

City of Sacramento
Electric Vehicle Implementation Blueprint



Task 2.1: EV Data and Forecasts

ARV-17-042

Prepared for the City of Sacramento
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Introduction

The purpose of this memo is to forecast potential electric vehicle (EV) growth to determine policies, incentives, code requirements, and ordinances that Sacramento can put in place to encourage infrastructure to support deployment of EVs and increase access to EV mobility in disadvantaged communities. The focus is on battery electric EVs and supportive infrastructure and assumes that plug-in hybrids (PHEV) and fuel cell vehicles (FCEV) will also benefit from actions. In this report, ZEVs are defined as zero-emission vehicle technologies that include EVs, PHEVs, and FCEVs.

The City of Sacramento's Electric Vehicle Strategy¹ adopted in December 2017 targets 75,000 zero emission vehicles (ZEVs) by 2025. Sacramento Area Council of Governments (SACOG) analysis in 2017 estimated that Sacramento could have 17,000 to 74,000 ZEVs by 2025. The lower-growth scenario was based on SACOG's analysis of likely sales without additional intervention and high-growth scenario reflected Sacramento's share of Governor Brown's 2015 target of 1.2 million ZEVs by 2025.²

Baseline Data

Current Population of Zero Emission Vehicles in Sacramento

Table 1 shows the calculations used to arrive at the baseline number of 4,664 total ZEVs and 2,390 battery electric vehicles in Sacramento zip codes as of January 1, 2019. We estimated the number of ZEVs in Sacramento by using:

1. Department of Motor Vehicles (DMV) reports dated 1/1/2018 that show the total number of vehicles registered in the city's 24 zip codes.³ The DMV reports aggregate all vehicles, including heavy-duty, fleet, and exempt vehicles (e.g. registered to a government agency).
2. Clean Vehicle Rebate Program (CVRP) data that details rebates by location, type of vehicle, and rebate amount. Current data is through 9/30/18.⁴
3. An estimation that 30% more vehicles are sold than apply for the rebate.⁵ This includes vehicles sold and leased to fleets and to people who earn above the CVRP income cap.
4. Estimated ZEV sales/leases in November and December based on average sales of 77 cars each month (the nine-month average of the sum of lines 2 and 3).

¹ https://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/EVStrategy_171206_FINAL_DRAFT_CityOfSacramento.pdf?la=en

² Executive Order B-48-18, signed January 26, 2018, increased the target to 5 million ZEVs by 2030

³ Includes light-duty, heavy-duty, commercial, and exempt vehicles. https://www.dmv.ca.gov/portal/wcm/connect/c24637c9-5faf-4fe2-9375-9b5221a2ef4a/motorvehiclefueltypes_city.pdf?MOD=AJPERES&CVID

⁴ <https://cleanvehiclerebate.org/eng/rebate-statistics>

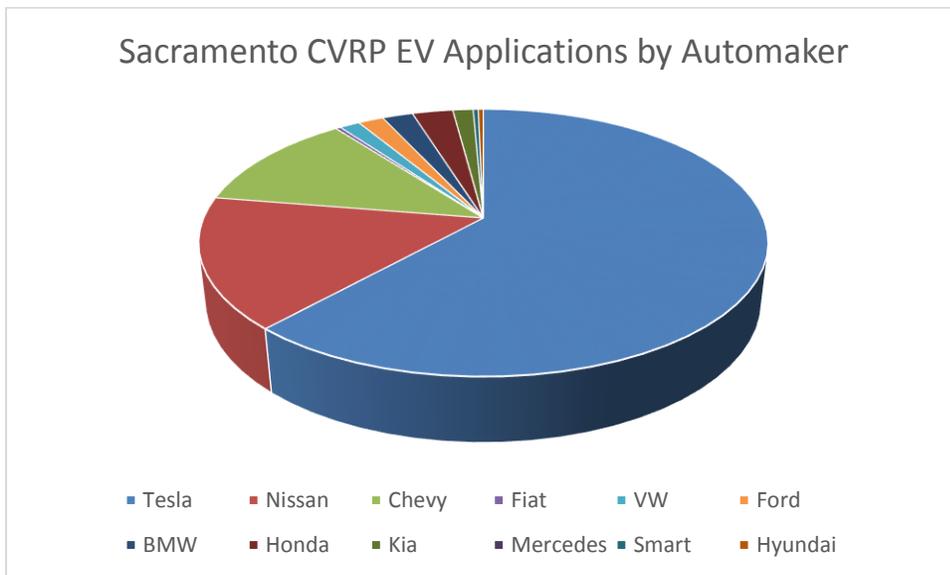
⁵ Based on conversations with SMUD, Center for Sustainable Energy, and UC Davis (December 2018 and January 2019)

Table 1: Estimated baseline of all ZEVs as of 1/1/19

	EV	FCEV	PHEV	Total
DMV 1/1/18 registrations	1,887	79	1,751	3,717
CVRP rebates 1/1/18-9/30/18	290	26	219	535
Additional 30% ZEVs that did not apply for rebate	87	8	66	161
Estimated ZEV registrations 10/1/18-12/31/18	126	11	95	232
Total estimated vehicles in Sacramento on January 1, 2019	2,390	2,131	124	4,644

Figure 1 shows that that Tesla cars received the most rebates in Sacramento (179 out of 290). Nissan had 46 rebates and Chevy had 35. All other EVs had 10 or fewer.

Figure 1: Rebate by automaker in Sacramento in January-September 2018



ZEV adoption in Sacramento is lower than other areas of the state. The International Council on Clean Transportation (ICCT) publishes an annual report that quantifies electric vehicle market growth across California local markets.⁶ The report calls out that Sacramento is the fifth largest metropolitan area by population and has a high percentage of public chargers per capita (Figure 2) yet is not in the top 30 cities for EV deployment.

⁶ <https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf>

Figure 2: Correlation of ZEV adoption and public charging in major metro areas (Illustration from ICCT report)



Current Charging Infrastructure

According to data from the Alternative Fuel Data Center and PlugShare,⁷ Sacramento has 110 public and workplace charging locations that are open and under construction. When all are completed, the sites will have 612 connectors, as listed in Table 2.

Table 2: Public charging connectors available and under construction

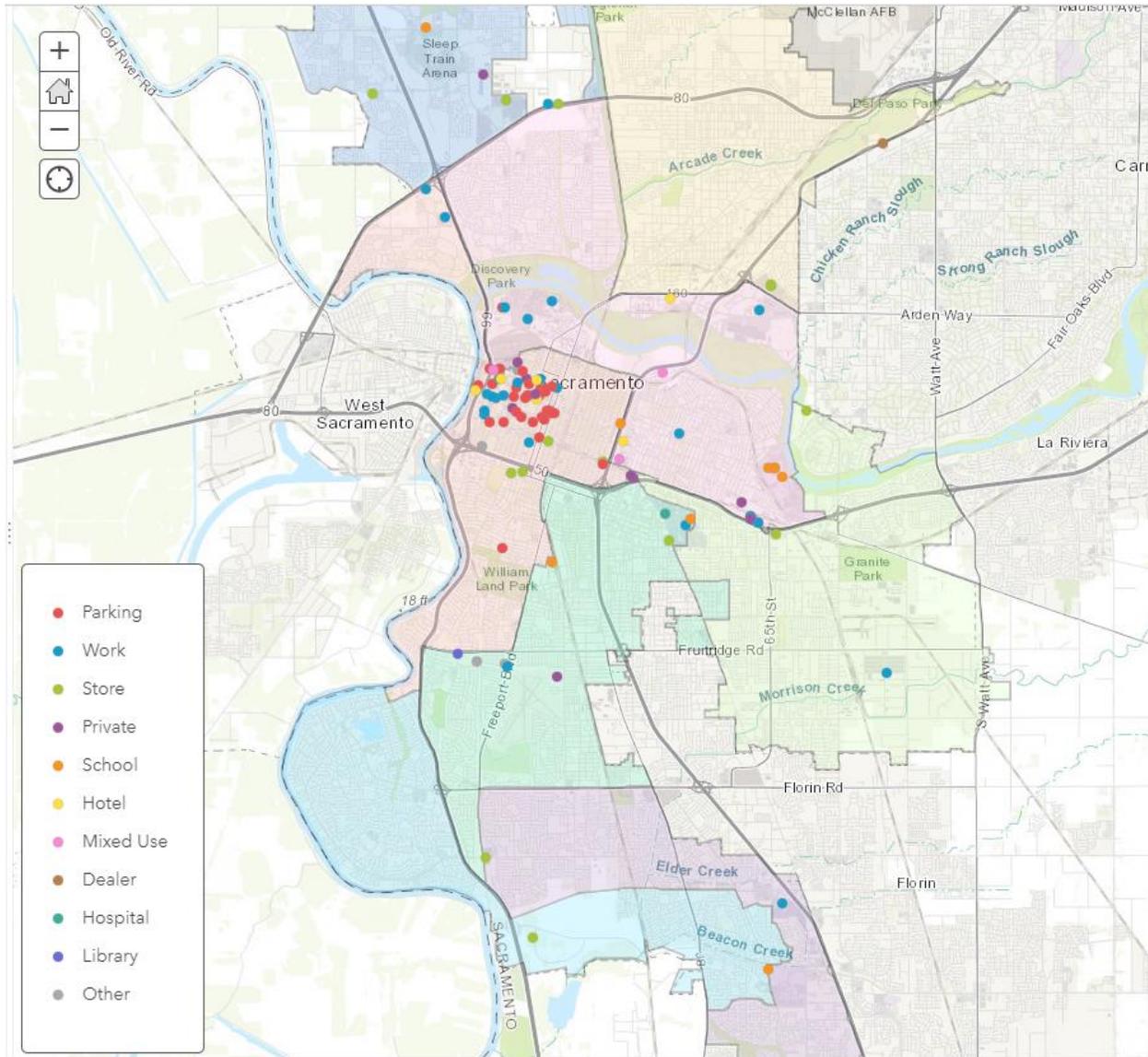
Total Charging Connections	612
Level 1 (wall outlet—full charge in 8+ hours)	72
Level 2 (full charge in 4-6 hours)	454
DC Fast Charging (full charge in less than an hour)	39
Tesla-only (uses a specific connector)	47

Figure 3 shows the public and workplace locations in Sacramento on January 25, 2019.⁸ Most chargers are in parking garages and lots, and at the area’s largest employers including SMUD, Kaiser, UC Davis, government buildings, and colleges. PlugShare is a user-driven, map-based database of public charging locations. Drivers can check into a site and leave comments about the functionality. At many of the public sites, users comment that chargers are occupied by people working at the location.

⁷ <https://www.plugshare.com/>

⁸ Other locations are in permitting processes, and some existing chargers may not appear on maps or in databases

Figure 3: Public charging locations in Sacramento from AFDC and PlugShare



Sacramento is adding curbside charging and the request for proposals (RFP) for the curbside charging pilot closed as this memo was drafted. The RFP included a map of streets in downtown Sacramento with the potential for curbside charging.⁹

EV owners also charge their cars at home with a Level 1 wall outlet or a Level 2 charger. Data about home chargers isn't available and the numbers of homes with installed chargers is unknown. SMUD reports that 84 customers in the county have EV meters and only six of those are installed at multifamily dwellings. SMUD is prohibited from releasing any information that might identify a customer. A joint report from the Energy Commission and the National Renewable Energy Lab

⁹ <https://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/MAP-CurbsideChargerPotential120318.pdf?la=en>

(NREL)¹⁰ notes that in California 88 percent of drivers have access to home charging (6 percent from a wall plug) and 10 percent of the home charging is at multifamily dwellings.

