CVRP Guide to Fleet Electrification

Presented by the Clean Vehicle Rebate Project and the Center for Sustainable Energy

August 2020

About this Guide

This is a comprehensive guidebook about light-duty fleet electrification created for fleet, building, energy and sustainability managers.

About the Clean Vehicle Rebate Project (CVRP)

CVRP promotes clean vehicle adoption by offering rebates of up to $7,000 for the purchase or lease of new, eligible zero-emission vehicles, including battery electric, plug-in hybrid electric and hydrogen fuel cell vehicles. CSE administers CVRP throughout the state for the California Air Resources Board (CARB).
CleanVehicleRebate.org[1]

About the Center for Sustainable Energy® (CSE)

CSE is a nonprofit with one simple mission—decarbonize. We offer clean energy program administration and technical advisory services with the experience and streamlined efficiency of a for-profit operation and the passion and heart of a nonprofit. We work nationwide with energy policymakers, regulators, public agencies, businesses and others as an expert implementation partner and trusted resource.
EnergyCenter.org[2]

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1 California Clean Vehicle Rebate Project (2020). Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng

2 Center for Sustainable Energy (2020). Retrieved July 22, 2020, from https://energycenter.org/

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CALIFORNIA CLIMATE INVESTMENTS
Cap and Trade Dollars at Work

CALIFORNIA CLEAN VEHICLE REBATE PROJECT℠

Table of Contents

EV Terms and Concepts

Common words used when talking about EVs and the EV marketplace.

Criteria Air Pollutants
Six common air pollutants can harm your health and the environment, and cause property damage. These pollutants are particulate matter, photochemical oxidants (including ozone), carbon monoxide, sulfur oxides, nitrogen oxides and lead. The Environmental Protection Agency (EPA) calls these pollutants "criteria" air pollutants because it sets National Ambient Air Quality Standards for them based on the criteria, which are characterizations of the latest scientific information regarding their effects on health or welfare.

GHG: greenhouse gas
Gases contributing to the greenhouse effect resulting in harmful climate changes with serious environmental issues and negative health impacts.

CAP: climate action plan
A detailed and strategic framework for measuring, planning and reducing greenhouse gas emissions and related climate impacts.

DAC: disadvantaged community
Areas that suffer from a combination of economic, health and environmental burdens. CVRP uses the CalEnviroScreen 3.0 map* to show the disadvantaged communities designated by the California Environmental Protection Agency.

ICE: internal combustion engine
A common term used to describe gasoline or diesel-powered vehicles. Gasoline and diesel engines generally run on petroleum-based fuels and produce criteria pollutants (hydrocarbons, nitrous oxides, particulate matter, etc.) and greenhouse gases (carbon dioxide).

BEV: battery electric vehicle
A BEV is a plug-in electric vehicle. It has a large battery that powers an electric motor. A BEV does not have a gasoline-powered engine, a tailpipe or tailpipe emissions.

PHEV: plug-in hybrid electric vehicle
PHEVs have batteries and a limited all-electric range. They also have a gasoline-powered engine to meet the driver's needs when the battery's charge is depleted.

FCEV: fuel cell electric vehicle
FCEVs are battery electric vehicles. When the vehicle's battery charge is depleted, hydrogen gas passes through the fuel cell, creates an electrical current and recharges the battery. FCEVs do not have a gasoline engine and do not plug-in. For hydrogen fuel cell vehicles, their only emission is water. Many manufacturers currently provide free fueling for the first three years.

ZEV: zero-emission vehicle
ZEVs emit no emissions and include BEVs and FCEVs, but not PHEVs.

Regenerative braking
EV motors can slow the vehicle. The regenerative braking captures energy from slowing down the vehicle and returns it to the battery. This reduces brake wear and is known as "one-pedal driving."

EVSE: electric vehicle supply equipment
EVSE is the charging infrastructure that connects the power supply to the vehicle's onboard charger. EVSE is sometimes referred to as electric vehicle infrastructure (EVI). And sometimes incorrectly referred to as EV chargers or electric vehicle charging stations (EVCS).

* California Office of Environmental Health Hazard Assessment (2018). *SB 535 Disadvantaged Communities Using CalEnviroScreen 3.0 Results*. Retrieved July 22, 2020, from https://oehha.maps.arcgis.com/apps/View/index.html?appid=c3e4e4e1d115468390cf61d9db83efc4

Onboard vehicle chargers
The actual 220-volt vehicle charger is embedded in each plug-in vehicle. In North America, the Level 1 (120 volt) and Level 2 (220 volt) use the same SAE J-1772 connector plug. The onboard charger for many plug-in hybrids (PHEVs) are 3.3 kilowatt-hours (kWh). The onboard chargers on most BEVs are 6.6 to 7.4 kWh. Chargers on some BEVs are capable of charging at 9.4 to 19.2 kWh.

L1: Level 1 charger
The slowest method of charging, L1 uses a cable that comes with the vehicle and is plugged into a standard 120-volt AC outlet. Average range per hour of charge: 3.5~6.5 miles. A Level 1 EVSE uses 1.1 kWh–the same energy as running a typical microwave oven for an hour.

L2: Level 2 charger
L2 charging is typically three to six times faster than L1 charging but requires an EVSE or a 220-volt outlet on a dedicated 20 or 40 amp 208~240-volt electrical circuit. The average range per hour of charge will be 14~35 miles.

DCFC: direct current fast charger
These chargers provide the fastest available charging and are often found at major destinations and along travel corridors. Currently, most DCFC are either 50 kWh or 150 kWh. Newer 150 kWh DCFC may be capable of being upgraded to 350 kWh. Tesla DCFC are 75 kWh or 120~150 kWh. The actual rate of charge will vary based upon the vehicle battery's state of charge (SOC) and the vehicle's battery management software. Most DCFC are 440 volts. The DCFC bypasses the onboard 220-volt charger and charges the batteries directly. Average range per charge: approximately 100 miles in 30 minutes.

TOU: time of use
TOU is a utility tariff with rates varying according to the time of day with higher rates during peak demand hours and lower rates during off-peak times, especially when there is an abundance of solar. TOU rates benefit EV owners who can charge in the middle of the day or the middle of the night between 10 p.m. and 7 a.m.

Demand charge
Demand charges refer to significantly higher electricity cost associated with a utility consumer's highest peak usage of energy. Demand charges dramatically increase utility bills.

Kilowatt (kW)
A measure of 1,000 watts of electrical power equal to 10 100-watt incandescent lightbulbs. It can also be used similarly to horsepower when describing EV acceleration.

Kilowatt-hour (kWh)
A measure of electrical energy equivalent to consuming 1,000 watts for 1 hour. Understanding kWh can help EV drivers select charging types when they are on the road and also simplify electric fuel use accounting.

Introduction

This is a comprehensive guidebook about light-duty fleet electrification created for fleet, building, energy and sustainability managers. When transitioning to an electrified fleet, it is important to think long term to make the process time and cost efficient. This guide offers information and tips to help plan electric vehicle (EV) acquisition from vehicle and infrastructure assessments to procurement strategies, incentives, management and promotional best practices. Whether you're choosing to electrify your fleet because of greenhouse gas (GHG) reduction mandates, cost reduction, resiliency or simply because EVs are fun to drive, the guide will help you to navigate the complexities of fleet electrification and help you to leverage the benefits to build your business case.

Benefits of Electrifying Your Fleet

Building an electrified green fleet is a great opportunity to improve your bottom line and total cost of ownership, reducing criteria pollution and improving the health of your community, and adding to the resiliency of your organization and community.

Meeting CAP and GHG Goals

California has enacted several policy initiatives and regulations to both facilitate and require the transition to fleet electrification. All are designed to help better the future of communities by improving local air quality, curbing the impacts of climate change and stimulating the economy by using clean technologies. Some of the initiatives enable smaller local entities like cities and counties to enforce their own regional GHG emission reduction requirements. Fleet managers should seek to understand and comply with these requirements as there may be local incentives available, as well as significant penalties for noncompliance.

For the state's fleets, Governor Jerry Brown issued Executive Order B-16-2012,[3] which requires California's fleets to increase the procurement of zero-emission vehicles (ZEVs) over time. Specifically, the order requires at least 25% of the state's light-duty fleet vehicle purchases be ZEVs by 2020. Executive Order B-48-18[4] was issued by Governor Brown in 2018 and builds on this policy by requiring that California deploy 5 million EVs by 2030.

3 Office of California Governor Edmund G. Brown Jr. (2012). *EXECUTIVE ORDER B-16-2012*. Retrieved July 22, 2020, from https://www.ca.gov/archive/gov39/2012/03/23/news17472/index.html

4 State of California's Office of Planning and Research. *Zero-Emission Vehicles*. Retrieved July 22, 2020, from https://opr.ca.gov/planning/transportation/zev.html

Legislation has been passed that requires timelines for state fleets to transition to EVs. Senate Bill (SB) 498[5] (Skinner, 2017) requires the Department of General Services to ensure that at least 50% of light-duty vehicle purchases each fiscal year be ZEVs, beginning in fiscal year 2024-25. Additionally, Assembly Bill (AB) 739[6] (Chau, 2017) establishes requirements for state fleets to purchase medium- and heavy-duty (MD/HD) ZEVs. Specifically, the legislation requires that starting in 2026, at least 15% of new vehicles with a gross vehicle weight rating of at least 19,000 pounds be ZEVs. The requirement increases to 30% starting in 2031.

For smaller jurisdictions like cities and counties, landmark climate legislation including AB 32[7] (Nunez, 2006) and SB 32[8] (Pavley, 2016) enables these jurisdictions to adopt climate action plans to enforce regional emissions reduction requirements. For example, the San Francisco Climate Action Plan proposed discouraging low-efficiency vehicles by charging higher registration fees and promoting more efficient vehicles by offering grants and benefits like high-occupancy vehicle (HOV) lane access.

Air Quality and Climate Benefits

By using a ZEV or PHEV you are reducing harmful emissions (aka criteria pollutants or particulate emissions) and greenhouse gases (GHGs), which directly affect the health and well-being of community members and directly affect the future negative impacts of climate change, respectively. Transportation is the largest single source of pollution statewide. So, replacing vehicles with zero-emission vehicles is the right place to start. Almost 38% of California's total smog and 36% of GHGs come from motor vehicles. If petroleum refineries are included, the percentage increases to almost 50% of the state's GHGs. According to the California Air Resources Board (CARB), residents drive more than a billion miles every day, producing 1,000 tons of smog-forming pollutants and more than 530,000 tons of GHG emissions.[9] Further, CARB reports that more than 90% of Californians live in areas that fail to meet federal or state air quality standards, which creates substantial health impacts.

