APPENDIX

San Diego
PLUG-IN ELECTRIC VEHICLE (PEV) READINESS PLAN

SAN DIEGO REGIONAL PLUG-IN ELECTRIC VEHICLE (PEV) READINESS PLAN

APPENDIX B

Contents: Fact Sheets

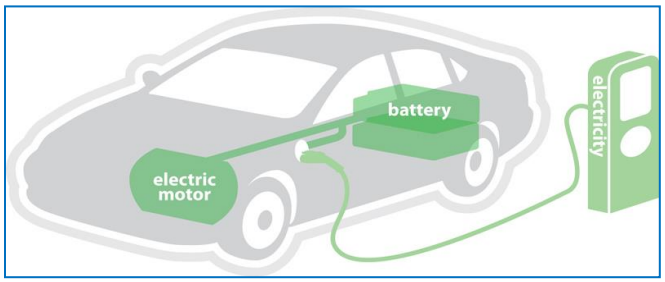
Plug-in Electric Vehicles & Charging: Getting Started

California is leading the nation in plug-in electric vehicle (PEV) adoption, and about 20% of PEVs in California are in the San Diego region. Interested in learning more about these new vehicles on our roads and highways? Here are some answers to your questions about the basics of PEVs, benefits of PEVs, charging options, and available incentives.

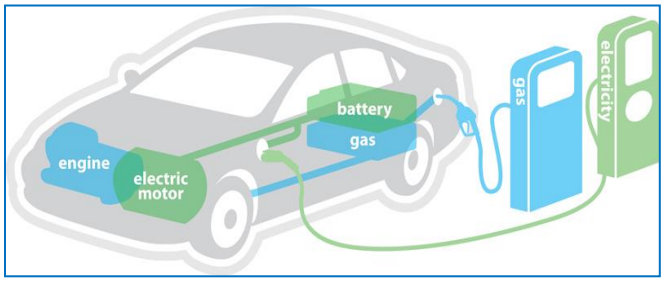
What is a plug-in electric vehicle?

A plug-in electric vehicle (PEV) is the generic term for cars that operate, fully or partially, on battery power and that are charged from the electricity grid. There are two main types of PEVs: battery electric vehicles and plug-in hybrid electric vehicles.

Battery Electric Vehicle (BEV) - Runs on electricity stored in batteries and has an electric motor rather than an internal combustion engine.



Plug-in Hybrid Electric Vehicle (PHEV) - Plugs into the grid and operates on electricity as well as an internal combustion engine.



What are all the options?

There are currently more than **16 different PEV models** on the market, offered by a variety of manufacturers. Check out an EV buying guide at http://www.driveclean.ca.gov.

How far can I drive?

Battery electric vehicles can generally go 60 – 120 miles on a full charge, which is plenty of range for most people (the average Californian travels less than 30 miles a day). If more range flexibility is needed, a plug-in hybrid might be a better choice. They can generally run on battery alone for 10 – 40 miles, and then continue for up to 400 miles as a gasoline-electric hybrid.

Why should I drive a PEV?

- Help to reduce emissions and improve air quality
- Lower fueling costs
  - ✓ Save money and charge your vehicle overnight with SDG&E's time-of-use rates. Learn more at http://www.sdge.com/evrates.
- Lower maintenance costs
  - ✓ No more oil changes, fewer tune-ups

How do I charge?

Most PEV drivers will do the majority of their charging at home, but the availability of public charging stations is growing. Public stations offer drivers more charging options. A list of public charging locations can be found at http://www.afdc.energy.gov/afdc/locator/stations.

How long does it take to charge?

Charging times depend on three primary factors: the size of the battery, the onboard vehicle charger, and the type of charging equipment. The onboard charger is located in the vehicle and determines the amount of power that can enter the vehicle from the grid. Generally, BEVs have a larger battery compared to PHEVs. Three types of charging equipment are described in the table below:

Type of Charger	Miles of Range for 1 hour of charge	Where to charge?
Level 1 (120 volt)	3 to 4	Standard three-pronged outlet
Level 2 (240 volt)	8 to 20	At-home or public charging station
DC Fast Charger	50 to 60	Few public DC Fast Chargers

Are there incentives for buying or leasing a PEV?

For a limited time, rebates and tax breaks are available for PEV purchasers and lessees. Incentives include a state rebate of up to **$2,500**, a federal tax credit of up to **$7,500**, and HOV lane access.

- Find incentives available in your area at http://driveclean.ca.gov/pev/Incentives.php.

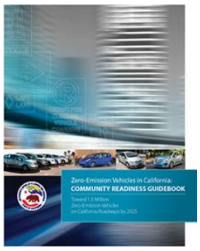
Tax credits are also available for charging stations and allow consumers to claim up to 30% of the cost of hardware and installation, find out more at http://www.afdc.energy.gov/laws/law/US/10513.

Plug-in Electric Vehicles

Resources for Public Agencies in San Diego

Plug-in electric vehicles (PEVs) are becoming more common, and local permitting agencies should be prepared for the growing PEV market and understand how PEVs can help agencies' achieve climate and sustainability goals. This fact sheet was developed by the San Diego Regional Electric Vehicle Infrastructure[1] (REVI) working group and offers San Diego's public agencies resources and technical training information as they become PEV ready.

Zero-Emission Vehicle (ZEV) Community Readiness Guidebook



The Office of Planning and Research's (OPR) *Zero-Emission Vehicles in California: Community Readiness Guidebook* contains vital information to help communities across the state make the switch to zero-emission vehicles. Full text available at: http://opr.ca.gov/docs/ZEV_Guidebook.pdf.

Did you know?

- The San Diego region represents more than 20% of the California PEV sales market.
- Roughly 1 of every 35 new cars bought or leased in California during Q1 of 2013 was a PEV.

Building Support - *engineers, plan checkers, project managers and building officials*

Permitting

Electric vehicle charging systems are relatively new to permitting departments and are often permitted through existing processes and permits. The Cities of Oceanside and San Diego have developed guidance documents to aid with the permitting, installation, and inspection processes.

- City of Oceanside *Residential Electric Vehicle Charger Guidelines* http://www.ci.oceanside.ca.us/civica/filebank/blobdload.asp?BlobID=30053
- City of San Diego *Information Bulletin 187: How to Obtain a Permit for Electric Vehicle Charging Systems* http://www.sandiego.gov/development-services/pdf/industry/infobulletin/ib187.pdf
- The PEV Collaborative has developed *Streamlining the Permitting and Inspection Process for Plug-in Electric Vehicle Home Charger Installations*, which includes statewide codes and standards, recommended permitting fees, and background information on EVSE hardware. http://www.evcollaborative.org/sites/all/themes/pev/files/PEV_Permitting_120827.pdf
- Department of Energy's Alternative Fuels Data Center EVSE permitting template for jurisdictions http://www.afdc.energy.gov/pdfs/EV_charging_template.pdf

Regional Permit Fees

From mid-2011 to early 2013, the EV Project[2] reported that the median cost for permitting a residential EVSE installation was $226. Permitting fees vary by jurisdiction, so it is a good idea to contact the permitting agency for specific fees.

Building & Electrical Codes

The National Electrical Contractors Association provides a common set of electric vehicle terminology and code in the presentation linked below[3]. Pacific Gas & Electric offers a condensed version of code requirements for EVSE installations, from disability requirements to PEV signage, at http://www.pge.com/includes/docs/pdfs/shared/environment/pge/cleanair/ev5pt3.pdf.

[1] http://energycenter.org/programs/pev-planning/san-diego
[2] San Diego REVI meeting, *The EV Project: Initial Findings On Charging Behavior,* April 18, 2013. http://www.theevproject.com/
[3] http://iaei-western.org/Files/2011/Programs/NECA%20EVSE%20Presentation%20NECA%20SD%202011%20Western%20IAEI%20Section.pdf

Planning Department Staff - *planners*

Addressing Accessibility for PEV Chargers

Assuring charging systems are accessible to all drivers is critical for public adoption. The OPR, in conjunction with the Department of the State Architect, is developing a guidance document to help public agencies standardize accessibility opportunities for PEV charging. To view or download copies of the draft guidelines, visit http://opr.ca.gov/docs/PEV_Access_Guidelines.pdf.

The City of San Diego has developed a comprehensive technical policy guide addressing accessibility and PEV parking at https://www.sandiego.gov/development-services/pdf/industry/tpolicy11b1.pdf.

Parking Guidelines

The California Green Building Standards Code (CALGreen) includes standard statewide Residential and Non-Residential Voluntary Measures for PEV and EVSE listed in Appendix 5A of CALGreen: http://www.documents.dgs.ca.gov/bsc/CALGreen/2010_CA_Green_Bldg.pdf

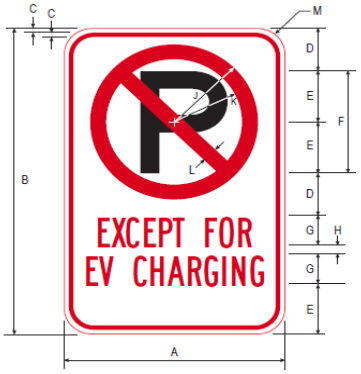
CALGreen Code Sections for PEV and EVSE:

- *A5.106.5.1* **Designated parking for fuel-efficient vehicles**
- *A5.106.5.3.1* **Electric vehicle supply wiring**
- *A5.106.6* **Parking capacity**

Parking Enforcement

The City of Santa Monica has adopted an electric vehicle parking ordinance. This ordinance offers an example for other local agencies interested in incorporating and enforcing PEV parking into existing policy documents.

- *3.12.835* **Electric vehicle parking** (adopted at Santa Monica City Council Meeting 07/24/2012)[4]

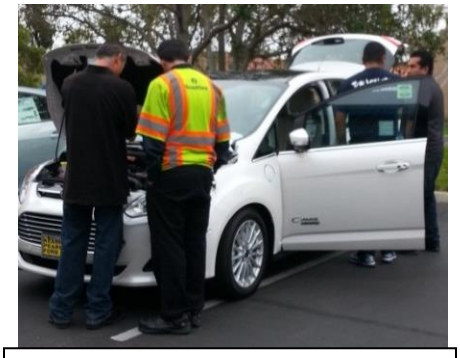


The California Department of Motor Vehicles has codified electric vehicle parking enforcement with Vehicle Code (VC) Section 22511 *Off-Street Parking: Electric Vehicle,* a standard template available for use by local jurisdictions.[6]

PEV Signage

The California Manual on Uniform Traffic Control Devices has released a statewide traffic operations policy directive on zero-emission vehicle signs and pavement markings standardizing signs and markings for PEV charging stations and parking stalls.[5]

Safety Training for First Responders



The ATTE program trained SANDAG's Freeway Service Patrol (FSP) drivers.

Firefighters, police officers and other first responders encounter PEVs when responding to incidents. For their safety and the safety of the public, it is essential that they receive PEV training.

National Alternative Fuels Training Consortium – First responder safety training
http://afvsafetytraining.com
National Fire Protection Association – Online first responder safety training
http://www.evsafetytraining.org/training.aspx
Miramar College: Advanced Transportation Technology and Energy Program (ATTE) - Technical education, training and resources
http://www.attemiramar.com/
First Responder Guides for Tesla Vehicles
http://www.teslamotors.com/firstresponders

[4] http://www.smgov.net/departments/council/agendas/2012/20120724/s2012072407-A-1.htm
[5] http://www.dot.ca.gov/hq/traffops/signtech/signdel/policy/13-01.pdf
[6] http://www.dmv.ca.gov/pubs/vctop/d11/vc22511.htm

Plug-in Electric Vehicles

Regional Planning for Public Charging in San Diego

As plug-in electric vehicle (PEV) adoption increases in San Diego region, local and regional governments and public agencies need to develop land use policies and transportation plans that integrate electric vehicle supply equipment (EVSE) into the infrastructure network. Supporting PEVs helps advance local government and public agency efforts to achieve goals for greenhouse gas emission reduction while cutting their fuel use and costs.

