plug the car into its charger after returning the vehicle, reduced its appeal. Seven years later, the battery range of electric vehicles is much higher and continues to increase. The City should reach out to Zipcar to see if it might be willing to switch out some of

its conventional vehicles for electric ones. The City should also investigate expanding its car-share services by working with companies that offer "free-floating" also called "one-way" services where vehicle reservations must be ended within a large "home" zone, but not necessarily at the same place where the reservation began. Two companies have expressed interest in expanding to San José. Both offer electric vehicle car-share services in other communities and might be willing to do so here.

2. Seek to Accelerate the Electrification of Ride-hailing

The increasing volume of trips and miles being logged by ride-hailing services (such as Uber and Lyft) make them a prime target for electrification. However, access to charging infrastructure, battery range, cost and lack of awareness about electric vehicles deter many ride-hailing drivers from making the switch. According to the International Council on Clean Transportation (ICCT), approximately 1% of ride-hailing vehicles in California in 2017 were plug-in electric. There are benefits to drivers who do convert, including lower operating costs and the preference of many users to ride in electric vehicles. But, there are also significant barriers, chief among them convenient access to charging. "Ride-hailing is a commercial business, and time spent charging and driving to or queuing at charging stations means downtime and lost revenue," noted ICCT in a January 2019 report.[xxxviii] There are steps San José could take that might encourage more companies and drivers to go electric. For example, it could work with ride-hail companies to identify priority locations for non-residential chargers that could serve their drivers or give preferential curb or parking access to ride-hail electric vehicle drivers or companies that offer a high number of electric vehicles or electric miles traveled in the city. The City should reach out to ride hail companies and drivers to better understand the obstacles they face and identify effective steps the City could take to encourage the electrification of ride-hailing in San José.

3. Establish parking policies that support electric and shared vehicle parking

As part of its work to establish new citywide parking and pricing policies, the City is exploring policies such as the removal of parking minimums, unbundled parking, and demand based pricing strategies. Recognizing the anticipated growth of electric and shared vehicles, the City should consider parking maximum policies that would allocate a portion of new parking facilities to electric and shared passenger vehicles.

4. Pursue grant opportunities with CBOs on clean mobility pilot programs

The City should take advantage of new state and federal grant opportunities that will be made available in 2020 to pursue shared mobility pilot projects in partnership with community-based organizations and other partners that would advance local transportation needs.

APPENDIX A
Technical Terms Defined

Vehicles

Plug-in Hybrids (PHEVs), such as the Chevrolet Volt, are similar to a hybrid but with a bigger battery. The vehicle is primarily powered by electricity and the smaller-than-standard gas tank is used to recharge the vehicle battery when its power is depleted. The disadvantage is that the owner needs to both charge and refill the vehicle's gas tank, although less frequently than required for a conventional gas-powered vehicle.

Battery Electric (BEVs or "fully-electric") vehicles, such as Tesla and the Chevy Bolt. Vehicles are powered entirely by an electric motor. No more oil changes, replacement belts, or radiator fluid to maintain. Electric motors are more efficient, quiet, and require less maintenance than internal combustion engines. They also emit no tailpipe pollution.

Gas-Hybrids, such as the Toyota Prius, use both a gasoline engine and an electric motor. The electric battery is charged by the engine as well as regenerative braking-- capturing the energy that otherwise generates heat. The combination results in high fuel economy. Hybrids have very limited fully-electric capability. The advantage though is that the owner doesn't need to think about charging their car.

Fuel Cell Electric (FCEVs) vehicles are powered by hydrogen and produce no tailpipe emissions—only water vapor and warm air. Like electric vehicles, they are more efficient than conventional internal combustion engine vehicles and are equipped with regenerative braking systems, which capture the energy lost during braking and store it in a battery. Fuel Cell vehicles can fuel in less than five minutes and have a driving range of more than 300 miles. However, the high cost to build hydrogen refueling stations, and hence their low numbers, as well as the high cost of fuel has severely limited their deployment. The source of the hydrogen is also an issue. To date, hydrogen has typically been derived from natural gas.

NOTE: Only plug in hybrid and fully-electric vehicles are considered "electric" for the purposes of this report and *Climate Smart's* electric vehicle targets.

Electric Vehicle Charging

Level 1: A standard household plug (120 volt) plug. Vehicles can get two to five miles of range per hour of charging via a 120 volt outlet. This method is primarily used in homes, but sometimes at workplaces and airports.

