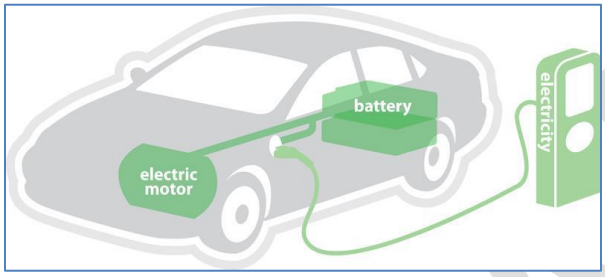
IV. Appendices

The Basics: A Guide to Plug-in Electric Vehicles and Charging Infrastructure

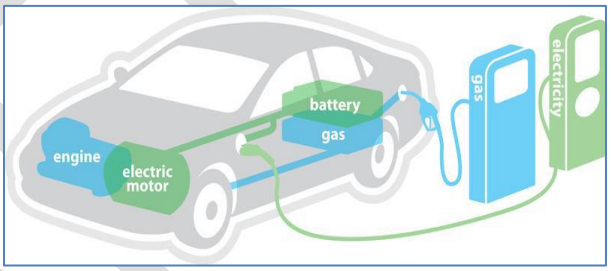
What is a Plug-in Electric Vehicle?

A plug-in electric vehicle (PEV) is a vehicle fueled at least partially by an onboard battery charged from the electrical grid. There are two types of PEVs that are commercially available: battery electric vehicles and plug-in hybrid electric vehicles.

A **battery electric vehicle** (BEV) is a fully electric vehicle fueled only by the onboard battery. Most BEVs available on the market have a range of approximately 60-100 miles on a full charge.



A **plug-in hybrid electric vehicle** (PHEV) is capable of running on both an onboard battery charged from the electrical grid or from gasoline. After battery power dips below a specific charge threshold, the vehicle seamlessly switches to gasoline power.



PEVs are not limited to light-duty passenger vehicles. There are many trucks and heavy-duty vehicles that also run on electric power. For a complete list of heavy-duty vehicles that run on electric power, visit the Alternative Fuels Data Center (AFDC) website about heavy-duty vehicle and engines at (http://www.afdc.energy.gov/vehicles/search/heavy/).

How Do You Charge a PEV?

There are three levels of PEV charging.

Type of Vehicle Charging	Miles of Driving Range per Hour of Charging	Where to Charge?
Level 1 (120 volt)	3 to 4	Standard three-pronged outlet
Level 2 (208/240 volt)	8 to 20	At home, workplace or public charging
DC Fast Charger	50 to 60	Public or commercial sites only

PEV charging time depends on two factors: the size of the vehicle's battery and the vehicle's onboard charger. The onboard charger is located in the vehicle and determines the amount of power than can enter the vehicle from the grid. PEVs typically come with a 3.3- or 6.6-kilowatt (kW) onboard charger. BEVs have larger batteries than PHEVs.

DC fast charging uses direct current to charge PEVs. It typically provides the fastest PEV charging times available.

Types of Charging Equipment

Level 1 charging infrastructure consists of a charging cord set that comes standard with every PEV. The charging cord can be plugged into any standard three-pronged, 120-volt outlet.

Level 2 charging infrastructure consists of a designated charging unit (known as electric vehicle supply equipment, or EVSE) that plugs into or hardwires into a 208/240-volt circuit.

There are two common types of Level 2 installation styles.

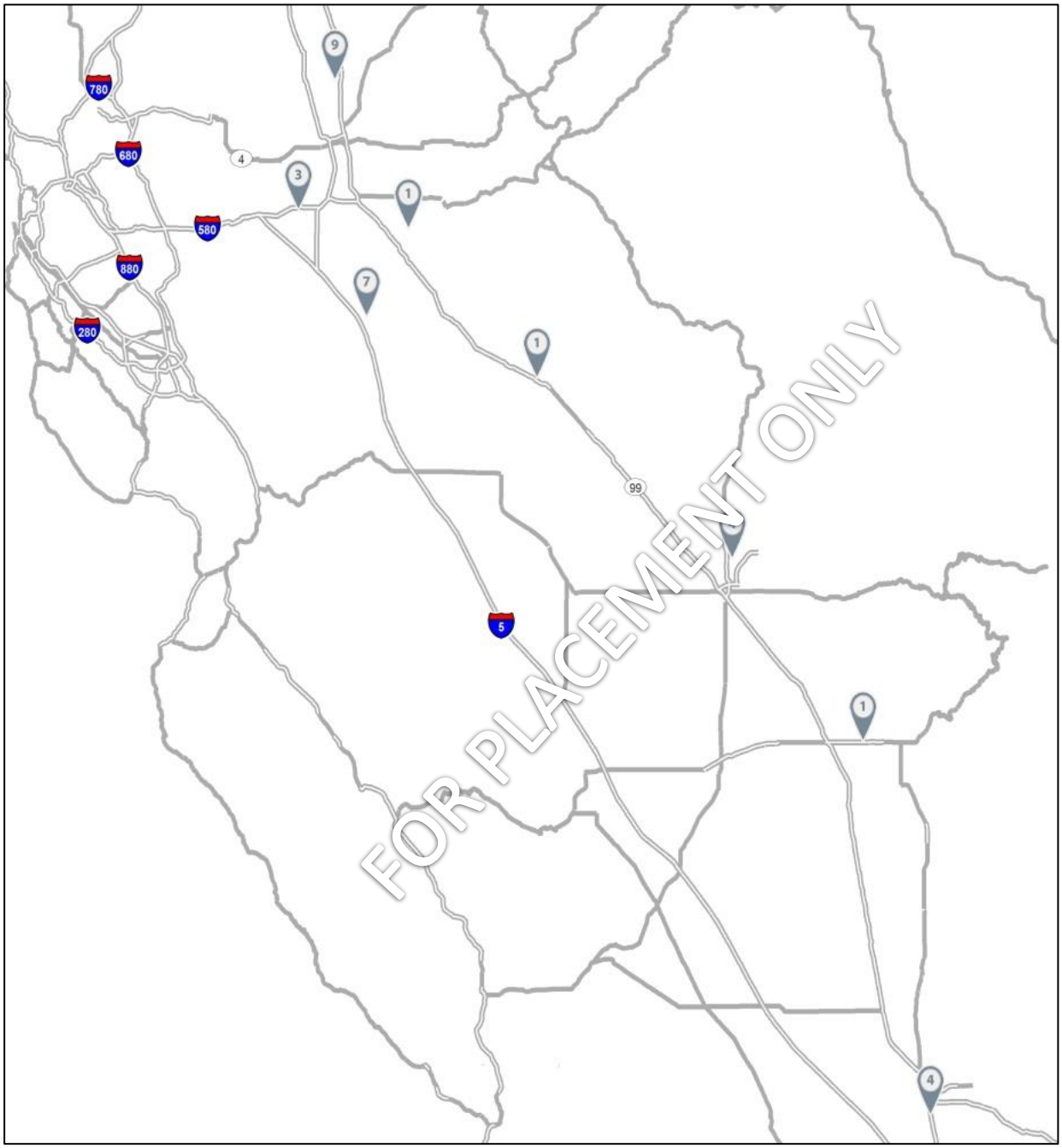
Level 2 Installation Style		Installation Method	Considerations
Floor mount (bollard style)	Mounted to the ground and wired through the base	Generally requires concrete work along with underground trenching	
Wall/Pole mount	Installed on any wall or pole and can be wired through a garage wall	Offers flexible placement options and takes up less floor space than a floor mount	

DC fast charging infrastructure is complex and requires commercial-grade electrical capacity. The equipment can cost more than $10,000, and installations of a single unit can cost up to $50,000.

Where are Public Charging Stations?

Public charging locations in the San Joaquin Valley can be found easily online through the AFDC's station locator at http://www.afdc.energy.gov/locator/stations/ and by mobile apps such as PlugShare (http://www.plugshare.com/).

The following map displays Level 2 charging station locations in the San Joaquin Valley.



Charging Environments: Single-Family Residence and Multi-Unit Dwellings

Charging at Single-family Residences

The majority of plug-in electric vehicle (PEV) charging will take place at a single-family residence because it is convenient and more cost-effective than paying for public charging or charging at the workplace. In addition, data show that PEV owners tend to live in clusters in the same neighborhoods and plug in at similar times—usually in the evening.

The following are important stakeholders for single-family residence charging.

- **Utilities** – providing the fuel for PEV drivers to charge their vehicle. Typically, PEV drivers can plug in and charge at home at any time, but some utilities in the region offer cost-effective options for customers to charge at night. These rates are typically called time-of-use (TOU) rates and incentivize charging during off-peak hours, generally after 8 p.m. Informing utilities about residential electric vehicle supply equipment (EVSE) can help utilities properly plan for any increased load.
- **Local government –** may require PEV owners to obtain permits to install EVSE at home. This is to ensure safe and reliable installations.
- **EVSE vendors –** providing EVSE to PEV owners. Many EVSE manufacturers sell through certified distributors and other manufacturers have products at big-box retail stores.
- **Electrical contractors –** ensuring that EVSE installations are made safely and according to electrical code standards.