Why plan at all?

- Near-term needs
  - Identify method to best site PEV chargers
  - Use visual tools through GIS mapping
  - Plan for 1,500 publicly accessible chargers
- Long-term goals
  - Select public sites with the most regional benefit
  - Reduce driver range anxiety
  - Develop interregional network
  - Enhance future siting capabilities

What is the EV Project?

- ECOtality received $230M funding from Dept. of Energy and partner matches
- Deploying chargers in major cities and metropolitan areas across the U.S.
- Collecting and analyzing data to evaluate EVSE infrastructure
- Identifying lessons learned and establishing streamlined deployment strategies

What's been done?

San Diego EV Project Stakeholder Advisory Committee (ESAC)

- Participants: Local governments and public agencies, nonprofits, universities, utilities and private businesses
- Purpose: Provide input to ECOtality on the local context, history and motivation for EV adoption. Determine and rate factors to be used in siting Level 2 and DC fast charging (DCFC) EVSE.
  1. Characteristics of optimal Level 2 EVSE locations:
     - High number of users
     - High frequency of vehicle turnover (stay times of 45 minutes to 3 hours)
     - Significant availability (maximize hours and days of operation)
  2. Characteristics of optimal DCFC locations:
     - High number of users
     - Very high frequency of vehicle turnover (stay times of 5 to 30 minutes)
     - Significant availability
  3. All locations assessed against the land use suitability factor
  4. Weighted factors applied to the master geographic reference areas (MGRAs) and normalized to provide a score for each MGRA
  5. MGRAs mapped and focus placed on the highest scoring areas to identify potential locations for Level 2 EVSE – 3,333 MGRAs were targeted[1]

DC Fasting Chargers on Transportation Corridors

The ESAC provided additional guidance on DCFC along transportation corridors and determined that the following specifications should be documented and taken into account in site selections:

- Major transportation corridors are defined as freeways and highways
  1. Interstate Freeways 5, 8, 15 and 805
  2. State Highways 52, 54, 56, 67, 78, 125, 163 and 905
- Approximately half of the transportation corridor DCFCs should be located at very high volume designed interchanges, with the remaining at slightly lower volume designed interchanges
- Consider characteristics of the host site use that match the typical charge times of 5 minutes to 25 minutes, such as a coffee shop, convenience store or other such businesses
- Spacing of DCFC should consider the potential of additional travel distance (up to 80 miles in 30 minutes)

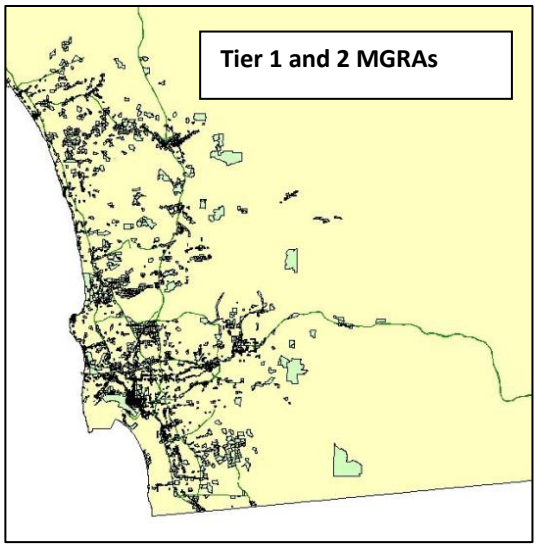
- DCFC spacing should include locations on the periphery of the San Diego EV Project boundary. In addition, DCFCs should be deployed 30–50 miles beyond the boundary along the same transportation corridors.

EV Project Installations

- Installations[1]
  - April 2011–May 2013: 435 nonresidential AC Level 2 EVSE units including 321 publicly accessible at 121 sites and 114 workplace/fleet EVSE units at 39 sites; 4 DCFC units in the region
- Installations vs Plan[1]
  - Analysis done for 3,333 units within ¼ mile (walking) of the highest scoring MGRAs
  - Several charging units were placed within ¼ mile of more than one MGRA
    - 1,138 (34%) MGRAs served by a deployed publicly accessible EVSE
    - 10 units installed in areas outside a targeted MGRA (not within ¼ mile).
    - 3 units installed far from the nearest MGRA, serving as a means to extend trips.

EV Project Conclusions to Date[2]

- Charge events per public EVSE continue to increase
- 74% of all charging events are residential
- 27% of all public charging events are from Car2Go
- 19% of all electricity consumed is from publically accessible Level 2 and DC fast charge events



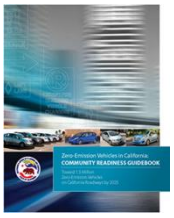
What's next?

The EV Project was integral in establishing the region's EVSE infrastructure, however, a number of barriers still challenge the deployment of a complete regional EVSE network, including

- Challenges to implementation?
- Education
- Incentives/rebates — money
- Clear legislative and regulatory direction
- Better integration into local policies and activities
- More cohesive infrastructure network — connectivity between regions

We can work to overcome these obstacles by

- Further incorporating EVSE infrastructure into planning and development policies
- Considering PEVs in project design and as standard conditions of approval
- Continuing to coordinate with local, regional and neighboring communities/agencies/jurisdictions to link EVSE infrastructure networks
- Informing state agencies about regional challenges, concerns, considerations and impacts from policy and regulatory developments
- Getting the word out and continuing to educate leadership, community leaders and the public



Zero-Emission Vehicle (ZEV) Community Readiness Guidebook

The Office of Planning and Research has information about identifying PEV infrastructure needs in communities in its document, *Zero-Emission Vehicles in California: Community Readiness Guidebook*, found at: http://opr.ca.gov/docs/ZEV_Guidebook.pdf.

[1]The EV Project: *Lessons Learned – The EV MICRO-CLIMATE Deployment Process in San Diego*
www.theevproject.com/cms-assets/documents/112390-451046.mcproc-sd.pdf
[2]The EV Project: *Q2 2013 Quarterly Report*
www.theevproject.com/cms-assets/documents/127233-901153.q2-2013-rpt.pdf

Plug-in Electric Vehicles

Resources for Fleet Managers in San Diego

Plug-in electric vehicles (PEVs) offer government fleet managers opportunities to decrease fuel and operating costs while supporting goals mandated by local, state and feral policies to significantly reduce greenhouse gas (GHG) emissions.

PEVs in Local Public Agency Fleets

Cleaner fleets can play a sizeable role in meeting local and state GHG emissions reductions goals. Local agency fleets that have successfully adopted PEVs include:

- Port of San Diego: http://www.portofsandiego.org/environment/1520-nissan-electric-car-debuts-in-san-diego.html
- University of California, San Diego: http://sustainability.ucsd.edu/initiatives/transportation-alternatives.html

Benefits of PEVs

Reduced petroleum use, GHG emissions and operating costs

Government incentives

Reduced dependence on imported oil

PEVs in Private Fleets

Integrating clean vehicles in private fleets can help companies achieve their sustainability goals. Private fleets that have deployed PEVs in the San Diego region include:

- Frito-Lay: http://www.fritolay.com/about-us/press-release-20120810.html
- FedEx: http://news.van.fedex.com/fedex-expands-hybrid-electric-fleet-50-percent-groundbreaking-conversion-program
- car2go: https://www.car2go.com/en/sandiego/

Vehicle Incentives and Rebates

- Local governments and public agencies can take advantage of PEV rebates offered by the Clean Vehicle Rebate Project for up to 20 vehicles per year.[1]
- The California Hybrid Truck and Bus Voucher Incentive Program is available to public entities purchasing a hybrid or electric truck or bus. Find out more at http://www.californiahvip.org/.
- The Goods Movement Emissions Reduction Program Proposition 1B provides funding for California truck owners to replace their old vehicles with newer, cleaner equipment.[2]

Choosing the Right PEV

Choosing the right PEV for your fleet requires a thorough understanding of current vehicle use.

- Fleet data logs can help determine which fleet vehicles can be replaced by PEVs.
- Fleet vehicles that travel fewer than 100 miles per day can be replaced with battery electric vehicles (BEVs-100% electric).
- Fleet vehicles that need extended range can be replaced with plug-in hybrid electric vehicles (PHEVs).
- The Department of Energy maintains a website of currently available PEVs at http://www.afdc.energy.gov/vehicles/electric_availability.html.

Charging PEVs at a Fleet Facility

An important consideration when planning for PEVs is the need for charging equipment, known as electric vehicle supply equipment (EVSE). San Diego Gas & Electric (SDG&E) can help plan for fleet charging. Learn more at http://www.sdge.com/clean-energy/business/fleet.

- SDG&E will help fleet managers understand their historic electricity use (demand and timing) to determine the most cost-effective plan for charging. Commercial customers will receive information on their facility's electrical capacity for charging.

[1] https://energycenter.org/programs/clean-vehicle-rebate-project

[2] San Diego fleet managers can keep up to date with funding for this program by visiting http://www.sdapcd.org/homepage/grants/grants.html.

- Fleet managers must determine the number, location and types of EVSE for their PEVs. The different levels of charging (Level 1: 120-volt, Level 2: 240-volt) offer different charging speeds and have different up-front and operating costs.
- Placing charging infrastructure near electrical utility equipment can reduce installation costs.

Considerations for Fleet Managers

- Collect drive cycle data to understand fleet needs and which PEV would best meet those needs.
- Determine which fleet vehicles are optimal for replacement by PEVs.
- Consider future PEV fleet size and EVSE siting/needs when installing charging infrastructure.
- Inform drivers on ways to maximize fuel efficiency/battery life (reduce speeding, use of GPS route planning).
- Offer test drive opportunities to staff members and fleet drivers to promote and exhibit new technology.
- Share successful experiences with electric fleets and infrastructure installation among other regional fleet managers.
- Take into account the capital required for EV charging equipment and installation when planning for a new electric fleet.

Resources

California Energy Commission: Resources for fleet managers interested in upgrading to a clean vehicle fleet can be found at http://www.energy.ca.gov/drive/upgrade/fleets.html.

California Air Resources Board: Resources for incentives, grants, and funding for fleet managers interested in greening their fleet can be found at http://www.driveclean.ca.gov/pev/Resources_For_Fleets.php.

Department of Energy Clean Cities: A Plug-In Electric Vehicle Handbook for Fleet Managers is available online at http://www.afdc.energy.gov/pdfs/pev_handbook.pdf

Idaho National Laboratory Report: A brief report comparing energy costs per mile for electric and gasoline-fueled vehicles by the Idaho National Laboratory is found at http://avt.inel.gov/pdf/fsev/costs.pdf.

Department of Energy: The DOE's tool, eGallon, calculates fuel savings by using electricity instead of gasoline at http://energy.gov/articles/egallon-how-much-cheaper-it-drive-electricity.

