

Driving to Zero Net Energy: Overview of Electric Vehicles in Chula Vista

Presented by City of Chula Vista's Sustainable Communities Program

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Sustainable Communities Program

- Provides resources to stakeholders of the Chula Vista built environment to improve compliance with **energy efficiency** and **green building codes** and to promote construction of **sustainable buildings**.
- Part of the **City of Chula Vista's Local Government Partnership program**, which is funded by California utility customers and administered by San Diego Gas & Electric® under the auspices of the California Public Utilities Commission.

Agenda

- What is Net Zero Energy?
- Intro to Electric Vehicles
- South Bay EV readiness and permitting
- Installation case studies
- Conclusion





Center for
Sustainable Energy™

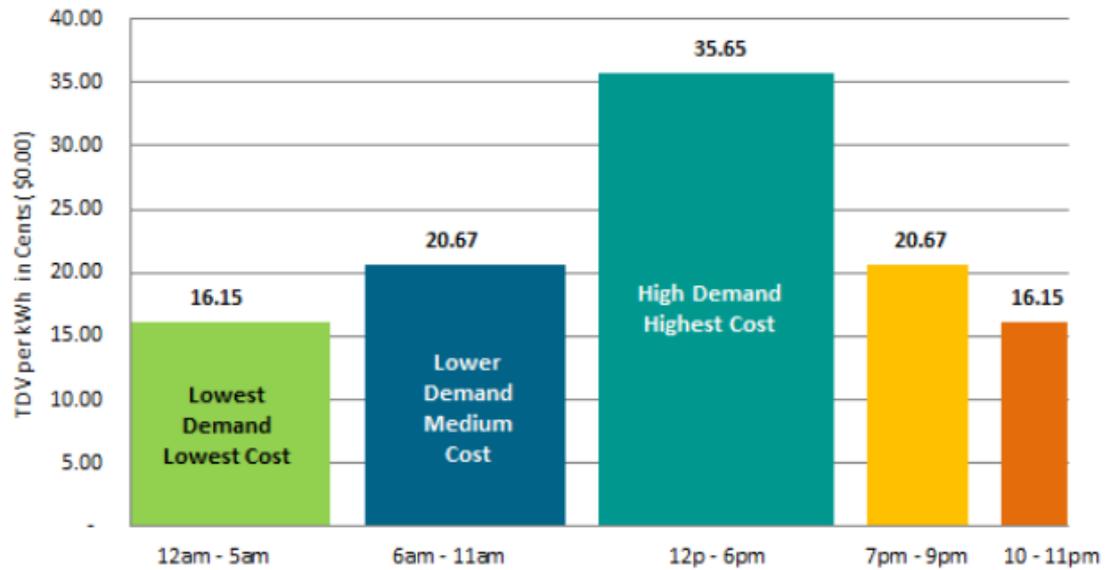
- Independent nonprofit organization
- Our mission: Accelerating the transition to a sustainable world powered by clean energy
 - Program management
 - Training and education
 - Technical assistance

What is “Zero Net Energy”?