> Transportation has an even greater impact on air quality than on GHG emissions in California. It accounts for 80% of NOx (nitrogen oxides) and 95% of particulate emissions in the state.[10]

5 California State Senate (2017). *SB-498 Vehicle fleets: zero-emission vehicles*. Retrieved July 22, 2020, from https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB498

6 California State Assembly (2017). *AB-739 State Vehicle Fleet: Purchases*. Retrieved July 22, 2020, from http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB739

7 California Air Resource Board (2018). *AB 32 Global Warming Solutions Act of 2006.* Retrieved July 22, 2020, from https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006

8 California State Senate (2016). *SB-32 California Global Warming Solutions Act of 2006: emissions limit.* Retrieved July 22, 2020, from https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32

9 **CASE STUDY:** California Clean Vehicle Rebate Project (2020). *Reduced Environment Impacts*. Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng/ev/benefits/environmental-impacts

10 California Environmental Protection Agency Air Resource Board (2016). *California Greenhouse Gas Inventory for 2000-2014 — by Category as Defined in the 2008 Scoping Plan*. Retrieved July 22, 2020, from https://ww3.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_2000-14.pdf

Reduced Health Issues Related to Car Emissions

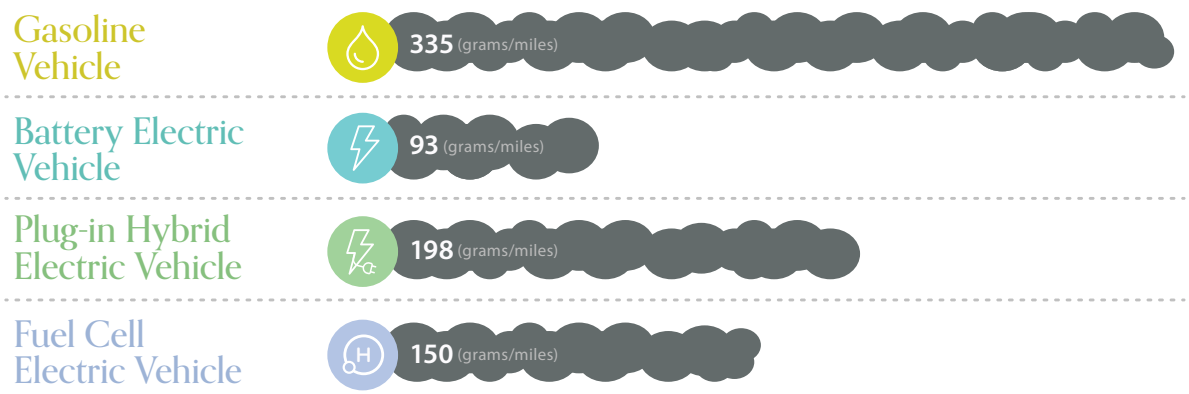
When you reduce criteria pollutants, you are improving the air quality. This has a direct effect on the health of the people within your community. Criteria pollutants directly impact children, the elderly and those with compromised immune systems. According to the World Health Organization, long-term exposure has also been linked to cancer and damage to immune, neurological and reproductive systems.[11] Even limited exposure to high levels of air pollution has resulted in irritation to the eyes, throat and lungs, especially for children and senior citizens. For people with a pre-existing respiratory condition, such as asthma or emphysema, air pollution can aggravate and intensify symptoms. The communities most heavily impacted by the associated air pollution from transportation are disadvantaged communities (DACs). These communities are disproportionately impacted by the pollution caused by transportation, both to and from warehouses and factories and along major freight corridors.

GHG Reduction Benefits

By reducing GHGs you are preventing catalyst gases from reaching the atmosphere that would be detrimental to climate change. According to the Environmental Protection Agency (EPA), GHG emissions from transportation account for about 29% of total U.S. GHG emissions, and when you include the refineries it's about 50%, making it the largest contributor of GHGs.[12] When these gases are released into the atmosphere, they trap heat, warming the atmosphere and creating major changes in our climate. This results in issues such as displaced communities and native wildlife due to sea level rise, water scarcity, loss of food crops and an increase in extreme weather event intensity and frequency, such as hurricanes, tornados, heat waves and wildfires.

By transitioning your fleet to cleaner vehicles, you are directly improving the future health and well-being of your community and the planet. Table 1 showcases the 2019 baseline GHG emissions per vehicle provided by CARB. The emissions from the 2019 gasoline-powered ICE car is producing more than 350% (3.5 times) more GHGs. Unlike ICE vehicles, as the grid gets supplied by more renewable energy, EV emissions will get cleaner and emit much fewer GHGs over time.

Table 1. Baseline GHG emissions per 2019 vehicle (grams/mile)[13]



11 South Coast Air Quality Management District (2015). *Multiple Air Toxics Exposure Study in the South Coast Air Basin*. Retrieved July 22, 2020, from http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-ii/mates-ii-contents-and-executive-summary.pdf

12 United States Environmental Protection Agency (2020). *Carbon Pollution from Transportation*. Retrieved July 22, 2020, from https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation

13 California Air Resource Board (2019). *Fiscal Year 2019-20 Funding Plan on Clean Transportation Incentives Appendix A: Emission Reductions Quantification Methodology*. Retrieved July 22, 2020, from https://ww2.arb.ca.gov/sites/default/files/2019-09/fy1920fundingplan-appa.pdf

Lower Total Cost of Ownership

There are many cost-related benefits to electrifying your fleet. Some of these benefits will be addressed in further detail in later sections, but here are some main advantages.

Lower Maintenance Costs

EVs have much lower maintenance costs. Services such as oil changes, spark plug replacements and most fluid transfers are unnecessary for BEVs and FCEVs, and greatly reduced for PHEVs. Since BEVs and FCEVs don't have emission control systems, there are no smog checks or smog registration fees. Thanks to regenerative braking, EVs experience far less brake wear resulting in infrequent replacements. Some replacement items include the cabin filter, windshield wipers and tire changes.

Fuel Resiliency

It can be frustrating when volatile fuel costs double your fuel budget and skew future operational cost projections. The same amount of driving is done, but your budget suffers when prices swing from $2.49/gallon to $4.50/gallon. Unlike market-priced gasoline, electric utilities are regulated by the California Public Utilities Commission and are required to have consistent pricing. An electrified fleet will allow you to better project your monthly costs and budget accordingly. If you invest, or have invested in on-site solar, there can be even greater fuel cost savings.

> The City of Houston estimates that its fleet of 27 Nissan LEAFs will accrue $110,000 in annual savings compared to internal combustion engine vehicles.[14]

Current Rebates and Incentives

Several different rebate and incentive opportunities exist throughout California. These differ by jurisdiction, air district and utility provider. Capitalizing on and leveraging these opportunities with the decision-makers within your organization is crucial to realizing a quicker payback or return on investment (ROI) on EVs and charging investments. The CVRP website[15] provides a list of incentives available by type and region. Also, try utilizing the CVRP Savings Calculator,[16] DriveClean.org,[17] PlugStar.com[18] or FuelEconomy.gov for a quick reference of additional EV incentives available based on your location. **View the appendix for an extensive list of incentives and rebates available for electric vehicles and electric vehicle infrastructure.**

14 **CASE STUDY:** Electrification Coalition (n.d.). *City of Houston: Forward Thinking on Electrification.* Retrieved July 22, 2020, from https://driveevfleets.org/wp-content/uploads/2018/08/Houston_Case_Study_Final_113013.pdf

15 Center for Sustainable Energy (2020). Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng/ev/incentives

16 California Clean Vehicle Rebate Project (2020). *Savings Calculator.* Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng/community/savings

17 DriveClean (2020). *About this Site.* Retrieved July 2020, from https://driveclean.ca.gov/about

18 PlugStar by Plug In America (2020). *Everything you need to know to drive electric*. Retrieved July 22, 2020, from https://plugstar.com/

Other Benefits

Green fleets across the nation have realized other benefits such as creating on-site resiliency to power outages, helping accelerate clean vehicle adoption, improving community relations and gaining recognition as regional sustainability leaders.

Assessing Your Current Fleet

Is your fleet operating as efficiently as possible? When determining which vehicles should be replaced, it is important to assess several different factors. Zero-emission or near-zero-emission replacement vehicles provide a good rate of return (ROI) while allowing your team members to execute their jobs and responsibilities more efficiently.

Should I Swap Out this Vehicle for an EV?

While the market and technologies available continue to evolve rapidly and improve for both light-duty and medium-duty/heavy-duty (MD/HD) EVs, BEVs may not always make the best replacement for your traditional ICE vehicle. Depending on your vehicle's use and your workers' needs and driving patterns, an ideal replacement may be currently unavailable. For example, while there are many light-duty mid-range and long-range EVs available today, pick-up trucks won't begin to arrive until the end of 2021. Or when considering a worker with an inconsistent and fluctuating daily driving route, say 20 miles one day and 200 or more miles the next day, you may want to select a PHEV as they can utilize gas to extend driving range. Currently, the ideal BEV candidate is a vehicle with a consistent daily driving distance less than 200 miles per day. For a comprehensive list of light-duty CVRP eligible vehicles, visit cleanvehiclerebate.org/eligible-vehicles.[19] To see a comprehensive list of MD/HD vehicles, a great tool to utilize is the Zero-Emission Technology Inventory (ZETI) tool.[20]

Other Alternative Fuel Options

For those looking to reduce GHG emissions but are curious about other clean energy options, you may benefit from researching alternative fuels such as hydrogen fuel cell technology. Hydrogen is the most abundant element in the universe and is among the cleanest and greenest fuels used for powering fuel cell electric vehicles (FCEVs). While FCEVs still have a hefty price tag and currently lack as many refueling stations like their EV counterparts, their only emission is water. FCEVs currently have the largest incentives. You can receive up to $7,000 per vehicle from CVRP, and several manufacturers currently include three years of free hydrogen fuel

19 California Clean Vehicle Rebate Project. *CVRP Eligible Vehicles*. Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng/eligible-vehicles

20 Global Commercial Vehicle Drive to Zero (2020). *Zero-Emission Technology Inventory*. Retrieved July 22, 2020, from https://globaldrivetozero.org/tools/zero-emission-technology-inventory/

with a vehicle—valued at around $15,000. FCEVs fuel quickly—it only takes about three to five minutes to refill a FCEV tank for 300 miles of range. We suggest checking out the California Fuel Cell Partnership[21] to learn more about this clean energy option and FuelEconomy.gov[22] for their list of cleaner alternative fuel options.

Rightsizing and Optimizing

Operating an optimized fleet starts with fleet basics. Having the right number of vehicles available for your staff when they need them is the goal. As a fleet manager, rightsizing becomes one of your highest priority goals. To rightsize, you are simply aiming to fully utilize all the vehicles in your fleet and not have any vehicles parked and unused. To get there, you must track the following factors for each of your vehicles.

Collecting Fleet Data

The more data you have on all your vehicles, the more informed your purchasing and managing decisions will be. But reporting and data collecting can be very time-consuming. If your budget is slim and your time is limited for recording all the data, we suggest assessing your current duty and drive cycles to help you narrow your options and evaluate the best replacements for your fleet.

Addressing how many hours per day each vehicle is used and how they are being used can provide a better idea of the current utilization of your fleet's vehicles and help you begin rightsizing your fleet. This can be done as simply as a written log for each worker and their vehicle.