Plug-in Electric Vehicles

Charging at Condos, Apartments and Community Living Areas

By 2050, half of the San Diego region's population is expected to be living in multi-unit dwellings (MUDs). When it comes to accommodating EV chargers, each MUD has its own unique set of circumstances and challenges to address. Below are some of the most common challenges and ways that local apartment buildings, homeowner associations (HOAs) and condos have addressed them. This document is designed to be used in conjunction with SDG&E's fact sheet on installing PEV charging stations in multi-unit dwellings titled, *Prepping Multi-Units for Plug-in Vehicles*.

Reaching Out to Building Management or HOA

Since EV chargers will likely be installed in common areas, it is important to engage the building management or HOA early in the process. Identify any existing rules in the covenants, conditions and restrictions (CC&Rs) that could affect the installation of charging stations. It is best to be prepared and aware of any potential hurdles or opportunities by doing the research before approaching building management.

Tips for approaching building management about EV Charging

- Talk to other residents about their interest in EV charging and build a coalition of support
- Look for incentives for chargers available in your area: http://www.driveclean.ca.gov/pev/Incentives.php
- Review the parking layout in relation to electrical supply and propose possible arrangements
- Contact SDG&E to help determine necessary

Determining Demand for EV Charger Installations

Survey residents to gauge their interest in purchasing a plug-in electric vehicle (PEV). This survey will help determine the number of charging units and/or amount of conduit to install and in what layout(s). Identify demand for Level 1 versus Level 2 charging. Planning ahead by installing extra capacity for future charging units can save on costs down the road.

The PEV Collaborative has developed a sample survey for MUD residents. Both print and electronic survey options are available at http://www.driveclean.ca.gov/pev/Charging/Home_Charging/Multi-unit_Dwellings.php#survey

Allocating Costs

It is important to establish how EV charger installation, operations, maintenance, insurance and electricity bills will be paid. How costs are allocated will depend on how the chargers are installed. Potential options include:

- **Chargers in assigned spots:** Individual meters installed for each charging station and resident covers the actual charger cost, billing, insurance and maintenance of the unit. Installation costs for the meters, panel upgrades and conduit can either be covered by management, the resident or shared.

- **Common area chargers for residents only:** Building management installs electric vehicle supply equipment (EVSE) in common area and recoups costs from residents through a billing system in the charger.

- **Common area chargers for residents and general public:** Building management installs EVSE in public common area and recoups costs from residents and public through a billing system in the charger.

Siting EV Chargers

Identify the location and type of electric metering and wiring in the parking area. Determine if existing supply is adequate or if a meter/panel upgrade is needed. If an upgrade is required, consider the capacity needed to accommodate additional PEV chargers in the future. Contact the building/planning department to discuss any permits or requirements that should be considered when siting chargers.

Power supply for EV chargers

- The closer the EVSE is to the power supply, the lower the installation costs will be.
- Installation costs will increase if a panel upgrade or meter installation is necessary. The power supply needs for Level 1 and Level 2 EVSE are as follows:
    - **Level 1:** Dedicated branch circuit with NEMA 5-15R or 5-20R receptacle
    - **Level 2:** Dedicated branch circuit hardwired to a permanently mounted EVSE with 240VAC/single phase, 4-wire

Assigned vs. unassigned parking spaces

Consider which assigned and unassigned parking spaces could accommodate PEV charging equipment. Key factors include:

- Proximity to electric meter; can avoid costly trenching through concrete. Soft landscapes or locations near the electric meter are preferred.
- Location for charging stations and bollards (short vertical post) to ensure EVSE cord does not present a tripping hazard

Accessibility to EV Chargers

See the City of San Diego EVSE accessibility guidelines for sample EVSE configurations: http://www.sandiego.gov/development-services/industry/pdf/tpolicy11b1.pdf

Policy Considerations

Legislation has been adopted in California to reduce barriers to the installation of EVSE in multi-unit dwellings. SB 880 prohibits common interest developments (e.g., condo/apartments) from restricting the installation of EVSE in a deeded/contracted parking space. If the charging unit is installed in a common area, the law does state that certain conditions can be imposed, including a $1 million home owner liability policy that names the HOA as an additional insured.

Resources for MUDs

San Diego Gas & Electric – http://www.sdge.com/clean-energy/residential/apartments-and-condos

SDG&E Quarterly MUD Vehicle Charging Workshops – http://www.seminars.sdge.com

Plug-in Electric Vehicle Resources Center –
http://www.driveclean.ca.gov/pev/Charging/Home_Charging/Multi-unit_Dwellings.php

eVgo for Multi-Family Buildings – http://www.evgonetwork.com/own-or-manage-multi-family-communities

PEV Collaborative's *Plug-in Electric Vehicle Charging Infrastructure Guidelines for Multi-unit Dwellings* –
http://www.pevcollaborative.org/sites/all/themes/pev/files/MUD_Guidelines4web.pdf

The Office of Planning and Research's *Zero-Emission Vehicles in California: Community Readiness Guidebook* –
http://opr.ca.gov/docs/ZEV_Guidebook.pdf

Plug-in Electric Vehicles

Workplace Charging for Businesses in San Diego

As the number of plug-in electric vehicle (PEV) owners grows, businesses can offer workplace charging to help employees meet their commuting needs. Making workplace charging available to employees allows them more environmentally-friendly transportation options, demonstrates commitment to the community, helps attract and retain employees, and contributes toward green certifications.

Key Considerations for Workplace Charging

The sections below describe the following key considerations for businesses interested in installing EV charging:

- Does your business own or lease its facilities?
- What type of charging is needed?
- What are different ways to pay for charging?

What are other businesses saying?

A survey of local businesses with EV Chargers revealed the following:

Why did your company decide to invest in chargers?

- Achieve goals in company's sustainability plan
- Provide additional service to customers

What benefits do you see from investing in chargers?

- Positive impact and association with the company brand
- Increased visitation
- Employee attraction and retention

Survey conducted by CCSE in 2012 of institutions in San Diego County that have installed public and workplace EVSE.

Does your business own or lease its facilities?

Building Owners

Employers that own their facility and parking area encounter fewer challenges when developing a plan for vehicle charging.

✓ Engage key stakeholders in the process, including PEV drivers, operations supervisors, building/facility manager, facility technicians, and legal counsel

Building Tenants

Employers that do not own their facility will likely be required to obtain an agreement from the building or property owner.

✓ If an agreement cannot be reached with the owner, look to partner with a neighboring parking lot owner or another business to develop a cooperative PEV charging program

What type of charging is needed?

Employers should determine the appropriate charging levels based on the electrical capacity available at their facility.

- ✓ Vehicles generally park at the workplace for 8-9 hours, which makes Level 1 charging an easy and cost-effective option
- ✓ Consider a hybrid approach with Level 1 serving the needs of most employees, and one or two charge-per-use Level 2 chargers available for those who need a quicker charge
- ✓ Installing in proximity to existing electric utility equipment is cheaper than adding new circuits and conduit that can increase capital costs significantly
- ✓ Incorporate PEV charging in future infrastructure plans and development

Levels of Charging

Level 1 – 120 volt
(standard household outlet)

Level 2 – 240 volt
(large home appliances)

Who will pay for the charging?

Employers can choose to cover electricity costs and allow employees to charge their vehicles for free, or an employer may want to recoup some or all of the electricity costs by requiring employees to pay for their charging.

Option 1: Free to employees
Many businesses offer PEV workplace charging for free to their employees. Here are some reasons why:

- ✓ It offers an incentive to employees to support PEV adoption
- ✓ It simplifies the employee charging policy and reduces administrative time and expense
- ✓ Free charging could be considered a reportable employee benefit

However, there are some risks with offering free charging:

- ✓ Businesses could incur demand charges that become prohibitively expensive with greater PEV adoption
- ✓ May create workplace friction among non-PEV owning employees not receiving reimbursement for gasoline costs
- ✓ Employees with home charging may choose to charge exclusively at work

Option 2: Employees pay for charging
Billing employees for PEV charging can help recuperate capital and operational costs over time. Some considerations:

- ✓ Bill for exact usage (kWh), which may require more expensive equipment
- ✓ Set up a monthly/yearly subscription rate based on estimated usage
- ✓ Employ a third-party administered turn-key model that fully covers installation, maintenance, operation, and employee billing

Resources

SDG&E: San Diego Gas & Electric (SDG&E) helps employers through the process of choosing and installing EV charging at their business. They offer workplace charging seminars, assistance in evaluating billing impacts, and other helpful tips for businesses. Visit: http://www.sdge.com/clean-energy/business/employers-and-property-owners.

Employer EV Initiative: Read about best practices, case studies and more from employers across the state. Visit: http://www.evworkplace.org.

San Diego REVI: Find a Request for Proposal (RFP) template for public agencies or businesses interested in EVSE. Visit: http://energycenter.org/plug-in-and-get-ready.

eVgo: Local businesses can benefit from eVgo's Ready for Electric Vehicle (REV) Program for California office buildings and corporate complexes. They offer 100% free EV charging equipment and electricity reimbursement. Visit: http://www.eVgoNetwork.com.

***Zero-Emission Vehicles in California: Community Readiness Guidebook*:** This resource from the Office of Planning and Research offers useful information about workplace charging. Visit: http://opr.ca.gov/docs/ZEV_Guidebook.pdf.

Steps to Workplace Charging

1. Engage PEV owners, facility staff, managers, and legal council
2. Survey employee interest in workplace charging
3. Discuss findings and PEV charging needs among employees and company decision-makers
4. Conduct a site assessment with a contractor to determine ideal charging locations and costs
5. Contact SDG&E to determine the potential billing impacts of PEV charging
6. Examine different charger options and compare the benefits and costs (e.g. Level 1, Level 2)
7. Determine equipment ownership– building/parking lot owner, EVSE vendor or lessee
8. Establish company policies for employee access, define employee benefit and cost recovery
9. Explore existing incentives or rebates for workplace chargers
10. Select equipment, obtain multiple installation quotes
11. Present installation plan and budget to management for approval
12. Purchase equipment and hire a licensed electrical contractor for permitting, installation and inspection
13. City/county inspection of the charger installation
14. Install signage, alert employees
15. Publicize and share with the community

Adapted from the Calif. PEV Collaborative *Workplace Charging Installation Guideline*

Resources for Electrical Contractors in San Diego

San Diego accounts for more than 20% of total statewide plug-in electric vehicle (PEV) sales and has the largest all-electric vehicle car-sharing program in North America. With every PEV purchase, the need for charging infrastructure expands and the demand for local electrical contractors grows.

Electrical Vehicle Supply Equipment Training

The PEV industry and local governments want to ensure contractors are completing safe and reliable electric vehicle supply equipment (EVSE) installations for their customers and constituents.

The International Brotherhood of Electrical Workers, in conjunction with the National Electrical Contractors Association, offers statewide EVSE installation training courses. The Electric Vehicle Infrastructure Training Program (EVITP) is designed for and available to all electrical contractors addressing best practices for residential, commercial, public, and fleet installations.

EVITP training is offered at regional community colleges and electric training centers. For information and a list of EVITP training opportunities, visit http://www.evitp.org/training-programs or email *info@evitp.org*.

Training benefits to electrical contractors include:

- Learning new and emerging technologies
- Gaining competitive knowledge
- Qualifying to submit bids for RFQs and RFPs for EVSE installations
- Supporting California's goal to reach 1.5 million zero-emission vehicles on the road by 2025

Nearest EVITP training centers:

1. San Diego Electrical Training Trust
   www.positivelyelectric.org
   858-569-6633
   4675 Viewridge Ave.
   San Diego, CA 92123
2. Cuyamaca College
   http://www.cuyamaca.edu/
   619-660-4000
   900 Rancho San Diego Pkwy.
   El Cajon, CA 92019
3. Orange County Electrical JATC
   www.ocett.org
   714-245-9988
   717 South Lyon Street
   Santa Ana, CA 92705

Electric Vehicle Supply Equipment Options

There are numerous EVSE product manufacturers and retailers. Many EVSE products are safety tested and certified by Underwriters Laboratories (UL). For a complete list of currently approved EVSE, visit http://goelectricdrive.com/index.php/find-an-ev-charger.