Homeowners have the option of using either Level 1 or Level 2 for charging their vehicles. Level 1 charging requires no installation for the PEV owner, but may require an amperage upgrade, particularly for older homes. Level 2 requires professional installation of a dedicated EVSE system.

Charging at Multi-Unit Dwellings

A multi-unit dwelling (MUD) is a property that comprises two or more housing units. Installing EVSE at MUDs presents a few obstacles. One issue is that a resident's dedicated parking spot may be located far from their household meter, thereby increasing installation costs. Another problem arises if the EVSE is provided as a common good (such as a laundry machine) and a decision must be made whether all non-PEV driving tenants should pay for EVSE maintenance and operation.

Installing charging equipment at MUDs is a challenge that requires the coordination of many stakeholders.

- **Property owners and managers** should be made aware of the PEV charging opportunities that arise. If there is a need for EVSE, property owners and managers will need to work with the homeowners association (HOA) to develop operation and use policies. Further, owners and managers will need to work with tenants who drive PEVs to figure out how to fund the installation and hardware.
- **EVSE vendors** can coordinate with property owners and managers to install EVSE at the MUD site.
- **Tenants and residents** who own PEVs should be involved in the EVSE planning process by engaging the HOA about the topic and bringing attention to charging needs in the area.

Charging Environments: Charging at Retail, Workplace and Public Locations

Background

Charging at retail stores, workplaces and public locations allows plug-in electric vehicle (PEV) drivers to extend their driving range and trip duration. Drivers are generally at the workplace for more than six hours a day, which provides adequate opportunity to complete a charge. Certain retail and public locations, such as sporting facilities and parks, attract visitors who stay for several hours at a time, again ample time to charge a PEV. Among the advantages for retail and public locations to offer PEV charging are attracting more visitors and charging user fees, hopefully at reasonable prices.

Installing electric vehicle supply equipment (EVSE) at retail, workplace and public locations requires the cooperation of employees and managers, property owners, consumers and local government agencies.

Retail and Public Locations

There are three factors to consider when installing EVSE at retail and public locations: dwell time, time of use and the value of parking spots.

The value of non-PEV parking spots is important to consider because a site host would not want to limit the number of visitors to its facilities because of adding EVSE. Locations with few parking spaces and a high volume of activity throughout the day would not benefit from adding EVSE, which may inhibit non-PEV drivers from parking. Alternatively, sites with available parking spaces would benefit from EVSE because it would not impede non-PEV drivers to park and shop at that location.

If a location charges a user fee for EVSE, it is most cost effective to allow charging at all times, even when a location might not be open for regular business. Doing so allows the site host to recoup some of the cost of electricity used for charging during peak hours (typically from 2 p.m. to 6 p.m.).

PEV drivers will visit a site for reasons beyond simply charging their vehicle. Therefore, it is strategic to place EVSEs at retail and public locations in which people generally stay for one to two hours. While Level 2 chargers provide a faster charge, when PEVs are parked for longer times, installing Level 1 chargers may be more practical, with lower equipment and installation costs for the host.

Common travel destinations and their dwell times (i.e., how long they are parked) have been identified by an analysis of 2009 National Household Transportation Survey data (Krumm 2012). Following is a list of public locations where vehicles tend to park for two hours or more on average.

- Government workplaces
- Transportation stations (e.g., light rail, subway, bus, airports)
- Public parking facilities
- Recreational, natural and cultural facilities (e.g., sports parks, pools, parks, museums, libraries, theaters)
- Nonprofit sites (e.g., houses of worship, clubs, cultural centers)

The following are commercial sites that have average dwell times of longer than one hour.

Site	Average Dwell Time (approximation)
Theaters	2.39 hours
Sports events	2.39 hours
Bars and nighttime entertainment venues	2.39 hours
Exercise and sporting facilities	1.76 hours
Medical and dental services	1.14 hours
Nail, beauty or hair salons	1.11 hours

Retail locations that host EVSE will attract customers that want to charge their vehicles while they shop, eat or engage in other activities. With one hour of dwell time, a PEV driver can add up to 20 miles of driving range.

Financial Viability of Retail & Public Locations

The financial viability of EVSE at commercial sites largely depends on consumer use. The more a public charging station is utilized, the more revenue it generates. Other factors in a return on investment analysis are the user rate and installation[1] and operation costs. Nonrevenue benefits, such as boosting a company's sustainability credentials and lessening environmental impacts, should be considered. However, the financial returns for the charging equipment will depend on user fees and frequency of use per day.

The California Center for Sustainable Energy has produced a draft report that provides insight into the value proposition for companies and institutions that install Level 2 charging infrastructure.[2] The report identifies the median willingness to pay (WTP) among PEV drivers for different charging scenarios.

	WTP for Daily Charging	WTP for Occasional Charging
Median ($/hour)	$0.50	$1.00
Median ($/kWh)	$0.15	$0.30

The study subsequently showed that the median WTP for occasional charging is sufficient to break even only with lower-cost Level 2 EVSE installations and that the median WTP for daily charging is not sufficient to break even with any currently available Level 2 EVSE.

[1] From paying an electrical contractor to buying the charging equipment, the installation can cost about $4,000 for a Level 2 charger.

[2] CCSE's Research and Analysis team presented the draft report *Providing a Place to Plug In: The Value Proposition of Hosting Level 2 Non-Residential Electric Vehicle Supply Equipment and Drivers' Willingness to Pay for PEV Charging* at the March 19, 2013, REVI meeting. A copy of the presentation can be found at: http://energycenter.org/programs/pev-planning/san-diego

Charging Environments: Workplace Charging

Introduction

Workplaces present a significant, and largely untapped, opportunity for PEV charging. After residences, workplaces are the single most important environment for electric refueling. Because vehicles are generally parked at workplaces for several hours every weekday, it is possible to completely recharge before the commute home and dramatically increase electric miles traveled for PHEVs. The ability to charge at work may also encourage PEV adoption by those for whom residential charging is cost-prohibitive or logistically difficult, particularly residents of multi-unit dwellings.

Background

Implementing EV workplace charging is easiest when a business or organization is in complete control of a location. Singular control of parking area, building and electrical service, make it a straightforward process to establish an EV charging opportunity for employees.

The long dwell times of vehicles in workplace parking lots allow them to recharge using slower, less expensive Level 1 charging.

Permitting and Installation Considerations

The permitting process for workplace charging has many variables that employers may have to consider.

- Cost (installation, maintenance, operation, etc.)
- Developing an internal policy regarding charging vehicles (i.e., determining protocol for plug-sharing among employees)
- Liability issues
- Choosing the appropriate EVSE, vendor and electrical contractor
- Compliance with the Americans with Disabilities Act (ADA)
- Obtaining approval from property or parking garage owners
- Getting employees interested in using the system
- Evaluating future infrastructure needs during the initial installation
- Pricing of electricity provided at the worksite to employees
- Apportioning charging spaces between employees and the public and understanding the conditions when public access is required

Did you know?

The San Joaquin Valley Air Pollution Control District hosts two Level 2 Clipper Creek chargers and two Level 1 chargers for their employees and visitors. The installation was completed thanks to Clipper Creek's Reconnect Program.

Recommended Actions

Successful efforts to establish workplace charging for PEV owners depend on the employee, employer and building owner being fully informed about the challenges and benefits. Local governments can play a key role in helping share information about workplace charging with interested employers and help guide them through the permitting process.

If you are a business that wants to offer your customers or your employees the benefit of charging, please use the Plug-In Vehicle Collaborative resources for businesses or the workplace charging page on driveclean.ca.gov.

Share Information with Interested Employers about Installation Guidelines

The following information can be shared with employers in your community.

- Determine charging site(s) at your business
    1. Closer to existing electric utility equipment is cheaper, adding new circuits and conduit can increase capital costs significantly
    2. Review traffic, pedestrian flow, parking requirements and applicable ADA compliance issues
    3. It is strongly advised to install extra conduit to allow for future expansion during your initial installation – this will save future trenching costs
- Estimate the electrical load at site(s)
    1. Determine whether to use Level 1 or Level 2 charging
    2. Obtain charger requirements from vehicle and charger suppliers
    3. Determine the appropriate number of EVSE units
    4. Contact EVSE suppliers
        - Confirm charging needs, types and costs
- Contact Utility
    1. Assess existing electricity supply — is it adequate?
    2. Review metering requirements and elective options
        - Time-of-use meter, demand response meter (can add costs)
        - Determine the impacts of rates on choosing charging times and frequencies
- Contact pertinent permitting agencies and obtain all pertinent building and use permits

Permitting & Inspection Guidelines: Residential Installations

How do I charge my plug-in electric vehicle at home?

The type of plug-in electric vehicle (PEV) you purchase will determine the ways you can charge your vehicle. Consult with your car dealership about your home charging options. There are two basic types of EV chargers for home use: Level 1 and Level 2. Chargers and related equipment are also known as electrical vehicle supply equipment, or EVSE.

Level 1 charging can be as easy as plugging directly into a standard 120-volt household outlet (three-pronged). PEVs come standard with a 120-volt charging cord that enables PEV owners to charge their vehicles with a conventional outlet.