Sacramento's Population and Housing

The 2017 American Community Survey (ACS)¹¹ Five-Year Study estimated the population in Sacramento's 111 census tracts in July 2016. Table 3 is a summary of ACS housing data. The list of census tracts is in Appendix A.

Table 3: Sacramento housing demographics from the 2017 American Community Survey

Total population	520,861
Total housing units	207,242
% occupied	94
Occupied single family detached	125,053
Occupied single family attached	13,690
Multi-unit	65,116
Mobile home, boat	3,262
Owner occupied	45%
Renter occupied	55%
Worked in county of residence	82%
Median income	\$55,448

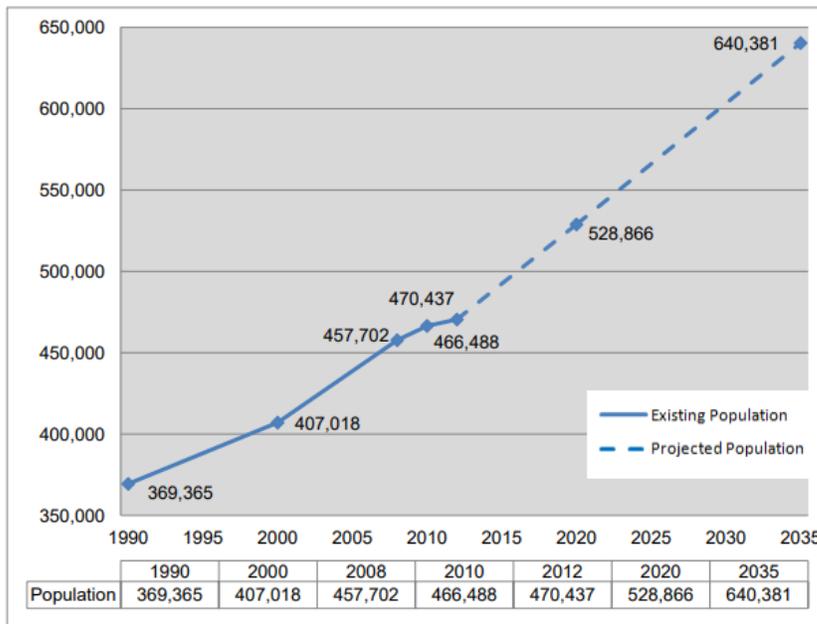
Sacramento's 2035 General Plan references the Housing Element developed in 2013 and adopted in 2014.¹² The Housing Element projected Sacramento's population to grow to 640,381 by 2035, as shown in Figure 4. The plan noted that Sacramento's population had been growing about 1 percent per year since 2010, and the fastest-growing segment of the population was adults aged 55 to 64. Assuming 1 percent growth per year from 520,861 people in 2016, by 2025 Sacramento's population is estimated to be 556,255; very close to the growth curve identified in the Housing Element.

¹⁰ <https://www.nrel.gov/docs/fy18osti/70893.pdf>

¹¹ <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>

¹² <http://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/General-Plan/2035-GP/Housing-Element.pdf?la=en>

Figure 4: Sacramento 2035 General Plan Population Estimates



Source: 1990, 2000, 2010 Census; 2012 DOF; 2008, 2020, 2035 Sacramento Area Council of Governments, May 2013; City of Sacramento, 2013.

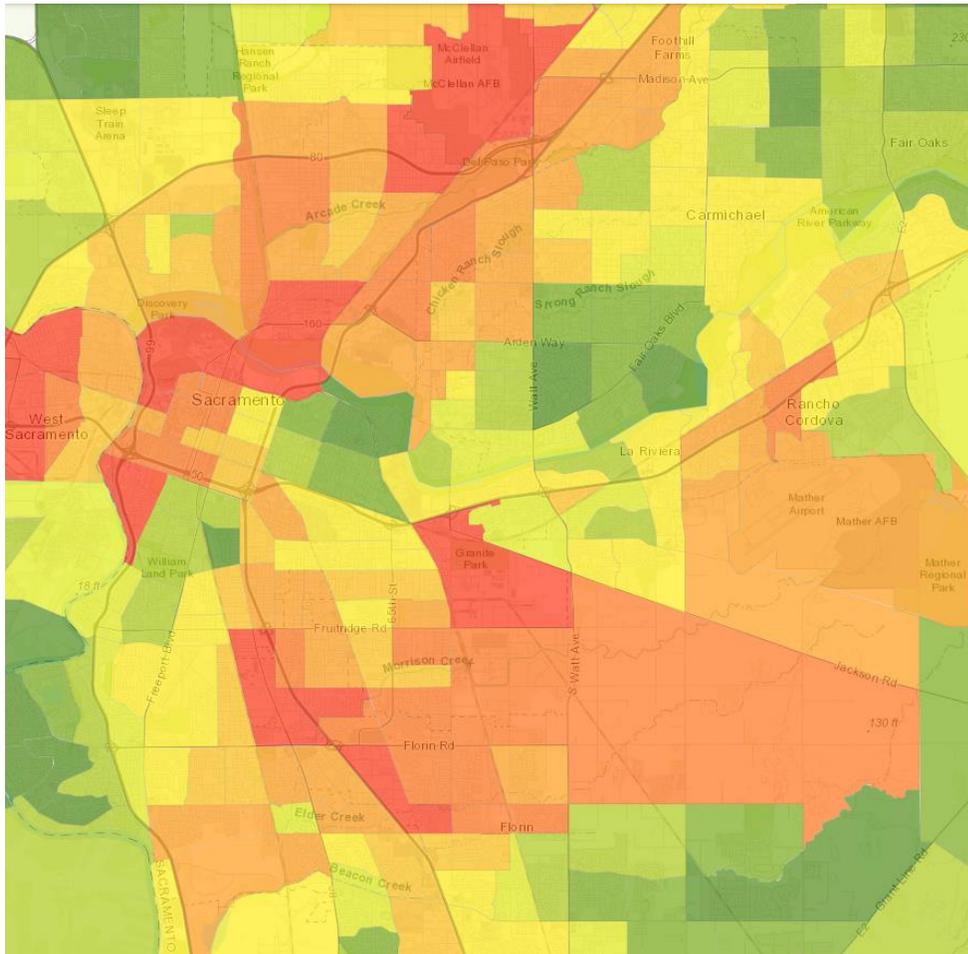
Figure H 3-1: Existing Population and Population Projections for the City of Sacramento

Disadvantaged Communities

Sacramento’s EV Strategy, along with other City initiatives, targets disadvantaged communities (DACs). The State of California developed CalEnviroScreen¹³ as a statewide standard for identifying census blocks that are disproportionately burdened by multiple sources of pollution and socioeconomic vulnerability. Within Sacramento, 28 census tracts with a total population of 114,167 people meet the criteria of a disadvantaged community. Figure 5 is the CalEnvrio Screen 3.0 map that shows the disadvantaged tracts in red and shades of orange. Note that some of these areas are in the unincorporated County and not within City limits.

¹³ <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30>

Figure 5: CalEnviroScreen 3.0 map of Sacramento



According to the 2017 American Community Survey, the median income of Sacramento's DACs is \$37,955, well below Sacramento's median income of \$55,448, and unemployment rates are as high as 25 percent. Except for two census tracts in the downtown area that have few residents, 20-to-64 percent of households live below the federal poverty line. Families with female householders living with related children are disproportionately affected by poverty.

CalEnviroScreen 3.0 uses socioeconomic data from the 2010 census, which shows unemployment as high as 60 percent. Table 4 provides a snapshot of socioeconomic data from 2017 ACS.

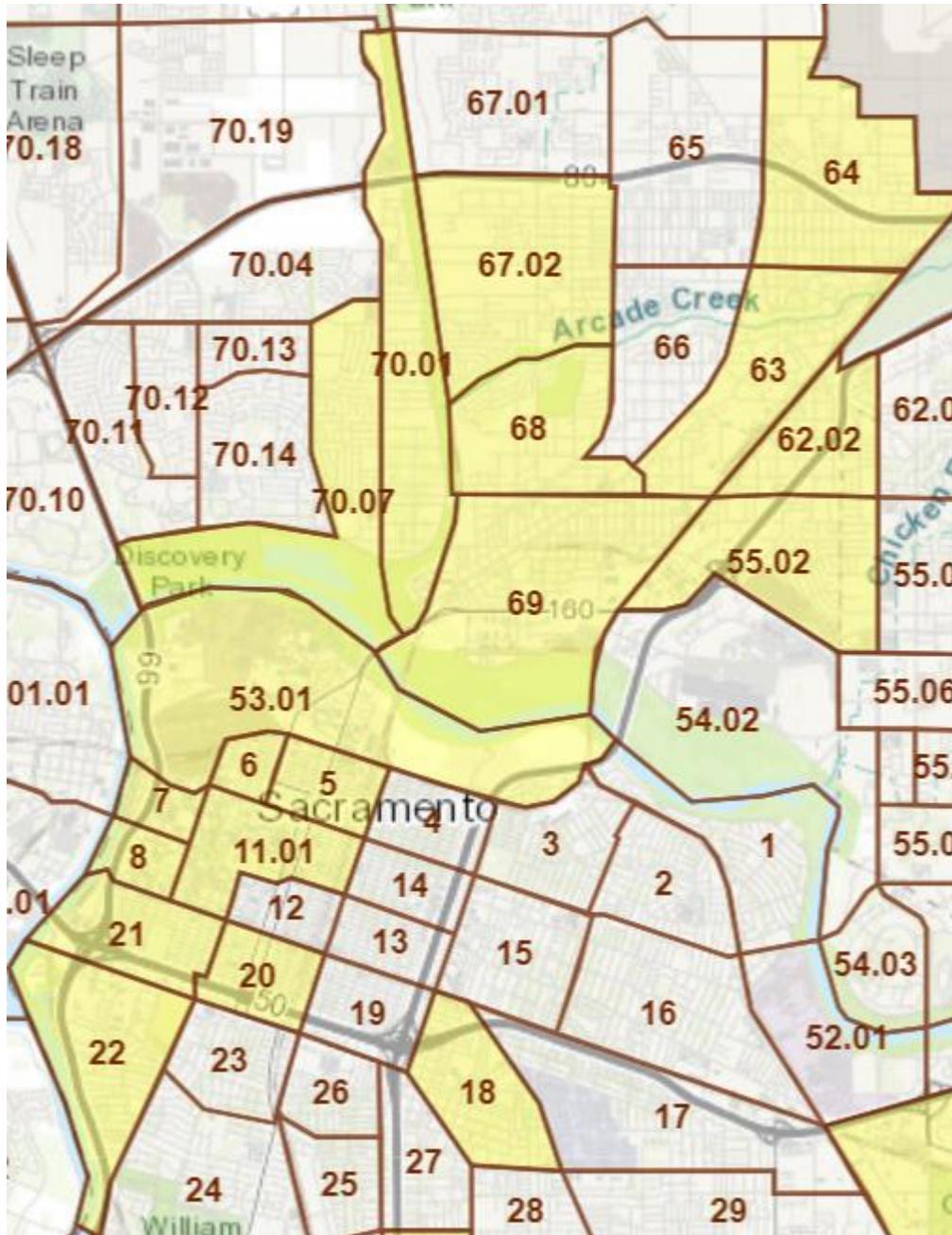
Table 4: Summary of socioeconomic data from DAC census tracts from 2017 American Community Survey