Electrical Vehicle Supply Equipment Installation and Maintenance

Every EVSE installation is different. The following resources address EVSE safety as well as technical and consumer issues electrical contractors and inspectors may encounter.

Regulatory Compliance

The City of San Diego requires EVSE installations in public areas to be made accessible to persons with disabilities. The City of San Diego Technical Policy 11B-1 applies to the installation of EVSE in both new and existing construction. More information can be found at: https://www.sandiego.gov/development-services/pdf/industry/tpolicy11b1.pdf.

For installations outside the City of San Diego, contact the local permitting office for accessibility guidelines.

The Alternative Fuels Data Center (AFDC) lists California laws, state incentives, and regulations related to PEVs and other advanced vehicles, which is found at: http://www.afdc.energy.gov/laws/state_summary/CA.

Installation and Inspection
The EVSE installation process begins with a site assessment and identifying the EVSE.

The City of San Diego has developed an information bulletin that describes the permitting and inspection process for EVSE on an existing site or building, found here: http://www.sandiego.gov/development-services/pdf/industry/infobulletin/ib187.pdf.

Common EVSE installation steps are also included in Advanced Energy's document, Charging Station Installation Handbook for Electrical Contractors and Inspectors.[1]

Load Calculations
Load calculations are a required component of most electrical permit submittals. The National Electric Code (NEC) considers EVSE a continuous load. EVSE-specific information can be reviewed in NEC Article 625 by visiting http://www.advancedenergy.org/transportation/charging_station_forum.

The City of Oceanside has developed an EVSE load calculation worksheet and included it within the *Residential Electric Vehicle Charger Guidelines* (see *Residential Installations*).

Residential Installations
Most PEV charging takes place at home, overnight using Level 1 (120 volt) or Level 2 (240 volt) EVSE. EVSE is most often installed in a garage. EVSE installations for a single-family residence that can accommodate Level 2 EVSE is usually simple and straightforward. Installations may become more complex if an electrical service upgrade is required. Charging at multifamily developments offer additional considerations and often comes with higher cost estimates.

The cities of Oceanside and San Diego have developed guidance documents to help streamline the electric vehicle charger permitting process.

- City of Oceanside *Residential Electric Vehicle Charger Guidelines* http://www.ci.oceanside.ca.us/civica/filebank/blobdload.asp?BlobID=30053
- City of San Diego *Information Bulletin 187: How to Obtain a Permit for Electrical Vehicle Charging Systems* http://www.sandiego.gov/development-services/pdf/industry/infobulletin/ib187.pdf

Nonresidential Installations
Nonresidential EVSE locations include vehicle fleet facilities, workplaces, retail stores, parking lots, commercial garages, and other government-owned public spaces. The following sections in the EV *Project's San Diego EVSE Guidelines for public and commercial EVSE installations* provide more information about various installations[2]:

- Installation process for commercial fleet operations (p. 27)
- Installation flowchart for public charging (p. 34)

The Clean Cities Coalition *Electric Vehicle Handbook* includes detailed information on all of these topics and more at http://www.afdc.energy.gov/pdfs/51228.pdf.

[1] http://www.bc3sfbay.org/uploads/5/3/3/9/5339154/charging_handbook.pdf
[2] http://www.theevproject.com/downloads/documents/Electric%20Vehicle%20Charging%20Infrastructure%20Deployment%20Guidelines%20for%20the%20Greater%20San%20Diego%20Area%20Ver%203.2.pdf

Plug-in Electric Vehicles

Electric Vehicle Charging Station Installation Guidelines: Residential and Commercial Locations

Streamlining the Permitting and Inspection Process of Residential and Commercial Electric Vehicle Charging Station Installations[1]

Purpose

This guideline has been developed to streamline the permit and installation process of residential and commercial plug-in electric vehicle (PEV) charging stations, also known as Electric Vehicle Supply Equipment (EVSE). This guide can be used by jurisdictions as a template to provide clear information to homeowners and electrical contractors as to residential and commercial EVSE permitting requirements. Jurisdictions within the San Diego region are encouraged to use this document directly or modify it to reflect the specific requirements of their agency.

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

The type of PEV a person chooses to purchase may determine the way they charge their vehicle. A homeowner may plug their vehicle into a conventional 120-volt household outlet (three-pronged outlet) or install a 240-volt circuit for faster charging. PEVs come with a 120-volt charging cord that enables PEV owners to charge their PEV with a conventional 120-volt outlet. This is a very practical solution for owners of plug-in hybrid electric vehicles (PHEV), such as a Toyota Plug-in Prius or Chevrolet Volt.

Commercial Charging

Workplace Charging for Businesses in San Diego[2] offers guidance for the installation of EVSE at non-residential locations. It includes information about how to assess the charging needs and potential of a commercial site and relevant resources.

On the other hand, a person that purchases a battery electric vehicle (BEV) like a Nissan LEAF may choose to charge using a Level 2 charging station. Level 2 charging stations use 240 volts, which takes about half the time to charge compared with 120 volts. Level 2 charging generally requires the installation of a dedicated circuit and a charging station at your home (usually in the garage). In this case, the homeowner will be required to obtain a permit from their local jurisdiction.

The table illustrates the charging time associated with the most popular BEV and PHEV on the market.

Charging Level	Power Supply	Charger Power	Miles/Hour of Charge	Type of PEV	
				Nissan LEAF	Chevrolet Volt
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

Source: California PEV Collaborative

[1] Adapted from the City of Riverside's *ELECTRIC VEHICLE (EV) CHARGER INSTALLATION GUIDELINES* and the City of Oceanside's *Residential Electric Vehicle Charger Guidelines.*

[2] http://energycenter.org/sites/default/files/docs/nav/programs/pev-planning/san-diego/fact-sheets/Workplace%20Fact%20Sheet.pdf

What do I need to provide to the permitting jurisdiction in order to obtain a permit?

Residential EVSE Permits

The following are submittal requirements to obtain a permit for the installation of a typical residential EVSE.

Supporting Documentation	Description
Plot 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 (See sample load calculation attached).
Electrical Plans	Single line diagrams showing the system, point of connection to the power supply and the EVSE. (See sample electrical plan attached)
EVSE Information	The EVSE manufacturer's installation instructions and charger specifications.

(Note: Jurisdictions may need to modify this list to reflect their specific requirements)

In most cases, homeowners or contractors simply need to submit the documentation outlined above to the local permitting office (usually the building and safety division) for review and permit issuance. PEV owners and contractors are encouraged to check their local jurisdiction's permitting website to see if this process is available online. If not, they will likely need to visit the permitting office for an over-the-counter review and permit issuance.

If all of the information is provided and the proposal complies with the applicable codes, the review and approval process occurs shortly thereafter. It is important to note that load calculations per California Electrical Code, Article 220, are required if the existing service panel is rated less than 200 amps. Electrical panel upgrades and electrical wiring shall be in conformance with the current edition of the California Electrical Code (CEC).

Commercial EVSE Permits

Installation of EVSE at commercial locations can be more complex than residential installations and may require additional permits or submittal documentation. The following are some additional considerations for commercial EVSE installations:

- ✓ Zoning Requirements
- ✓ Community or Design Guidelines
- ✓ Existing Use Permits
- ✓ Electrical Source / Metering
- ✓ Parking and Signage Requirements
- ✓ Permit and Inspection Fees

A simple commercial EVSE installation may have similar permitting requirements as a residential installation with the addition of a Tenant Improvement (TI) Electrical Permit. A more complex commercial installation may require a modification to an existing Use Permit or a Site Plan addressing specific community or zoning design criteria. It is important to meet with staff from the building and, if necessary, planning departments of the permitting jurisdiction to fully understand all of the necessary requirements and fees prior to when permits are submitted.

Do I need to get my charging station inspected by the permitting jurisdiction?

All jurisdictions in the San Diego region require an inspection of an installed EVSE. When the installation is complete, an inspection of the work is scheduled with the Building Inspector upon request. Generally, inspections occur less than one week after the request. Typically, the home or property owner (or tenant) will need to be present during the inspection so that the Inspector can access the location of the charging station and any other electrical or structural change. Please see the attached *EVSE Inspection Checklist*, which has been designed to serve as a guide for local Building Inspectors and has been endorsed by the National Electrical Contractors Association. A residential checklist being used in the cities of Oceanside and San Diego is also included.

How do I install a charging station?

Residential Installations

Installing a residential EVSE may require changes to the home's electrical wiring and utility electricity rates.

- For a step-by-step installation guideline, please view the attached *Plug-in and Get Ready* document. For more information on PEV charging stations currently available on the market, visit www.GoElectricDrive.com.

Commercial Installations

Commercial EVSE installations are often location and use specific. It is advisable to consult the permitting and/or planning agency before breaking ground.

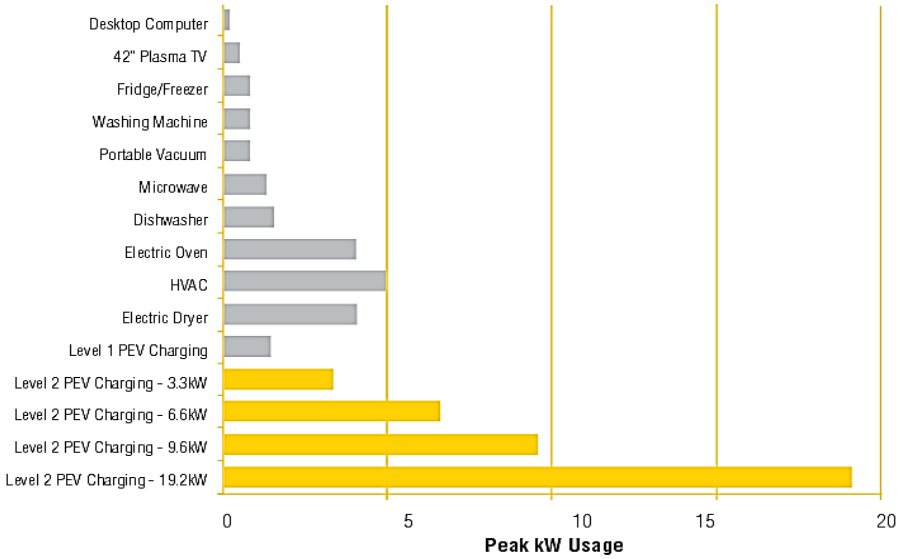
When installing a home or commercial charging station, property owners are encouraged to choose a local electrical contractor with the proper expertise, information, tools and training for installing EVSE to ensure a high quality and efficient installation experience. Please reference the wiring methods based on the California Electrical Code attached.

Why would SDG&E need to know about your charging station?

SDG&E needs to be able to accurately track the number of PEV charging stations installed to properly plan for local increases in electricity demand due to PEV charging. The combined effect of several chargers in the same area could result in overloads on utility secondary wires and transformers. Therefore, utility notification is an important component of providing safe, reliable electricity to all SDG&E customers.

SDG&E can help businesses understand pricing options for employees. They also help businesses identify potential EVSE rebates and incentives.