Several manufacturers sell Level 2 EV chargers for the home that are capable of charging PEVs in half the time. A Level 2 EV charger uses a dedicated 240-volt circuit for faster charging but generally requires a permit. Level 2 charging typically requires the installation of a dedicated circuit close to where your vehicle is parked (usually in the garage, carport or driveway). Visit www.GoElectricDrive.com for information on available chargers. In order to obtain the permit, you (or your electrical contractor) will need to provide some basic information to show that your existing electrical service can handle the added load.

Charging Level	Power Supply	Charger Power	Miles/Hour of Charge	Type of PEV	
				100% Electric	Plug-In Hybrid
Level 1	120 VAC	1.4 kW (onboard charger)	~3–4 miles	~17 hours	~9 hours
Level 2	240 VAC	3.3 kW (onboard charger)	~8–10 miles	~7 hours	~3 hours
		6.6 kW (onboard charger)	~17–20 miles	~3.5 hours	~1.5 hours

What information do I need to provide to obtain a permit?

This Residential EV Charger Permit Guideline will help you navigate the permit, installation and inspection process. In most cases, you (or your contractor) simply need to submit the permit application and associated documentation outlined below. Always check with the local jurisdiction's permitting department to make sure of what you need.

Documentation*	Description
Permit Application	Electrical permit or special permit for EV chargers

EVSE Manufacturer's Information	The manufacturer's installation instructions and EV charger specifications
Site Plan	Identify the complete layout of existing parking spaces and proposed location of EVSE parking space(s) with respect to existing building and structures
Electrical Load Calculations	Home electrical load calculation that estimates if an existing electrical service will handle the extra load from a residential EVSE and wiring methods based on the California Electrical Code (CEC) (Note that CEC Article 220 requires load calculations if the existing service panel is rated less than 200 amps)
Electrical Plans	Single line diagrams showing the system, point of connection to the power supply and the EVSE

** Documentation will be specific to each jurisdiction*

EV charger installation

PEV owners are encouraged to choose a licensed local electrical contractor to install EVSE. The electrician should have a C-10 license along with the expertise, tools and training for installing home EV chargers. You can verify your electrical contractor's license by visiting www.CSLB.ca.gov or by calling (800) 321-CSLB. The contractor should follow the installation instructions of the EVSE manufacturer and the requirements of California Electrical Code.

Is an inspection required for my EV charger?

Yes, inspections are required for all EV charger installations before they are used. Upon completion of the installation, it is your responsibility (or your contractor's) to schedule a final inspection with the jurisdiction. In order to schedule an appointment, please check with your local jurisdiction, usually the building department.

Contact your local utility before installing your EV charger

Though an individual Level 2 EV charger may have a negligible impact on the utility electric system, making it important to notify your utility of any Level 2 charger installations to ensure that utility electrical system components will maintain service reliability in your neighborhood. By contacting your utility, you can also access information on special EV time-of-use (TOU) rates they may offer. These rates can provide you a significantly lower cost for electricity based on the time of day you charge your vehicle.

Sample Zoning Code Provisions

Electric Vehicle Infrastructure: Allowed Uses

Purpose: This section provides sample regulations and guidance for jurisdictions when choosing to regulate where, what type and how many electric vehicle charging stations will be permitted in different land uses.

Zoning District Tables

Electric vehicle charging stations of various electrical levels are permitted in zoning districts as identified in Table A. For each zoning district, the table identifies the type of infrastructure permitted and the permitting process for each type. A "P" represents that the charging station is a permitted use in the corresponding zone.

Guidance

- In adopting an ordinance, there may be a need to provide a definition of low- and high-density residential.

Table A: Sample Zoning Districts and Allowed Electric Vehicle Infrastructure Uses

Zoning District	AC Level 1 and 2 Charging Station	DC Level 2 (DC Fast Charging) Station	Battery Swap Station
Low-density Residential	P_1	P_1	
High-density Residential	P_1	$P_{1, 2}$	
Mixed Use	P_1	P_1 or P_2	
Commercial	P	P	P
Industrial	P	P	P
Institutional	P	P	P
Recreational	P_1	P_1	

P = Permitted Use

DC Level 2 is synonymous with DC fast charge.

P_1 allowed only as an accessory to a principal permitted use or as a conditional or special use

P_2 local jurisdictions may choose to allow DC Level 2 charging stations as a permitted use or to adopt development standards applicable to high-density residential, mixed-use residential or other zoning districts

Local Utilities: Solutions and Programs for Plug-in Electric Vehicle Charging

Southern California Edison (SCE)

Secondary Metering – SCE offers several electric vehicle rates. The Electric Vehicle Plan (TOU-EV-1) supplies a second meter, allowing customers to charge on a separate bill and take advantage of seasonal and time-of-use (TOU) rate changes without affecting their home energy bill.

Electric Vehicle Plan (TOU-EV-1)		
	Summer	**Winter**
On-Peak Noon – 9 p.m. Daily	33¢/kWh	23¢/kWh
Off-Peak 9 p.m. – Noon Daily	11¢/kWh	11¢/kWh

Consumer Outreach Programs – SCE has developed an extensive PEV website (https://www.sce.com/wps/portal/home/residential/electric-cars) for consumers, businesses and local jurisdictions. It provides information on PEV and EVSE rebates, incentives and charging station equipment, PEV rates and installation procedures.

Smart Grid Opportunities – SCE has taken a leadership role in adopting smart grid technology. Within its territory, the utility has deployed Itron smart meters to all customers and has conducted pilot projects for new distribution management systems, energy storage and neighborhood grid integration.[3]

Renewable Energy Options – Although SCE does not offer a separate renewable energy option, approximately 20% of its power was generated from renewable energy such as wind and solar in 2012.

Multi-Unit Dwellings (MUDs) –Property owners may be eligible for residential rates designed for PEV charging. SCE encourages MUD customers to consider the various factors involved in installation, including the choice between dedicated-resident charging and common-area charging, before contacting an energy advisor for guidance in the installation process and rate structure.

Pacific Gas & Electric (PG&E)

Time of Use Rates

	EV-A	**EV-B**
Rate Design:	Single meter, home and PEV on time-of-use	Dual meter, PEV on time-of-use
Ideal For:	Low energy usage, especially during peak hours	High energy usage or high residential usage during peak hours

[3] https://www.sce.com/NR/rdonlyres/BFA28A07-8643-4670-BD4B-215451A80C05/0/SCE_SmartGrid_Strategy_and_Roadmap.pdf

Costs:	None specific to rate; panel and/or service upgrade may be required	$100 per meter fee and second panel installation; service upgrade may be required

Consumer Outreach Programs – PG&E's dedicated website for PEVs (http://www.pge.com/electricvehicles/) offers an array of tools and PEV resources to help customers become PEV ready. It includes a guide to become plug-in ready and a PEV rate calculator to estimate electricity costs for a variety of PEV models. It also has information for nonresidential customers interested in fleet or workplace charging.

Smart Grid Opportunities – The smart meter deployed by PG&E allows customers to intelligently monitor their energy use. Further, PG&E has an outage detection program and intelligent circuits to improve reliability.

Renewable Energy Options – As of April 2013, PG&E has proposed a "green option" pending California Public Utilities Commission approval. This program gives customers the option of purchasing 100% renewable energy produced by new and existing projects. Participants would pay the full cost of renewable energy projects built in response to their demand, but receive credits for avoiding generation. http://www.pge.com/myhome/environment/pge/greenoption/

Multi-Unit Dwellings (MUDs) – PG&E's website provides a step-by-step guide to EVSE installation applicable to MUDs. http://www.pge.com/myhome/environment/whatyoucando/electricdrivevehicles/installationprocess/

Lodi Electric

Time-of-Use Rates – PEV owners can take advantage of Lodi's Schedule EV rate to meet their charging needs. The rate recognizes two periods for time of use charges, incentivizing off-peak charging. It also requires a secondary meter.

Period	Energy Cost (per kWh)	Time
EV charging period	$0.10427	10 p.m. – 6 a.m.
Non-EV charging period	$0.33000	6 a.m. – 10 p.m.

Consumer Outreach Programs – PEV owners in Lodi can visit the utility's electric vehicle website to access information on the EV rate, a meter service application and electrical standards for EVSE installation. http://www.lodielectric.com/electricvehicles.html?page=r

Local Government Action Plans: Best Practices for Plug-in Electric Vehicle Readiness

PEVs can help local governments realize the goals delineated in their Climate Action Plans in many ways. These are examples of how local governments have provided for PEVs.