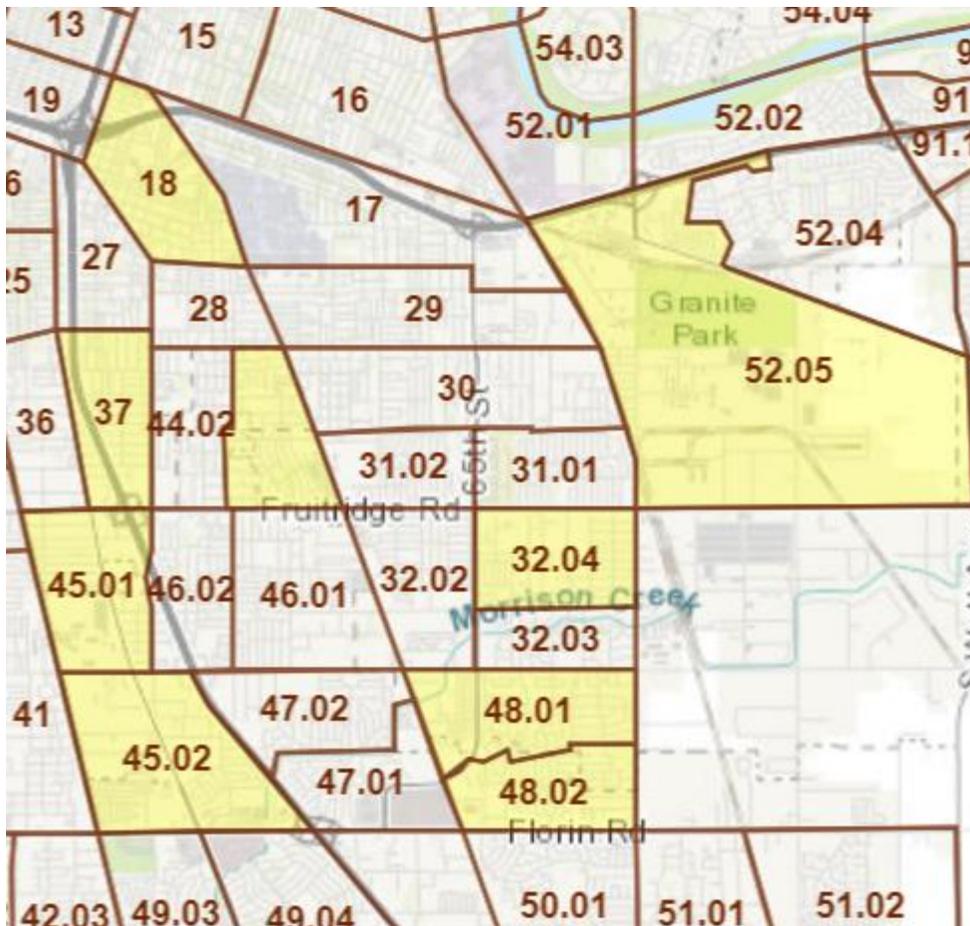
Tract Number	Households	Median Income	# 16 and Over in the Labor Force	% Unemployed	% Households Below Poverty Level	% Households Single Female w/ Children Under 18 Below Poverty	% Households Single Female w/ Children Under 5 Below Poverty
5	1,815	55,053	2,211	6.7	35	77.5	100
6	591	23,618	651	18.2	34.3	100	100
7	554	12,426	120	25.0	8.1	-	-
8	1,068	71,719	1,098	10.1	21.9	-	-
11.01	1,615	32,639	1,304	4.9	26.6	100	100
18	4,719	74,083	2,999	6.3	11.1	25.5	0
20	1,349	38,125	1,693	13.2	17.2	10.5	100
21	1,047	55,034	1,538	5.1	26.9	52.5	-
22	1,801	30,955	1,926	12.8	43.6	79.7	60.9
32.04	1,527	35,885	2,496	9.7	26.7	44.6	-
37	1,307	30,712	1,732	18.8	31.5	44.6	100
44.01	1,330	37,074	1,557	10.3	15.1	33.9	100
45.01	1,041	29,012	1,498	14.2	36.9	71.6	41.7
45.02	5,333	34,000	2,290	21.1	35.1	63.1	53.1
48.01	1,674	37,292	2,486	16.7	19.7	47.1	43.6
48.02	4,762	47,826	2,139	13	19.8	21.5	0
52.05	967	32,037	1,011	12.1	23.7	40.5	100
53.01	450	13,429	381	27.0	63.5	93.4	77.8
55.02	2,034	29,808	2,900	16.3	32.8	64.7	37.7
62.02	1,452	34,773	1,576	19.4	20.2	50	100
63	1,763	33,603	2,352	19.5	25.7	60.2	100
64	1,782	37,627	2,338	13.4	25.9	46.1	31.6
67.02	1,973	38,554	2,649	5.9	29	58.5	0
68	4,762	25,839	3,238	13	42	64.3	62.5
69	2,073	26,250	2,320	23.9	31.8	57.9	51.2

Tract Number	Households	Median Income	# 16 and Over in the Labor Force	% Unemployed	% Households Below Poverty Level	% Households Single Female w/ Children Under 18 Below Poverty	% Households Single Female w/Children Under 5 Below Poverty
70.01	1,117	44,309	2,047	12.0	23.6	53.8	100
70.07	1,623	51,807	2,452	9.0	19.9	59	0
96.01	1,779	49,256	2,911	11.9	20.2	52.1	0

Figure 6 is two maps from the American Community Survey website to give context to the census tract numbers. Yellow tracts are DACs.

Figure 6: Locations of DAC census tracts





The Urban Institute's 2016 paper *What if Cities Combined Car-Based Solutions with Transit to Improve Access to Opportunity?*¹⁴ is a broad look at the links between poverty and transportation. Referencing many researchers, the paper states:

- Women who must balance work, child care, and/or elder care are disproportionately affected by mobility. Transit routes don't fit their schedules, yet car ownership is too expensive.
- For families living in low-income neighborhoods, car ownership costs are likely higher than in other neighborhoods because people often turn to predatory lending, encounter discriminatory practices or "redlining" in automobile insurance premiums, and tend to own older vehicles that break down more often.
- People who rely on transit instead of cars have a smaller travel radius. In a National Household Travel Study,¹⁵ 2009 data found that car owners had a travel radius of twice the distance as transit riders. The radius directly impacts access to jobs and education.
- Housing prices push low-income people further and further into suburbs, where transit is less frequent.

¹⁴ <https://www.urban.org/sites/default/files/publication/81571/2000818-What-if-Cities-Combined-Car-Based-Solutions-with-Transit-to-Improve-Access-to-Opportunity.pdf>

¹⁵ <https://nhts.ornl.gov/briefs/PovertyBrief.pdf>

These findings point to the impact that reliable transportation can make for low-income residents. Because CalEnviroScreen DACs are also impacted by pollution, increasing access to ZEVs also improves air quality.

In the 28 DACs, American Community Survey shows that 53,810 people reported being employed and 67 percent reported that they drove to work alone or in a car with someone else. At a PEV Collaborative meeting, speakers from community-based organizations estimated that 80 percent of DAC residents had a car, but EV ownership is low due to high price of vehicles and lack of awareness about EVs. The lack of charging infrastructure is a significant barrier. Ability to get financing and insurance may also stand in the way of EV ownership for low-income families.

To help low/moderate-income households purchase or lease ZEVs, in 2016 CVRP increased rebates for households that earn 300% of the Federal Poverty Level—\$36,420 for a single person, \$75,300 for a family of four.¹⁶ Since 2016, 47 Sacramento households received the additional incentive for a EV (about 5% of total EV rebates). Used EVs do not qualify for CVRP rebates. According to the Colorado Electric Vehicle Plan,¹⁷ an EV owner saves \$54,468 over the life of the car due to fuel savings, reduced maintenance costs, and emission benefits.

¹⁶ <https://cleanvehiclerebate.org/eng/income-eligibility#LMI>

¹⁷ https://www.colorado.gov/governor/sites/default/files/colorado_electric_vehicle_plan_-_january_2018.pdf

Future Deployment

To estimate the number of EVs that can potentially be deployed in Sacramento by 2025, it's important to assess the size of the new car market, regulatory requirements, car-sharing and other options to private car ownership, and the potential of medium- and heavy-duty EVs.

Vehicle Ownership and New Car Sales

The Energy Commission collaborated with the National Renewable Energy Lab (NREL) to prepare the *California Plug-In Electric Vehicle Infrastructure Projections: 2017-2025*¹⁸ report published in March 2018, which included county-level assessments of new vehicle adoption. The report estimated that Sacramento County accounted for about 4 percent of new vehicle sales between 2012 and 2016.

DMV reports showed that on January 1, 2018 about half of the 1,181,251 vehicles registered in Sacramento County were in Sacramento zip codes. The number includes exempt vehicles that are likely registered in Sacramento zip codes because the city, county, air district, state, and federal government offices are predominately in the downtown area. In discussion with the PEV Collaborative Executive Committee, it was agreed that assuming 1.3 percent of statewide new vehicle registrations was valid to attribute to Sacramento.

Light-Duty Vehicle Sales

To determine sales, we used data from the California New Car Dealers Association's (CNDCA) 2017¹⁹ California Auto Outlook²⁰ and Annual Economic Impact Report²¹ that shows:

- 2,047,632 new cars and light trucks were registered in California in 2017.
- 51.3 percent of new vehicle registrations were light trucks (pick-ups, SUVs, vans).
- About 92 percent of those vehicles were sold at California dealerships. The other 8 percent were from out-of-state dealerships or through brokers.
- 825,825 used vehicles were sold through retail outlets in 2017. This doesn't account for private sales between individuals or vehicles sold for salvage or at auction.

New vehicle registrations are different from new vehicle sales. Consumers increasingly shop for cars outside their city, county, and even state. Dealerships do not have a process to track the destination of each vehicle they sell or to report vehicle sales as individual, business, fleet, or exempt. Currently, DMV's public data doesn't designate between new and renewed vehicle registrations.

Using 1.3 percent of light-duty new vehicle registrations and used vehicle sales (cars, pick-up trucks, SUVs, and vans), we estimate that in 2017:

- 26,600 new vehicles were registered in Sacramento
- 11,000 used vehicles were purchased from a dealership and registered in Sacramento

¹⁸ <https://www.nrel.gov/docs/fy18osti/70893.pdf>

¹⁹ 2017 is the last full year of data for car sales and CVRP rebates.