To further optimize, you can track the following factors and attain a more in-depth understanding of your fleet's current usage and needs.

Duty cycle:

How much are your vehicles being used? How many hours per day, and how many miles a day?

Drive cycle:

How is the vehicle being used? Is the vehicle used for short random trips or for long-distance hauling with space for large equipment?

- **Current usage:** Likely the most important metric in an analysis. Ideally, this entails how far a vehicle is driven in an average year, the range of daily usage, how long it idles, the length of trips, etc. The more information provided, the better.
- **Vehicle make, model and body type:** Determines the general size, shape and specific attributes and capabilities of each vehicle and its general class (e.g., large SUV, compact hatchback, etc.).
- **Car telematics:** Telematics includes current usage from above as well as potential charging time and driver behavior. This will become very helpful as you optimize fleet logistics and processes. It is important to note that not all cars include telematics in the vehicle and an add-on may be required.
- **Fuel type:** Fuel types will identify different costs as well as emissions and GHGs abated by switching to an EV.

21 California Fuel Cell Partnership (2020). *Fuel Cell Electric Vehicles & Hydrogen Fuel.* Retrieved July 22, 2020, from https://cafcp.org/

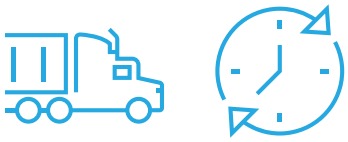
22 United States Department of Energy Office of Energy Efficiency & Renewable Energy Alternative Fuels (2020). *Alternative Fuels*. Retrieved July 22,2020, from https://www.fueleconomy.gov/feg/current.shtml

- **Vehicle age:** Helps determine the average annual mileage for each vehicle. Vehicles under three years old are unlikely to be good candidates for replacement. Conversely, vehicles over 10 years old are more likely to be due for replacement, and their maintenance and repair costs will probably exceed their value.
- **Expected service life:** How long will this vehicle normally be expected to be in service?
- **Life cycle utilization:** How close is the vehicle to its retirement?
- **Life-to-date cost:** Keeping an eye on this number will allow you to prepare for its future replacement.
- **Purchase price of replacement:** Helps with planning and utilization analysis.
- **VIN:** Needed for identification purposes.

Setting a Baseline

Establishing a baseline is important to your fleet. It allows you to track the improvements you are making. Baselining also allows you to set more realistic goals related to your budget, efficiency and greenhouse gas reduction (GGR) values. A baseline utilization formula can be as simple as tracking the number of hours vehicles are used during the day divided by the number of working hours in the day. Take into consideration that each fleet is unique and that individual vehicles may have different utilization rates at different times of the year. Thus, it is important to set your baseline using metrics that capture your full calendar year cycle. It is also very important to set baselines that are specific to the different vehicle applications or uses. The same type of vehicle may carry different weighted materials, resulting in different fuel consumption (or fuel burn).

Baseline Utilization Per Vehicle



# of hours vehicle used / # hours per working day

Baseline Fuel Burn Per Day Per Vehicle

Total gallons of fuel used per vehicle per day

Baseline Utilization of Your Fleet

# of vehicles used during the day / # of vehicles in fleet by class or type

What is a good utilization rate?

We suggest shooting for a utilization goal of 80% for a very optimized fleet.

What is a good goal for annual fuel burn reduction?

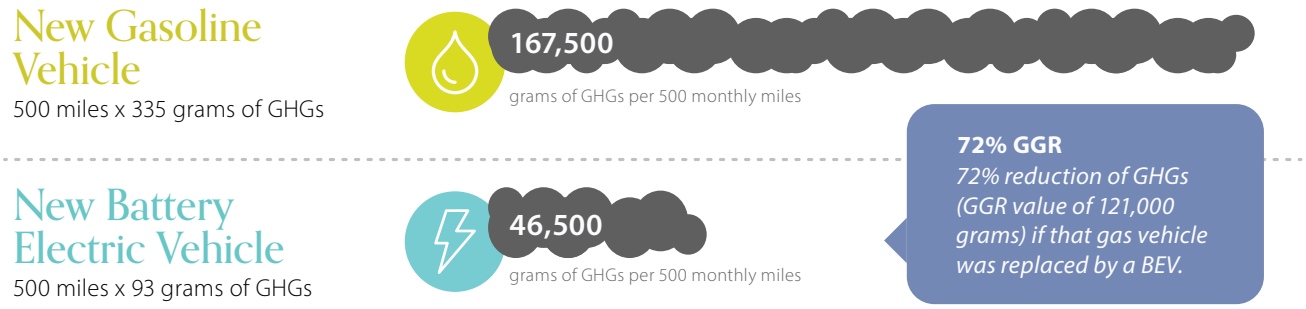
We suggest shooting for a fuel burn reduction of 5% a year.

Installing Devices and Software to Track Usage and Increase Optimization

By installing telematic devices and software to help you gather and track all this data, you will save hours of manual reporting and analyzing time, which will allow you to focus on the important decision-making. Especially for large fleets, it is an investment worth exploring. The information provided could significantly impact your payback or ROI. If you don't currently use telematics, consider exploring it. Some companies offer monthly subscriptions per vehicle.

How to Simply Assess Your Greenhouse Gas Reduction (GGR) Values

For a simple analysis of GGR, use the baseline GHG emissions provided by CARB in Table 1 and multiply that number by the number of miles driven. This number will allow you to show your GGR compared to the vehicle's gasoline equivalent. When you add solar, and if all or most of the fleet's EVs energy is coming from your solar, your fleet's emissions will be reduced to nearly zero.



Motor Pools and Shared Vehicles

Motor pools and shared vehicles should be considered when staff members have occasional or varying short-term driving needs. Selecting the right vehicles for these pooled or shared vehicles can increase your fleet's efficiency and cost-effectiveness. Creative car sharing can maximize the use of each vehicle, without major upfront capital expense (CAPEX) costs for additional vehicles. You can also eliminate operational expense (OPEX) costs such as lease payments or maintenance costs for underutilized vehicles.

Things to consider:

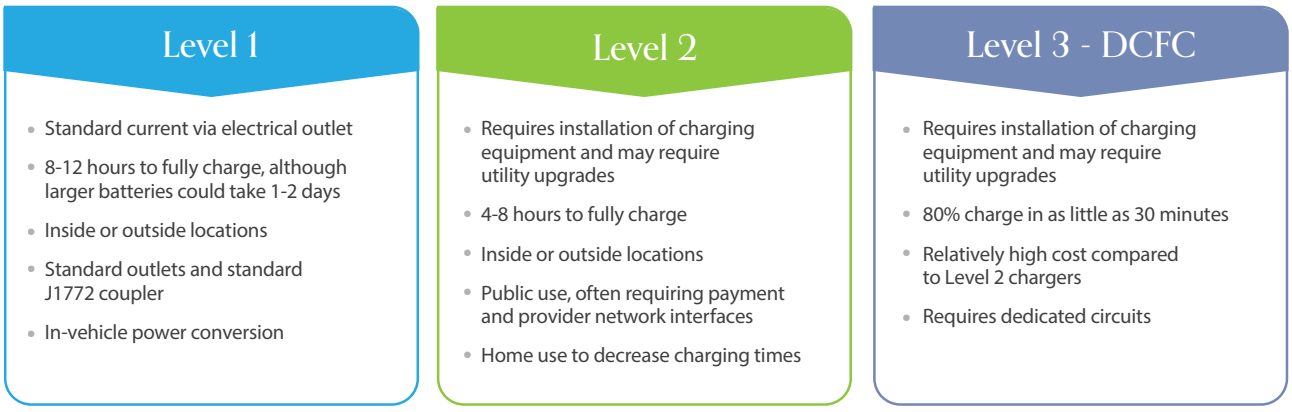
- Which team members have similar occasional needs and flexible schedules that lend themselves to a motor pool or car sharing?
- Are there currently underutilized vehicles that could be shared and would be appropriate for pooled use?
- Identify suitable vehicles and initiate a process for scheduling vehicle use.
- Scheduling can be as simple as making a calendar or as advanced as installing radio-frequency identification (RFID) card readers for each vehicle.

Electric Vehicle Infrastructure and Chargers

While new charging technologies are on the horizon, we currently work with three main types of EV charging units. To optimize your installations, begin by rightsizing your infrastructure. Your current EV infrastructure options fall into these categories:

- **Level 1 charging** for a single vehicle is as simple as taking the cord that comes with the vehicle and plugging it into a standard 120-volt household outlet. While it's convenient, this is the slowest option, maxing out at around 1.1 kilowatts of power. This means that it can deliver around 1.1 kWh of energy in an hour resulting in an average of 3.5–4.5 miles of range added per hour. While this may be adequate for a short-range vehicle with the opportunity to charge overnight, it's not quite an adequate solution for today's long-range EVs with large battery packs. (Warning: Unless new individual 120-volt circuits have been installed for each outlet, these outlets can/will become overloaded if multiple vehicles are plugged in and charged simultaneously. Most 120-volt outlets are "daisy-chained" like strings of Christmas tree lights. A single circuit breaker will support multiple outlets, but if too many high-draw loads are placed on a single circuit, the circuit will become overloaded and fail.)
- **Level 2 charging** may require a dedicated charging station. Many EV owners install Level 2 chargers at their homes. Level 2 EVSE are commonly found at workplaces, shopping centers and transit stations. They range from 3.3 kW to 19.2 kW, though the most common power level is between 6.6–7.2 kW resulting in an average of 14–35 miles of range added per hour. This is usually the highest rate of charge for a PHEV, though there are some exceptions.
- **DC fast charging** is the fastest available charging rate, and these chargers keep getting faster. With the exception of Tesla, the standard DCFC rate has generally been 50 kWh. Today, many 150 kWh DCFC are being installed and some of these will be upgradeable to 350 kWh. The 150 kWh and 350 kWh DCFC are currently well beyond what most current plug-in vehicles can take advantage of. A 50 kWh DCFC can add up to 100 miles of range to a long-range EV in about 30 minutes. Tesla has a unique connector and has built its own network of fast chargers or Superchargers. Most of the 120 kWh Superchargers have been upgraded to 150 kWh. New Urban Superchargers are capable of 72 kWh. It's important to note that due to the high-power output of these chargers, vehicles begin charging at a high rate and then automatically reduce the power acceptance rate as the vehicle reaches a higher state of charge. This prevents damage to the battery. DCFC chargers and Tesla Superchargers are typically only found at commercial sites such as along highways and in shopping centers.

Figure 1. Three levels of EV charging



As the charging speeds increase, the cost of the infrastructure increases as well. While a simple Level 1 cord is included with most vehicles and can be purchased for around $180, a dedicated non-networked Level 2 will cost between $400 to $800 plus installation. Newer higher priced $600–$800 residential models offer Wi-Fi so owners can schedule and control when their vehicle charges.