Climate Action Plans

City of Oakdale (2011)

(http://www.ci.oakdale.ca.us/gp/Links/pdfs/oakdale-cap-20120720.pdf)

- *Strategy TLU.3.1: Reduce Traffic Speeds and Increase Safety in Sensitive Areas*
  - Lower the speed limit to 35 mph in many streets to allow for the expanded use of neighborhood electric vehicles (p. 5-21)
- *Strategy TLU.4.1: Implement Preferred Parking Policy*
  - Use parking policy to discourage driving and/or encourage the use of more fuel-efficient vehicles (p. 5-22)
- *General Plan Policy EV-2.8*
  - Reduce emissions associated with transport of goods and services to municipal operations

City of Merced (2012)

(http://www.cityofmerced.org/depts/cd/planning/climate_action_plan/default.asp)

- *Strategy AR 4.2.1*
  - The "Build a Green Fleet" program supports converting city fleet to cleaner vehicles (p.43)
- *Strategy AR 4.2.8*
  - Consider the use of neighborhood electric vehicles when appropriate
- *Strategy AR 4.4.9*
  - Facilitate conversion to clean, heavy-duty fleets and expansion of necessary infrastructure

Tulare County (2010, draft)

(http://generalplan.co.tulare.ca.us/documents/GeneralPlan2010/ClimateActionPlan.pdf)

- Building energy efficiency/green building design strategy (p. 11)
- Convert fleet vehicles by replacing diesel engines with electric motors (p. 52)
- Provide the necessary facilities and infrastructure to encourage the use of low- or zero-emission vehicles (p. 260)

City of Tulare (2011)

(http://www.ci.tulare.ca.us/pdfs/departments/planning/City_of_Tulare_CAP_2011.04.11_complete.pdf)

- *Measure VE 4.1*
  - Continue and expand clean fuel vehicles in city fleet (p. 66)
- *Measure VE 4.2.1*
  - Update codes to require electric vehicle charging equipment and parking for alternative fuel vehicles according to CALGreen (p. 111)
- *Measure VE 4.3*
  - Facilitate conversion of medium- and heavy-duty vehicles to clean fuels by promoting fueling infrastructure and incentivizing fleet adoption (p. 113)

Sustainability Action Plans

City of Tracy (2011)

(http://www.ci.tracy.ca.us/documents/Sustainability_Action_Plan.pdf)

Measure T-17: Increased Use of Low Carbon Fueled Vehicles

Conduct the following to promote the use of low-carbon fueled vehicles:

- Use the zoning ordinance to allow no-/low-carbon fueling stations as part of the gas and service station land use category
- Amend the zoning ordinance or city standards to require new projects to provide parking spaces reserved for hybrid or electric vehicles and carpool or car share vehicles
- Require dedicated parking spots for alternative fuel, hybrid, carpool or car share vehicles in city parking lots and consider installing charging connections
- Encourage the use of hybrid and electric construction equipment and the use of alternative fuels for construction equipment
- Convert the municipal automotive fleet to cleaner fuels and lower emissions – convert the municipal nonautomotive fleet to cleaner fuels and lower emissions where possible

General Plan Updates

City of Arvin (2012)

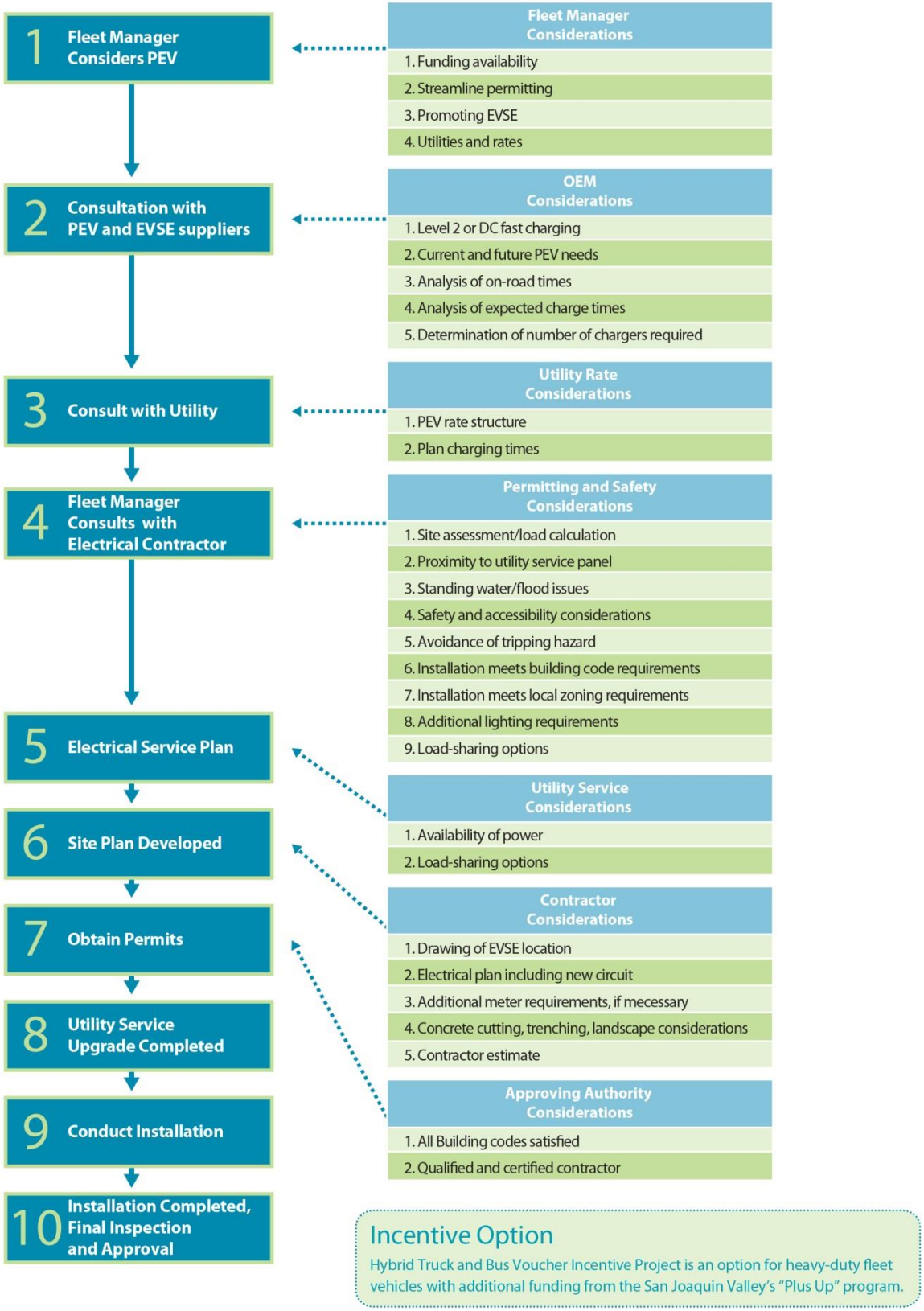
(http://www.arvin.org/downloads_pdfs/Final-Arvin-GP-IS%20%28July-12-2012%29.pdf)

- *Conservation and Open Space Element*
  - **Goal 7:** Improve air quality in the Arvin area by controlling emissions from stationary and mobile sources
- *Air Quality Element*
  - **Goal 1:** To the greatest extent feasible, integrate air quality, land use and transportation planning and policy to reduce the emission of criteria pollutants and greenhouse gases from mobile sources
  - **Goal 2:** Encourage the use of low-emission vehicles in city operations and in the larger community
- *Policy AQ-2.1*: Replace city fleet vehicles with low-emission technology vehicles wherever possible
- *Policy AQ-2.2:* Provide preference to contractors using reduced-emission equipment for city construction projects, as well as for city service contracts
- *Policy AQ-2.3:* Encourage developments and street systems that accommodate the use of neighborhood electric vehicles (NEVs) for local travel

City of Patterson (2010)

- *Implementation Measure T-2:*
  - City should maintain a street master plan that should be regularly updated to indicate the necessary right-of-way to be acquired or dedicated (applicable to on-street parking EVSE installations)
- *Implementation Measure T-9:*
  - City shall implement the downtown physical design plan