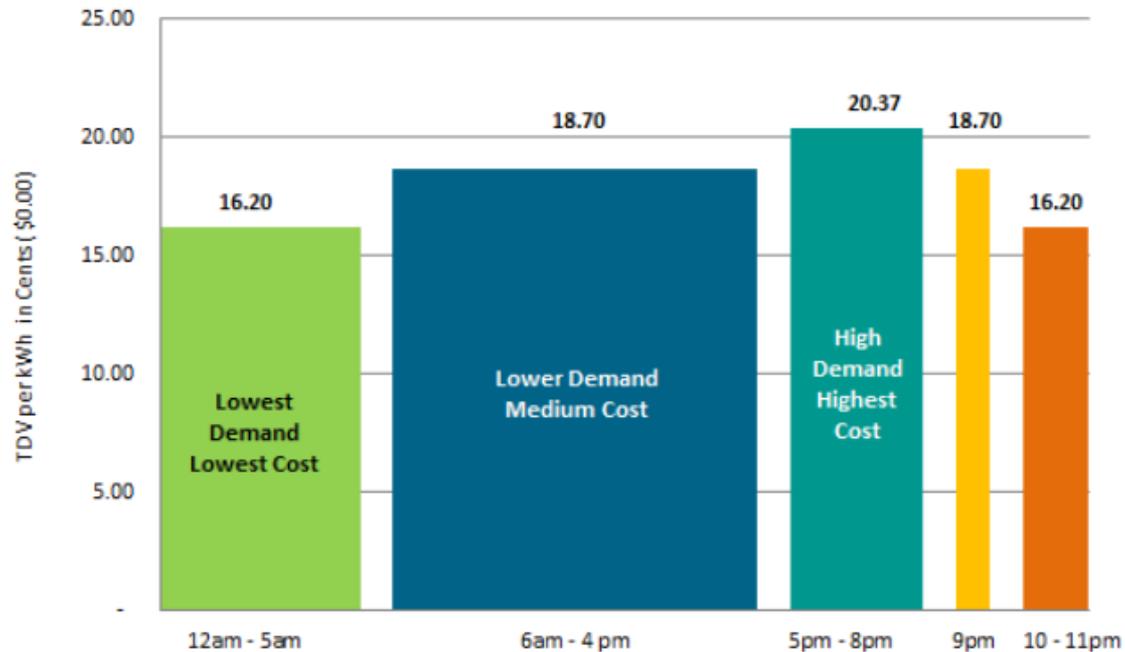
A Zero-Net-Energy Code Building is one where the **net amount of energy produced by on-site renewable energy resources** is equal to **the value of the energy consumed annually by the building**, at the level of a single “project” seeking development entitlements and building code permits, measured using the California Energy Commission’s Time Dependent Valuation metric.

-- California Energy Commission, 2013 Integrated Energy Policy Report

Average Summer TDV per kWh in Climate Zones 7 & 10



Average Winter TDV per kWh in Climate Zones 7 & 10



California's ZNE Goals

- All **new residential construction** will be ZNE by 2020
- All new and 50 percent of existing **state-owned public buildings** will be ZNE by 2025
- All **new commercial buildings** will be ZNE by 2030
- 50 percent of **existing commercial buildings** will be retrofit to ZNE by 2030



PLUG-IN ELECTRIC VEHICLES

Why Electric Vehicles?

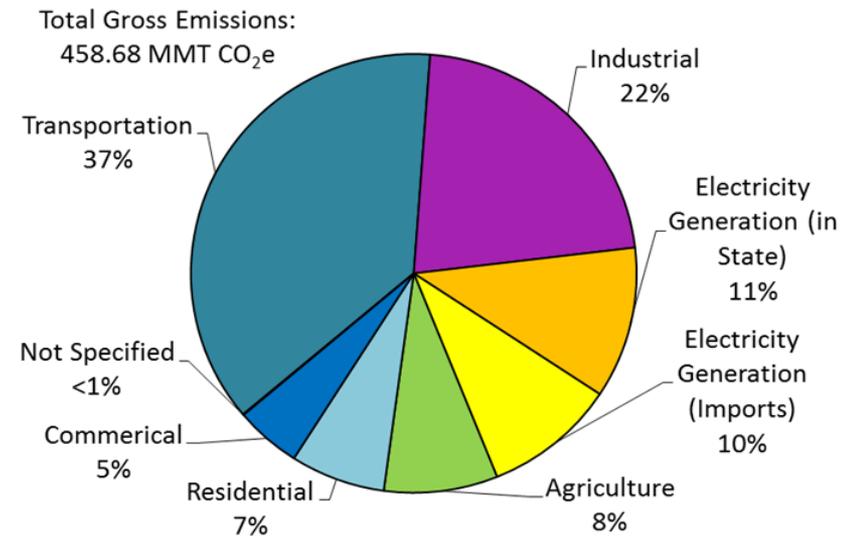
- Reduce today's petroleum use in cars and trucks by up to 50% within the next 15 years (by 2030)
- Reduce greenhouse gas emissions to 40% below 1990 levels by 2030
- Accommodate 1 million zero-emission vehicles by 2020 and have 1.5 million ZEVs by 2025



Why Electric Vehicles?

- Transportation largest source of regional GHG emissions

California GHG Emissions



- Chula Vista Climate Action Plan Update
 - #11 Alternative Fuel Vehicle Readiness A) Support the installation of more local alternative fueling stations and designate preferred parking for alternative fuel vehicles. B) Design all new residential and commercial buildings to be “Electric Vehicle Ready.”