Commercial Level 2 EVSE stations can cost between $2,000 to $6,000 per port for the hardware alone—before factoring in an average of $6,000–10,000 per unit for installation. DCFC station costs can easily increase by an order of magnitude, over level 2, due to the cost of the equipment, heavy power demands and associated electrical upgrades. According to a 2020 report by the California Energy Commission, the total project cost per DC fast charger ranged from a minimum of $38,793 to a maximum of $161,472 with a mean and median of $95,881 and $93,683, respectively.[23] These costs are highly dependent upon the power level of the DCFC and any required site upgrades.

Table 2. Charging equipment use and costs

Charging Equipment (EVSE)	Typical User Profile	Equipment Cost* (avg. per unit)	Install Cost† (avg. per unit)	Total Average Costs
Level 1	Parked for 6-12+ hours	$0–$800	<$1,000	$0‡ to ~$800
Level 2	Parked for 2-8+ hours	$500–$6,500	$6,000–$12,000	~$11,000
DCFC (50 kW)	Quick stop for 25-60 minutes	$10,000–$35,000	$14,000–$51,000	~$60,000
DCFC (150 kW)	Quick stop for 15-30 minutes	$65,000–$90,000	$60,000–$75,000	~$155,000

* Equipment costs will be more for 2-4 ports and combination units.

† Installation costs if for minimal trenching needs and no service upgrades. Costs increase for sites requiring trenching and/or panel upgrades.

‡ Assuming the owner uses the Level 1 charger provided with the car and plugs into an available 120-volt outlet.

Networked vs. Non-Networked Stations

The most basic Level 2 stations available on the market today are non-networked stations. They are far less expensive than their networked counterparts. Non-networked stations have one functionality—on or off.

Networked stations communicate with a back-end software network that can provide additional functionality, including limiting access, charge event data, managing when vehicles charge and priorities, costing and cost recovery/payments, availability, reservations, monitoring, access controls and remote diagnostics. This additional functionality can be beneficial for tracking costs and sometimes necessary for controlling access and costs. Annual networking fees can add as much as $300 per port per year. Some network firms offer subscription-based models, leasing and advertising opportunities that can mitigate some upfront costs.

23 California Energy Commission (2020). *CALeVIP DC Fast Chargers, Range of Rebate, Unit Cost, and Total Project Cost Per Charger.* Retrieved July 22, 2020, from https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/california-electric-vehicle/calevip-dc-0

Assess Site Locations

Several criteria can inform the overall suitability of a site. By considering the following when choosing your site locations, you can save a lot of money.

- **Suitable electrical infrastructure:** EV charging can represent a sizeable electrical load and may require significant service upgrades or even new service. An upgraded or new dedicated transformer may be required if more than one or two L2 EVSE are installed, as well as a new dedicated electrical panel. This is especially true if a significant number of chargers are expected to be utilized at the same time, or if a DC fast charger is installed. It is critical that you work with your utility's account manager and your facility manager to identify the optimum installation location.
- **Distance from transformer:** The further the desired EV charging installation site is from the transformer, the more expensive trenching and conduit runs will be. Longer runs also require thicker, heavier gauge wire to compensate for line loss. At approximately $100/foot, trenching can become one of the largest expenses of a fleet electrification project. Fleets should also consider trenchless technology as a cost-effective alternative—especially in a high traffic area where trenching will disrupt operations. We highly suggest considering any other potential future installations as well, as retrenching is also very costly.
- **Americans with Disabilities Act:** ADA requirements apply to employee and public charging spaces. ADA does not apply to areas restricted to fleet vehicles or to assigned parking spaces. The parking area for the motor pool vehicles or the fleet manager's reserved parking space are not subject to ADA regulations. Shared use areas, such as spaces shared by fleet vehicles and employees, are subject to ADA. Projects should follow all accessibility requirements outlined in California Building Code Title 24 Part 2 Chapter 11B. California Division of State Architect provides guidance on these requirements.[24]
- **Public vs. private opportunities:** Fleets should consider installing chargers that are available to the public. This creates an opportunity to charge for the usage, a potential extra revenue stream, and helps promote EV adoption in your organization and community. Upcoming mandates require that public facing chargers must operate credit card readers and mobile payment device options on Level 2 and direct current fast charger EVSE allowing payment by members and non-members at EVSE locations that require payment. These required regulations may require equipment at the higher end of the cost scale. Charging times can be tailored to the exact length of time drivers need to get a sufficient charge or the amount of time a site host wants each EV owner to be parked. For example, a longer dwell time for Level 2 chargers located at an office building or public library and a shorter dwell time for DCFC at locations adjacent to a highway.
- **Getting creative:** Some cities have integrated charging with high-efficiency lighting, mounted on power poles, combined with parking control systems or linked into multimodal "mobility hubs." The City of Los Angeles integrated 284 EV charging stations to streetlights that had available load capacity due to energy-efficient lighting upgrades.[25] This provided public, right-of-way charging, which helps the city achieve its goals of increasing the percentage of electric and zero-emission vehicles to 25% by 2025, 80% by 2035 and 100% by 2050.

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24 Division of the State Architect. *Access Compliance Reference Materials*. Retrieved October 8, 2020 from https://www.dgs.ca.gov/DSA/Resources/Page-Content/Resources-List-Folder/Access-Compliance-Reference-Materials

25 FLO (2019). *The Los Angeles Bureau of Street Lighting Installs FLO EV Chargers*. Retrieved July 22, 2020, from https://www.youtube.com/watch?v=SGbGP5u588Y&feature=youtu.be

- **Get expert advice:** Consult with a specialist for your project. You may uncover more affordable solutions. For example, a mixed-use development in East London lacked the sufficient substation capacity for their planned EV charging infrastructure.[26] After consulting experts, they were able to successfully meet their EVI needs without changing their existing electrical infrastructure.

General Steps and Considerations for Infrastructure Build-out

1) Plan ahead with major stakeholders

- Plan your fleet replacement and acquisition needs for the coming 10 years
- Meet with the facility and energy managers of your organization
- Meet with your utility's account manager
- Meet with a consultant and preferred contractors

2) Identify priority locations

- Is there or will there be high demand for electrification at this site?
- Are fleet vehicles parked overnight?
- Is the existing electrical infrastructure able to support the anticipated number of chargers?
- Will the utility's current infrastructure support the installation?
- Is there an upcoming remodel/refurbishment that this could be part of?

3) Conduct electrical assessment

- How many chargers can the existing infrastructure support?
- Will I need to upgrade my transformer or main electric service?
- Do I foresee wanting to install more chargers five, 10 or 15 years down the line?
- How far is my desired installation site from my transformer? Can I move it closer?

4) Assess type and quantity of chargers needed

- How many chargers will realistically be used?
- What will installing this number (and type) of chargers do to my utility bill?
- Do I want smart networked or non-networked chargers?

5) Determine overall costs and potential funding opportunities

- How should I run power to these chargers (e.g., underground or conduit)?
- What incentive programs do I qualify for?
- Does the air district and/or utility offer a program?
- Are there state programs to help with the costs?
- If eligible for multiple funding sources, can they be "stacked?"
- Where can I find a good contractor? (CALeVIP Connects is a good resource found in the Appendix section)
- Should I install solar and/or energy storage along with these chargers?

26 Pod Point (2020). *Residential Development in Bow Case Study*. Retrieved July 22, 2020, from https://pod-point.com/business/case-studies/residential-development

EVI Incentives

EV charging usually represents a sizeable investment. To help, several state, utility and regional incentive programs may be available to reduce the upfront and overall cost of purchasing EV infrastructure. We have outlined some of the major programs in the Appendix section at the end of this guide. It's important to also keep in mind that these incentives are limited and may decline or end at some point. We suggest connecting with program administrators as well as EVI companies to capitalize on these significant savings while they are available. Some programs require data reporting, which will require dedicated submeters or a networked EVSE. This may influence your decision to buy a smart charger or install submeters.

Offsetting Costs Through Charging

While free public charging is ideal for accelerating EV adoption in your community and organization, public charging also opens an opportunity for revenue generation. New state regulations (from CARB and Department of Measurement Standards [DMS]) designed to provide pricing transparency will add significant costs to public EVSE/DCFC. The Open Access Regulation for from CARB will require credit card readers on each DCFC by January 1, 2022 and for each EVSE by January 1, 2023. The DMS regulations begins in January 1, 2021 for Level 2 and January 1, 2023 for DCFC.[27] Additionally, CARB is requiring quarterly reports for all EVSE and DCFC beginning August 15, 2020. There are significant penalties for failure to report and report on time. DMS is requiring a receipt printer similar to a gasoline dispenser or a terminal on the gas island.[28]

Public charging may be viewed as a "public good"—like street lighting. Public charging is critical in communities with a large number of multifamily units whose residents may not have access to charging where they live. It is also critical in disadvantaged communities where residents may not be able to install EVSE at their homes. Refer to Table 3 for the different ownership options and their potential costs and related revenue.

Table 3. Summary of city public charging ownership models[29]

Ownership	Cost to City	City Revenue
Third-party owned and operated	Low: program management costs	Low
City-owned, third-party operated	Medium: hardware and management costs	Medium
City-owned and operated	High: hardware, operation and management costs	High (but unlikely to break even)
Leasing or charging as a service	Medium: subscription fee	Shared revenue with third party
Advertising-supported free charging	Low	Small monthly site host payment

27 California Code of Regulations (n.d.). *Attachment A: Final Regulation Order.* Retrieved July 22, 2020, from https://ww2.arb.ca.gov/sites/default/files/2020-06/evse_fro_ac.pdf

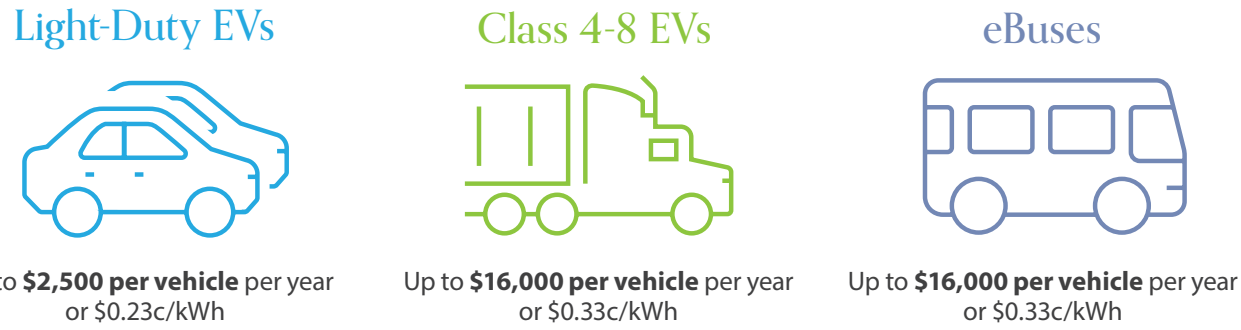
28 California Department of Food and Agriculture (n.d.). *Division of Measurement Standards Title 4, Division 9, Proposed Changes in the Regulations.* Retrieved July 22, 2020, from https://www.cdfa.ca.gov/dms/pdfs/regulations/EVSE_ISOR.pdf

29 FORTH (2020). *City Initiatives.* Retrieved July 22, 2020, from https://forthmobility.org/our-work/city-initiatives

Low Carbon Fuel Standard (LCFS) Credits

If you own the EVSE, the fleet is eligible for Low Carbon Fuel Standard (LCFS) credits. Under the AB 32 Scoping Plan, CARB identified the LCFS as one of the nine discrete early action measures to reduce California's greenhouse gas emissions that cause climate change. The LCFS is designed to encourage the use of cleaner low-carbon transportation fuels in California, encourage the production of those fuels and, therefore, reduce GHG emissions and decrease petroleum dependence in the transportation sector. The value of these credits can be substantial and will vary depending upon the source of the energy. Currently, credits for grid power equal about $0.09 a kWh, while energy directly from solar can be almost double that value.