²⁰ <https://www.cncda.org/wp-content/uploads/California-Covering-4Q-2017.pdf>

²¹ <https://www.cncda.org/wp-content/uploads/2018-Economic-Impact-Report.pdf>

Although the population and number of households in Sacramento will continue to grow, predictions show the overall market for new cars will stay about the same. Figure 7 shows CNCDA Auto Outlook's tracking that new light-duty registrations average about 2 million a year, although registrations drastically dipped during the 2008-2012 recession years. CNCDA projects that 2 million will remain a steady number for the next few years. AutoForecastSolutions believes the mix of vehicles will stay about half cars and half light trucks through 2025.²²

Figure 7: Annual new light vehicle registrations in California



If Sacramento captures 1.3 percent of 2,000,000 new vehicle light-duty registrations every year between January 1, 2018 and January 1, 2026, a total of 208,000 new vehicles will join the population. DMV reports showed that ZEVs were .63% and EVs were .32% of the total vehicle population in 2018. To reach the target of 75,000, the percentage of ZEVs as new car registrations needs to exponentially grow each year, as illustrated in Table 5. *These numbers are to help understand how quickly sales must ramp up and not meant to be used as sales projections, forecasts, or estimates.*

Table 5: Illustration of percentage of new vehicle sales needed to reach ZEV target

Date	Registered ZEVs (Cumulative)	Total Vehicles	Assumed new registrations (ZEV and non-ZEV)	Assumed percentage of registration that are ZEVs	New ZEV registrations as a % of all new vehicles
1/1/2018	3,717 ¹	591,134 ¹	26,000 ³	0.63%	3%
1/1/2019	4,644 ²	617,134	26,000	0.75%	4%
1/1/2020	8,000	643,134	26,000	1.24%	15%
1/1/2021	12,000	669,134	26,000	1.79%	23%
1/1/2022	18,000	695,134	26,000	2.59%	35%
1/1/2023	27,000	721,134	26,000	3.74%	42%
1/1/2024	38,000	747,134	26,000	5.09%	65%
1/1/2025	55,000	773,134	26,000	7.11%	77%
1/1/2026	75,000	799,134		9.39%	
			208,000		

²² CAR Management Briefing Summit. https://www.cargroup.org/wp-content/uploads/2018/08/CAR-MBS-2018_McCabe.pdf

- 1) From DMV data on 1/1/18
- 2) From estimates in this memo
- 3) Doesn't include new trucks, buses, or medium-duty vehicles that are included with DMV data

It is important to note that conversations with Sacramento area new car dealers, Bill Boyce from SMUD, and other stakeholders indicated that Sacramento residents do not turn over their vehicles as quickly as other residents in the state and 26,000 new registrations a year may be ambitious.

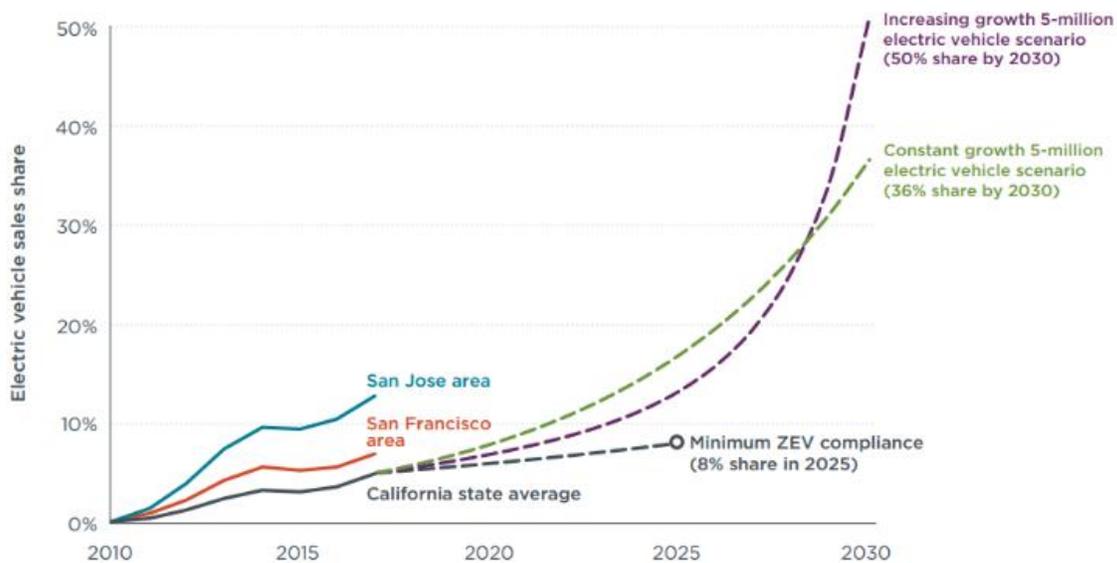
The market for used EVs is small, as described below. After SMUD launches the local incentive program Sacramento deploys Clean Cars for All, an EV incentive program aimed at low-income families, it will be important to evaluate the potential of used EV sales to add a to the vehicle population.

Potential Limiting Factors

Many factors are outside the control of the City of Sacramento and should be considered when tracking goals and progress.

Vehicle Availability: In May 2018, the International Council on Clean Transportation (ICCT) published a briefing²³ about California’s electric vehicles market development that shows the distinct difference between the State’s 5 million ZEV goal and the minimum number of vehicles required for automakers to comply with the Zero Emission Vehicle Regulation.²⁴ As shown in Figure 8, ZEV sales need to be 15 percent of new car sales by 2025 and then steeply ramp up to meet the State’s target, but automakers do not need to produce that many cars to comply with the regulation. It could result in fewer EVs being produced and sold than needed to achieve ZEV goals.

Figure 8: ZEV compliance and California’s target



²³ <https://www.theicct.org/sites/default/files/publications/CA-cityEV-Briefing-20180507.pdf>

²⁴ https://www.arb.ca.gov/msprog/zevprog/factsheets/zev_regulation_factsheet_082418.pdf

Vehicle Models: According to the California New Car Dealers Association, about half of new vehicles sales are light trucks, pick-ups, SUVs, and vans;²⁵ EVs are currently not available in this class of vehicle.²⁶ Volvo, Audi, Mercedes, and Hyundai are introducing ZEV SUVs in 2019 and 2020 and start-up companies Rivian and Atlys plan to introduce EV pick-up trucks in 2020. Volkswagen announced an all-electric version of its minibus to be available in 2022. All these vehicles are aimed at the luxury car buyer, but they will pave the way for non-luxury versions. Until EV light trucks are available and have similar utility as conventional pick-ups and SUVs, it will limit EV adoption for a large group of buyers.

Used Car Sales: When cars are traded into a dealership, the car often heads to a wholesale auction. At international conferences about clean transportation, Frontier Energy learned that wholesalers buy EVs at U.S. auctions and then export them to countries where new EVs are not sold. The EVs are late-model cars with low miles that wholesalers can buy relatively cheaply and sell at premium prices outside the county. If this trend continues, most used EVs traded in will not be for sale in Sacramento.

Pay-per-Charge: Many workplace and parking lot chargers are free to use or free to use with paid parking. As property owners and facility managers have noted, this doesn't cover operating and maintenance costs. A fee for charging could reduce interest in EVs or encourage more people to charge at home instead of using public charging.

VMT Reduction: The City has initiatives to reduce vehicle miles traveled (VMT) by expanding pedestrian and bicycle infrastructure, improving transit services, and piloting ridesharing programs with car sharing and on-demand transit. Sacramento recently passed an ordinance that new housing projects within a quarter- or half-mile of a light rail station can have fewer—or zero—parking spaces.²⁷ As people change their behavior and commute patterns, households may reduce vehicle ownership.

Opportunities to Increase EV Adoption

Sacramento took an early lead in EV policies and strategies and has opportunities to increase the market share of EVs by deploying charging infrastructure, encouraging EV use in new mobility, and assisting businesses and disadvantaged communities with clean vehicle options.

Infrastructure

The Energy Commission created a California version of NREL's EV Infrastructure Projection Tool (EVI-Pro)²⁸ to account for California's energy profile and average traffic patterns. It estimates that

²⁵ CNCDA states that 51.3% of new vehicle registrations statewide are light trucks (pick-ups, SUVs, vans). www.cncda.org

²⁶ Tesla's Model X is a cross-over (CUV) and registered as a car, not a light truck

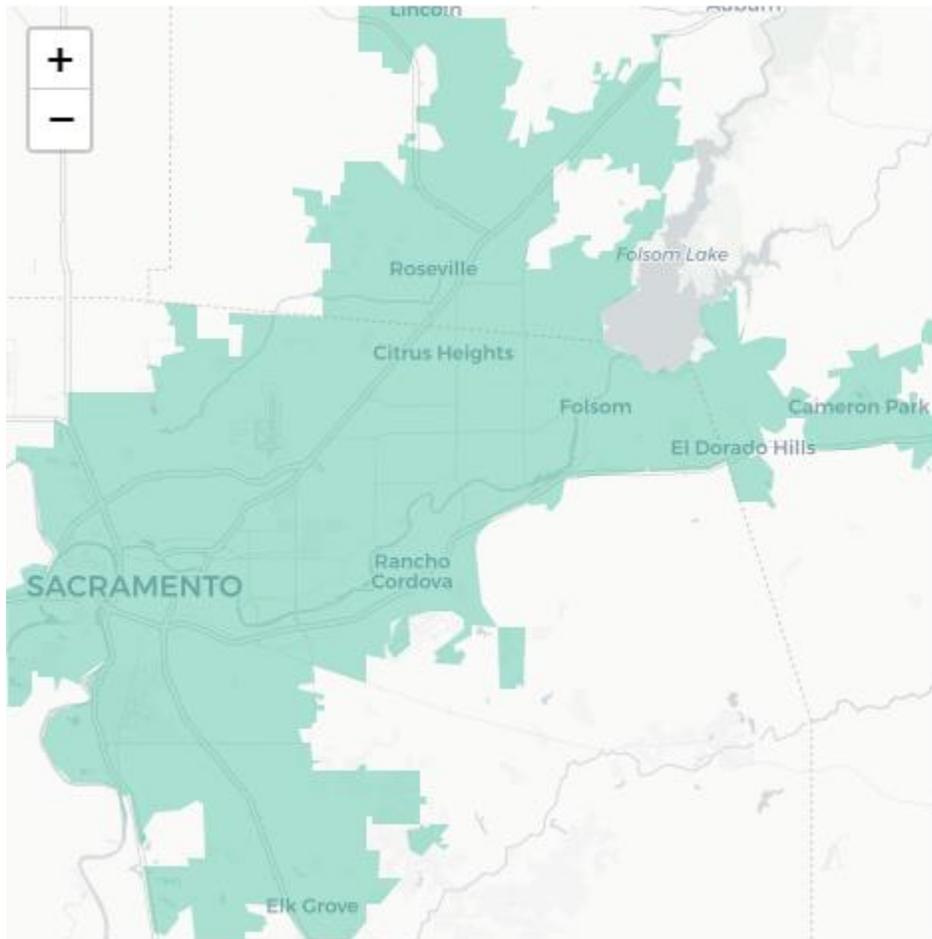
²⁷ <http://www.capradio.org/articles/2018/12/10/sacramento-pushes-development-focused-on-mass-transit-not-parking/>

²⁸ <https://afdc.energy.gov/evi-pro-lite>

Sacramento County will have a total of 37,240 residential (personal) EVs by 2025. The tool shows results by county, is not configurable, and doesn't show assumptions.

NREL's own version of EVI-Pro—EVI-Pro Lite²⁹—on the Alternative Fuel Data Center website provides more insight, but considers Sacramento as a major metropolitan area, as shown in Figure 9. The tool doesn't allow selection by zip code or census tract.

Figure 9: Sacramento as defined by EVI-Pro



Because the City's target is to support 75,000 EVs, following parameters were used:

PHEVs with 20-mile range	15%
PHEVs with 50-mile range	15%
EVs with 100-mile range	35%
EVs with 250-mile range	35%
Public charging support for PHEVs	0% ³⁰
Drivers with access to home charging	88%

²⁹ <https://afdc.energy.gov/evi-pro-lite>

³⁰ The focus is on battery electric EVs. Assumes PHEVs and fuel cell vehicles will also benefit from actions.