What is a Plug-in Electric Vehicle?

WHAT IS A PEV?

A PEV is a Plug-in Electric Vehicle that runs at least partially on battery power and is recharged from the electricity grid.



Pure Battery Electric Vehicles (BEVs) run on electricity stored in batteries and have an electric motor rather than a gasoline engine.



Plug-in Hybrid Electric Vehicles (PHEVs) combine two propulsion modes in one vehicle – an electric motor (that is battery-powered and can be plugged in and recharged) and a gasoline engine (that can be refueled with gasoline).

BEVs and PHEVs – What's the difference?

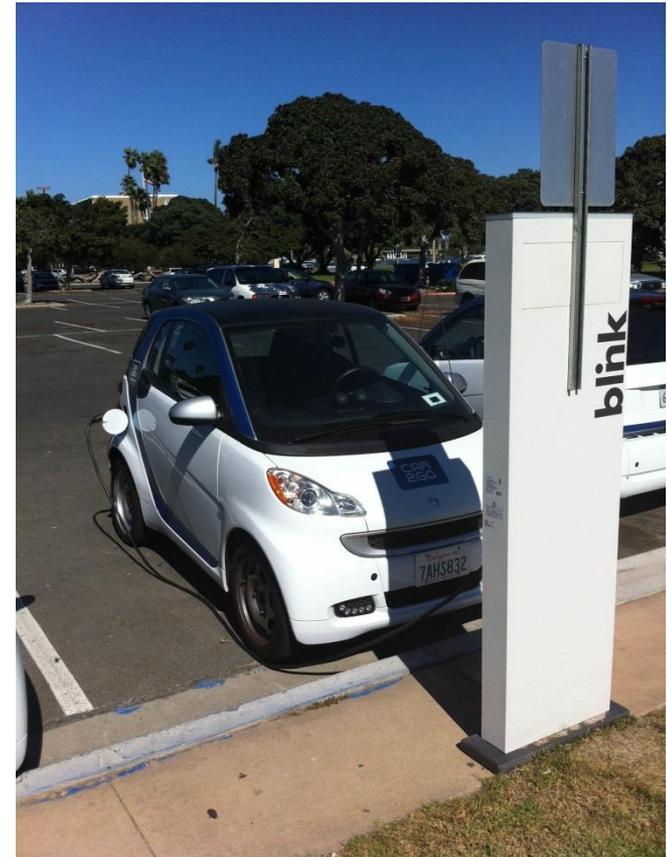
	BEV	PHEV
Emissions	Zero emissions from vehicle; only emissions are from utility electricity generation mix	Zero emissions when driving on electricity. Emissions when driving on gasoline depend on engine emissions certification
Range	Generally 70 to 100 miles (proportional to battery size) ; some models are higher	All electric range varies from 15 to 35 miles (proportional to battery size); gasoline range is about 300+ miles
Propulsion	Electric motor / battery only	Electric motor / battery <i>plus</i> gasoline engine
Re-fueling	Recharge with electricity	Recharge with electricity <i>and/or</i> refuel with gasoline

Source: California PEV Collaborative (CG2-2).

BEV and PHEV Graphics courtesy of the Electric Power Research Institute, *Plugging In: A Consumer's Guide to the Electric Vehicle*, 2011.

Why Should Developers Care?

- Future CALGreen building codes will require some EV preparedness in new constructions
- More cost-effective to install prewiring for charging stations early in the development phase than retrofitting later
- There is a fast-growing EV market in California



Charging Equipment

AC Level 1

- Uses a standard 110/120-volt alternating current (VAC) three-pronged wall plug



Not exactly as shown

AC Level 2

- Uses 208/240 VAC and can be hardwired or connected with a plug



DC Fast Charging

- Uses commercial-grade 440 /480 VAC – produces direct current (DC) to charge
- Commercial/Public – due to costs
- Provides fast charge for a some BEVs
- Multiple standards