SDG&E's Clean Transportation Program has created the figure below that displays the significant load difference of a residential EVSE as compared with typical household appliances. According to SDG&E, a PEV charging at 9.6kW may double or triple a household's prior peak load. Additionally, PEV owners who notify SDG&E of a residential EVSE installation will be informed of SDG&E's PEV time-of-use rates (EV TOU). These rates provide a significantly lower cost of electricity for PEV owners that charge during the night, when demand is lower.



Source: San Diego Gas & Electric

Visit SDG&E's website for more information about their Electric Vehicle Programs: http://www.sdge.com/electric-vehicles

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) INSPECTION CHECKLIST

Key Concerns for Electric Vehicle Supply Equipment Inspections

1. Is the appropriate permit secured and is there a plan and calculation as required by the AHJ?
2. What type of electric vehicle supply equipment (EVSE) is being installed (i.e. Level 1, Level 2, other)?
3. Where is the EVSE located in relation to the charging location and the service or supply source?
4. Is the EVSE listed by an NRTL and are the installation instructions available for reference?
5. Is the EVSE going to be cord-and-plug connected (and so listed) or direct wired to an individual branch circuit?
6. What amount of voltage and current is required for the type of EVSE (nameplate information)?
7. Is the EVSE securely mounted to the structure and individual branch circuit wiring installed per NEC?
8. Is the properly sized equipment grounding conductor connected and proper overcurrent protection provided?
9. Does the service or source have adequate capacity for the load served?
10. Are separate utility meter(s) and/or service disconnecting means installed for special utility rates?

INSPECTION CHECKLIST (non-inclusive)

EVSE Inspection Activity Details

	Item	Inspection Activity	Code Reference	Comments
	1.	Verify permit is posted and all plans, calculations and installation instructions are available as required. May require use of examples in NEC Chapter 9. A calculation may be required to determine adequate capacity.	Local Regulations and NEC 90.8, 220.12, 220.14, 220.16, 220.82	
	2.	Verify that the EVSE is listed by an NRTL and installation instructions are provided.	NEC 90.7, 625.5, 110.3(B)	
	3.	Verify the EVSE location and that it is securely fastened to the structure and guarded from physical damage as required.	NEC 110.13, 110.27(B), 625.29, 625.30	
	4.	Determine if EVSE is directly wired to the branch circuit or is cord-and-plug connected. Must be listed for cord-and-plug connection. Individual receptacle reqd.	NEC 110.3(B), 625.13, 625.18, 625.19, 625.29	
	5.	Verify an individual branch circuit is installed for the EVSE. Applies to Level 1, Level, 2, and fast chargers. Branch circuit and feeders (if applicable) must be sized 125% of nameplate current.	NEC Article 100 continuous load, 210.19(A)(1), 215.2(A), 625.21	
	6.	Verify installed branch circuit wiring method is listed and securely fastened to the structure. Listed wiring and fittings must be installed. Check fished and surface wiring.	NEC 300.11 and the applicable .30 section of article	
	7.	Verify the size of the branch circuit overcurrent protection is per nameplate and protects the conductors.	NEC 110.3(B), 240.4	
	8.	Verify circuit conductors are sized not less than 125% of EVSE nameplate current. Be sure that the conductor ampacity complies with the rating of the overcurrent protection.	NEC 210.19(A)(1), 215.2(A), 110.3(B), Table310.15(B)(16), 310.15(B).	
	9.	Verify properly sized equipment grounding conductor is installed with the branch circuit and connected at the EVSE and to panelboard or service. Verify the equipment grounding conductor is identified.	NEC 250.110, 250.112, 250.114, 250.120, 300.3(B), 250.119, 250.122.	

	10.	Check the electrical connections of the circuit conductors and equipment grounding conductor connections.	NEC 110.14, 250.148(A) Annex I	
	11.	Verify disconnecting means is provided and properly located for EVSE rated greater than 60 amperes and 150 volts.	NEC 625.23	
	12.	Verify installation of EVSE is in a neat and workmanlike manner.	NEC 110.12, NECA 1, NECA 413	
	13.	Verify existing service conductors are of adequate size. For Level 2 EVSE installations, identify any existing service conductor sizes that might have been installed using NEC 310.15(B)(7) and Table 310.15(B)(7)	NEC 230.31, 230.42, 310.15(B)(7) and Table 310.15(B)(7)	
	14.	Verify circuit breaker compatibility with existing panelboard or service equipment. Must be manufactured by the panelboard or service equipment manufacturer.	NEC 110.3(B), Article 240 Part VII, Article 408 part I	
	15.	Branch circuit device and any disconnects must be identified as to the use.	NEC 408.4(A), 110.22(A)	
	16.	Where separate utility metering and enclosures are installed, verify NEC compliance for service equipment and conformance to applicable utility regulations.	Utility company regulations and NEC Article 230	
	17.	Verify equipment is suitable for connection to the line side of the service disconnecting means.	NEC 230.82	
	18.	Verify sufficient working space is provided at EVSE, Panelboards, service equipment, and disconnects.	NEC 110.26	
	19.	Verify additional service disconnects (if installed) are grouped.	NEC 230.72	
	20.	Verify the maximum number of service disconnects has not been exceeded	NEC 230.71	
	21.	Verify that any additional service disconnect is properly rated.	NEC 230.79	
	22.	Verify the wiring method used for the additional service conductors installed.	NEC 230.43	
	23.	Verify that additional service disconnects are properly identified.	NEC 230.70(B)	
	24.	Verify service disconnect is listed as suitable for use as service equipment.	NEC 230.70(C)	
	25.	Verify the overcurrent protection for any newly installed service equipment and conductors.	NEC 230.90, 230.91	
	26.	Verify grounded conductor (neutral) is brought to the service disconnect and bonded to the enclosure.	NEC 250.24(C)	
	27.	Verify metal service equipment enclosures and raceways are bonded together effectively.	NEC 250.92, 250.92(B)	
	28.	Supply-side bonding jumpers are sized properly	NEC 250.102(C), 250.66	
	29.	Verify existing service grounding and bonding.	NEC 250.50, 250.104(A) and (B)	
	30.	Verify EVSE that is intended to be used as interactive systems, bi-directional, or optional standby systems be listed for that purpose.	NECA Articles 702 and 705	

** Note: These items included in the checklist are non-inclusive and are to serve as a guide or basis for inspection. They do not include any local Code requirements or regulations.*

LEVEL 2 ELECTRIC VEHICLE CHARGER - SERVICE LOAD CALCULATION

INSTRUCTIONS: Review the list of electrical loads in the table below and check all that exist in the home (don't forget to include the proposed Level 2 EV Charger). For each item checked, fill-in the corresponding "Watts used" (refer to the "Typical Usage" column for wattage information). Add up all of the numbers that are written in the "Watts Used" column. Write that number in the "Total Watts Used" box at the bottom of the table and proceed to the next page.

(Loads shown are rough estimates; actual loads may vary – for a more precise analysis, use the nameplate ratings for appliances and other loads and consult with a trained electrical professional.)

✓Check All Applicable Loads	Description of Load	Typical usage	Watts used
GENERAL LIGHTING AND RECEPTACLE OUTLET CIRCUITS			
✓	Multiply the Square Footage of House X 3	3 watts/sq. ft.	
KITCHEN CIRCUITS			
✓	Kitchen Circuits	3,000 watts	3,000
	Electric oven	2,000 watts	
	Electric stove top	5,000 watts	
	Microwave	1,500 watts	
	Garbage Disposal under kitchen sink	1,000 watts	
	Automatic Dish washer	3,500 watts	
	Garbage Compactor	1,000 watts	
	Instantaneous hot water at sink	1500 watts	
LAUNDRY CIRCUIT			
✓	Laundry Circuit	1,500 watts	1,500
	Electric Clothes Dryer	4,500 watts	
HEATING AND AIR CONDITIONING CIRCUITS			
	Central Heating (gas) and Air Conditioning	6,000 watts	
	Window mounted AC	1,000 watts	
	Whole-house or attic fan	500 watts	
	Central Electric Furnace	8,000 watts	
	Evaporative Cooler	500 watts	
OTHER ELECTRICAL LOADS			
	Electric Water Heater (Storage type)	4,000 watts	
	Electric Tankless Water Heater	15,000 watts	
	Swimming Pool or Spa	3,500 watts	
	Other: (*describe)*		
	Other:		
	Other:		
ELECTRIC VEHICLE CHARGER CIRCUIT			
	Level 2 Electric Vehicle Charger rating*		
(Add-up all of the watts for the loads you have checked ✓) **TOTAL WATTS USED ➔**			

Use name plate rating in watts or calculate as: (Ampere rating of circuit X 240 volts = Watts)

INSTRUCTIONS: Apply the ***Total Watts Used*** number from the previous page to the Table below to identify if the Existing Electrical Service Panel is large enough to handle the added electrical load from the proposed Level 2 EV Charger. If your electrical service is NOT large enough, then you will need to install a new upgraded electrical service panel.

Table based on NEC 220.83 (A).

✓Check the appropriate line	Total Watts Used	Minimum Required Size of Existing 240 Volt Electrical Service Panel *(Main Service Breaker Size)*	Identify the Size of Your Existing Main Service Breaker *(Amps)***
	up to 24,000	60 amp	
	24,001 to 48,000	100 amps	
	48,001 to 63,000	125 amps	
	63,001 to 78,000	150 amps	
	78,001 to 108,000	200 amps	
	108,001 to 123,000	225 amp	

**Please note that the size of your Existing service MUST be equal to or larger than the Minimum Required Size identified in the Table above or a New Upgraded electrical service panel will need to be installed (separate permit required for new service).

CAUTION: This table is **NOT** to be used to determine the size of a ***NEW UPGRADED*** Electrical Service Panel if your existing panel is too small or overloaded according the Table above. In order to determine the size of a NEW or UPGRADED Service Panel, there is a completely different load calculation methodology that applies. Sizing of a NEW or UPGRADED Electrical Service Panel should only be done by a qualified Electrical Contractor or Electrical Engineer.

STATEMENT OF COMPLIANCE

By my signature, I attest that the information provided is true and accurate.

Job Address: _____
(Print job address)

Signature: _____ _____
(Signature of applicant) (Date)

In addition to this document, you will also need to provide a copy of the manufacturer's installation literature and specifications for the Level 2 Charger you are installing.

Please note that this is a voluntary compliance alternative and you may wish to hire a qualified individual or company to perform a thorough evaluation of your electrical service capacity in lieu of this alternative methodology. Use of this electrical load calculation estimate methodology and forms is at the user's risk and carries no implied guarantee of accuracy. Users of this methodology and these forms are advised to seek professional assistance in determining the electrical capacity of a service panel.

OTHER HELPFUL INFORMATION FOR EV CHARGER INSTALLATIONS:

The Table below illustrates the type and size of wire and conduit to be used for various Electric Vehicle Charger circuits.

Size of EV Charger Circuit Breaker	Required minimum size of Conductors (THHN wire)	Conduit Type and Size***		
		Electrical Metallic Tubing (EMT)	Rigid Nonmetallic Conduit – Schedule 40 (RNC)	Flexible Metal Conduit (FMC)
20 amp	#12	1/2"	1/2"	1/2"
30 amp	#12	1/2"	1/2"	1/2"
40 amp	#10	1/2"	1/2"	1/2"
50 amp	#8	3/4"	3/4"	3/4"
60 amp	#6	3/4"	3/4"	3/4"
70 amp	#6	3/4"	3/4"	3/4"

******Based on 4 wires in the conduit (2-current carrying conductors, 1-grounded conductor, 1-equipment ground).***

As an alternate, Nonmetallic Sheathed Cable (aka: Romex Cable or NMC) may be used if it is protected from physical damage by placing the cable inside a wall cavity or attic space which is separated from the occupied space by drywall or plywood.