EVI-Pro estimated that Sacramento will need an additional:

- 738 Workplace Level 2 charging connectors
- 398 Public Level 2 charging connectors
- 399 DC fast charging connectors

Based on the Energy Commission’s finding that 88 percent of current EV drivers charge at home, 66,000 residences will need home charging. The Energy Commission estimated that 10 percent of the residences would be multifamily resulting in 6,660 connectors at multifamily dwellings and 59,400 at single family homes. The Energy Commission also estimated that 6 percent of single-family homes could use a Level 1 outlet. If 88 percent of the existing 2,390 EV owners have home charging, then 53,733 additional single-family homes will need Level 2 charging to support the City’s target. Table 6 lists the numbers.

Table 6: Need for home charging to support 75,000 EVs at 88% home charging availability

88% of 75,000 vehicles		66,000
10% at multifamily		6,600
90% of single family (SF)		59,400
94% of SF that need L2		55,836
88% of 2,468 existing owners with home charging		2,103
Final gap in SF L2 charging		53,733

A spreadsheet provided by the City of Sacramento listed projects currently in the planning department and showed a total of 46,901 single-family, multifamily, and mixed-use residential units as new construction or rehabilitation. If each of these new units is built and added Level 2 charging, a gap would remain to support home charging for 88 percent of 75,000 residential EVs.

Adding public charging near residences could fill this gap. Sacramento’s current public charging infrastructure favors commuters—those driving an EV to work. Level 2 public chargers open or in construction at McKinley Village, The Cannery, and Belle Cooleedge Library are in public areas near housing. Chargers at UC Davis Med Center’s parking lots, Amtrak, and some the stores and shopping centers are in residential areas, but not an easy walk from the charger to home. Public chargers in well-lit areas within a short walk of residences could fill a need for workplace, commuter, and residential charging.

In Boulder, Colorado, several schools in residential areas have Level 2 charging in partnership with ChargePoint. Charging is free for teachers and school employees, who swipe a special tag. During non-school hours, charging is open to the public for a small fee collected by credit card or through a ChargePoint account. ChargePoint and the school share revenue from the chargers. The parking lot is well lit and surrounded by a fence, except for the driveway.

In Grand Junction, Colorado, a local company set up two Level 2 chargers with four connectors at a neighborhood library. The EV spots are farthest from the doors of the library but closest to the homes in the neighborhood. Charging is free. When we stopped to charge at the library, a neighbor told us that residents used all four connectors every night and had a schedule worked out. (He was worried that we would upset the schedule.)

“Semi-public” charging is a new concept that builds a plaza of Level 2 chargers that are available only to members who pay a fee. It could be offered as an amenity like off-street parking and health club access. A potential benefit of semi-public charging is that it could be available to residents and workers and could create a revenue model for the plaza operator.

In April 2019, Sacramento County will participate in the California Electric Vehicle Infrastructure Program (CALeVIP)³¹ that offers direct incentives for the purchase and installation of EV charging at publicly accessible locations. A stakeholder group worked with the Center for Sustainable Energy to identify incentive priorities that will provide up to \$5,500 for Level 2 and \$80,000 for DCFC in DACs, and a lower amount for projects outside DACs. The project has \$7.7 million in rebates for Level 2 and \$6.3 million for DCFC. When applications open in April, it will be important to track the locations and types of projects applying for funding to identify trends and opportunities for collaboration.

Car Sharing and On-Demand Transit

A report³² by Deloitte stated that car sharing is on the rise but is still a niche transportation option and largest effect is that households reduce the number of cars they own. Deloitte updated a formula from a 2005 Transportation Research Board report, *Car-sharing: Where and how it succeeds*, to identify neighborhoods where car sharing was likely to be feasible, meaning that enough people would use the cars to cover the operational costs. Deloitte also assumed that cities would cover costs for the car-share start up and potentially subsidize low-income drivers from deferred road construction costs, accident avoidance, and reduced GHGs due to fewer cars on the road.

We applied the report’s formula of identifying feasible neighborhoods to census tracts that met the following criteria in ACS data and from the City of Sacramento General Plan GIS map³³:

- Percent one-person households high (Scenario 1=60%, Scenario 2=70%)
- Percent households with children low (Scenario 1=40%, Scenario 2=30%)
- Percent rental households high (Scenario 1=60%, Scenario 2=70%)
- Percent transit users and walkers high (Scenario 1=60%, Scenario 2=70%)
- Percent households with no vehicle high (Scenario 1=60%, Scenario 2=70%)
- Housing units are 30 per acre or higher (Medium- and High-density designations)

³¹ <https://calevip.org/incentive-project/sacramento-county-incentive-project>

³² <https://www2.deloitte.com/insights/us/en/industry/public-sector/smart-mobility-trends-carsharing-market.html#endnote-sup-3>

³³ <http://data.cityofsacramento.org/datasets/general-plan>

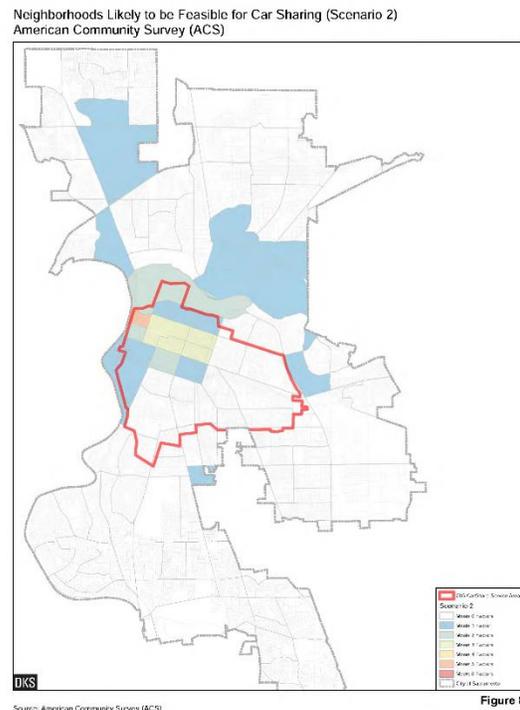
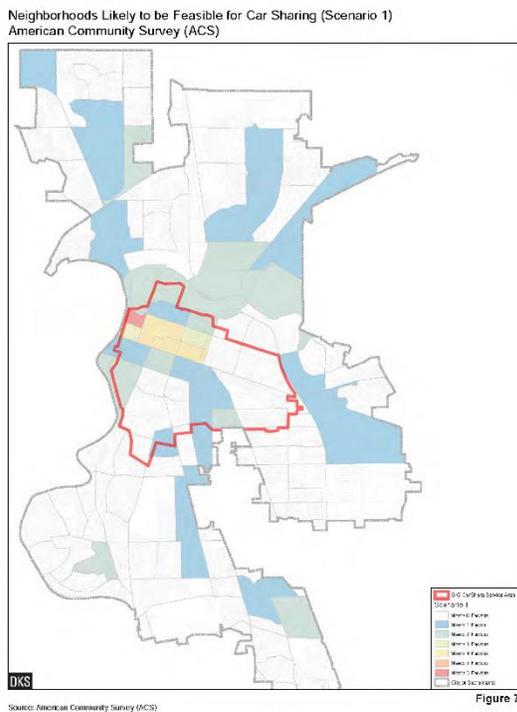
Each census tract was assigned a score of 0 through 6 based on the number of criteria it met. The total number of tracts for each scenario is listed in Table 7. Locations of the census tracts in both scenarios are shown in Figure 10 and Figure 11, overlaid with the “home zone” of the GIG free-floating car-share program. Only five of the census tracts meet the CalEnviroScreen DAC designation—three in the Central City, one in Del Paso Heights, and one in South Sacramento.

Table 7: Car-share neighborhood score

Score	Scenario 1		Scenario 2	
	# Tracts	Total Population	# Tracts	Total Population
1	26	110,726	16	73,692
2	10	47,821	3	8,329
3	2	111,950	4	11,047
4	3	119,990	0	
5	0		1	2,547
6	1	12,426	6	0

Figure 10: Scenario 1 – 60% High, 40% Low

Figure 11: Scenario 2—70% high, 30% low



UC Berkeley’s study of car2go free-floating car sharing in five cities found that one car served an average of eight people a day.³⁴ San Francisco Metropolitan Transit Authority’s On-Street Car Sharing Pilot Program with Zipcar found that one car served an average of 19 people a day.³⁵ Zipcar’s survey of 200 Sacramento members showed that 60 percent of trips included at least two

³⁴ http://innovativemobility.org/wp-content/uploads/2016/07/ImpactsOfcar2go_FiveCities_2016.pdf
³⁵ <https://www.sfmta.com/blog/one-car-19-people-3-key-findings-how-sf-uses-street-car-sharing>

people and that the most popular uses were for grocery shopping, errands, and appointments. When asked about destinations for Community CarShare users, Breathe California stated that people commonly used the cars for work and school, and specifically mentioned people drove from Sacramento to work in Elk Grove.

Electrify America is funding two EV car-sharing programs in Sacramento:

- GIG’s free-floating car share that will be operated by AAA Northern California, Nevada, and Utah. Users can pick up and drop off a vehicle at any legal public parking spot, including metered locations, within a 13 sq. mile “home zone.” GIG Car Share will initially launch with 260 vehicles and charging stations. More than 70 percent of the census tracts in GIG’s proposed home zone are low-income or disadvantaged communities. The user pays through the GIG app by rental time or distance traveled, whichever is cheaper.
- Envoy’s round-trip car sharing will have 142 EVs and dedicated chargers at 71 locations, with 75 percent in low-income and disadvantaged communities. Locations will be at multifamily dwellings and offered as an amenity for residents at a competitive rate.

Once the GIG and Envoy programs are in full operation, the City will evaluate progress and collaborate with the service providers to understand the number of people each car serves, popular uses and destinations, and potential for expanding the programs into other areas of the city.

Sacramento Regional Transit (SacRT), like many other transit agencies around the county, launched a pilot program for on-demand transit, which Sac RT also calls microtransit. Riders use an app or phone call to summon a shuttle that operates within a defined area. Riders pay a regular transit fee but have more control over when and where they are picked up and dropped off than they do with a fixed-route transit bus. A route in the Franklin Blvd. neighborhood started in July 2018 and will transition to three EV shuttles in 2019. Data will be shared with the City of Sacramento to help assess ridership and financial viability of expanding ZEV microtransit into other parts of the city.

Car Sharing and DACs

The City’s existing Community CarShare and the two new programs target disadvantaged communities. Greenlining Institute’s Electric Vehicles for All Equity Toolkit³⁶ recommends focusing on demographics and identified community needs. For example, the Franklin Blvd. microtransit program was placed on a route that isn’t served by public transit. Needs identified in PEV Collaborative meetings included:

- Access to grocery stores and farmer’s markets
- Addressing poverty in single-woman with children households
- Overcoming barriers to employment
- Incorporating non-English speakers

³⁶ <http://greenlining.org/publications-resources/electric-vehicles-for-all/#tab4-section1>

Identifying one or more inequities can directly inform placement of charging infrastructure and/or car-share locations. For example, if a car-sharing hub is located at an elementary school, it may be possible for a single mother to take her children to school and then drive to work or job training. If residents use car-share vehicles for trips to Costco, the program may need vehicles with more trunk space or a DCFC at Costco.