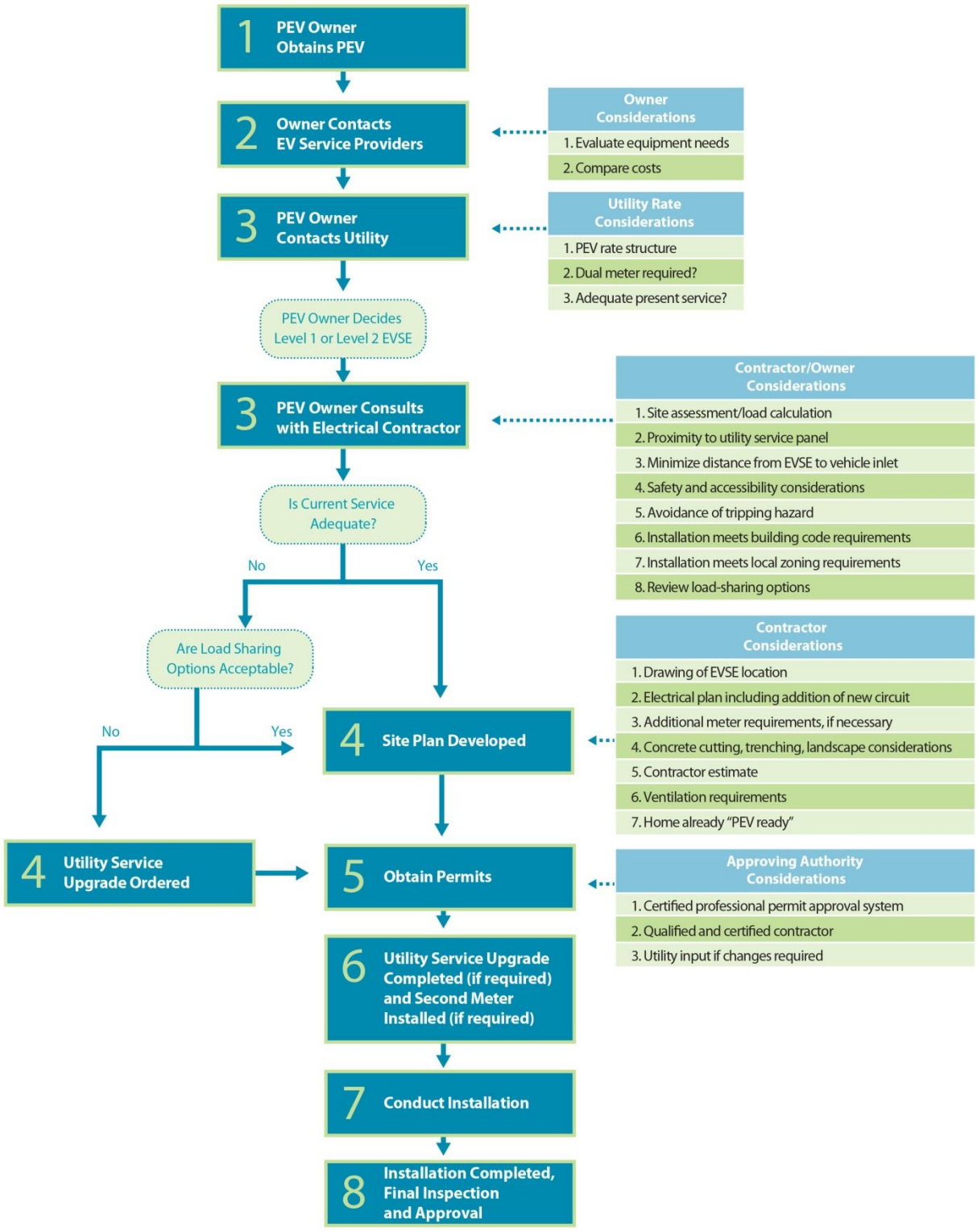
Fleet EVSE Installation Guidelines



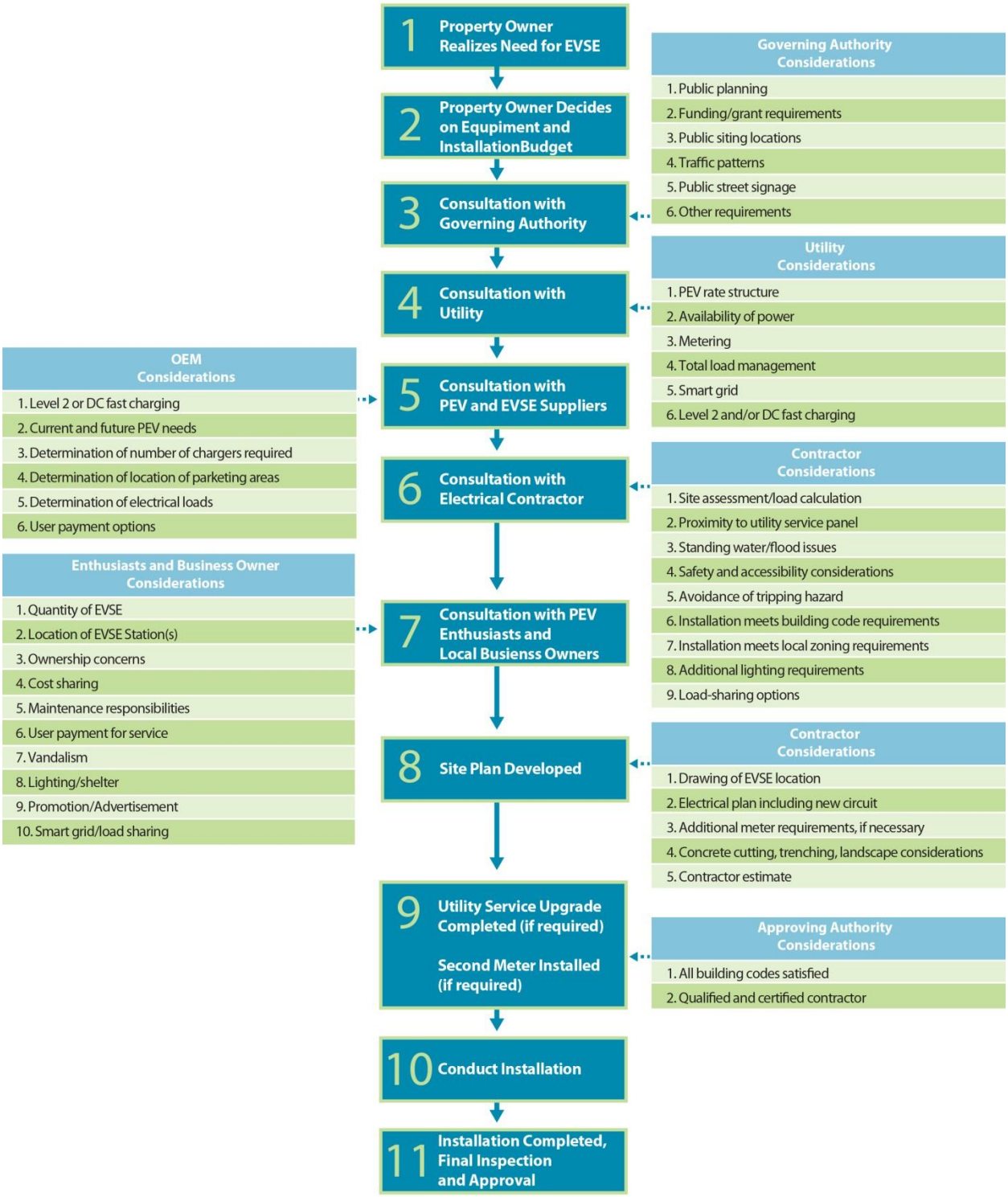
Incentive Option

Hybrid Truck and Bus Voucher Incentive Project is an option for heavy-duty fleet vehicles with additional funding from the San Joaquin Valley's "Plus Up" program.

Residential EVSE Installation Guidelines



Non-Residential EVSE Installation Guidelines



Considerations for Public Agencies that Provide Charging

Background

Public agencies have several reasons to want to pursue EVSE installations. Public agencies may want to support greater PEV adoption in the community in order to meet their climate goals, provide infrastructure to support an electric fleet, or just to provide an extra public good to community members.

Key Issues

Though public agencies often have these goals in mind, it can be difficult to navigate the diversity in the electric vehicle supply equipment (EVSE) market. Additionally, EVSE installations can be expensive, and it is necessary to secure funding before pursuing an installation project.

Considerations for public agencies before pursuing an installation:

- How will the project be paid for?
- Will the chargers be available for public, government employee, or fleet use?
- Will charging be offered for free?
- What research exists on the EVSE marketplace?
- Will the agency want to issues a request for proposal (RFP) for EVSE installations?
- Approximately how many chargers will the project consist and where will they be located?

Oftentimes, the impetus for installing charging infrastructure comes from Climate Action Plans (CAPs), which call for emission-reduction goals. This may guide the way the public agency will conduct the installations. For examples of how San Joaquin Valley public agencies have implemented clean vehicles into their CAPs, see the Climate Action Plan fact sheet found in Appendix A.8.

Available Funding Sources

Public agencies that want to upgrade or install new charging infrastructure for public and employee use can follow two important federal and state solicitation websites for a chance to apply for grant money.

TIGER Grants – The US Department of Transportation (DOT) provides cities and public agencies with grant money for transportation projects that better environmental problems, such as the installation of electric vehicle charging stations. More information can be found on their website, http://www.dot.gov/tiger.

Alternative and Renewable Fuel and Vehicle Technology Program – AB 118 (Núñez, Chapter 750, Statutes of 2007) created the Alternative and Renewable Fuel and Vehicle Technology Program and AB 8 (Pavley, Chapter 401, Statutes of 2013) authorized the California Energy Commission (CEC) to develop and deploy alternative and renewable fuels and advanced transportation technologies to help the state achieve its climate change policies. Public agencies can pursue certain solicitations and receive funding for alternative fuel projects by visiting http://www.energy.ca.gov/contracts/transportation.html. "Electric Vehicle Charging Infrastructure" program notices are generally solicitations that provide funding for public agencies and non-profits to install charging infrastructure.

Request for Proposals

To pursue large-scale EVSE installation projects, it can be useful for public agencies to release a request for proposals (RFPs) and let EVSE vendors bid on the project.

The RFP will consist of the agency's list of requirements of the EVSE and may include a list of sites where the vendor will need to evaluate and install EVSE. An RFP may include a "turnkey" style installation, wherein the vendor will complete the installation and be responsible for operation and maintenance of the equipment.

Usually these turnkey installations are not free; because of high installation costs, it is usual that vendors prefer for the host (i.e. the public agency) to pay for some of these costs. However, having vendors bid on a project allows the public agency to choose the most price-competitive project.