Level 2: Requires the installation of specialized charging equipment that provides charging through a 240 volt (for residential) or 208 volt (for commercial) plug. Level 2 chargers can deliver 10 to 20 miles of range per hour of charging and are used in homes, workplaces, and for public charging.

Direct Current (DC) Fast Charge: Uses a larger, high-powered charger that provides charging through a 480 volt input. Vehicles also must have special equipment installed to use fast

chargers. (Plug-in hybrid electric vehicles typically do not have this capability.) Older DCFC's that deliver 50 kW per hour, can provide 60 to 80 miles of range in 20 minutes. Newer DC fast chargers, with 150 kW power ratings, can provide 180 miles of range in 20 minutes. Due to their high cost, these chargers are primarily used as public charging stations.

Ultra Fast Charging: A number of companies are beginning to install "ultra" fast chargers—chargers with power ratings of 350 kW and higher—in Europe, Asia, and the U.S. For example, ChargePoint is installing ultra-fast charging stations with power ratings of up to 500 kW. The company says these chargers will provide up to 533 miles in 20 minutes. Current models of electric vehicles can't handle the power surge delivered by these chargers, but future models will.

Induction or Wireless Charging: Uses an electro-magnetic field to transfer electricity to an electric vehicle without a cord. The Department of Energy is supporting research to develop and improve wireless charging technology. Wireless chargers are currently available for use with certain vehicle models.

Sources:

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Appendix B
Summary of San José Electric Mobility Roadmap Actions

Action	Underway	Committed	Recommended	Department Lead
Electric Vehicle Charging Infrastructure				
Streamlined permitting: The City has adopted a streamlined permitting system for the charger installations on commercial/industrial properties and multi-family properties.	**x**			PBCE
PG&E EV Charger Network program: Installation of 162 ports at five City sites serving the city's fleet, employees, visitors, and residents scheduled for early 2020.	**x**			DOT, PW
Electrify America: To date, Electrify America has installed 17 EV chargers at five sites in San Jose. In its second 30-month investment plan (July '19-Dec. '21), Electrify America intends to install more charging clusters in San Jose's metro area.	**x**			DOT
Electric Vehicle Reach Code: In September the City Council will consider adoption of the City's revised Building Code, which includes an EV reach code.	**x**			PBCE
Engage community in disadvantaged communities before installing chargers: Work with neighborhoods to determine if, where, and under what conditions chargers should be located in these communities to avoid or mitigate displacement.		**x**		DOT
CALeVIP Regional Program: Secure Council approval for SJCE match funds and acceptance of CALeVIP funds. Use allocation to support the installation of chargers in in public areas, such as offices, shopping centers, and shared parking spaces in multi-family developments.		**x**		DOT, SJCE
Adopt and Implement Electrical Vehicle Rate: Secure Council approval for a SJCE electric vehicle rate that mirrors PG&E's, should it be approved by the CPUC. Determine which facilities would benefit by switching to the new rate and make the change where appropriate.			**x**	SJCE, DOT, PW
Monitor and Improve Electric Vehicle Reach Code: Review San Jose's 2019 EV Reach code at the end of 2020 to see if any improvements			**x**	PBCE, ESD, DOT, SJCE

should be made. Consider expanding requirements to include major residential and commercial building renovation projects where parking is provided.				
Designate Electric Mobility Infrastructure Leads: The Department of Transportation and Public Works will coordinate future City electric vehicle charger installations, in consultation with other City departments, to ensure that installations align with the priorities identified in the *Roadmap*.			**x**	DOT, PW
Create Electric Vehicle Charging Fund: Identify funding to address the need to upgrade power in City facilities and provide matching funds to purchase and install new electric vehicle chargers on City-owned property.			**x**	DOT, PW
Public-Private Partnerships: Partner with private entities to install more non-residential chargers in priority locations where the City does not own property.			**x**	DOT
Provide Technical Assistance: Explore the possibility of establishing a technical assistance program, possibly in partnership with other organizations to help small building owners and managers and low-income homeowners install electric vehicle chargers.			**x**	SJCE, DOT
Wayfinding: Develop wayfinding/branding and signage standards for electric vehicle charging infrastructure.			**x**	DOT, PBCE, OER
Fleet Electrification				
City Fleet: Develop a conversion plan for 2020-2021, within current budget constraints.	**x**			PW, DOT, ESD
Electrify public transit: Continue to support VTA's efforts to convert its fleet to electric buses. Encourage VTA to continue to prioritize the deployment of electric buses on lines that serve or pass through disadvantaged neighborhoods and electrify its paratransit and shuttle services.	**x**			DOT
Pilot New Electric Vehicle Applications: Pilot test new vehicles that appear to meet the operational requirements of the City's medium		**x**		PW