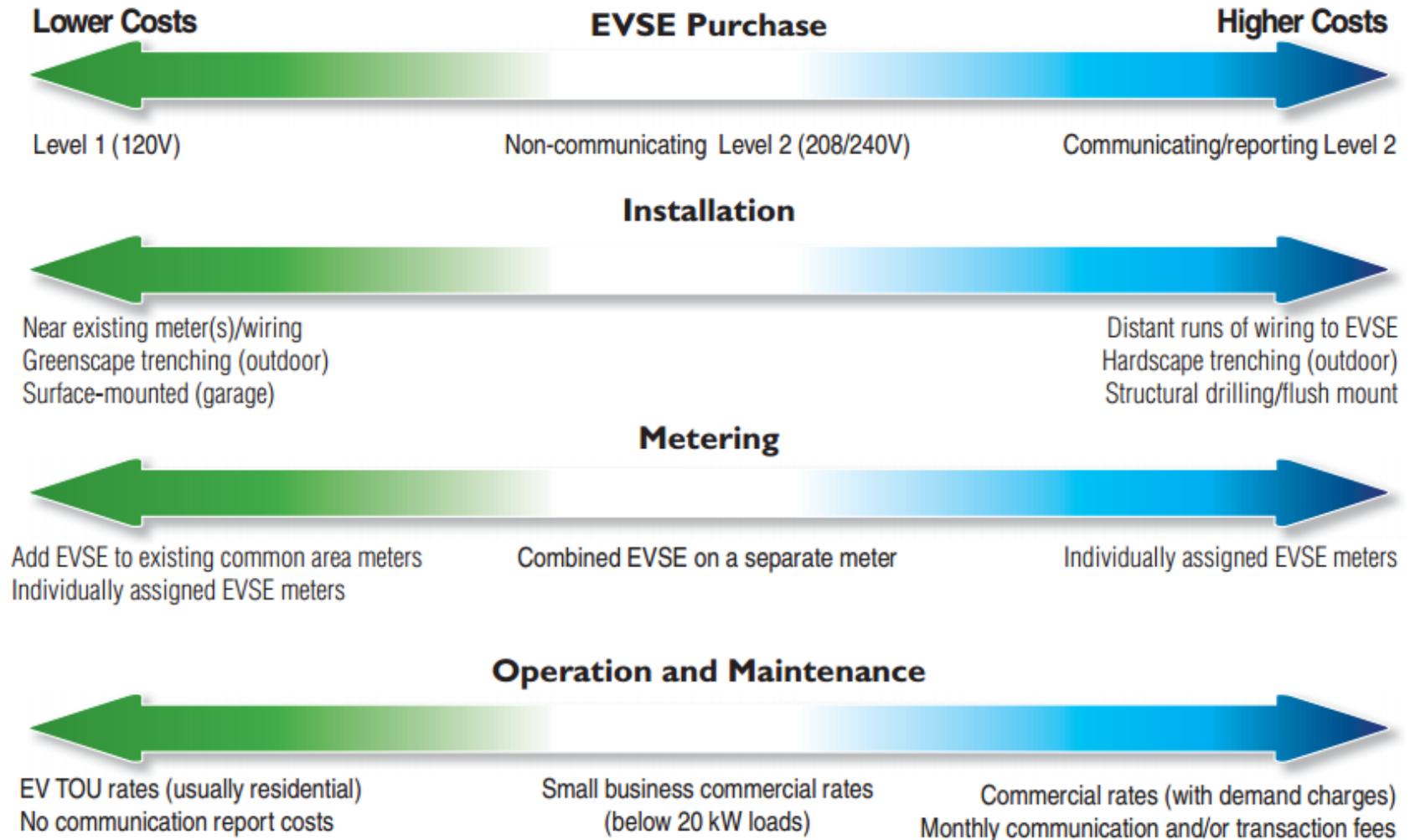


How quickly will it charge?

Type of Charging	Power Levels (installed circuit rating)	Miles of Range per Hour of Charging*
AC Level 1	110/120VAC at 15 or 20 Amps	~4-6 miles/hr.
AC Level 2		
3.3 kW (low)	208/240VAC at 30 Amps	8-12 miles/hr.
6.6 kW (medium)	208/240VAC at 40 Amps	16-24 miles/hr.
9.6 kW (high)	208/240VAC at 50 Amps	32-48 miles/hr.
19.2 kW (highest)	208/240VAC at 100 Amps	> 60 miles/hr.

* Refer to vehicle specifications for exact ratings.

How Much Does it Cost?