When vendors bid for EVSE projects, they usually have a manufacturer, service provider, and electrical contractor in mind to complete the project. Therefore, this lessens the amount of work for the public agency to find each stakeholder individually.

Below, there is an RFP template that public agencies can use to solicit for EVSE installations.

San Joaquin Valley Example

The City of Lodi can be seen as having been at the forefront of electric vehicle charging. Ten years ago, Lodi had installed two entry-level PEV chargers at City Hall and four chargers at their municipal service center.

Early in 2012, EVSE vendor Clipper Creek contacted the City of Lodi. Clipper Creek was promoting a CEC grant in which they were serving as contractor to provide replacement charging heads for old Level 2 legacy chargers. The company would provide the upgrade at no cost for the municipality.

During this time, the City was in the process of developing their CAP. Thanks to the timing of the Clipper Creek project, the City decided to install more stations around the town in order to complement their CAP. Clipper Creek agreed and installed five more stations for free. The new charging stations were installed at the City's library, finance office, parking garage (transit center), community center, and animal shelter.

Currently, the City does not charge to use its charging stations. In summer 2013, Clipper Creek had plans to add a card-swipe device to these chargers. The chargers will have a credit or debit capability and then people will pay to use these charging stations. It is still uncertain how much drivers will be charged. Further, there is an ordinance that allows towing of vehicles that are parked in EV-designated parking spaces.

Recommendations

To expand the number of chargers deployed by public agencies, these recommendations should be followed:

1. Turnkey style EVSE installations are beneficial for both the EVSE vendor and the public agency
2. To keep costs low, if the utility or city plans to upgrade street lighting, electrical capacity can be made for EVSE installations
3. When writing an RFP, public agency needs to be very clear to not bear any liability
4. Add PEV infrastructure development to a Climate Action Plan as a way to achieve climate mitigation goals

REQUEST FOR PROPOSAL (RFP) TEMPLATE

Installation and Operation of Electric Vehicle Charging Stations

The following is a Request for Proposal (RFP) template that provides recommended headings and proposal language to assist in the issuance of an RFP for Electric Vehicle Charging Stations. In the outline, a brief summary is provided for each heading and this information can and should be customized for each individual RFP. This outline was created based off of information gathered from RFP's drafted by the City of Chula Vista and the City of Long Beach.

Disclosure: *Proposals shall be kept confidential until a contract is awarded. The <insert jurisdiction> reserves the right to request clarification of any proposal term from prospective vendors. Selected vendor(s) will be notified in writing. Any award is contingent upon the successful negotiation of final contract terms. Negotiations shall be confidential and not subject to disclosure to competing vendors unless and until an agreement is reached. If contract negotiations cannot be concluded successfully, the <insert jurisdiction> reserves the right to negotiate a contract with another vendor or withdraw the RFP. Any contract resulting from this RFP shall not be effective unless and until approved by the <insert jurisdiction Council>.*

1. **Overview of the Project**

Requesting proposals from vendors to fully fund, design, install, operate, maintain, market, and potentially remove electrical vehicle (EV) charging stations, also known as Electric Vehicle Supply Equipment (EVSE), on publically-owned property for public use. This work will also include assisting the jurisdiction in identifying ideal site locations for the EVSE installations.

2. **Acronyms/Definitions**

A glossary of the necessary acronyms and definitions used throughout the RFP (e.g. "Vendor" – Organization/individual submitting a proposal in response to this RFP)

3. **Scope of Project**

The Scope of the Project is as follows:

- Provide attractive and well-maintained EVSE.
- Cover all costs associated with installation, maintenance, and electricity for the EVSE. The vendor may establish a service charge and method of payment collection to recoup these costs as well as any operating profit from EVSE users.
- Identify siting locations, including physical address, project site (landmark location), reasoning behind the location selection, and accompanying notes.
- Provide proper EV parking signage and reconfiguration of any parking stalls for EV parking.
- Market the project as well as provide product advertisement.
- Offer options for EVSE when the agreement expires (e.g. charging unit removal, transfer of ownership, contract renewal options).

- The <insert jurisdiction> to provide the required parking spaces to accommodate the EVSE within the parking facilities at no cost to the vendor.
- Comply with all permitting, ADA, and parking requirements.

4. Additional Considerations

A. The vendor must agree to insurance and liability requirements (scope and coverages) set by the jurisdiction and state such in its proposal.

<Jurisdiction to insert summary of applicable insurance and liability requirements here and/or can attach full description to end of this template.>

B. <Jurisdiction can add any additional considerations here. For example, if City offers/restricts use of advertisements on or around EVSE.>

5. Submittal Instructions

For questions regarding this RFP, submit all inquiries via email to <insert email address> by <insert due date>. Responses to the questions will be posted <insert where responses will be made available> no later than <insert date>. All proposers are recommended to visit the above mentioned <insert jurisdiction> website on a regular basis as responses will be posted when available.

Proposal Evaluation Process Timeline

TASK:	***DATE/TIME:***
Deadline for submitting questions	<Insert date>
Answers to all questions submitted	<Insert date>
Deadline for submission of proposals	<Insert date>
Evaluation period	<Insert date>
Selection of vendor	<Insert date>

NOTE: These dates represent a tentative schedule of events. The <insert jurisdiction> reserves the right to modify these dates at any time, with appropriate notice to prospective vendors.

Vendors shall submit one (1) original proposal marked "ORIGINAL" and four (4) identical copies to the following:

<Insert Jurisdiction Name>
<Insert Contact Name>
<Insert Address>

Proposals shall be clearly labeled in a sealed envelope or box as follows:

REQUEST FOR PROPOSAL NO.: <insert proposal number>
FOR: Electric Vehicle Charging Stations

Disclosure: *Proposals must be received by <insert date and time>. Proposals that do not arrive by the specified date and time WILL NOT BE ACCEPTED and will be returned unopened. Vendors may submit their proposal any time prior to the above stated deadline. E-mail or fax submissions will not be accepted.*

At its sole discretion, the <insert jurisdiction> may reject incomplete proposal submittals if, in its judgment, the submittal lacks information needed to effectively evaluate the proposal. Nothing in this request for qualifications implies a contractual obligation with any firm, nor will the <insert jurisdiction> reimburse costs for submittal preparation.

Proposal Format:

Vendor Information:

- The legal name of the vendor, address and telephone number.
- The structure of the organization (e.g., sole proprietorship, partnership, corporation, etc.) including state of formation.
- The name, address and telephone number of the person to whom correspondence should be directed.
- The year the company was established as currently being operated.
- A certified financial statement, including, but not limited to a Dun and Bradstreet rating.
- Employer ID number as well as a DUNS number.

Vendor Background & Work Experience:

- A list of all communities within the local utility (e.g. Pacific Gas and Electric, Southern California Edison, San Diego Gas & Electric) territory in which the vendor has provided and maintained publicly-available EVSE during the last five years, if applicable. Please list communities with active EVSE and communities where EVSE have been removed. Also include the following information for each community:
  - Name of the organization that contracted with you for EVSE sites. Please include the name of a contact person and phone number.
  - Was the contract/franchise exclusive or nonexclusive?
  - Number of EVSE provided.
  - Time period that the EVSE were installed.
  - Reporting sales & usage (sample reports)
- A list with additional California communities, and/or communities in United States in which the vendor has provided and maintained publicly-available EVSE during the last five years, if applicable. Include all of the information identified in the previous bullet.
- A list of vendor's ten most recent projects with a short description of the scope of work.
- Please list any public agencies that have chosen to cancel or not renew EVSE contracts with your firm during the last five years. Show names of organizations and names and phone numbers of persons who can be contacted.
- Provide qualifications of the local contractors that will perform the EVSE installations. Demonstrate that the vendor is working with C-10 licensed electrical contractors employing California state-certified electricians to handle EVSE installations and maintenance.
  - List any EVSE-specific trainings or certifications that the vendor's electrical contractor and/or the contractor's electricians have completed, if applicable (e.g. The Electric Vehicle Infrastructure Training Program (EVITP) or UL training).
  - Include the number of EVSE installations completed to date by the vendor's electrical contractor and/or the contractor's electricians.
- Demonstrate an understanding of <insert jurisdiction> processes, required permits, permit costs, licenses, applicable state and local codes specific to EVSE and procedures for this type of project.

Scope of Work:

- A written and pictorial description of the proposed EVSE design, including:
  - Comprehensive specifications (including make, manufacturer, & model numbers of equipment).
  - Delivery and proposed installation schedule.
  - The submission of more than one type of charging station is permitted, however, if the selection of any particular design would result in a change to the proposed rate structure and method of collection, those changes must be noted.
- Metering configurations identifying how the vendor will provide the electricity to the EVSE end consumer at no cost to the jurisdiction.
  - Process and schedule for reimbursement to the jurisdiction for cost recovery of electricity provided to EVSE (if applicable).
- Proposed EVSE end consumer rate structure (e.g. charging customers per kWh usage or plug time) and customer method of payment (e.g. credit card reader for universal usage or restricted access for only network users).
- Description of the proposed EVSE maintenance program including the location of maintenance facilities, number of staff that will be available for maintenance, and anticipated response times.
- Description of ability and staff expertise to provide services including marketing, installation, monitoring, and maintenance of EVSE.
  - Quality control/safety features.
  - Marketing plan details and available resources.
- Financial incentives to the <insert jurisdiction> (if applicable).
- Options for EVSE when the agreement expires (e.g. charging unit removal, transfer of ownership, contract renewal options) and responsible party for any costs incurred (if applicable). Highly preferred that the vendor cover any removal costs.