and heavy-duty fleet and police vehicles (patrol, undercover, and community officer).				
Replace City's Older, Non-Police Sedans with Electric Vehicles: By 2021, replace all the City's non-police sedans 10 years or older. That would include 32 gas-powered sedans as well as 58 older gas-hybrid Prius': a total of 89 vehicles.			**x**	PW
Develop an Emergency Back-Up Plan for the City's Electric Fleet: Develop a strategy to reduce risks and maximize opportunities to utilize the City's fleet to enhance the City's resilience in the event of na natural disaster or a PG&E public safety power outage.			**x**	PW, SJCE, ESD
Pursue Battery Recycling Pilot: Explore opportunities to test repurposing vehicle batteries for critical applications, such as providing back up power for emergency services during a public safety power shut-off or blackout.			**x**	PW, DOT
Update Green Fleet policy: Update San Jose's Green Fleet policy to conform with the City's electrification goals.			**x**	PW, DOT, ESD
Private fleet conversion: Reach out to private fleet operators to identify ways the City might encourage private fleets to convert to zero emission vehicles.			**x**	DOT, SJCE
Seek to Accelerate the Electrification of Urban Freight: Reach out to local fleet and freight operators to see what obstacles stand in the way of their shifting to electric vehicles and to see what support or nudges the City might be able offer to accelerate that process.			**x**	DOT
Promote Electric-Powered Cargo Bikes: Promote the use of electric-powered cargo bikes in the City's more urban areas as a more efficient and less-intrusive alternative to large trucks or automated drones and/or robots.			**x**	DOT
Personally-Owned Electric Vehicles				
Expand Shared Micro-Mobility Services and Usage: Expand number and distribution of shared e-bike and e-scooter services in the City, including in disadvantaged neighborhoods. Increase the usage of shared e-bike and e-scooter services across City and particularly in	**x**			DOT

disadvantaged neighborhoods. (Climate Challenge)				
Implement Shared Micro-Mobility Discounts for Low-Income Users: Provide discounted membership and usage fees for low income e-scooter and bike share users.			**x**	DOT
Expand Bike Network and Protected Bike Lanes: Expand bike network and protected bike lanes to increase residents comfort and safety in using human-powered or electric assist bikes and scooters. (Climate Challenge)	**x**			DOT
Ride & Drive: Organize at least one ride and drive events in fall 2019 and possibly more in 2020 to raise awareness about electric vehicles. (Climate Challenge)	**x**			SJCE
Webpage: Create a webpage that provides information about electric vehicles and existing incentives.	**x**			SJCE, DOT
Dealer Education Program: Reach out to the City's auto dealerships and possibly auto manufacturers to explore the potential of partnering with them on an education, training, and incentive program that would boost electric vehicle sales. (Climate Challenge)		**x**		DOT
Discount Group Buy: Explore the possibility of organizing a discount group electric vehicle buy or lease program in San Jose with other local public agencies and auto dealerships.			**x**	DOT, SJCE
Shared Electric Mobility				
Pursue development of an EV shared mobility pilot program (Climate Challenge). Design a pilot program that utilizes electric vehicles in a shared service, such as car-share or ride-hailing.		**x**		DOT
Adopt a Parking Management and Pricing Policy: Update downtown and citywide minimum and maximum parking requirements to allow for greater densities and encourage increased use of public transit and other alternatives. Evaluate demand based pricing and transportation demand management programs for city-owned parking garages. (Climate Challenge)		**x**		PBCE, DOT

Expand and electrify car-share service: Reach out to San Jose's existing service provider and other companies that have an interest in expanding to the City about offering an e-car share here.			**x**	DOT
Seek to Accelerate the Electrification Ride-hailing: Reach out to ride-hail companies and drivers to understand the barriers to their shifting to electric vehicles and identify where and how the City might be able to encourage more ride-hail companies and drivers to switch to electric vehicles.			**x**	DOT
Establish parking policies that support electric and shared vehicle parking: As part of its parking management and pricing policy work, the City should consider parking maximum policies that would allocate a portion of new parking facilities to electric and shared passenger vehicles.			**x**	DOT, PRNS
Pursue grant opportunities with partners for clean mobility pilots: Pursue new state and federal grants to develop shared mobility pilot projects in partnership with community-based organizations and other stakeholders.			**x**	DOT

Roadmap Endnotes

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