The Table below illustrates the required supports for various types of electrical conduit or cable.

Conduit Support	Electrical Metallic Tubing (EMT)	Rigid Nonmetallic Conduit – Schedule 40 (RNC)	Flexible Metal Conduit (FMC)	Nonmetallic Sheathed Cable (NMC)
Conduit Support Intervals	10'	3'	4-1/2'	4-1/2'
Maximum distance from box to conduit support	3'	3'	1'	1'

In addition to the above noted requirements, the California Electrical Code contains many other provisions that may be applicable to the installation of a new electrical circuit. Installers are cautioned to be aware of all applicable requirements before beginning the installation. For additional information or guidance, consult with the Building and Safety Division staff or a qualified and experienced Electrical Contractor.

SAN DIEGO REGIONAL PLUG-IN ELECTRIC VEHICLE (PEV) READINESS PLAN

APPENDIX C

Contents:

June 6, 2013 File Number 3200800

Ken Alex, Director
Governor's Office of Planning and Research
1400 10th Street
P.O. Box 3044
Sacramento, CA 95812-3044
ZEVfeedback@opr.ca.gov

SUBJECT: San Diego REVI Comments on the *Plug-In Electric Vehicles: Universal Charging Access Guidelines and Best Practices*

Dear Director Alex:

The San Diego Regional Electric Vehicle Infrastructure Working Group (REVI) is pleased to submit these comments regarding Plug-In Electric Vehicles (PEV): Universal Charging Access Guidelines and Best Practices (Guidelines) prepared by the Governor's Office of Planning and Research (OPR) and the Division of the State Architect (DSA). The REVI serves as the San Diego region's PEV Coordinating Council (PEVCC) and is developing a regional PEV readiness plan through California Energy Commission and San Diego Association of Governments (SANDAG) funding. Our member list is included as Attachment 1. The REVI is glad that OPR and DSA are updating the DSA 97-03 interim guidelines, and we appreciate the opportunity to provide comments for your consideration (Attachment 2).

The San Diego region has been at the forefront of PEV deployment and REVI members have experience addressing accessibility for electric vehicle (EV) charging station installations, particularly through the EV Project. In April 2012, the City of San Diego issued *Technical Policy 11B-1 on Accessibility to Electrical Vehicle Charging Stations (CSD-TP11B-1)* to address the uncertainty faced by charging station hosts and suppliers regarding accessibility (Attachment 3). Local jurisdictions have been using CSD-TP11B-1 as a best practice since its release, and it has enabled a significant increase in PEV charger installations.

The primary recommendation in our comments is to add flexibility to the ADVISORY for EVG-250.1 by making it consistent with CSD-TP11B-1 and allowing accessible EV charging stations at existing accessible parking spaces. Some REVI members went as far as suggesting that OPR replace its Guidelines with the City of San Diego's. The Guidelines state that accessible EV charging stations are not to be reserved exclusively for the use of persons with disabilities. The City's CSD-TP11B-1 allows for accessible EV chargers at existing accessible parking spaces with limitations. This flexibility has facilitated EV charging station installations at existing facilities that would otherwise not be able to accommodate an accessible EV charging station due to their mandated parking requirements. We provide more explanation for this, as well as other suggestions, in our attached comments.

Thank you for your consideration in developing these Guidelines. If you have any questions, please contact me at SANDAG, 401 B Street, Suite 800, San Diego, CA 92101; (619) 699-7387; or Susan.Freedman@sandag.org.

Sincerely,

SUSAN FREEDMAN, CHAIR
San Diego Regional Electric Vehicle Infrastructure Working Group (REVI)

Attachments

1. San Diego REVI Member List
2. REVI Comments and Recommendations on Draft Guidelines
3. City of San Diego Technical Policy 11B-1: Accessibility to Electrical Vehicle Charging Stations

SAN DIEGO REGIONAL ELECTRIC VEHICLE INFRASTRUCTURE WORKING GROUP

REPRESENTATION	MEMBER	ALTERNATE
South County Subregion	Brendan Reed City of Chula Vista	Chris Helmer City of Imperial Beach
North County Coastal Subregion	Ramsey Helson City of Del Mar	Mike Grim City of Carlsbad
North County Inland Subregion	Kathy Winn City of Escondido	Vacant
East County Subregion	Kathy Valverde City of Santee	Scott Munzenmaier City of La Mesa
City of San Diego	Jacques Chirazi	Vacant
County of San Diego	Peter Livingston	Susan Freed
San Diego Association of Governments	Susan Freedman, Chair	Allison King
San Diego Regional Airport Authority	Paul Manasjan	Brett Caldwell
Caltans, District 11	Chris Schmidt	Vacant
Unified Port District of San Diego	Michelle White	Jenny Lybeck
San Diego Gas & Electric	Joel Pointon	Randy Shimka
California Center for Sustainable Energy	Mike Ferry, Vice Chair	Colin Santulli
University of California, San Diego	Dave Weil	Jim Ruby
Miramar College, Advanced Transportation Technology and Energy	Greg Newhouse	Vacant
San Diego Electric Vehicle Network	Randy Walsh	Vacant
National Electrical Contractors Association	Karen Prescott	Tim Dudek
International Brotherhood of Electrical Workers Local 569	Micah Mitrosky	Vacant
ADVISORY MEMBERS		
San Diego Air Pollution Control District	Mike Watt	Nick Cormier
Department of Defense	Chris Parry, US Navy	
Metropolitan Transit System	Claire Spielberg	
City of Coronado	Bill Cecil	
City of Encinitas	Diane Langager	
City of National City	Ray Pe	
City of Solana Beach	Dan King	
City of Vista	Lyn Dedmon	
Ecotality	Andy Hoskinson	
Car2go	Mike Cully	
Aerovironment	Charlie Botsford	
Coulomb Technologies	Colleen Quinn	
General Electric	David Wang	

SAN DIEGO REVI COMMENTS AND RECOMMENDATIONS ON OPR'S AND DSA'S
PLUG-IN ELECTRIC VEHICLES: UNIVERSAL CHARGING ACCESS GUIDELINES AND BEST PRACTICES

General Comments:

1. Recommended changes to specific language in the draft guidelines are provided here in BOLD RED. Removal of language is shown in STRIKETHROUGH.
2. The guidelines component and regulations component of the document should use consistent terminology and definitions.
3. Revise all existing parking stall figures to show the preferred location of the electric vehicle charging station and cord. Refer to the figures in City of San Diego's Technical Policy 11B-1: Accessibility to Electric Vehicle Charging Stations for clear examples. (Attached to these comments.)
4. Replace references to the 2013 California Building Code with "current edition of the California Building Code" where applicable.
5. Include definitions for all uses of the term "maximum extent feasible" and "available right-of-way."

Comment 1: Alter ADVISORY EVG-250.1 to offer more flexibility at existing sites.

Explanation

The City of San Diego Technical Policy 11B-1 (CSD-TP11B-1) allows for use of existing ADA spaces for EV charging. In this case, the space remains ADA first and EVSE second. Non PEV users of ADA spaces are encouraged, but not required, to park in other ADA spaces before taking an ADA space that also has access to an EV charger. CSD-TP11B-1 was created to address actual experiences faced by businesses and agencies interested in hosting EVSE at their sites, but were unable due to how the EVSE impacted their parking requirements (counts of stalls, etc.). Prior to this technical policy, the EV Project experienced uncertainty and hosts backing out of the project because the addition of EVSE could not be reconciled with mandatory parking requirements.

OPR is encouraged to allow for flexibility here, to answer challenges in finding locations for accessible EV charging stations. Less ideal options, other than using an existing ADA parking space at existing sites and locations, include:

1. Convert an existing ADA parking space to an accessible EV charging space, and remove signage and coloring for ADA parking. (This is not a likely solution as most parking lots cannot remove an ADA parking space without consequences due to number counts of parking spaces.)
2. Convert a standard parking space into an accessible EV charging space. (This is a challenging solution as many parking lots adhere to the exact number of parking spaces they are required to provide. They do not have an excess number of spaces to enlarge a standard parking space and thus take away a second parking space.)
3. Place an EV charger between an ADA parking space and a standard space to allow access by either a person with disabilities or a vehicle without the ADA placard. (This can be a solution in

some locations (including the parking structure at SANDAG's office building); however, many large stores have the ADA parking spaces clustered together near the front of the building, so an adjacent standard space is not always available.)

Recommended Revision to ADVISORY: EVG-250-1

ADVISORY: EVG-250.1 General. While there is no positive requirement to provide electric vehicle charging stations, when they are provided a portion of them should be accessible. When co-located with parking spaces, electric vehicle charging is considered the primary function of these ~~stations~~ **spaces**, not parking. **For new construction, electric vehicle charging when co-located with parking spaces is considered the primary function of these stations, not parking. Accessible electric vehicle charging stations are not to be reserved exclusively for the use of persons with disabilities. They should not be identified with signage that would mistakenly indicate their use is only for vehicles with placards or license plates for individuals with disabilities. For installations at existing sites and locations, existing ADA spaces can also be used as electric vehicle charging stations if the site or location would fall out of compliance with its required parking counts by reconfiguring parking stall(s) into an accessible electric vehicle charging station. In this case, the space remains ADA first and an electric vehicle charging station second. Users of ADA spaces are encouraged, but not required, to park in other ADA spaces before utilizing an ADA space that provides access to an electric vehicle charging station. The space must continue to be identified with ADA signage.**

Comment 2: We support inclusion of a "programmatic" option in EVG-250.5.2 to address the difficulty in siting on-street electric vehicle charging, and the scope of a programmatic option should be determined at the local level.

Explanation

- The interpretation of "programmatic basis" should be left to the discretion of the public entity because in some cases it could refer to just a few blocks, a neighborhood or an entire city.
- Include a definition for "maximum extent feasible."

Recommended Revision to ADVISORY: EVG-250.5.2

The required total number of electric vehicle charging stations complying with EVG-250.2 and EVG-250.3 may be provided on a combined basis using both on-site locations **owned or controlled by a state or local governmental jurisdiction** and on-street locations within a public right-of-way owned or controlled by a state or local governmental jurisdiction. On-street electric vehicle charging stations within the public right of way shall be integrated with on street parking to the maximum extent feasible. **Maximum extent feasible is defined as _____.**

Comment 3: Provide clarification to EVG-250.6 to denote the purpose as Path of Travel and defining "cost of compliance" and "path of travel" using the definitions provided in 2013 CBC 11B-202.4 (pages 17-19 of OPR draft).

Explanation

The narrative, EXCEPTION, and ADVISORY are difficult to comprehend at times and should be written clearer.

Recommended changes:

1. Revise the opening narrative to read, "**Path of travel provisions for** alterations **at existing facilities** solely for the purpose of installing electric vehicle charging stations shall be limited to the actual scope of work of the project and shall not be required to comply with section 11B-202.4 of the current edition of the California Building Code."