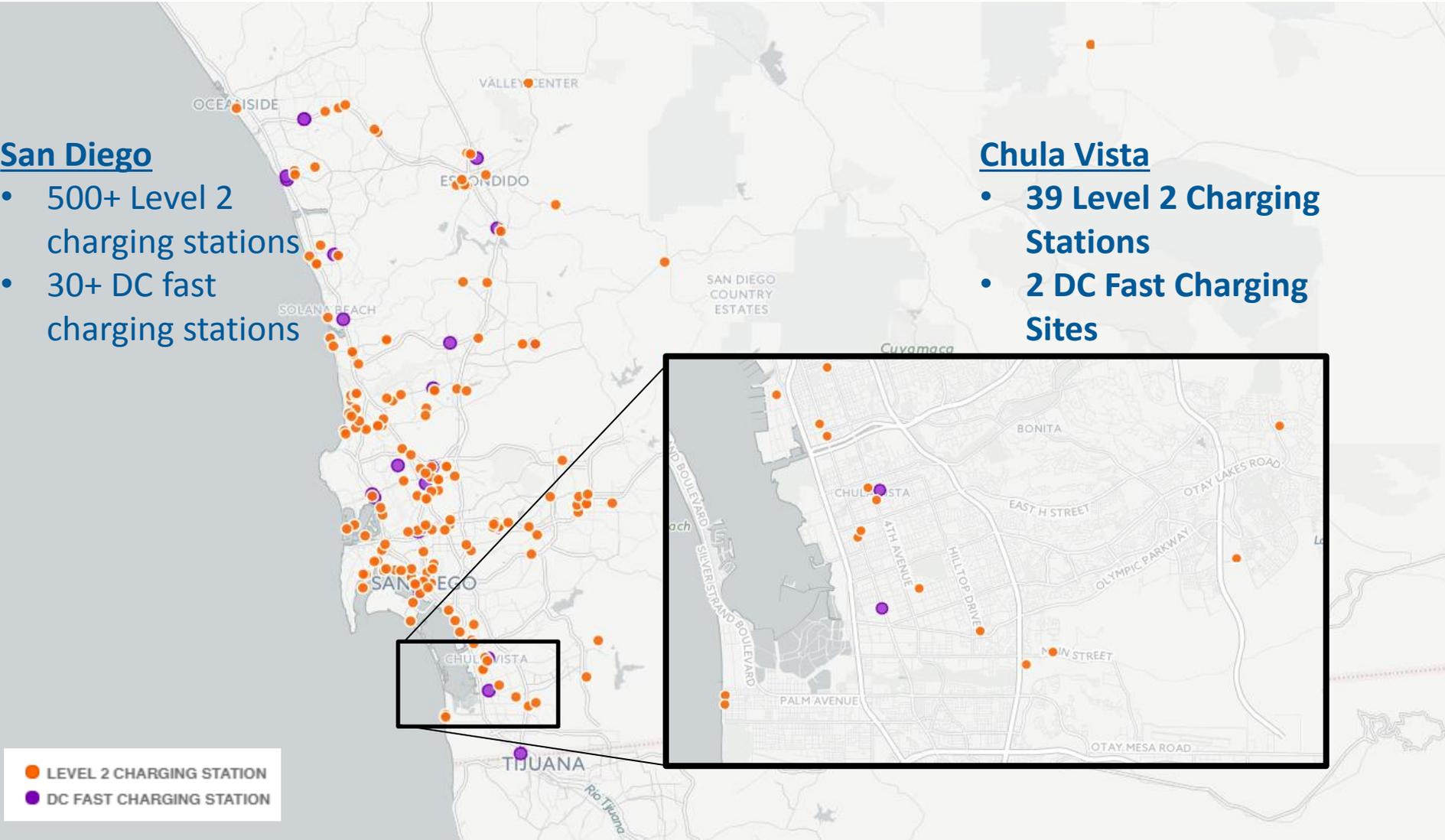
Where Charging is Located

San Diego

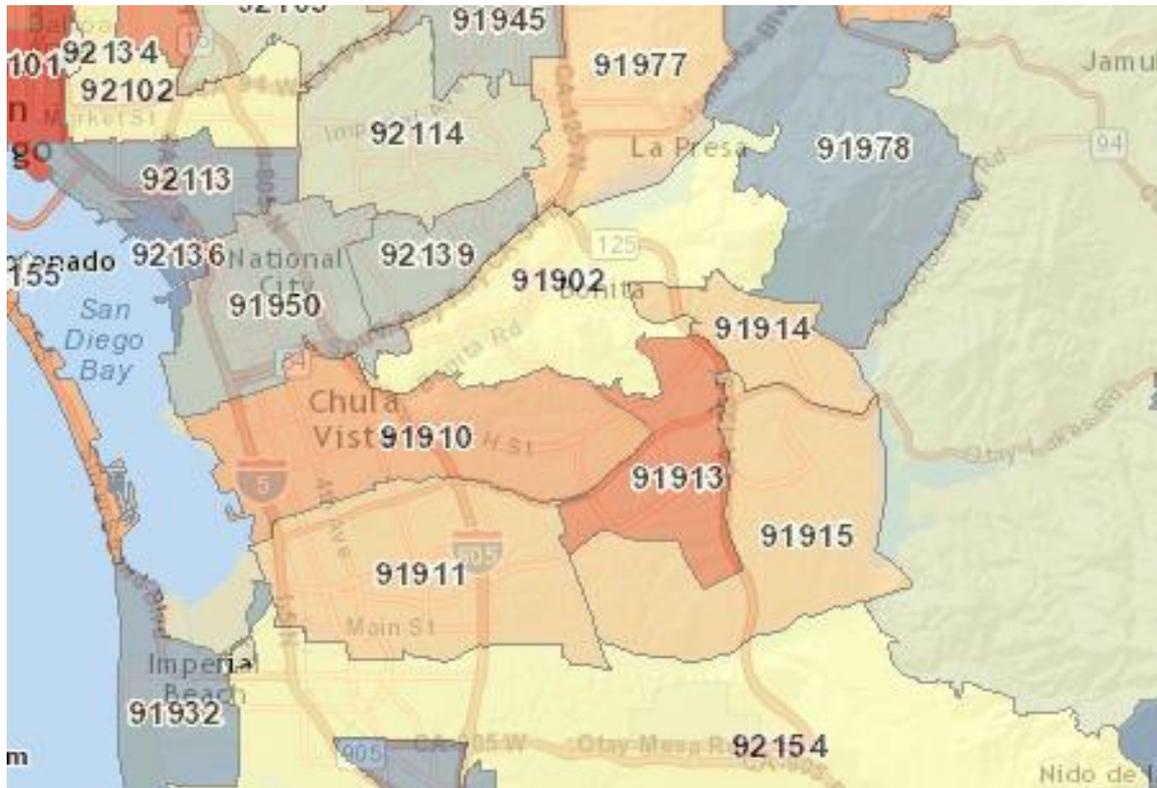
- 500+ Level 2 charging stations
- 30+ DC fast charging stations

Chula Vista

- 39 Level 2 Charging Stations
- 2 DC Fast Charging Sites



Number of PEVs in Chula Vista



Over 430 PEVs
in Chula Vista
(approx.)

A close-up photograph of a person's hand plugging a charging cable into the port of a white electric vehicle. The scene is set outdoors at sunset, with a bright sun in the upper right corner creating a lens flare effect. The background is slightly blurred, showing a city street with buildings and a bicycle. A semi-transparent white banner is overlaid across the middle of the image, containing the title text.

South Bay EV Readiness/Permitting

EV Readiness in South Bay

- Project
 - CivicSpark
 - City of Chula Vista
 - City of National City
- SD PEV Readiness Plan
 - Regional Electric Vehicle Infrastructure Group
- EVSE Permit Guide