Commercial Vehicles and Light Trucks

The Sacramento EV strategy is focused on light-duty vehicles but recognizes the potential for medium- and heavy-duty vehicles and equipment. Although commercial vehicles are fewer in number, trucks and buses tend to spend more time on the road and burn more fuel than passenger vehicles. The U.S. EPA found that medium- and heavy-duty (MHD) vehicles account for 23 percent of greenhouse gas (GHG) emissions yet are 15% of the vehicles on the road.³⁷ Replacing MHD vehicles with ZEVs can help meet GHG reduction targets. Figures 12 through 15 were created from Argonne National Lab's AFLEET³⁸ tool calculates the average greenhouse gas emissions and pollutants for a fleet vehicle.

Transit buses: Sacramento RT serves Sacramento, Citrus Heights, Elk Grove, Folsom, and Rancho Cordova with 192 40-foot CNG buses, 27 gasoline shuttle vans, 112 paratransit vehicles,³⁹ and an electric light rail system. As of May 2018, Sac RT had 24 zero emission buses on order, awarded, or planned in a joint application with the Yolo Transit District.⁴⁰ The buses include the three on-demand shuttles mentioned above, six buses that will operate between the UC Davis campus in Davis and the UC Davis Medical Center in Sacramento, and six buses that Yolo Transit District will operate.

A December 2018 ruling from the California Air Resources Board set a goal for all public transit agencies to transition to 100 percent zero emission buses by 2040⁴¹ and requires that large transit agencies purchase or operate 25 percent ZEVs by 2025; 50 percent by 2026; and all new bus purchases must be ZEVs by 2029.⁴² SacRT's 2019 strategic goals⁴³ include developing a ZEV fleet conversion plan to replace CNG buses and gasoline shuttles in revenue service with EVs to meet ARB's target, which will ultimately add vehicles to the City's ZEV count.

³⁷ <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100USI5.pdf>

³⁸ <https://afleet-web.es.anl.gov/afleet/>

³⁹ Paratransit vehicles are currently exempt from ARB ZEV rulemaking

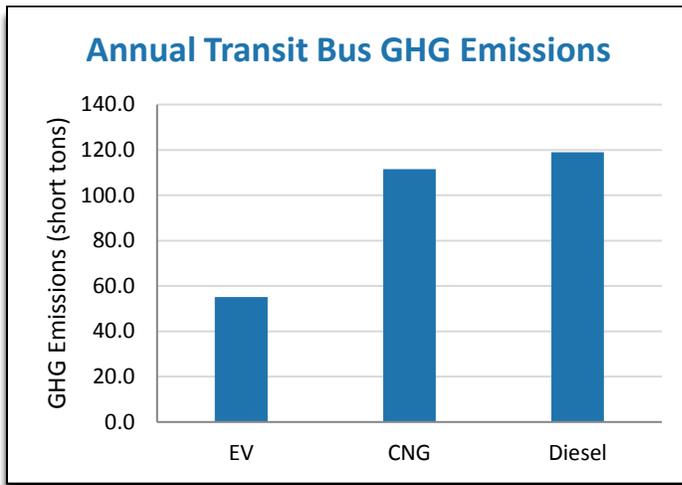
⁴⁰ <https://arb.ca.gov/msprog/ict/faqs/zbusmap.pdf>

⁴¹ <https://ww2.arb.ca.gov/news/california-transitioning-all-electric-public-bus-fleet-2040>

⁴² https://www.arb.ca.gov/regact/2018/ict2018/res18-60attacha.pdf?_ga=2.115658118.100017492.1548267774-368227744.1484264568

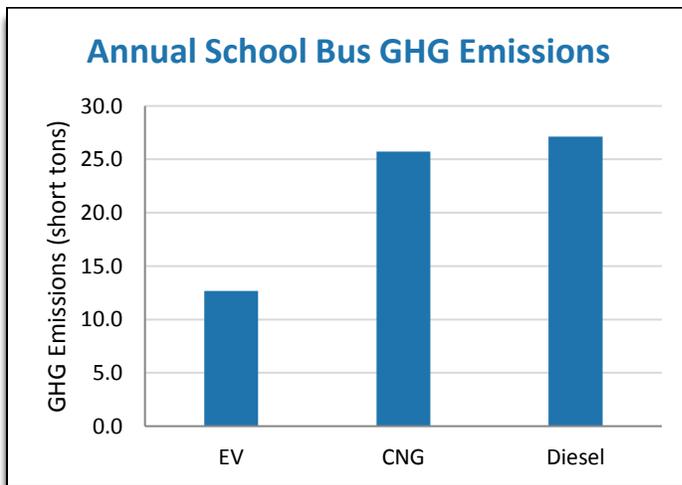
⁴³ http://www.sacrt.com/documents/financialdocs/FY18-19_Final_Budget.pdf

Figure 12: AFLEET Calculation for a Transit Bus⁴⁴



School buses: Sacramento school districts—Sacramento Unified, Natomas Unified, Robla, and Twin Rivers—jointly operate fewer than 500 buses. The Twin Rivers School District operates 16 electric buses and will add more in a joint purchase with Elk Grove. Currently, state government and air districts offer grants to replace propane and diesel buses with electric models. For example, the Energy Commission’s School Bus Replacement Program⁴⁵ provides grant funding up to \$165,000 per bus and up to \$500,000 for infrastructure to replace an old bus with a zero-emission bus. In meetings with local air districts, utilities, and at the Sacramento PEV Collaborative, stakeholders reported that interest in EV school buses is growing, but lack of space for charging equipment impacts deployment.

Figure 13: AFLEET Calculation for a School Bus



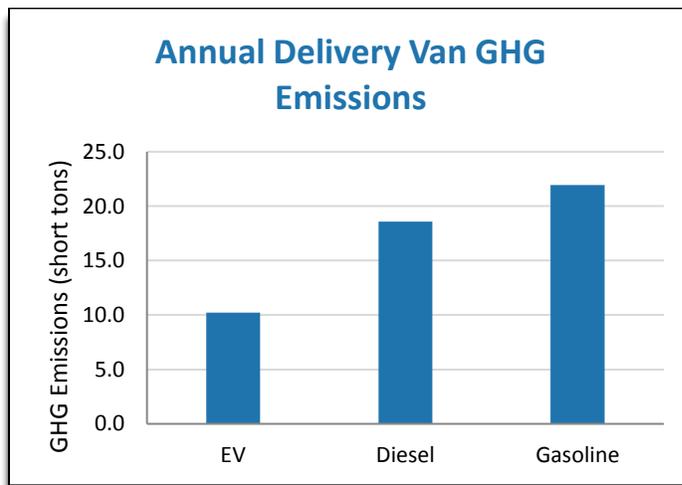
⁴⁴ Sacramento RT doesn’t operate diesel buses, but AFLEET uses diesel as a default

⁴⁵ <https://www.energy.ca.gov/transportation/schoolbus/>

Delivery Vans: The first ZEV delivery vans entered the market in late 2018 and 2019, with cargo vans from Mercedes, Nissan, Volkswagen, Workhorse, and Chanje. Sacramento is the first area of deployment for the Chanje vans in partnership with Ryder. According to Ryder, the Sacramento region has more than 1,000 companies in wholesale, distribution, and delivery that are potential users of these vans.

Between June and November 2018, the Public Utilities Commission (PUC) approved new programs from the three investor owned utilities to establish charging infrastructure for medium- and heavy-duty (MHD) vehicles and for forklifts.⁴⁶ MHD vehicles require a different connector than light-duty vehicles use, and state and utility funding for MHD charging will likely be allocated differently than funding for light-duty vehicles. It could present opportunities to co-locate public or workplace charging for light-duty and medium-duty EVs.⁴⁷

Figure 14: AFLEET Calculation for a Medium-Duty Commercial Van

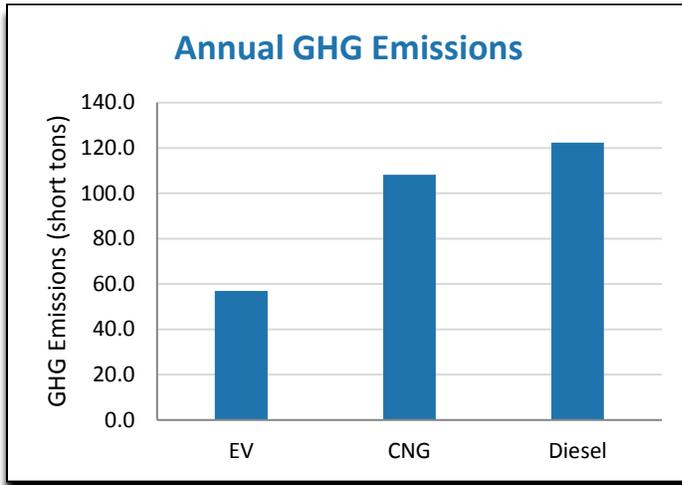


Heavy-duty ZEVs: Short-haul class 8 trucks and yard hostlers are just entering pilot programs. Fuel cell trucks from Toyota and Kenworth are on the road in Southern California, and Tesla and Nikola have pre-production class 8 battery and fuel cell trucks. Loop Energy has fuel cell and battery yard hostlers at the Ports of Los Angeles, Long Beach, and San Diego. Peterbilt plans prototype fuel cell and battery trucks in 2020. Most of the Air Resources Board's investments in ZEV freight have been targeted at the Southern California ports, however Tim Taylor is coordinating with the Port of Sacramento to apply for a grant for ZEV yard hostlers.

⁴⁶ <http://www.cpuc.ca.gov/sb350te/>

⁴⁷ It is unlikely that heavy-duty trucks would use the same locations because large trucks need more space to maneuver.