2. Revise the EXCEPTION to read, **"EXCEPTION:** Alterations solely for the purpose of installing EV charging stations at sites where vehicle parking or storage is the sole and primary use of the facility shall comply with the current edition of the California Building Code section 11B-202.4 Path of Travel Requirements in Alterations, Additions and Structural Repairs to the maximum extent feasible. The cost of compliance with 11B-202.4 shall be limited to twenty percent of the **adjusted construction** cost**s** of the work directly associated with the installation of the electric vehicle charging equipment**. For the purposes of this exception, the adjusted construction costs of alterations, structural repairs or additions shall not include the cost of alterations to path of travel elements required to comply with 11B-202.4.**

   Adjusted construction costs are determined on a three-year period. If an area has been altered without providing an accessible path of travel to that area, and subsequent alterations of that area or a different area on the same path of travel are undertaken within three years of the original alteration, the total cost of alterations to the areas on that path of travel during the preceding three-year period shall be considered in determining whether the cost of making that path of travel accessible is disproportionate.

3. Omit the last sentence of ADVISORY EVG-250.6 (page 8): "~~For projects with basic costs above the CBC valuation threshold of $139,964, the cost above which path of travel alterations would become disproportionate has been aligned with the federal requirements of twenty percent (20%).~~" It creates unnecessary confusion regarding projects valued under $139,964.

Comment 4: For EVG-812.3, insert language stating that an access aisle shared between an accessible parking space and an EV charging station that enables use of the EV charger from the accessible space can be counted as an accessible EV charger as long as the EV charger's cord does not impede the accessible path of travel. Include figures to identify where the electric vehicle charging station and its cord should be located in this situation.

Explanation

Placing an EV charger between an ADA parking space and a standard space allows access by either a person with disabilities or a vehicle without the ADA placard. This set-up offers flexibility for utilization of the EV charging station. The City of San Diego Technical Policy 11B-1 allows for this.

THE CITY OF SAN DIEGO

Development Services
Division of Building, Construction & Safety

Technical Policy 11B-1

Subject: Accessibility to Electrical Vehicle Charging Stations
Code Section: N/A
Code Edition: 2010 California Building Code
Issue Date: April 19, 2012

Approved by: Signed copy on file
Afsaneh Ahmadi, Chief Building Official P.E.

The 2010 California Building Code (CBC) requires public accommodations and services to be made accessible to persons with disabilities. The 2010 CBC includes accessibility standards for card readers at gasoline fuel-dispensing facilities but does not include regulations for accessibility at electric vehicle (EV) charging stations. The Division of the State Architect has developed a guideline titled "Interim Disabled Access Guidelines for Electrical Vehicle Charging Stations" and published Policy #97-03 (see copy attached). City of San Diego Technical Policy 11B-1 has been adapted from the State guidelines and State standards for access to card-reader devices at fuel-dispensing equipment to ensure uniform and consistent enforcement by review and inspection staff.

When the CBC requires that parking in existing or new construction be accessible, the required parking is designed to serve the building and shall be used exclusively for parking of appropriately identified vehicles. Accessible EV charging stations provide a service available to disabled and non-disabled persons using electric vehicles and are provided based on an availability basis.

This policy applies to the installation of EV Charging Stations in both new and existing construction.

EV charging stations located in non-public areas and used to charge vehicles managed by fleet services such as rental car agencies, EV car dealerships etc.are not required to be accessible since they do not serve persons with disabilities.

I. Where Required:

1. **New Construction.** When provided in conjunction with new buildings or parking facilities such as surface parking lots or parking garages, the accessible EV charging station(s) must be located in close proximity (DSA recommends within 200 ft) to a major facility, public way or a major path of travel on the site.

   Accessible EV charging stations not provided in conjunction with accessible parking spaces need not be provided immediately adjacent to the major facilities on the site since the primary purpose of the stations is to provide the charging as a service, parking is not intended to be the primary use of the EV charging stations.

   An accessible path of travel is required from the accessible EV charging station to other services provided at the site such as buildings, parking facilities, etc.

2. **Existing sites.** When provided at existing sites, the accessible charging station need not be located in close proximity to other services at the site.

An accessible path of travel connecting the accessible EV charging station to a major facility, public way or major path of travel on the site is required to the extent that the cost of providing such path does not exceed 20% of the cost of the EV equipment and installation of all EV charging stations at the site over a three-year period, when such valuation does not exceed the threshold amount referenced in CBC Section 1134, Exception 1.

In lieu of providing detailed information on the plans to demonstrate compliance with the CBC accessibility requirements for the existing parking and path of travel, the following two notes can be added to the plan(s) to certify that the existing facilities complies with the CBC. The notes shall be as follows.

a. Add and sign the following certification note "I am the designer/owner in responsible charge of this EV charging station project; I have inspected the proposed location for the proposed accessible EV charging station and have determined that the accessible route of travel to the EV charging station shown on the site plan complies as an accessible route of travel as is required by the California Building Code. Signature: _____

   Print Name: _____
   Date: _____."; and

b. "If the Building Inspector determines noncompliance with the above statement he/she shall require complete, detailed plans clearly showing all existing non-complying conditions and the proposed modifications to meet current accessibility provisions for the parking space and accessible route of travel to the EV charging station to the extent required by the California Building Code. The revised plans must be resubmitted to the Structural review section for approval."

Accessible EV charging stations in existing accessible parking spaces: When the CBC requires that parking in existing or new parking facilities be accessible, the required parking is designed to serve the building and shall be used exclusively for parking of appropriately identified vehicles. Accessible EV charging stations provide a service available to disabled and non-disabled persons using electric vehicles and are provided based on an availability basis.

When a new accessible EV charging station is installed in an existing accessible parking space, not less than one additional EV charging station shall be provided.

Not more than one accessible EV charging station shall be located in an existing accessible parking space unless more than one accessible EV charging station is required.

When more than one accessible EV charging station is required and are placed in existing accessible parking spaces, the EV charging stations shall be reasonably distributed throughout the parking lot or parking structure.

When an EV charging station is placed in conjunction with an existing accessible parking space the identification sign required in subsection (d) below shall be omitted.

II. **Specifications for Disabled Accessible EV Charging Stations:**

Vehicular spaces provided for accessible EV charging stations shall allow for persons with disabilities to exit an electric vehicle, to access the charging unit and place the charging cable on the vehicle. While the space designated for the accessible EV charging station is not required to be striped and identified as is required for accessible parking spaces, the space shall be designed to comply with the following requirements.

(a) **Number of Accessible EV Charging Stations Required:** Not less than one EV charging station shall be accessible to persons with disabilities.

When the number of EV charging stations proposed exceeds 25, they shall be provided at a rate of one accessible EV charging station for every 25 stations proposed. Not more than a total of 4 accessible EV charging stations is required on the same site.

(b) **Dimensions for Accessible EV Charging Stations:** The EV charging station shall include a space to place the electric vehicle that is not less than 9 foot wide by 18 feet deep to accommodate the vehicle. The space shall also include a 5 ft wide access aisle that extends the full depth of the vehicular space and located on the passenger side of the vehicle. Alternatively, the access aisle can be located between an accessible parking space and an accessible EV charging station. See figures 1, 2 and 3 for possible configurations.

(c) **Identification for Accessible EV Charging Stations:**

The accessible EV charging station shall be identified.

(i) The accessible EV charging station and its access aisle need not be striped or provided with signage as required for an accessible parking space.

(ii) When an EV charging unit is installed in an existing accessible parking space, the signage at the accessible parking space shall remain in conformance with the requirements of the CBC.

(iii) To identify an accessible EV charging station an informational sign must be posted which reads, “Parking for EV Charging Only; This Space Designed for Disabled Access; Use Last.” When an EV charging station is placed in conjunction with an accessible parking space this sign shall be omitted.

(d) **Disabled Access to Accessible EV Charging Equipment:**

Charging equipment serving accessible EV charging stations shall be accessible.

(i) The charging equipment, and when applicable card readers, must meet all applicable reach range provisions of CBC Section 1118B and Ch 11C for a 30 by 48 inch wheelchair space used for side or front approach.

(ii) A clear path of travel measuring not less than 36 inches in clear width shall be provided to access the charging equipment.

Figure 1

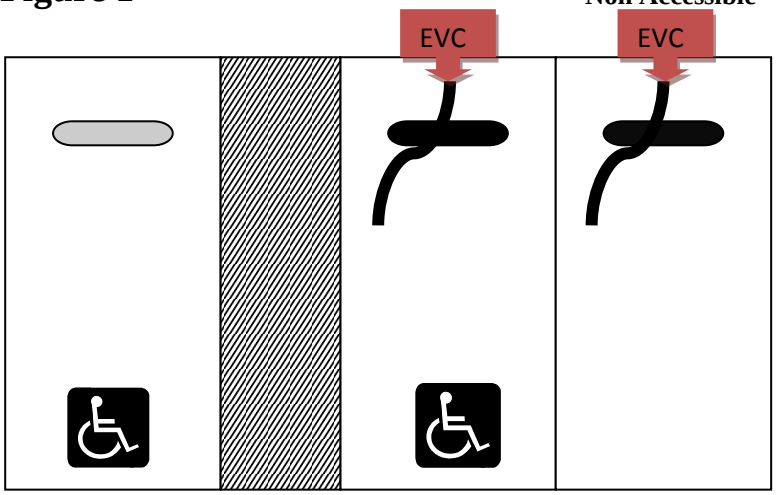


Figure 2

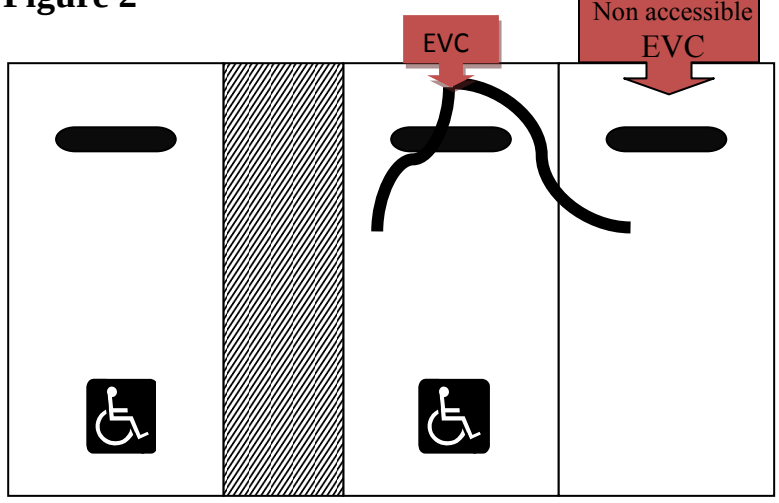
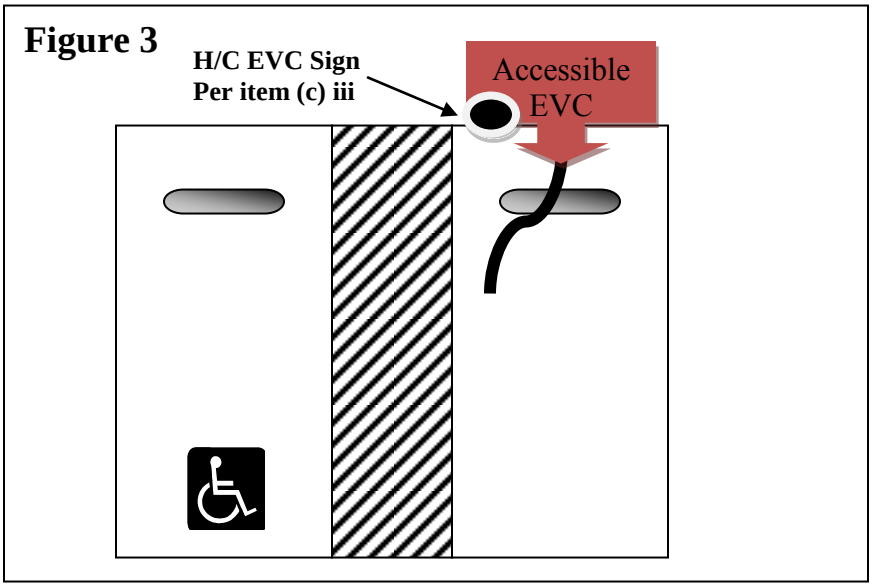


Figure 3



Interim Disabled Access Guidelines for Electrical Vehicle Charging Stations

97-03

Effective 4-30-97
Revised 6-5-97

This policy is applicable to projects under DSA jurisdiction only. DSA's Access Compliance jurisdiction encompasses state-funded buildings, facilities and universities, as well as publicly-funded elementary schools, secondary schools, and community colleges. Local jurisdictions may or may not adopt similar methods of administering current code requirements, determining equivalent facilitation, or defining acceptable parameters as necessary in enforcing the existing California Building Standards Code as allowed under Government Code Section 4451(f)] of the California Code of Regulations.