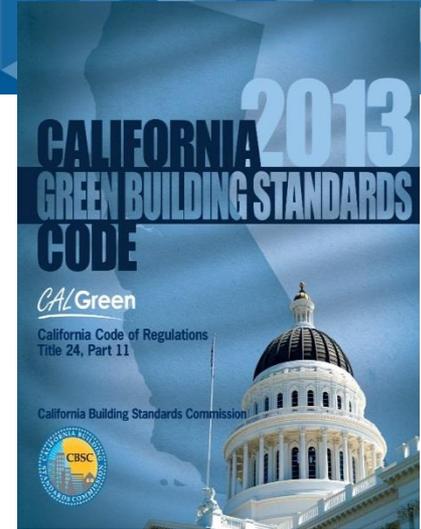
EVSE Permit Guideline



- **Introduction**
 - Where permitting is handled
- **Forms to complete**
 - Residential: Utility Permit Worksheet, Commercial: Tenant Improvement Worksheet
- **Plan check fees**
 - Residential, Commercial, Electric Service upgrade
- **Required information**
 - Title/Plot Plan, Service Load Calculation, Cut Sheet, Single Line Drawing
- **Inspection**
 - Online set up
- **Considerations**
 - Accessibility, Electric Service Upgrade, SDG&E Rates
- **Resources**
 - Installation and maintenance, service load calculation, accessibility guidelines, etc.

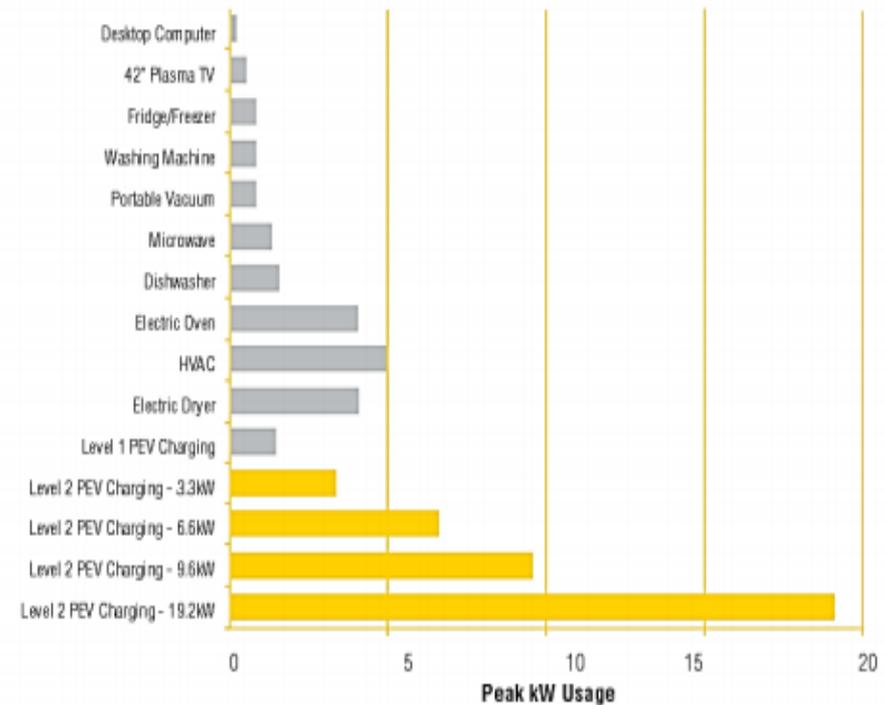
Required Information on Plans

- Title/ Plot Plan
 - General layout of lot with parking spaces and proposed location of EVSE parking space(s)
- Service Load Calculation
 - Estimates if existing electrical service will handle the extra load from EVSE
- Cut Sheet
 - EVSE manufacturer's installation instructions
- Single Line Drawing
 - System, point of connection to the power supply and the EVSE, conduit wire size to the EVSE, the circuit at the power supply, the trench detail, and the circuit of the subpanel for the EVSE



Considerations

- ADA compliance
 - Resources
 - Governor's OPR
 - City of San Diego
 - PEV Collaborative
- Source of power
 - Indicate in Single Line Drawing
- Electricity panels
 - CSE's San Diego Regional Electric Vehicle Infrastructure Working Group PEV Resources



Source: San Diego Gas & Electric



Installation Process & Case Studies

Steps to Installation at a Public Space

1. Property Owner wants to install EV Charging Stations
2. Property Owner procures funding for equipment and installation
3. Property Owner discusses with nearby business owners for buy-in
4. Property Owner researches electric vehicle service providers and equipment
5. Electrical contractor inspects the property (electrical service panel, building codes, etc.)
6. Property Owner consults with utility for rates, grid integration, etc.
7. Site Plan is developed
8. Installation is conducted



Who Owns the Charging Station: Public

Site Host

- Site host varies based on location. Could be a property manager, workplace, public agency, etc.
- Owns and operates the charging station for the benefit of the public to use