Additional Items:

- The proposal must be signed by the individual(s) legally authorized to bind the vendor.
- If complete responses cannot be provided without referencing supporting documentation, such documentation must be provided with the proposal and specific references made to the tab, page, section and/or paragraph where the supplemental information can be found.

6. Proposal Evaluation & Award Process

Proposals will be evaluated based on the following criteria (please reference attached *RFP Criteria Review Template*):

- Current and past vendor performance in similar contracts with other agencies.
- Financial stability of the proposer as reflected in a certified financial statement or other certified statement, including but not limited to a Dun and Bradstreet financial rating.
- EV customer rate structure and method of customer payment that will be used to charge customers.
- Description of metering configuration.
- Process and schedule to reimburse the jurisdiction in order to recoup cost of electricity used to provide EVSE (if applicable).
- Maximum public benefit (i.e., in terms of affordability and customer support).
- Strength, quality, durability, advanced technology, future flexibility, and aesthetic appeal of proposed EVSE.

- Proposed maintenance, repair and replacement schedule including response times for malfunctioning EVSE (e.g. vendor's proximity to the <insert jurisdiction> and number of proposer's employees performing maintenance functions).
- Possible commitment to providing additional EVSE at other <insert jurisdiction> owned parking facilities (desirable but not required).
- Vendor's specific marketing strategy that includes product advertising.
    - EVSE installation marketing plan.
    - Description of the vendor's available marketing resources.
- Proposed options for EVSE (e.g. system removal, transfer of ownership, contract renewal options)when the agreement expires and potential costs to the jurisdiction.
- Overall monetary return to the <insert jurisdiction> (if applicable).

Suggestion for Jurisdiction: Create a scoring criterion that may include assignment of percentages and/or weighting each criterion listed above.

7. Project Specifications

- Provide installation site plans (if applicable [for reference, please see Exhibit A of the City of Long Beach RFP No. PW12-016]).

8. Subcontractor Information and Business License

Does this proposal include the use of subcontractors?

Yes _____ No _____ Initials _____

If "Yes", vendor must:

- Identify specific subcontractors and the specific requirements of this RFP for which each proposed subcontractor will perform services.
- The <insert jurisdiction> requires that the awarded vendor provide proof of payment of any subcontractors used for this project. Proposals shall include a plan by which the <insert jurisdiction> will be notified of such payments.
- Primary contractor shall not allow any subcontractor to commence work until all insurance required of subcontractor is obtained.

BUSINESS LICENSE

<Insert Jurisdiction> requires all businesses operating in the <insert jurisdiction> to pay a business license tax. In some cases the <insert jurisdiction> may require a regulatory permit and/or evidence of a State or Federal license. Prior to issuing a business license, certain business types will require the business license application and/or business location to be reviewed by the Development Services, Fire, Health, and/or Police Departments.

9. Cost

- N/A

10. Terms, Conditions and Exceptions

<***Insert*** project specific terms, conditions and exceptions>
To view an example, please reference section 9 of the City of Long Beach RFP No. PW12-016.

<***Insert*** individual public liability and insurance requirements for your agency>

UPS Electric Vehicle Deployment Case Study

UPS is a global package delivery company, delivering 16.3 million packages and documents daily. Among its 96,173 vehicle fleet, 2,745 are alternative-fuel vehicles – the largest alternative fuel fleet in the country.

With the help of Electric Vehicle International (EVI), an EV manufacturer based in Stockton, California, UPS was able to conduct the largest deployment of EVs in the industry. The electric fleet consisted of 100 fully electric vehicles to deliver packages mainly in Sacramento, San Bernardino, Ceres, Fresno, and Bakersfield, CA.

Before officially launching the fleet, UPS tested the EV delivery trucks in different environments and provided training for drivers on how to use the vehicles. After drivers finished the training, staff accompanied the drivers on ride-alongs to ensure that they use the vehicles in the most optimal way.

The UPS facilities charging these trucks are equipped with Level 2 charging stations with smart metering capabilities. These smart chargers are able to identify the best time to charge a vehicle based on its delivery schedule and battery needs. Additionally, if there is charge left in the battery after a truck has completed its deliveries, the residual energy is fed back into the grid.

The UPS electric trucks will reduce their consumption of fuel by approximately 126,000 gallons per year.

Costs and Benefits of Switching to a Plug-in Electric Vehicle

What are the costs and benefits of switching to a plug-in electric vehicle?

The table below displays the average retail price of electricity among utilities in the San Joaquin Valley in 2011.

Entity	City of Lodi - (CA)	Merced Irrigation District	Modesto Irrigation District	Pacific Gas & Electric Co	Turlock Irrigation District	Southern California Edison
Class of Ownership	Public	Public	Public	Investor Owned	Public	Investor Owned
# Consumers	22,013	6,433	94,015	4,574,094	71,829	4,287,994
Average Retail Price (cents/kWh)	16.99	15.32	17.12	15.32	14.51	14.42

Comparing Costs

The annual cost of driving a gasoline-powered vehicle usually depends what a driver pays at the pump. Based on the average cost of regular gallon of gasoline and the average retail price per kWh for all residential customers in the San Joaquin Valley in 2011, a PEV driver in the San Joaquin Valley will pay a third of the cost of a gallon of gasoline to travel the same distance.

Calculating the Savings

The estimated efficiency of a new ICE vehicle is 28.2 mile per gallon.[4]

The estimated fuel economy of a PEV is about 35kWh/100 miles.[5]

The average retail price of electricity in the San Joaquin Valley was $0.15613[6] per kWh.

In California, the average cost of regular gasoline is about $3.89.

The following is a calculation to find the cost of what a PEV driver would pay to drive the same distance as an ICE driver on one gallon of gas.

$$28.2\ miles\ per\ gallon \times \frac{35kWh}{100} miles \times \$0.15613\ per\ kWh = \mathbf{\$1.54}$$

Other Considerations

Considering that an average driver in the San Joaquin Valley drives about 13,000 miles a year,[7] there are savings to be had. Using the average gasoline price in California ($3.89), a Valley driver would spend

[4] EPA Fuel Economy Trends Report http://www.epa.gov/oms/fetrends.htm#summary
[5] Model Year 2012 Fuel Economy Guide. http://www.fueleconomy.gov/feg/pdfs/guides/FEG2012.pdf
[6] The average electricity price was calculated by the following formula: (16.99+15.32+17.12+15.32+14.51+14.42)/6 = 15.61 cents
[7] This is calculated based on EMFAC2011 inventory and for persons aged 18 and over.

about $1,800 on gas per year. With a PEV, the same amount of driving would only cost about $700 in electricity.[8]

The Energy Information Agency estimates that with a PHEV, a driver will save $853 on fuel per year and with a BEV, a driver will save $787 per year on fuel.

[8] (13,000 mi/28.2mpg) x $3.89/gallon of gas

Renewable Energy and PEV Charging

(Data as of July 15 2013)

Table 1 shows residential solar panel rebate applications, with counties ranked according to the number of applications for the California Solar Initiative (CSI).

Table 1: Solar Panel Applications Residential (by County)

Amount of Rebates	County Name	% All Apps (res)	% SJV Apps (res)	% Households
5479	Fresno	5.51%	34.04%	1.92%
4135	Kern	4.16%	25.69%	1.65%
2154	Tulare	2.17%	13.38%	1.68%
1814	San Joaquin	1.82%	11.27%	0.85%
812	Madera	0.82%	5.05%	1.93%
661	Merced	0.66%	4.11%	0.89%
653	Kings	0.66%	4.06%	1.60%
387	Stanislaus	0.39%	2.40%	0.23%

Table 2: Solar Panel Applications Non-Residential (by County)

Amount	County	% All Apps (non-res)	%SJV Apps (non-res)
5219	Fresno	61.87%	40.85%
3445	Kern	40.84%	26.96%
1812	San Joaquin	21.48%	14.18%
788	Madera	9.34%	6.17%
650	Merced	7.71%	5.09%
387	Stanislaus	4.59%	3.03%
349	Kings	4.14%	2.73%
126	Tulare	1.49%	0.99%

Table 2 shows non-residential solar panel rebate applications, with counties ranked according to the number of applications for CSI.

Table 3: CVRP Rebates Residential (by County)				
Amount	County	% All Apps (res)	% SJV Apps (res)	% Households
118	Fresno	0.44%	28.57%	0.04%
109	Kern	0.41%	26.39%	0.04%
107	San Joaquin	0.40%	25.91%	0.05%
44	Stanislaus	0.16%	10.65%	0.03%
31	Tulare	0.12%	7.51%	0.02%
16	Merced	0.06%	3.87%	0.02%
16	Madera	0.06%	3.87%	0.04%
3	Kings	0.01%	0.73%	0.01%

Table 4: CVRP Rebates Non-Residential (by County)	
Amount	County
5	San Joaquin
4	Tulare
4	Fresno
2	Stanislaus
1	Kern

Table 3 shows residential plug-in electric vehicle rebates, with counties ranked according to the number of applications for the Clean Vehicle Rebate Project (CVRP). It also provides the percentage of residents who have gotten rebates in each county.