Figure 2. Estimated LCFS values[30]



(Warning – Read the EVSE contract fine print. The language in some contracts allows the network firms to claim LCFS and/or other credits that the buyer may not be aware of. Don't unintentionally "make a gift of public funds.")

Considering Distributed Energy Resources and Impacts

Because of electrical infrastructure limitations or a desire to limit costly demand charges, some alternatives to grid-tied chargers might be required and should be considered. The following techniques and technologies can provide demand-side management to mitigate costs and real-time load issues.

Connecting with Your Local Utility

This is a critical step for all fleets. Starting a conversation with your utility provider's account representative and your facility manager about your upcoming EVI projects will allow you to anticipate and assess costs, discuss different rate structures and, perhaps, bring grant or pilot opportunities to light.

Solar

Adding solar photovoltaic power generation is a great opportunity for an EV fleet environment. Beyond transportation fuel cost dropping to one-third of the price of gas by acquiring EVs, adding solar can bring that

30 SRECTrade (2020). *Homepage*. Retrieved July 22, 2020, from https://www.srectrade.com/

figure down to one-sixth. On average, the price of gas is about the equivalent to $0.56 per kWh ($3.56 per gallon/28.2 mpg = $0.13 per mile). Most super off-peak business electricity rates are near $0.18 per kWh, and EVs average 3.3 miles per kWh ($0.18/3.3 = $0.05 per mile). However, total solar production over the 25-year life of the panels divided by the cost, after the federal tax credit and rapid depreciation deductions, averages to around $0.06 per kWh. Dividing $0.06 kWh by 3.3 miles per kWh equals $0.02 per mile or one-sixth the price of gas. Solar also allows your business to be its own energy supplier for operations other than EV charging.

You may want to explore portable solar EV chargers that allow for direct clean energy to charge your vehicles without relying on grid power, trenching or electrical power upgrades. While more costly, they can be sited anywhere and moved as needed. They can be particularly effective in remote locations where electrical power is at best limited or at sites for special events.

Battery Storage

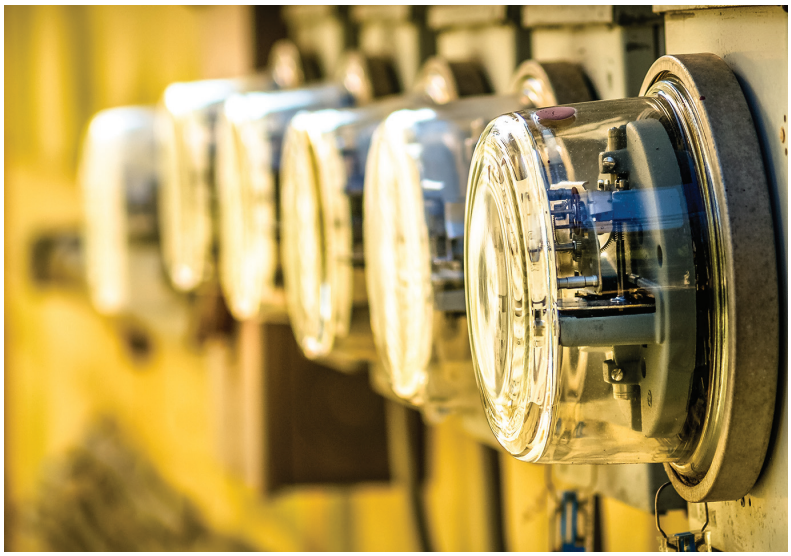
Because a large percentage of your EV fleet may be off property during midday solar peak, you may not be able to capitalize on maximum solar output (between 10 a.m. and 2 p.m.) unless you are using a battery storage system. Storing solar energy and using it for charging at a later time can provide your business a nice electricity cost buffer, especially if your facility is on a time-of-use (TOU) rate. On-site storage also can help mitigate or avoid demand charges, avoid TOU rate increases and provide resiliency in the event of a grid outage or extreme weather events. While the price of battery storage is quickly dropping, it remains relatively expensive. Look into the Self-Generation Incentive Program (SGIP)[31] offered through your utility. In response to increasing wildfires and public safety power shutoff (PSPS) events, SGIP offers significant energy storage incentive rates, especially for qualifying equity customers (serving DAC and low-income communities) and to customers with the greatest immediate resiliency needs.

31 Self-Generation Incentive Program (2020). *Online Application Database.* Retrieved July 22, 2020, from https://www.selfgenca.com/

Load Management

One major consideration to plan for with your electrified fleet charging system is to avoid triggering demand charges on your electric bill. On a tiered rate plan, utilities tend to add demand charges that can add a significant cost to your electricity bill when triggered by surging electricity usage during certain periods of the day. If you plan to charge your EV fleet during business hours, it would be best to request a new service line or dedicated meter to bypass those demand charges. By combining solar and battery storage with load management techniques, you can ensure that your EV charging adds minimal kW draw during peak demand times.

Another good option to reduce excess demand load is to implement load management software or hardware. This allows you to schedule or cap your charging to avoid peak demand charges. The software also can help evenly distribute energy throughout your fleet or direct it to charge your more important vehicles first.



Load management software can also be beneficial when your energy supply isn't sufficient for your needed or desired number of chargers, or when you don't have the funding to fully upgrade your electrical system. Utilizing a load management system will allow you to manage both the time and the amount of energy going to each charger. This allows you to work with your current capacity and still fully charge your fleet. The most expensive time to charge the fleet in between 4 and 9 p.m.—the same time when many fleet vehicles may return to their base. If the fleets charge during this time, energy costs can be more than double that of a later period. Load management software can delay the start of charging until after 9 p.m. without human intervention. This avoids charging during high cost periods and enables the fleet to be fully charged at the beginning of the shift in the morning. Refer to the Appendix for some load management company options.

Some network software can also manage the load between vehicles—limiting the need for infrastructure upgrades. For example, the facility has eight 7.2 kWh Level 2 plugs EVSE on an existing single 75 kilovolt-amp (kVA) transformer. This is the maximum number of EVSE by code that a 75 kVA transformer can support. The fleet will have 20 vehicles that should be charged each evening. The typical time to recharge each vehicle is about four hours. If the first eight vehicles start charging at 9 p.m., only eight of the 20 will be charged unless staff shuffle the vehicles about 1 a.m. Load management software would permit as many as 24 Level 2 plugs. The load management software delays the start of charging and then balances the charge to all 20 vehicles without human intervention. The same software can also respond to the utility's requests to shed load during periods of high energy demand—such as during an extreme heat wave—all without human intervention.

Vehicle-to-Grid

Commonly referred to as "V2G," vehicle-to-grid technology allows for a battery electric vehicle to feed power back into the facility or electric grid to help alleviate demand and provide resiliency during emergency situations and PSPS events. Currently this technology is still in development and is limited to bidirectional charging vehicles paired with compatible V2G chargers. Because of Rule 21,[32] there are limitations as to how your V2G system communicates with the grid and the safety precautions needed should the grid have an outage. However, if your EV fleet is planned to return from their daily routine prior to peak demand times (typically from 4 to 9 p.m.) and has remaining power in the battery that could be sent into the grid, V2G could be an electricity budget-saving mechanism and possibly a revenue generating avenue worth researching. Your EV fleet would then recharge overnight during off-peak times. This opportunity is currently being piloted in the PG&E territory using BMW i3s[33] and may be more widely available in the future depending on the success of the program and with help of manufacturers like Tesla announcing the V2G capability of their Model 3.[34]

Resiliency

With rolling blackouts and PSPS events that can leave your facility without energy for hours, days, or even weeks becoming more common, the opportunity to make your facility more resilient to natural disasters can be a major benefit for those in high-risk areas. By utilizing on-site renewable energy generation, energy storage, load management and V2G capabilities, you are on the road to creating a microgrid for your organization that can provide grid-free backup power during emergency situations—all thanks in part to your EV fleet!

> In the wake of 2011 Fukushima earthquake, Nissan deployed 7,000 Nissan LEAFs to provide 3-5 days of power for a household from each car.[35]

32 California Public Utilities Commission (2020). *Rule 21 Interconnection*. Retrieved July 22, 2020 from https://www.cpuc.ca.gov/Rule21/

33 Electrek & Fred Lambert (2016). *BMW is successfully using its electric vehicle fleet to offer grid services in California*. Retrieved July 22, 2020, from https://electrek.co/2016/11/15/bmw-electric-vehicle-fleet-grid-service-chargeforward/

34 Electrek & Fred Lambert (2020). *Tesla quietly adds bidirectional charging capability for game-changing new features*. Retrieved July 22, 2020, from https://electrek.co/2020/05/19/tesla-bidirectional-charging-ready-game-changing-features/

35 **CASE STUDY:** Electric Advisory Committee (2018). *Enhancing Grid Resilience with Integrated Storage from Electric Vehicles: Recommendations for the U.S. Department of Energy*. Retrieved July 2020, from https://www.energy.gov/sites/prod/files/2018/06/f53/EAC_Enhancing%20Grid%20Resilience%20with%20Integrated%20Storage%20from%20EVs%20%28June%202018%29.pdf

Procurement Planning and Goal Setting

It is helpful to plan for EV fleet procurement by balancing your vehicle needs with your budget for both the vehicles and their charging infrastructure. This means setting goals five to 10 years ahead while also considering upcoming technology, preparing for future business/employee changes and considering everything you've tracked in the previous sections. If done correctly, savings should begin to show in your monthly budget.

To help plan for your transition to an electric fleet, here's a list of things to consider with your procurement timelines.

What are your future goals?

- For example, a 5% reduction of petroleum consumption (or fuel burn) per year
- For example, a 25% reduction in GHG emissions by 2025 and 50% reduction by 2030
- If reducing GHG emissions by 50% in 2030, how many vehicles will need to be replaced utilizing the GGR formula?

What unique data should you be collecting to support the decisions to reach your goals?

- How long will it take to payback each investment considering incentives, cost savings, etc.?
- What metrics, such as utilization rates, cost benefits from reduced maintenance and fuel and other factors, would your management staff need to approve your project?

What's your budget?

- How much do you need to save on your budget to please management and build your business case?
- Should you utilize leasing options or subscription models?