Figure 15: AFLEET Calculation for a Short-Haul Class 8 Truck



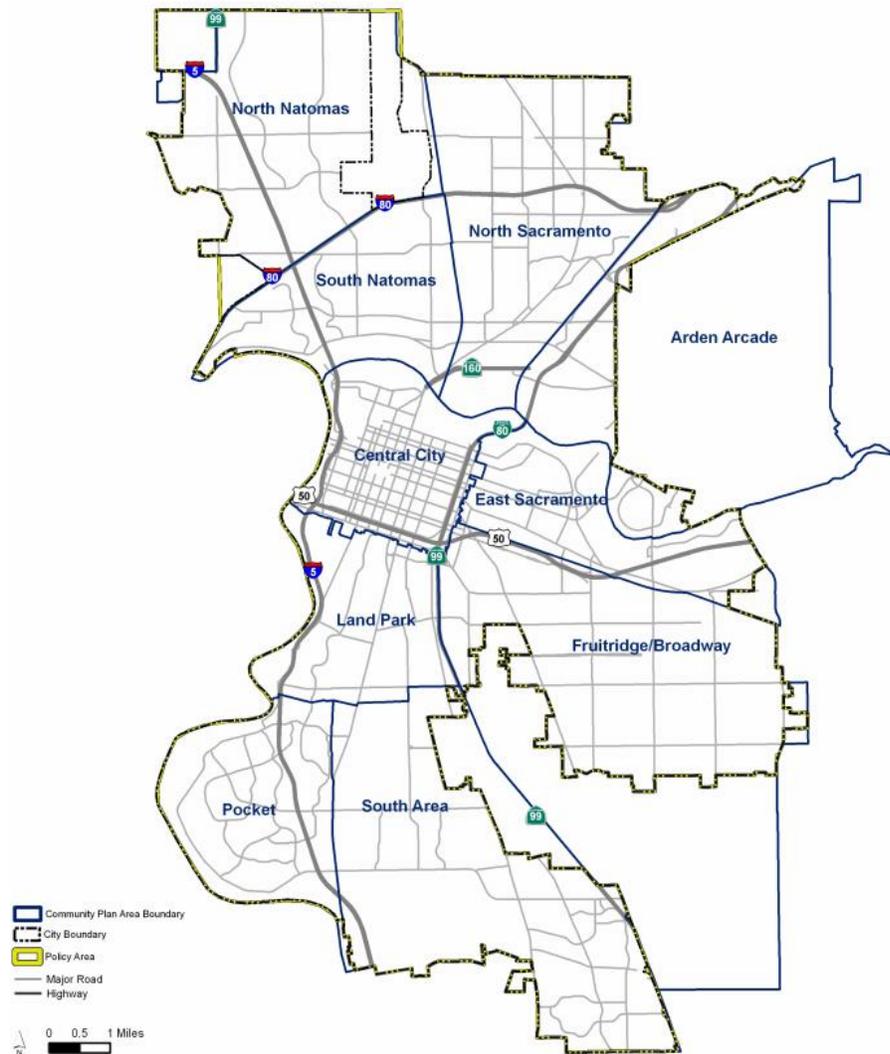
Other ZEVs

This memo focuses on battery electric vehicles and the infrastructure that can support their adoption. Forecasting tools from UC Davis and NREL, and the Energy Commission’s forecast expect that half the vehicles will be plug-in hybrids. The Sacramento region also has three hydrogen stations for light-duty vehicles and a planned station for heavy-duty vehicles. Each hydrogen station can fill at least 100 cars a day and FCEVs refuel about once a week. In a presentation to the Sacramento-area air districts, the California Fuel Cell Partnership estimated that FCEVs could be 20% of ZEV sales by 2025. For Sacramento, up to 15,000 of the ZEVs could use hydrogen stations—no charging infrastructure required.

Future Land Uses

Sacramento’s 2035 General Plan was developed with separate community plans, as shows in Figure 16.⁴⁸ To understand potential for adding public Level 2 and DC fast charging in new non-residential construction, we looked at each community plan to identify future land uses.

Figure 16: Community Plans in the 2035 Sacramento General Plan



Arden Arcade⁴⁹

The entire Plan Area (including incorporated and unincorporated areas) is mostly built out and has very little vacant land available for development. Cal Expo, which is designated as a quasi-public

⁴⁸ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/Community-Plan-Boundaries-Map.pdf?la=en>

⁴⁹ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/Arden-Arcade.pdf?la=en>

space, is the only area targeted for development that was not developed. Meeting minutes by the Cal Expo Long-Range Planning Committee indicate interest from two developers to add restaurants and entertainment facilities.⁵⁰

This is a potential location for co-locating charging for light- and medium-duty vehicles.

Central City⁵¹

The Central City contains numerous infill parcels in large districts such as the River District and the Railyards. Central City has the highest percentage of multifamily attached dwelling units and office employment of any of the community plan areas, and the largest number of historical buildings. The mobility section is focused on parking, commute bikeways, and increased frequency of transit.

Opportunity Areas are the R Street and C Street neighborhoods, River District and Railyards projects. The plan was written before Downtown Commons.

A significant consideration for this area is that the long-planned streetcar may change. At a City of West Sacramento commission meeting on January 23, it was announced that all the bids were rejected and that the two cities need to rethink the project and could impact plans for mobility in the railyards.

East Sacramento⁵²

Almost fully built-out, any remaining vacant land is scattered throughout the Plan Area. The only area targeted for development is the 65th Street/University Transit Village Plan (Government Code §65460 et seq.) that is envisioned as a Neighborhood/University Mixed Use District and encourages uses that encourage the use of transit and pedestrian activity, including offices, hotels, and high-density residences. This opportunity area is also part of the Fruitridge Broadway plan.

This is a potential location for a public or semi-public charging hub and car sharing.

Fruitridge Broadway⁵³

Fruitridge Broadway is largely residential with several major commercial corridors running through the area and has a large concentration of industrial land uses to the northeast. It has a higher proportion of employment in industrial and office sectors than most other community plan areas. Fruitridge Broadway has a significant amount of vacant land available for development, with vacant parcels located in the northeast and smaller parcels scattered throughout the Plan Area.

Opportunity areas are:

- Granite Park planned as a 120-acre office park and open space
- Power Inn Center for office space and light industrial development
- Lemon Hill/Army Depot for residential and light industrial development

⁵⁰ <http://calexpo.com/us/public-meeting-notes/>

⁵¹ <http://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Long-Range/Community-Plans/Central-City-CP.pdf?la=en>

⁵² <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/East-Sacramento.pdf?la=en>

⁵³ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/Fruitridge-Broadway.pdf?la=en>

- UC Davis Medical Center (not described in plan)

Each of these present opportunities for workplace and residential charging, and a potential for medium- and heavy-duty charging for trucks in the Power Inn and Army Depot areas. MHD chargers in these locations might also serve Sacramento RT buses and school buses.

Land Park⁵⁴

Almost fully built-out, any remaining vacant land is scattered throughout the Plan Area. The Plan calls for development of Curtis Park Village, which is underway, and centers at Riverfront and Setzer Site, both of which are partially located in other areas. It is an area of mostly older, traditional homes and businesses. Retrofitting for Level 2 charging requires careful coordination with SMUD.

Land Park neighborhoods, which include Curtis Park and Tahoe Park, may be prime locations for car-sharing.

North Natomas⁵⁵

A significant amount of land is vacant, much of it in the Panhandle, which is in unincorporated Sacramento County that abuts the city portion of North Natomas on the east, north, and west. North Natomas is a major employment center for the Sacramento region with multiple office and light industrial employment centers. The North Natomas plan has several elements specific to Arco Arena, which are no longer relevant. The Plan also details requirements for employment centers, retail, and housing that are dependent on the light rail extension. It may be possible to update those provision to include charging infrastructure and/or car-sharing programs.

North Sacramento⁵⁶

The area is a combination of suburban residential, light industrial, and office uses. It has some vacant land, but parcels are oddly shaped and lack infrastructure, which limits the major development potential and constrains the ability to develop many sites. McClellan Business Park (formerly McClellan AFB), is on the eastern border and continues to have a significant impact on land uses within the Plan Area, particularly the light industrial sectors.

The plan targets infill projects and commercial revitalization in Del Paso Heights, Norwood, El Camino Avenue, and Woodlake-Arden. Transportation specific plans are focused on street extensions. Opportunity areas are Robla and McClellan Heights for medium density housing and limited retail. The plan also calls out the Strawberry Manor neighborhood, but doesn't have details or recommendations.

⁵⁴ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/Land-Park.pdf?la=en>

⁵⁵ <http://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/North-Natomas.pdf?la=en>

⁵⁶ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/North-Sacramento.pdf?la=en>

The plan states that these are old neighborhoods with significant needs for upgraded sewer, water, and street improvements. It will be important for SMUD to assess the capacity of these neighborhoods to provide charging plazas or hubs.

Pocket⁵⁷

Mostly residential neighborhoods with local employment and retail centers, the Pocket area has very little vacant land is available for new development. The vacant land that remains is scattered, limiting major development potential. The plan calls for low-density housing and prohibits commercial development. The mobility section calls for park and ride facilities, which present an opportunity for mobility hubs.

South Natomas⁵⁸

South Natomas has a significant amount of multifamily residential development compared to other community plan areas. Most employment in South Natomas is in office uses, with very few industrial jobs. It has very little vacant land. The Opportunity Area is street improvements to Northgate Blvd for light rail expansion, which may provide an opportunity for a mobility hub.

South Sacramento⁵⁹

The South Area is a collection of districts, or subareas, each of which has its own unique character and land use pattern, including: Fruitridge/Florin unincorporated area, the town of Freeport, Delta Shores, Executive Airport, Meadowview, Parkway, and Valley Hi/North Laguna. A significant amount of vacant land is scattered throughout the Plan Area, and the largest concentration in Delta Shores, which is under development since the plan was written. Mobility measures focus on expanding SacRT service, active transportation, and more roadways.

Three Opportunity Areas are the Kaiser Medical Center, Methodist Medical Center, and Delta Shores. It also includes four new light rail stations, one of which is complete (Consumnes River College.)

The Florin subregion calls for more retail-focused, mixed-use development, and “reuse low-intensity employment uses and automobile-oriented retail with higher density, transit-oriented housing, higher-intensity employment generators, and compact, destination retail.” It called for a transit plaza that could be a mobility hub.

The Meadowview area calls for continued development of the entitled “Hampton Station” subdivision with a focus on placing residential and commercial infill on the large surface parking lots that are new the proposed light rail station. This could also serve as a mobility hub.

⁵⁷ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/Pocket.pdf?la=en>

⁵⁸ <https://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/South-Natomas.pdf?la=en>

⁵⁹ <http://www.cityofsacramento.org/-/media/Corporate/Files/CDD/Planning/Community-Plans/South-Area.pdf?la=en>

Connecting the Dots

The California Green Building Standards Code (CALGreen) requires that new residential construction be “EV-Capable,” meaning that the residence has a dedicated electrical circuit, a raceway for conduit and wire, and labeling on the electric panel. All new single-family homes must be EV Capable; at multifamily and non-residential 3 percent of parking spots must be EV Capable. New codes that take effect in 2020 are the same for single-family but increase the multifamily and non-residential requirement to 10% for all new construction. The codes do not require wiring for EV, which is called EV Ready, or the installation of charging equipment, called EV Installed.

Our analysis shows that the minimum code requirements will result in a gap in infrastructure needed to support 75,000 EVs, and the gap is greatest in disadvantaged communities. Car-sharing and on-demand transit may fill some of the gap by reducing the number of cars per household and compliment the City’s other efforts to reduce vehicle miles traveled. These alternative forms of transit may also alleviate inequities in education, employment, and health in Sacramento’s disadvantaged communities.

As transit buses, school buses, and local delivery vans are adopted, they may have a larger impact on greenhouse gas reduction targets than light-duty vehicles. MHD vehicles need different infrastructure than passenger cars and light trucks but could present opportunities for co-locating charging equipment that could serve both vehicles.

The target of 75,000 ZEVs is an ambitious target, but a concentrated effort on developing infrastructure to support EV charging for residents will also spur adoption of PHEVs and FCEVs, encourage people outside the city to commute to work in an EV, use a car-sharing EV for errands, and amplify the number of EVs in government and business fleets.

Appendix A: Geographic Notes

Data used for this report is typically provided by zip code or census tract, neither of which directly matches the City of Sacramento’s boundaries. To come as close as possible, we used zip codes provided by the Air Resources Board to estimate the number of EVs in the City of Sacramento’s EV Strategy.

95758	95818	95828
95811	95819	95831
95812	95820	95832
95813	95821	95833
95814	95822	95834
95815	95823	95835
95816	95824	95838
95817	95826	95864

The analysis used census tracts provided by the City of Sacramento. Some tracts cross into unincorporated areas. Figure 17 is a map from the American Community Survey website showing the locations of census tracts and the GIS data and names of the tracts is in Table 8.