Table 4 shows non-residential PEV rebates, with counties ranked according to the number of applications for CVRP.

Table 5: Solar Panel Applications			
Residential (by zipcode)			% Households (in zipcode)
zipcode	amount	city	percent
93619	784	Clovis	8.28%
93312	746	Bakersfield	4.30%
93611	675	Clovis	5.25%
93314	609	Bakersfield	9.12%
93720	462	Fresno	2.66%
93711	451	Fresno	2.93%
93311	404	Bakersfield	3.14%
93722	367	Fresno	1.60%
93727	328	Fresno	1.59%
93230	318	Hanford	1.54%

Table 6: CVRP Rebates			
Residential (by zipcode)			% Households (in zipcode)
zipcode	amount	city	percent
93619	21	Clovis	0.22%
93311	17	Bakersfield	0.13%
93306	14	Bakersfield	0.07%
93314	14	Bakersfield	0.20%
93611	14	Clovis	0.09%
93312	13	Bakersfield	0.07%
93720	12	Fresno	0.07%
95376	11	Tracy	0.07%
95391	11	Tracy	0.42%
93711	10	Fresno	0.06%

Table 5 shows the number of solar panel applications by zip code, ranked according to number of applications.

Table 6 shows the number of CVRP rebates by zip code, ranked according to number of rebates.

Tables 5 and 6 also present the percentage of households that apply within the zip code.

Table 7: Cities with highest PEV and solar rebates and applications		
Top Cities	% households w/ solar	% households w/ PEVs
Bakersfield	1.64%	0.05%
Clovis	4.48%	0.11%
Fresno	1.03%	0.01%

Table 7 presents the top cities that had both the highest PEV and solar rebates and applications.

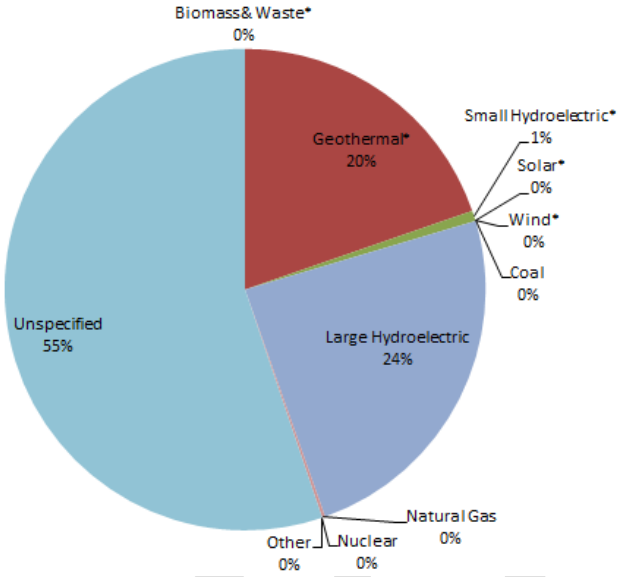
Though rebate and application numbers do not equal the real number of households with solar panels and/or PEVs, they are still highly correlated with the amount of solar and PEV owners.

Note: 2010 U.S. Census data was used for all population analysis. The CVRP data was taken from the latest CVRP dataset from the week of July 15, 2013. The CSI data was from the California Solar Initiative website, but only provides information from applications administered by California Center for Sustainable Energy, Southern California Edison, and Pacific Gas and Electric.

California's Electricity Sources

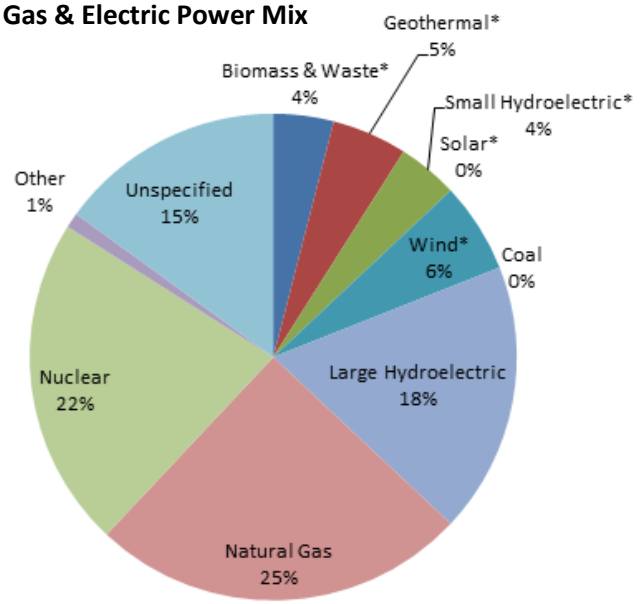
The California Renewables Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33% of total procurement by 2020. Below are the largest utilities represented in the San Joaquin Valley and their respective "power mix." Resources that have an asterisk (*) indicate they have either zero GHG emissions and/or are renewable.

Lodi Municipality Power Mix



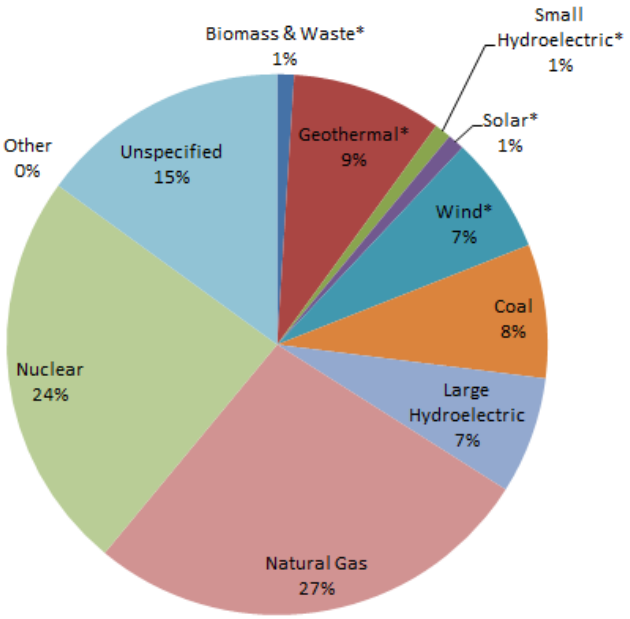
Biomass & Waste*	0.00%
Geothermal*	19.70%
Small Hydroelectric*	0.70%
Solar*	0%
Wind*	0%
Coal	0%
Large Hydroelectric	24.20%
Natural Gas	0.20%
Nuclear	0%
Other	0%
Unspecified	55.20%

Pacific Gas & Electric Power Mix



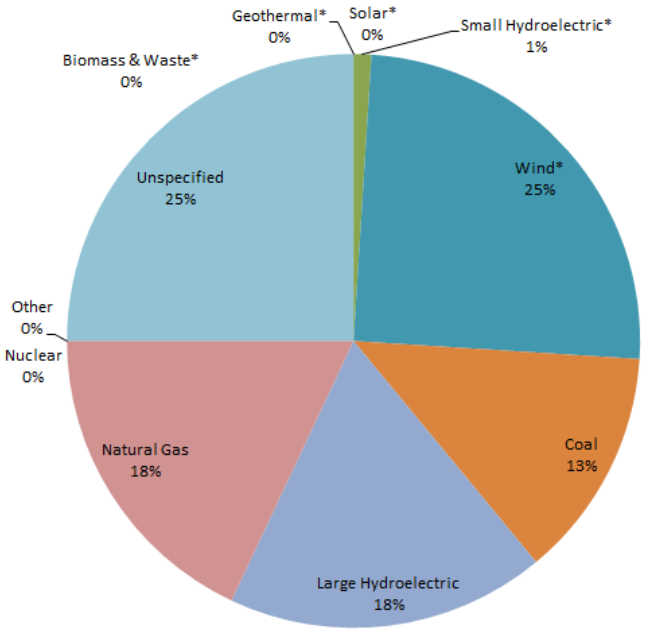
Biomass & Waste*	4%
Geothermal*	5%
Small Hydroelectric*	4%
Solar*	0%
Wind*	6%
Coal	0%
Large Hydroelectric	18%
Natural Gas	25%
Nuclear	22%
Other	1%
Unspecified	15%

Southern California Edison Power Mix



Biomass & Waste*	1%
Geothermal*	9%
Small Hydroelectric*	1%
Solar*	1%
Wind*	7%
Coal	8%
Large Hydroelectric	7%
Natural Gas	27%
Nuclear	24%
Other	0%
Unspecified	15%

Modesto Irrigation District Power Mix



Biomass & Waste*	0%
Geothermal*	0%
Small Hydroelectric*	1%
Solar*	0%
Wind*	25%
Coal	13%
Large Hydroelectric	18%
Natural Gas	18%
Nuclear	0%
Other	0%
Unspecified	25%

Plugging into any of the above utilities' grids allows PEV drivers to benefit from charging with at least 20% renewable energy and zero oil.

Power mix data was source from the California Energy Commission for the latest available data year, 2011.