Is your fleet rightsized?

- Can you lower the number of vehicles in your fleet?
- Can you downsize from a medium- or heavy-duty vehicle to a light-duty vehicle?
- Can you consolidate some cars into a motor pool?
- How many vehicles are past their life cycle and need replacement now?
- Which vehicles will you plan to change in five and 10 years?
- What are your vehicle replacement cycles? For general fleet best practice, it is best to consider replacing a vehicle *before* the maintenance costs outweigh the resale value.

Are you preparing for scalability?

- How many chargers will you need in five and 10 years? Preparing the electrical needs for future chargers, while installing your first round of chargers, will save costs later.

> Amazon is a prime example of how to set goals and milestones, investing $440 million toward 100,000 electric vans for their fleet. They plan to have 10,000 new electric vehicles on the road as early as 2022 and all 100,000 vehicles being electric by 2030—offsetting 4 million metric tons of carbon emissions per year by 2030.[36]

Planning for Vehicle Replacement

To help plan your procurement schedule, it's helpful to know what an average life cycle of a car looks like. Utilimarc's vehicle replacement module (VRM) mathematically determines when you should replace your assets. The VRM uses your historic practices to predict future ownership and maintenance cost and determines what life cycle will guarantee the lowest total cost over the life of the asset. This calculation is built on the following variables:

- Historic maintenance cost (including parts, labor, outside vendors)
- Historic utilization
- Historic acquisition cost and residual value
- Current acquisition cost

Table 4 presents the result of running the VRM methodology using data from across the industry. The result is a set of class-specific, industry standard life cycles for commercial or private fleets.

Table 4. Vehicle life cycle using VRM for commercial or private fleets[37]

Class	Description (or Example)	Purchase Price	Annual Mileage	Life cycle Range (years)
Compact Sedan	Cavalier	$21,786	7,112	5 to 8
Midsize Sedan	Camry, Malibu, Taurus	$25,798	9,155	4 to 6
Hybrid Sedan	Prius, Focus, Volt	$28,627	9,882	6 to 8
Light-Duty Pickup	½-ton pickup	$33,138	14,287	7 to 8
Heavy-Duty Pickup	1-ton pickup	$54,175	11,953	7 to 10
Compact SUV	Escape, Jeep Liberty	$26,695	11,513	4 to 7
Full-Size SUV	Suburban, Tahoe	$48,934	11,681	8 to 11
Van – Cargo	150 ½-ton cargo van	$38,315	13,099	6 to 9

36 **CASE STUDY:** Amazon (2019). *Amazon Co-founds The Climate Pledge, Setting Goal to Meet the Paris Agreement 10 Years Early.* Retrieved July 22, 2020, from https://press.aboutamazon.com/news-releases/news-release-details/amazon-co-founds-climate-pledge-setting-goal-meet-paris

37 San Diego Gas & Electric Company (2018). *Rebuttal Testimony of Carmen L. Herrera.* Retrieved July 22, 2020, from https://www.sdge.com/sites/default/files/regulatory/SDGE-221-Fleet%20Services%20C.%20Herrera%20with%20Appendices%20Redacted_0.pdf

Some government fleets on the other hand, see a typical vehicle replaced every 10-18 years, replacing about 5% of their vehicles a year. These studies also show that total annual costs tend to decline only marginally after nine years and should be weighed against many "soft cost" factors, such as downtime costs and employee morale.[38]

Lastly, considering the resale value of your vehicles may be important to your replacement cycles. Some fleets have seen reduced costs by crafting an in-depth and detailed procurement plan to sell their vehicles after a few years, verses holding onto them for a longer time frame. By maximizing the resale value of their vehicles, the Cahokia Public School District saw a 28% reduction in fuel expense and a 79% reduction in maintenance thanks to the help from the service company Enterprise Fleet Management.[39]

Involving All of the Right Stakeholders

Like any major project, connecting with all of the involved stakeholders will greatly benefit your organization in the long run. By doing so, several organizations have uncovered unknown savings, incentive and pilot opportunities and were better prepared for future risks and uncertainties that come with larger projects. It's important to first connect with your organization's facility manager and your local utility to understand your power needs and opportunities. We would then suggest to connect with: car manufacturers, EVSE & DCFC suppliers, energy service companies, regional air districts, and local Clean Cities coalitions to also discuss your upcoming project needs and any possible opportunities for cost saving offered through their services. For example, the City of Carlsbad installed 20 new EVSE at a cost of $100,000. The city's share of that was only $20,000 thanks to a partnership with Electrify America.[40]

For vehicle purchases, working with the State General Services contracts, SourceWell, or the Climate Mayors Electric Vehicle Purchasing Collaborative can help bring down your overall purchasing costs for your fleet. The City of Cincinnati saw an average 17% reduction in the total cost of ownership thanks to help from the Climate Mayors Electric Vehicle Purchasing Collaborative that was created to help public fleets throughout the nation by facilitating the purchasing process of EVs and charging infrastructure.[41] Information on the purchasing collaborative is in the Appendix section.

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38 Office of the Inspector General, J. Timothy Beirnes (2012). *Analysis of Fleet Replacement Lifecycle: Project #12-14*. Retrieved July 22, 2020, from https://www.sfwmd.gov/sites/default/files/documents/fleet_life_cycle_12-14.pdf

39 Enterprise (2020). *Cahokia School District Updates 94% of Fleet Vehicles and Saves 79% In Maintenance Spend*. Retrieved July 22, 2020, from https://www.efleets.com/en/proof-and-insights/case-studies/cahokia-school-district.html

40 **CASE STUDY:** North County Daily Star (2018). *City of Carlsbad Adding EV Charging Stations*. Retrieved July 22, 2020, from https://northcountydailystar.com/city-of-carlsbad-adding-ev-charging-stations/

41 **CASE STUDY:** Climate Mayors (2020). *Municipal Fleet Electrification: A Case Study of Cincinnati, OH*. Retrieved July 22, 2020, from https://www.2030districts.org/sites/default/files/atoms/files/City%20of%20Cincinnati%20%28Electrification%20Coalition%29%20-%20Municipal%20Fleet%20Electrificaiton%20Case%20Study.pdf

Savings Found From Reduced Total Operating Costs

EVs historically tend to have higher upfront vehicle prices, but costs are starting to come down with Tesla recently cutting the base cost of the Model Y Long Range by $3,000 and GM announcing that the base price for a 2021 Chevy Bolt with a 200+ mile range will be less than $30,000. Price parity with ICE counterparts is expected before the 2025 model year. There are also several various benefits of ownership that can add up to long-term savings. The initial cost can possibly deter your agency's governing board (i.e., city council or county board of supervisors) or executive team from making the investment in an electrified fleet. Be sure to include the following in your proposal to strengthen your business case.

- **Transportation fuel cost savings:** According to the eGallon tool[42] from the Department of Energy, driving with electricity is on average about half the cost of gas. Their tool can help provide average prices of both electricity and gasoline to give you the current difference. Once you factor in on-site solar, the cost of your fuel goes down considerably over time. To help with basic fuel cost comparison, we suggest using the U.S. Department of Energy's Energy Efficiency & Renewable Energy Vehicle Cost Calculator.[43] For a more in-depth tool to compare GHG/air pollutant emissions and simple payback, we would suggest the AFLEET Tool[44] by Argonne National Laboratory.
- **Reduced service and maintenance costs:** This is where EVs shine! Since EVs use fewer parts, there is no need for routine checkups on the oil or to replace costly parts such as fuel injectors, timing belts or fuel pumps. Since EVs use fewer parts, there is no need for routine oil changes or to replace costly parts such as fuel injectors, timing belts or fuel pumps.
- **Rebates and incentives:** Check for incentives on an EV purchase or lease from your electric utility or from city, county, state and federal governments. We recommend starting with the website DriveClean[45] where you can search for incentives that apply to your ZIP code. Remember you must purchase or lease your EVs from a California dealership to qualify for the Clean Vehicle Rebate Project (CVRP). You can also find a list of EV incentives in the Appendix section at the end of this guide.
- **Secured funds:** CVRP for Public Fleets[46] will allow you to secure your rebate funds up to 18 months prior to acquiring the vehicles. Find more info on this process in the next section.
- **CalCAP:** The California Capital Access Program (CalCAP) encourages banks and other financial institutions to make favorable-term loans to small businesses that have difficulty obtaining financing. For charging stations, there is a specific CalCAP EVCS Financing Program.[47]

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42 The United States Department of Energy (2013). *The eGallon: How Much Cheaper Is It to Drive on Electricity.* Retrieved July 22, 2020, from https://www.energy.gov/articles/egallon-how-much-cheaper-it-drive-electricity

43 United States Department of Energy: Energy Efficiency & Renewable Energy (2020). *Vehicle Cost Calculator.* Retrieved July 22,2020, from https://afdc.energy.gov/calc//

44 Argonne National Laboratory (2018). *AFLEET Tool 2018.* Retrieved July 22, 2020, from https://afleet-web.es.anl.gov/afleet//

45 DriveClean (2020). *About this Site*. Retrieved July 22, 2020, from https://driveclean.ca.gov/

46 California Clean Vehicle Rebate Project (2020). *Fleet Vehicle Rebates*. Retrieved July 22, 2020, from https://cleanvehiclerebate.org/eng/fleet

47 California Pollution Control Financing Authority (2020). *California Capital Access Program (CalCAP) Electric Vehicle Charging Station (EVCS) Financing Program*. Retrieved July 22, 2020, from https://www.treasurer.ca.gov/cpcfa/calcap/evcs/

- **LCFS credits:** When you own and operate your own EVSE and produce your own renewable energy, you become a low-carbon fuel supplier and can sell your Low Carbon Fuel Standard (LCFS) credits. For fleets with a dozen or more vehicles, this opportunity will significantly help to recoup your costs. Figure 2 (page 20) shows the average amount of savings seen. We offer more information on this in the Appendix section.

Utilizing the Different Types of Fleet Incentive Programs Through CVRP

The Clean Vehicle Rebate Project (CVRP) was designed to support California's goals of:

- Deploying 5 million zero-emission vehicles on the roads by 2030
- Reducing greenhouse gas emissions to zero across all sectors by 2045
- Achieving the air quality requirements established in the federal Clean Air Act

Vehicle Type	Standard Rebate	Increased Rebate
Fuel Cell Electric Vehicle (FCEV)	$4,500	$7,000
Battery Electric Vehicle (BEV)	$2,000	$4,500
Plug-in Hybrid Electric Vehicle (PHEV)	$1,000	$3,500
Zero-Emission Motorcycle	$750	$750

Public Fleets

CVRP offers up to $7,000 per vehicle for the purchase or lease of up to 30 new, eligible zero-emission and plug-in hybrid light-duty vehicles per year for public fleets. Public fleets can also reserve their rebates up to 18 months in advance with a letter of intent to purchase eligible vehicles.

Who is eligible for public fleet rebates?

Public agencies are defined as local or state government entities.

What are the requirements?