Turnkey Operation

- Third-party charging station company owns and operates the equipment on behalf of the site host



Case Study – Broadway Plaza (in Chula Vista)

- 1 Level 2 charging stations
- 2 DC Fast Charge ports
- NRG eVgo membership required to use stations

Process

Broadway Plaza wanted to host charging stations for its visitors



The Plaza did not want to own, operate, and maintain charging stations



Partnered with NRG eVgo to install eVgo charging stations at the outlet



NRG eVgo handles all operations, maintenance, and billing for the charging stations



Steps to Installation at a Workplace

1. Employer wants to install charging stations
2. Surveys employees to determine how many drive EVs or will in the future
3. Consults with Property Manager (if space is leased/rented)
4. Electrical contractor inspects the property (electrical service panel, building codes, etc.)
5. Employer consults with utility for rates, grid integration, etc.
6. Researches electric vehicle service providers, equipment, etc.
7. Site Plan is developed
8. Installation is conducted
9. Charging Station Use Policy is developed (fee or free? How long can people stay on?)



Who Owns the Charging Station: Workplaces

Property Owner/Employer

- Owns and operates charging stations that are accessible to all employees, possibly to the public as well

Turnkey Operation

- Third-party charging station company owns and operates the equipment on behalf of the employer/property owner



Case Study – County of San Diego County Administration Center

4 Level 2 charging stations
2 DC Fast Charge ports
\$10 parking fee
\$0.30/kWh – Level 2
(\$1.50/hr after charging is complete)
\$0.50/kWh – DCFC
(\$10/hr after complete)



Process

County of San Diego wanted to provide charging stations to both the public and its employees



County had little funding and did not want to own, operate, or maintain charging stations



County would apply for funding from the California Energy Commission



Partners with ChargePoint to install charging stations at ten County locations. Charge Point will own, operate, and maintain stations in return for the rights to the parking space(s).

Steps to Installation at an Multi Unit Dwelling

1. Property Owner/HOA wants to install charging stations
2. Property Owner/HOA researches equipment needs and compares costs
3. Electrical contractor inspects the property (electrical service panel, building codes, etc.)
4. Property Owner/HOA selects electric vehicle service provider
5. Site plan is developed
6. Property Owner/HOA contacts utility
7. Installation is conducted



Who Owns the Charging Station: MUDs

Homeowners Association

- Owns and operates charging stations that are accessible to all MuD residents, or
- Owns and operates charging stations for certain residents' parking spaces

Residents

- Own and operate their own charging station for use in their parking spaces or private garages

Turnkey Operation

- Third-party charging station company owns and operates the equipment on behalf of the HOA and/or the residents



Case Study – City Front Terrace

320 residential units
417 parking spaces
2 EV drivers
1 Level 2 charger, 19 pre-wired Level 2 for the future



Process

HOA wanted to facilitate the installation of charging units in the building, but wanted residents to support the cost



HOA would install individual meters and provide enough electrical capacity.



Each resident requesting charging paid an equal portion of upfront capital for the project



Residents are required to buy their own charging unit and can pay their EV's electrical usage directly to SDG&E

Charging Networks

- There are several networks that provide public charging
- Usually requires membership to have access to a network's charging station
 - Sometimes you pay an extra fee to use a credit card on a charging station whose network you are not a part of
 - Similar to bank ATMs
- Fees for use vary
 - Pay per kWh
 - Pay per hour
 - Monthly membership fee



Things to Consider When Offering Chargers

- **Level of Access**
 - For public use or private use?
 - Preferential use for employees (if in a workplace setting)?
- **System Upgrades**
 - Electrical panel capacity
 - Integrate distributed generation
- **Payment Options**
 - \$/hour
 - \$/kWh
 - Flat monthly rate
 - Free



Funding For charging stations

- California Pollution Control Financing Authority
 - Low interest loan
 - Up to 15% rebate
- CA Energy Commission
 - Competitive grants
- SDG&E- 2016
 - MUD & Workplace
 - Under PUC Consideration

ZNE + EVs = ?

- EVs essential in meeting state energy and climate goals
 - Increasing deployment
- EVS add substantial load
 - Still determining how they will be counted in ZNE calculations
- EVs can provide grid services
 - Vehicle Grid Integration
 - Vehicle to grid

Questions?

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