Figure 17: Census tracts

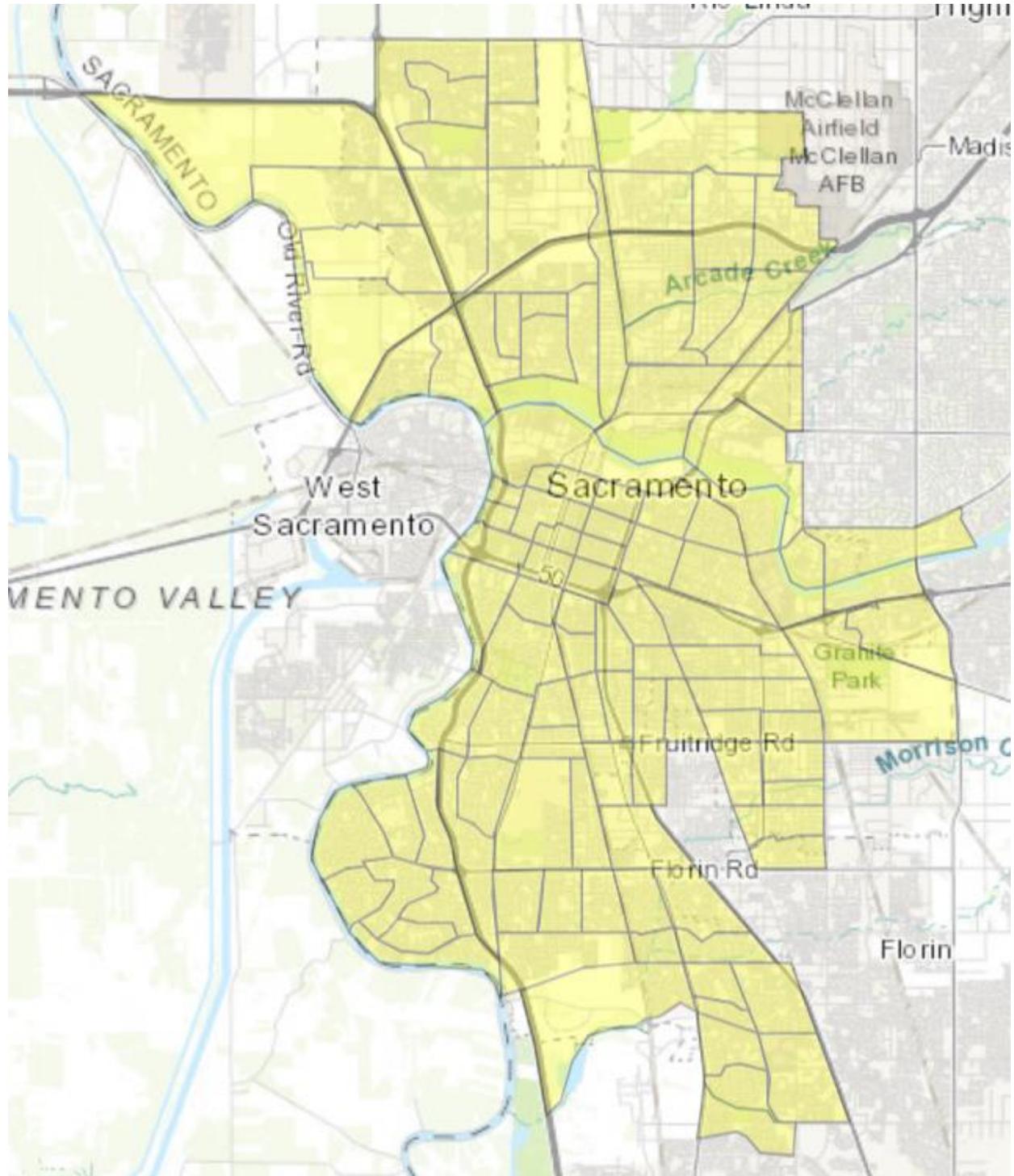


Table 8: Census tracts used in reports

OBJECTID	STATEFP	COUNTYFP	TRACTCE	GEOID	NAME	NAMELSAD
302	06	067	000100	06067000100	1	Census Tract 1
282	06	067	000200	06067000200	2	Census Tract 2
281	06	067	000300	06067000300	3	Census Tract 3
280	06	067	000400	06067000400	4	Census Tract 4
279	06	067	000500	06067000500	5	Census Tract 5
278	06	067	000600	06067000600	6	Census Tract 6
277	06	067	000700	06067000700	7	Census Tract 7
276	06	067	000800	06067000800	8	Census Tract 8
166	06	067	001101	06067001101	11.01	Census Tract 11.01
275	06	067	001200	06067001200	12	Census Tract 12
274	06	067	001300	06067001300	13	Census Tract 13
273	06	067	001400	06067001400	14	Census Tract 14
272	06	067	001500	06067001500	15	Census Tract 15
253	06	067	001600	06067001600	16	Census Tract 16
252	06	067	001700	06067001700	17	Census Tract 17
251	06	067	001800	06067001800	18	Census Tract 18
250	06	067	001900	06067001900	19	Census Tract 19
249	06	067	002000	06067002000	20	Census Tract 20
248	06	067	002100	06067002100	21	Census Tract 21
247	06	067	002200	06067002200	22	Census Tract 22
231	06	067	002300	06067002300	23	Census Tract 23
230	06	067	002400	06067002400	24	Census Tract 24
229	06	067	002500	06067002500	25	Census Tract 25
228	06	067	002600	06067002600	26	Census Tract 26
227	06	067	002700	06067002700	27	Census Tract 27
226	06	067	002800	06067002800	28	Census Tract 28
225	06	067	002900	06067002900	29	Census Tract 29
185	06	067	003000	06067003000	30	Census Tract 30
224	06	067	003101	06067003101	31.01	Census Tract 31.01
223	06	067	003102	06067003102	31.02	Census Tract 31.02
184	06	067	003202	06067003202	32.02	Census Tract 32.02
262	06	067	003203	06067003203	32.03	Census Tract 32.03
165	06	067	003204	06067003204	32.04	Census Tract 32.04
204	06	067	003300	06067003300	33	Census Tract 33
203	06	067	003400	06067003400	34	Census Tract 34
202	06	067	003501	06067003501	35.01	Census Tract 35.01
201	06	067	003502	06067003502	35.02	Census Tract 35.02
200	06	067	003600	06067003600	36	Census Tract 36
199	06	067	003700	06067003700	37	Census Tract 37

OBJECTID	STATEFP	COUNTYFP	TRACTCE	GEOID	NAME	NAMELSAD
198	06	067	003800	06067003800	38	Census Tract 38
197	06	067	003900	06067003900	39	Census Tract 39
196	06	067	004001	06067004001	40.01	Census Tract 40.01
177	06	067	004004	06067004004	40.04	Census Tract 40.04
176	06	067	004005	06067004005	40.05	Census Tract 40.05
175	06	067	004006	06067004006	40.06	Census Tract 40.06
174	06	067	004008	06067004008	40.08	Census Tract 40.08
99	06	067	004009	06067004009	40.09	Census Tract 40.09
254	06	067	004010	06067004010	40.10	Census Tract 40.10
97	06	067	004011	06067004011	40.11	Census Tract 40.11
98	06	067	004012	06067004012	40.12	Census Tract 40.12
173	06	067	004100	06067004100	41	Census Tract 41
172	06	067	004201	06067004201	42.01	Census Tract 42.01
171	06	067	004202	06067004202	42.02	Census Tract 42.02
170	06	067	004203	06067004203	42.03	Census Tract 42.03
169	06	067	004300	06067004300	43	Census Tract 43
183	06	067	004401	06067004401	44.01	Census Tract 44.01
182	06	067	004402	06067004402	44.02	Census Tract 44.02
164	06	067	004501	06067004501	45.01	Census Tract 45.01
163	06	067	004502	06067004502	45.02	Census Tract 45.02
180	06	067	004801	06067004801	48.01	Census Tract 48.01
26	06	067	004802	06067004802	48.02	Census Tract 48.02
151	06	067	004903	06067004903	49.03	Census Tract 49.03
305	06	067	004904	06067004904	49.04	Census Tract 49.04
150	06	067	004905	06067004905	49.05	Census Tract 49.05
149	06	067	004906	06067004906	49.06	Census Tract 49.06
148	06	067	005201	06067005201	52.01	Census Tract 52.01
147	06	067	005202	06067005202	52.02	Census Tract 52.02
160	06	067	005204	06067005204	52.04	Census Tract 52.04
29	06	067	005205	06067005205	52.05	Census Tract 52.05
293	06	067	005301	06067005301	53.01	Census Tract 53.01
138	06	067	005402	06067005402	54.02	Census Tract 54.02
145	06	067	005403	06067005403	54.03	Census Tract 54.03
137	06	067	005404	06067005404	54.04	Census Tract 54.04
136	06	067	005502	06067005502	55.02	Census Tract 55.02
103	06	067	006202	06067006202	62.02	Census Tract 62.02
144	06	067	006300	06067006300	63	Census Tract 63
143	06	067	006400	06067006400	64	Census Tract 64
132	06	067	006500	06067006500	65	Census Tract 65
131	06	067	006600	06067006600	66	Census Tract 66

OBJECTID	STATEFP	COUNTYFP	TRACTCE	GEOID	NAME	NAMELSAD
130	06	067	006701	06067006701	67.01	Census Tract 67.01
129	06	067	006702	06067006702	67.02	Census Tract 67.02
128	06	067	006800	06067006800	68	Census Tract 68
127	06	067	006900	06067006900	69	Census Tract 69
179	06	067	007001	06067007001	70.01	Census Tract 70.01
116	06	067	007004	06067007004	70.04	Census Tract 70.04
113	06	067	007007	06067007007	70.07	Census Tract 70.07
100	06	067	007010	06067007010	70.10	Census Tract 70.10
312	06	067	007011	06067007011	70.11	Census Tract 70.11
146	06	067	007012	06067007012	70.12	Census Tract 70.12
115	06	067	007013	06067007013	70.13	Census Tract 70.13
114	06	067	007014	06067007014	70.14	Census Tract 70.14
19	06	067	007015	06067007015	70.15	Census Tract 70.15
18	06	067	007016	06067007016	70.16	Census Tract 70.16
17	06	067	007017	06067007017	70.17	Census Tract 70.17
269	06	067	007018	06067007018	70.18	Census Tract 70.18
268	06	067	007019	06067007019	70.19	Census Tract 70.19
16	06	067	007020	06067007020	70.20	Census Tract 70.20
15	06	067	007102	06067007102	71.02	Census Tract 71.02
266	06	067	007103	06067007103	71.03	Census Tract 71.03
265	06	067	007104	06067007104	71.04	Census Tract 71.04
264	06	067	007105	06067007105	71.05	Census Tract 71.05
6	06	067	007106	06067007106	71.06	Census Tract 71.06
5	06	067	007107	06067007107	71.07	Census Tract 71.07
112	06	067	007204	06067007204	72.04	Census Tract 72.04
139	06	067	009601	06067009601	96.01	Census Tract 96.01
111	06	067	009606	06067009606	96.06	Census Tract 96.06
86	06	067	009608	06067009608	96.08	Census Tract 96.08
96	06	067	009609	06067009609	96.09	Census Tract 96.09
110	06	067	009610	06067009610	96.10	Census Tract 96.10
66	06	067	009614	06067009614	96.14	Census Tract 96.14
188	06	067	009633	06067009633	96.33	Census Tract 96.33
31	06	067	009634	06067009634	96.34	Census Tract 96.34