Vehicles must be new and operated in California for a minimum of 30 months.

Public fleets must submit annual vehicle usage reports to the CVRP administrator for all rebated vehicles 12, 24 and 30 months following the date of asset delivery. Required data may include, but is not limited to, mileage reporting, annual fuel use by fuel type and percentage of operation within underserved communities.

Am I eligible for the increased rebate?

Public fleets qualify for increased incentives only if the location of the facility is within a California disadvantaged community census tract. Check your eligibility for increased incentives by entering information in the CalEnviroScreen 3.0 tool[48] found on cleanvehiclerebate.org/fleet/public-agencies.

48 California Office of Environmental Health Hazard Assessment (2018). *SB 535 Disadvantaged Communities Using CalEnviroScreen 3.0 Results*. Retrieved July 22, 2020, from https://oehha.maps.arcgis.com/apps/View/index.html?appid=c3e4e4e1d115468390cf61d9db83efc4

Reserving Your Public Fleet CVRP Rebates Up to 18 Months Ahead of Time

A major benefit of CVRP for Public Fleets is the program allows local and state public entities to reserve up to 30 rebates a year up to 18 months in advance (or apply up to three months after purchase). By simply providing a letter of intent, you will be able to reflect the rebate savings in your procurement plan and showcase your opportunity of savings to your governing board.

Car Sharing and Rental Fleets

CVRP offers up to $4,500 for the purchase or lease of up to 20 new, eligible zero-emission and plug-in hybrid light-duty vehicles *yearly* for car sharing and rental fleets. This program is not eligible for the increased rebate.

What are the requirements?

Vehicles must be new, on the CVRP eligibility list and operated in California for a minimum of 30 months. You can only apply for rebates up to three months after purchase.

Reduced ownership provision for vehicles operated less than 30 months

Because car sharing and rental vehicles are typically circulated out of fleet operations in less than the 30-month ownership or lease period CVRP requires, a reduced ownership provision is available. Under this provision, car sharing and rental fleets are eligible for up to $1,800 in rebates per vehicle if they own and operate the vehicle for over one year and less than 30 months.

Businesses, Nonprofits, Federal Entities and Tribal Communities

Businesses, nonprofits, federal entities and tribal communities are eligible for one rebate per lifetime for up to $4,500 per vehicle. This program is not eligible for the increased rebate.

What are the requirements?

Vehicles must be new, on the CVRP eligibility list and operated in California for a minimum of 30 months. You must apply for the rebate within three months of purchase.

Contact A CVRP Electric Fleet Specialist

Visit: CVRP for Fleets

Email: publicfleets@energycenter.org

Phone: 866-984-2532

Fleet Management

Optimizing your fleet comes from tracking the right data and making timely adjustments as needed. As highlighted in previous sections, the more data you have, the more informed and justified your decisions will be. Hardware and software integration can immensely help optimize your EV fleet use and energy costs by setting driving schedules and routes, tracking driving habits and charging intervals, and creating utilization reports. These applications can also help ensure you are realizing all the benefits of your EVs to the fullest and help you assess future purchases. Below are some advantages found from managing your fleet with the help of a fleet management system.

- **GHG reduction tracking** – Easily track your results and evaluate how they relate to your goals.
- **Incentive program reporting** – For incentive programs such as CVRP and LCFS, you will need to report certain data, such as the number of miles driven in DACs or the amount of energy used to charge your vehicles.
- **Preventative maintenance** – By tracking the maintenance on your new vehicles, you will be able to clearly see the reduction in maintenance, downtime, and maintenance costs compared to your conventional fleet vehicles. And by utilizing a fleet management tool, you will be ahead of the curve, receiving alerts and reminders for both vehicles and their charging stations.
- **Telematics for benchmarking and recording data** – By tracking miles/hours driven, routes, charging activity, idling, etc., you will be able to provide driving feedback to staff and improve their understanding of their vehicle use.
- **GPS tracking and route planning** – Some of your drivers drive to specific locations throughout the day and week. By tracking their routes, you can make their day more efficient by limiting any wasted driving time or highlighting idling hours.
- **Getting the right software** – There are several companies, such as GEOTAB and Verizon Connect, that will help you streamline your data capturing and analysis of car and charging use, which in turn will help with process improvements, logistics and future procurement planning. For a list of companies, check out the Appendix section.

Staff Training and Education

Educating your team on EV technology and good driving tips is essential to reaching your goals. The time spent educating and training your staff on the benefits of EVs and good driving habits will shorten your payback period, lower your maintenance costs and extend your EV's life cycle.

- **Idling** – Reducing idling is a simple, yet very effective strategy in helping to reach all your goals, especially if you are unable to switch all of your traditional ICE cars to a BEV or PHEV. Since EVs idle without burning fuel, it will benefit both your cost savings and your GHG goals to train your staff to be mindful of when and how long they idle with the engine on. There are even idling reduction technologies available to help bring down operating costs and emissions. The Burlington Police Department saved 345 gallons of fuel and decreased operating costs by about $811 per vehicle annually by implementing such a technology.[49]
- **Aggressive acceleration** – Aggressive acceleration will diminish vehicle range and have negative effects on the lifetime of tires and brake pads. Training your staff on safe driving techniques will reduce fuel consumption and protect vehicle longevity.

49 **CASE STUDY:** United States Department of Energy Efficiency & Renewable Energy (2019). *Alternative Fuels Data Center: Idling Reduction Technology Saves Police Department Money, Reduces Emissions*. Retrieved July 22, 2020, from https://afdc.energy.gov/case/3076

- **Heavy braking** – Heavy braking will cause excessive brake pad wearing and result in frequent brake jobs. Most EVs utilize regenerative braking, which not only saves your brake pads, but also helps to recoup some energy while driving. This is also referred to as one-pedal driving.
- **Driving near empty** – Continually driving your EVs on a battery below 10% can harm the lifetime of the battery.
- **Charging best practices** – It is best to utilize a smart (networked) charging system to maximize charging efficiency, but not all fleets can afford such a system at the beginning of fleet electrification. You can increase your EV battery's lifetime and keep electricity costs down by educating staff on best practices such as charging at off-peak hours, choosing routes or destinations with easily accessible chargers and unplugging the vehicle when it is fully charged.

> Tracking driving habits can lead to increased range, safer roads and less accidents. Thanks to the GeoTab fleet management system, a London-based delivery service, Farmdrop, saw a 33% reduction in incidents of poor driving per mile and a 27% reduction in battery use.[50]

- **Motor pool best practices** – Sharing a vehicle can be difficult for some, but the cost benefits will quickly outweigh any issues. To make it easier for users, consider a motor pool software system that can simplify the whole process from reserving vehicles and scheduling charging to logging mileage and capturing data. It is best to set policies and guidelines to ease employee issues, such as keeping the car clean, fully charged and parked near the front of the motor pool area.
- **Maintenance training for EVs and infrastructure** – As with any new technology, you will need to train your staff. Having a properly trained staff that can help maintain your fleet will go a long way in ensuring its full utilization. Good news is your staff will have a lot less maintenance and upkeep on these vehicles.
- **The benefits** – Don't forget to educate your staff on why you are making these changes to the fleet. The more they understand the value (of lower or no criteria pollution and reduced GHGs), the more likely they will be willing to follow driving and charging guidelines.
- **Give awards and acknowledge good driving** – People enjoy being recognized for their achievements, so your staff should be rewarded for following guidelines and helping you on the way to an efficient and optimized fleet.
- **Engaging your employees to go electric** – Get your employees excited about going electric and schedule a free CVRP informational webinar where we can help educate your staff on the benefits and incentives available to them for purchasing an EV as their personal car. If interested, please contact cvrpshopper@energycenter.org.

50 **CASE STUDY:** Geotab (2018). *Farmdrop: Delivering the Goods in a Transparent and Ethical Manner.* Retrieved July 22, 2020, from https://www.geotab.com/case-study/farmdrop-delivering-the-goods-in-a-transparent-and-ethical-manner/

Promoting Your New Fleet

Promoting your fleet electrification program can be a very impactful step that will please stakeholders such as your board of directors or city council and give pride to everyone involved in the process. By taking the time to showcase your green fleet initiatives, your community will realize the significant indirect benefits, such as:

- Highlighting your commitment to tackling climate change issues and pollution within your community
- Reducing criteria pollution that can directly impact the health of the children and elderly of your community
- Emphasizing practical measures to help clean the air and improve community health
- Sparking more interest in EVs in your community and accelerating clean vehicle adoption
- Boosting employee morale and retention by building pride in their organization's proactiveness

Ways to promote

- **Local news coverage** – Distribute a press release or invite local reporters to check out your latest fleet upgrades.
- **Social media campaigns** – Social platforms such as LinkedIn, Twitter, Instagram and others provide a free, easy-to-access resource that are used frequently by many community members and stakeholders. Consider putting funds toward online advertising to reach more targeted audiences.
- **Vehicle wraps** – Apply vinyl graphics, wraps or decals to EVs that highlight or promote clean vehicle use and adoption. Drive and park them at high-traffic areas.
- **Public charging stations** – When planning your installations, remember to consider public-facing locations as it will help promote EV adoption in your community.
- **Workshops and test drives** – Offer in-person and online workshops, YouTube videos and other information about the benefits of your EV fleet. Show your vehicles at community public events and consider offering test drives or rides to promote EV adoption.
- **Get your team involved** – Reward your staff, conduct user surveys and highlight positive testimonials. This will get your team talking among their networks and spread the word about the work you are doing.

Conclusion

Planning for your fleet's electrification in a holistic manner, setting goals and establishing metrics to track the accomplishments are key to your success. By doing this, you are preparing your organization for an optimized fleet that is more reliable, cost-effective and sustainable while reducing negative impacts to the environment.

Appendix

General Resources

Clean Vehicle Rebate Project for Fleets

cleanvehiclerebate.org/eng/fleet

Official website for the Clean Vehicle Rebate Project for Fleets program. Apply for the program and learn about eligibility requirements, FAQs and more.

DriveClean

driveclean.ca.gov

DriveClean is a resource for car buyers who are looking to find the cleanest, most efficient car that meets their driving needs. Find information, tools and resources to learn about clean vehicles and available incentives.

EV Fleet Tools

evfleet.tools

EV Fleet Tools is a resource hub for fleet managers, sustainability staff or other public agency employees interested in fleet electrification. It provides a set of tools and best practices designed to enable public agencies to take meaningful first steps toward robust decarbonization of their fleet and facilities.

Fuel Economy

fueleconomy.gov

A great federal resource that helps you calculate, track and compare your fuel economy. The website also provides info on federal incentives, EPA gas mileage and air pollution and greenhouse gas estimates.

CARB Zero-Emission Vehicle Fleet Webpage

ww2.arb.ca.gov/our-work/topics/incentives

Sign up for zero-emission vehicle fleet workshops held by CARB and find links to other related resources.

EERE Alternative Fuels Data Center

afdc.energy.gov

The Office of Energy Efficiency and Renewable Energy's AFDC provides information, data and tools to help fleet operators and other transportation decision-makers find ways to reach their energy and economic goals through the use of alternative and renewable fuels, advanced vehicles and other fuel-saving measures.

Plug-In Electric Vehicle Handbook

afdc.energy.gov/files/pdfs/pev_handbook.pdf

A great resource for EV technology info provided by the U.S. Department of Energy EERE Clean Cities Initiative. It's designed to answer your basic questions about PEVs and charging infrastructure and point you to additional information so you can make the best decisions for your fleet.

Clean Cities Coalition

cleancities.energy.gov

A national resource for connecting with other local stakeholders working to implement alternative fuels, advanced vehicles and fuel-saving strategies. In addition, you can learn about unique funding opportunities and find technical answers related to improvements, alternative fuels and emerging transportation technologies.

Climate Mayors Electric Vehicle Purchasing Collaborative

driveevfleets.org

This collaborative represents an unprecedented cooperation among cities across the country to leverage their collective buying power and accelerate the conversion of public fleets to EVs—sending a powerful signal to the global auto market and helping the U.S. maintain its commitment to the Paris Climate Agreement. It is a turnkey, one-stop, online procurement portal providing cities, counties, state governments and public universities equal access to competitively bid EVs and charging infrastructure, innovative financing options and best practices and other forms of expertise.

Zero-Emission Technology Inventory (ZETI)

globaldrivetozero.org/tools/zero-emission-technology-inventory

This tool is an interactive online resource to establish a current and shared knowledge base for worldwide commercially available offerings of zero-emission medium- and heavy-duty vehicles. The tool aims to provide fleets and governments with comprehensive information including regions where zero-emission brands are available for purchase and the timeline over which additional models are expected to become available.

MyFleetBuy

mygreencar.com/fleet

MyFleetBuy integrates seamlessly with your existing fleet data to help you understand which of your vehicles can be replaced with an electric car.

Other EV Incentives

Advanced Transportation Tax Exclusion

treasurer.ca.gov/caeatfa/ste/index.asp

The California Alternative Energy and Advanced Transportation Financing Authority provides a sale and use tax exclusion for qualified manufacturers of advanced transportation products, components or systems that reduce pollution and energy use and promote economic development.

Alternative Fuel Vehicle & Fueling Infrastructure Grants

ww2.arb.ca.gov/resources/fact-sheets/motor-vehicle-registration-fee-program

The Motor Vehicle Registration Fee Program provides funding for projects that reduce air pollution from on- and off-road vehicles. Eligible projects include purchasing alternative fuel vehicles and developing alternative fueling infrastructure.

Alternative Fuel Vehicle Parking

afdc.energy.gov/laws/5426

The California Department of General Services and California Department of Transportation must provide 50 or more agency-owned and agency-operated parking spaces and park-and-ride lots to incentivize the use of alternative fuel vehicles.

Drive Clean! San Joaquin Valley

valleyair.org/drivecleaninthesanjoaquin/rebate

The San Joaquin Valley Air Pollution Control District administers the Drive Clean! Rebate Program with funding from California Climate Investments. Drive Clean! offers up to $9,500 in down payment assistance for low-to-moderate income valley residents to replace their 1999 and older cars with used plug-in electric or hybrid vehicles.

The Clean Transportation Program

www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program

Through the Clean Transportation program (also known as the Alternative and Renewable Fuel Vehicle Technology Program), the California Energy Commission provides financial incentives for businesses, vehicle and technology manufacturers, workforce training partners, fleet owners, consumers and academic institutions with the goal of developing and deploying alternative and renewable fuels and advanced transportation technologies.

Clean Off-Road Equipment Voucher Incentive Project (CORE)

californiacore.org

A new $44 million project to encourage California freight equipment users to purchase or lease commercialized zero-emission off-road freight equipment. This streamlined voucher incentive project helps offset the higher cost of zero-emission technology with a point-of-sale discount. There is no scrappage requirement, and additional funding is available for charging and fueling infrastructure and for equipment deployed in disadvantaged communities.

Clean Cars 4 All

ww2.arb.ca.gov/our-work/programs/clean-cars-4-all

The Clean Cars 4 All program helps lower-income California residents replace old, polluting cars with cleaner, more fuel-efficient vehicles. Programs are available in select air districts, and individual air districts administer the local Clean Cars 4 All program.

Enhanced Fleet Modernization Program (EFMP)

ww2.arb.ca.gov/our-work/programs/enhanced-fleet-modernization-program

EFMP is a vehicle scrap and replace program that encourages the voluntary retirement of high-polluting vehicles and offers incentives to replace those vehicles with newer, cleaner and more fuel-efficient models. The current program is open to residents who live in the South Coast Air Quality Management District, San Joaquin Air Pollution Control District and Bay Area Air Quality Management District. The EFMP Retirement-Only program provides $1,500 to lower-income drivers to retire a vehicle, while the EFMP Retire and Replace program provides up to $4,500 to lower-income drivers who scrap an older vehicle and buy a newer replacement vehicle. Combined with the Clean Cars 4 All program, they provide up to $9,500 if a low-income purchaser who lives in or near a disadvantaged community chooses to replace their vehicle with a PHEV or ZEV. Air district officials in the Sacramento region are planning to launch the Clean Cars 4 All program in 2020.

Sourcewell

https://www.sourcewell-mn.gov/

Sourcewell serves government, education & nonprofit organizations with a cooperative purchasing program that manages solicitation requirements & offers a network of awarded contracts, saving organizations time and money by combining the buying power of more than 50,000 government, education, and nonprofit organizations.

Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

californiahvip.org

To accelerate the adoption of cleaner, more efficient trucks and buses, HVIP works directly with dealers to apply the voucher incentive at the time of purchase.

HOV Lane Exemption

www.dmv.ca.gov/portal/vehicle-registration/license-plates-decals-and-placards/clean-air-vehicle-decals-for-using-carpool-lanes/

Qualified alternative fuel vehicles, including hydrogen, plug-in hybrid and battery electric vehicles, may use designated carpool lanes regardless of the number of vehicle occupants. Qualified vehicles also are exempt from certain road and bridge toll fees. The Clean Air Vehicle Decal Program is administered by the Department of Motor Vehicles in partnership with the California Air Resources Board.

Champions for Clean Air

sdge.com/residential/electric-vehicles/champions-clean-air-ev-rebate

School district employees and first responders who reside and work in the SDG&E service territory are eligible for a $1,000 point-of-sale rebate toward the purchase or lease of an all-electric or plug-in hybrid vehicle.

Department of General Services

www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Statewide-Contract-Fleet-Vehicles

The State's Statewide Contracts for Fleet Vehicles provide current model year Fleet Vehicles at contracted pricing to the State of California and local governmental agencies.

Other EVI & Utility Incentives

Many utilities offer some sort of financial incentive to install EV charging stations. Within California, each utility company offers a unique incentive for their region.

CALeVIP

calevip.org/find-project

The California Electric Vehicle Infrastructure Project (CALeVIP) is a charging equipment incentive program consisting of several regional projects throughout the state with rebates from $5,000 to $7,500 for L2 chargers and up to $80,000 for DCFCs. The CALeVIP website also has a list of EVI contractors and service providers as well as other useful resources.

Electric Vehicle Supply Equipment (EVSE) & Charging Incentives–Sacramento

smud.org/en/Going-Green/Electric-Vehicles/Residential

The Sacramento Municipal Utility District (SMUD) provides incentives and several pilots for electric vehicle charging installations for customers, tenants or employees with EVI incentives ranging from $1,500 for each Level 2 EV charger port to $80,000 per DC fast charger.

Electric Vehicle Supply Equipment & Charging Incentives–Sonoma

sonomacleanpower.org/programs/gridsavvy

Qualified Sonoma Clean Power customers are eligible to receive a free JuiceNet-enabled EVSE from eMotorWerks, which allows the EVSE to be connected to Wi-Fi and communicate with the power company's CleanCharge software.

Electric Vehicle Supply Equipment Incentives–San Joaquin Valley

valleyair.org/grants/chargeup.htm

The San Joaquin Valley Air Pollution Control District administers the Charge Up! Program that provides funding for public agencies and businesses for the purchase and installation of new, publicly accessible EVSE. A single-port Level 2 station is eligible for up to $5,000 per unit and a dual-port Level 2 station can receive up to $6,000 per unit.

Electric Vehicle Supply Equipment Loan & Rebate Program

treasurer.ca.gov/cpcfa/calcap/evcs/index.asp

The Electric Vehicle Charging Station Financing Program, part of the California Capital Access Program, provides loans of up to $500,000 for the design, development, purchase and installation of EVSE at small businesses statewide.

Carl Moyer Program

ww2.arb.ca.gov/resources/fact-sheets/carl-moyer-program

If you operate a heavier-duty fleet (e.g., delivery trucks, drayage trucks, buses), there is potential to leverage the Moyer Program, which is implemented through local air districts and can fund the replacement or repowering of vehicles, as well as fleet charging. For more information, contact your local air district.

Low Carbon Fuel Standard (LCFS)

ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard

Administered by the California Air Resources Board, LCFS is designed to incentivize the production of low-carbon transportation fuels. The program enables entities to generate credits for the production of low-carbon fuels through renewable energy sources and then sell the credits to regulated parties who are required to lower the carbon intensity of their fuels over time. Under the program, suppliers of electricity and owners of EV fuel supply equipment are eligible to generate credits and sell them to regulated parties. This credit generation pathway represents a potential revenue source for fleet managers especially when combined with renewable energy credits (RECs). To take advantage of this program, you must be able to track this usage by installing submeters or utilizing networked Level 2 chargers. Information on the different utility LCFS programs is available online.

Load Management Companies

By utilizing load management services, you can work with your current electric capacity and still fully charge your fleet by scheduling, evenly distributing or capping your charging to avoid excessive draw or peak demand charges.

Greenlots
greenlots.com

Liberty Plugins
libertyplugins.com

Powerflex
powerflex.com

Telematic Companies

By combining a GPS system with onboard diagnostics, telematic monitoring can record and map exactly where a vehicle is and how fast it's traveling, and cross reference that with how it is operating.

AT&T Fleet Management
business.att.com/products/fleet-manager.html

GeoTab
geotab.com

GPS Insight
gpsinsight.com

Lytx
lytx.com/en-us

MiX
mixtelematics.com

MyGreenCar
mygreencar.com

OmniTracs
omnitracs.com

Orbcomm
orbcomm.com

Spireon
spireon.com/fleet-management

TeleTrac Navman
teletracnavman.com

Web Fleet
www.webfleet.com/en_us/webfleet

Verizon
verizonconnect.com/solutions/gps-fleet-tracking-software

Learn More About the Impact of CVRP on the ZEV Market

Assembly Bill 615 Report to the Legislature on the Impact of the Clean Vehicle Rebate Project on California's Zero-Emission Vehicle Market, https://ww2.arb.ca.gov/sites/default/files/classic//research/apr/reports/AB%20615-Clean%20Vehicle%20Rebate.pdf