Issue: In state funded projects with electrical vehicle, charging stations must be accessible. Electric Vehicles are being slowly introduced to the consumer market over the next three years as a result of an agreement between auto makers and the State of California. The zero emission vehicles as well as the equipment to charge them are continuing to develop and change at a rapid pace. Yet to successfully serve new electric vehicle customers, public charging is essential. Public charging sites that are developed now are likely to see significant technology changes before electric vehicles are fully commercialized. Based on a rule adopted by the California Air Resources Board, beginning in 2003, 10% of vehicles sold in California must be zero emission.

Public charging stations will be installed in public places such as shopping centers, parking lots and garages of companies or municipalities. They are provided as a convenient charging location for Electric Vehicle owners while they work or shop. Full charging of an Electric Vehicle takes between two to three hours.

Resolution: Representatives of the Division of State Architect, California Electric Transportation Coalition, Edison EV, The California Building Officials, Department of Rehabilitation and members of the disabled community have held meetings for the purpose of developing interim guidelines to address the issue of disabled access to these charging stations. The following guidelines have been developed and agreed upon by the these organizations:

ARE EV CHARGING STATIONS REQUIRED TO BE ACCESSIBLE?

Yes. EV Charging Stations are required to be accessible because they offer a service to the general public. When EV charging is coupled with regular parking, the EV charging is considered the primary service. (See Item V for further discussions.)

WHAT PERCENTAGE OF THE EV CHARGING STATIONS MUST BE MADE ACCESSIBLE?

The following table shall be used in determining the required number of accessible charging stations:

# of charging stations provided at a site	# of accessible charging stations required
1 to 25	1
50	2
51 to 75	3

WHAT PERCENTAGE OF THE EV CHARGING STATIONS MUST BE MADE ACCESSIBLE?
The following table shall be used in determining the required number of accessible charging stations:

# of charging stations provided at a site	# of accessible charging stations required
76 to 100	4

WHAT SPECIFICATIONS MUST THE ACCESSIBLE EV CHARGING STATION COMPLY WITH?

a. A 9 foot wide space by 18 feet deep space is required. An access aisle of 5 feet on the passenger side is required. One in every eight accessible charging stations, but not less than one, shall be van accessible with a 8 foot access aisle.
b. The accessible EV charging station and its access aisle need not be striped or provided with signage as required for an accessible parking space. An information sign must be posted which reads, "Parking for EV Charging Only; This Space Designed for Disabled Access; Use Last."

MUST ACCESSIBLE EV CHARGING STATIONS BE RESERVED EXCLUSIVELY FOR THE USE OF PERSONS WITH DISABILITIES?

No. The primary function of these stations is the charging of Electric Vehicles. Parking is not intended to be the primary use of the charging station.

ARE THERE ANY RESTRICTIONS RELATIVE TO THE LOCATION OF THE ACCESSIBLE EV CHARGING STATIONS?

For installations associated with new construction, the accessible charging station must be located in close proximity to a major facility, public way or a major path of travel on the site. Note: 200 feet is the maximum distance recommended. However, the charging stations need not be provided immediately adjacent to the major facilities since, again, the primary purpose of the stations is to provide the charging as a service, and parking is not intended to be the primary use of the stations.

For installations at existing sites, the accessible charging station need not be located in close proximity to other services at the site.

IS AN ACCESSIBLE PATH OF TRAVEL REQUIRED FROM THE ACCESSIBLE EV CHARGING STATION TO OTHER SERVICES PROVIDED AT THE SITE?

Yes, for installations associated with new construction. As for other facilities on the site, an accessible path of travel is required between facilities.
For installation at an existing site, an accessible path of travel is required to the extent that the cost of providing such path does not exceed 20% of the cost of the EV equipment and installation of all EV charging stations at the site, when such valuation does not exceed the threshold amount referenced in Exception 1 of Section 1134 of Title 24. The accessible path of travel shall connect to a major facility, public way or major path of travel on the site.

WHAT SPECIFICATIONS MUST THE CHARGING EQUIPMENT MEET?

The charging equipment must meet all applicable reach range provisions of Section 1118B of Title 24. A clear path of travel measuring 36 inches in clear width to the charging equipment is required.

DOES THE INSTALLATION OF CHARGING STATIONS AT AN EXISTING SITE TRIGGER PATH OF TRAVEL IMPROVEMENTS SUCH AS PRIMARY ENTRANCE TO OTHER FACILITIES, RESTROOMS, TELEPHONES, OR DRINKING FOUNTAINS?

No, unless the above features are located in the parking lot, are accessed directly from the parking lot and designed for use with the parking lot.

HOW DOES THE THREE-YEAR VALUATION ACCUMULATION APPLY TO THESE INSTALLATIONS?
The valuation of other improvements at the site over the last three years need not be added to the cost of the installation to determine application of the exception referenced in item VI above. The cost of installation of other EV charging stations at the site over a three-year period must be used in determining compliance with the exception.

Approving Authority:

Michael J. Mankin, AIA
Manager, Access Compliance Program

San Diego County Sample RFP Template

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.

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 suppliers. Selected supplier(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 suppliers 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 supplier 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 suppliers 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. “Supplier” – Organization/individual submitting a proposal in response to this RFP)

EVSE – Electric Vehicle Supply Equipment

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 supplier may establish a service charge and method of payment collection to recoup these costs as well as any operating profit from EVSE users.
- 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 supplier.

4. Additional Considerations

A. The supplier 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>
Pre-Submission conference/meeting	<Insert date>
Deadline for submission of proposals	<Insert date>
Evaluation period	<Insert date>
Selection of supplier	<Insert date>

MANDATORY SITE VISITS

Site visits are scheduled as follows for potential EVSE suppliers to gather data and further assess proposed sites. The dates and times identified will be the only opportunity to view the proposed sites. Failure to attend the mandatory site visits will result in automatic disqualification with no further consideration for award.

PROPOSED SITE	DATE OF VISIT	TIME	CONTACT

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

Suppliers 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. Suppliers 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:

Supplier Information:

- The legal name of the supplier, 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.

Supplier Background & Work Experience:

- A list of all communities within the San Diego Gas & Electric (SDG&E) service territory in which the supplier 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 supplier has provided and maintained publicly-available EVSE during the last five years, if applicable. Include all of the information identified in the previous bullet.
- 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 supplier 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 supplier'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 supplier'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 supplier 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 supplier cover any removal costs.

Additional Items:

- The proposal must be signed by the individual(s) legally authorized to bind the supplier.
- 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 supplier 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. supplier'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).
- Supplier's specific marketing strategy that includes product advertising.
    - EVSE installation marketing plan.
    - Description of the supplier'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.

<u>Suggestion for Jurisdiction</u>: 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”, supplier 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 supplier 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>

Plug-in Electric Vehicle Benefits

Incentives available

Fun driving experience

Low fuel and maintenance costs

Minimal environmental impacts

Reduced dependence on oil

Different sizes and ranges to meet your needs

Learn more about the advantages of driving electric:

sdcleancities.org/ev

SAN DIEGO REGIONAL CLEAN CITIES COALITION

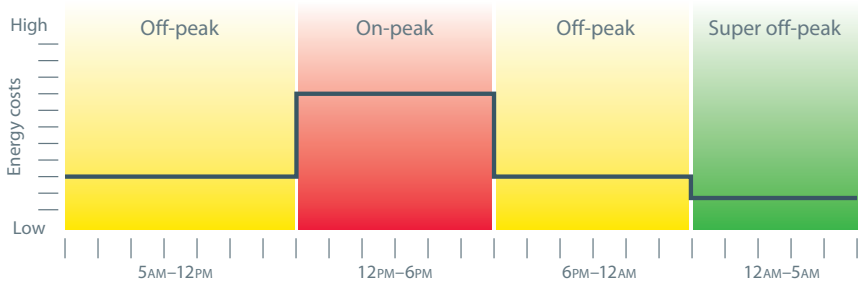
PLUG-IN.

SAVE MONEY. DRIVE ELECTRIC.

It matters *when* you charge your electric car.

San Diego Gas & Electric's electric vehicle (EV) rates will help you pay the lowest price for your EV fuel, when charging from midnight to 5 a.m.

Sign up for an EV time-of-use rate and program your car to charge when electric rates are at their lowest – during the **"off-peak"** and **"super off-peak"** hours.



Connect with SDG&E® first when purchasing an EV, by visiting:
sdge.com/ev

SDGE connected
A Sempra Energy utility℠

SDG&E supports the adoption of EVs while ensuring safe and reliable service.

PLUG-IN.
SAVE MONEY. DRIVE ELECTRIC.

California EV drivers qualify for *major incentives!*

Clean Vehicle Rebate Project

State cash rebates of up to $2,500! Qualifying is easy . . .

- Purchase or lease a new eligible plug-in electric vehicle and register it in California
- Minimum 36 month lease term or ownership required
- Available to California residents, businesses and public entities

Funding based on availability and is first-come, first-served.

Federal Tax Credit

Get money at tax time!

Federal tax credits range from **$2,500** to **$7,500** based on battery capacity.

DMV Clean Air Vehicle Sticker

EV drivers can use the carpool lane as a single occupant.

Learn more by visiting:
energycenter.org/ev

Center for Sustainable Energy® CALIFORNIA

California Environmental Protection Agency
Air Resources Board

PLUG-IN. SAVE MONEY. DRIVE ELECTRIC.

Planning for *EV charging* across San Diego

The San Diego Association of Governments (SANDAG) is the 18 cities and county government and serves as a forum for regional decision-making and the region's planning and transportation agency. **sandag.org/energy**

SANDAG is helping to facilitate EV charging and to resolve barriers to EV charger installations through the San Diego Regional EV Infrastructure (REVI) Working Group:

Diverse Membership

- Local governments and public agencies
- Public utility and private businesses
- Not-for-profits and educational partners

Learn more: **energycenter.org/pluginready**

A number of resources on EV charging are available, including

- Department of Energy – Alternative Fueling Station Locator: **afdc.energy.gov/locator/stations**
- National Renewable Energy Laboratory, Vehicles & Fuels Research – EV vehicle and charging information: **nrel.gov/vehiclesandfuels**
- California PEV Collaborative – A resource for statewide activities, tools, resources and information: **pevcollaborative.org**

SANDAG

PLUG-IN. SAVE MONEY. DRIVE ELECTRIC.

Center for Sustainable Energy® CALIFORNIA

Your Guide to Plug-In and Get Ready*

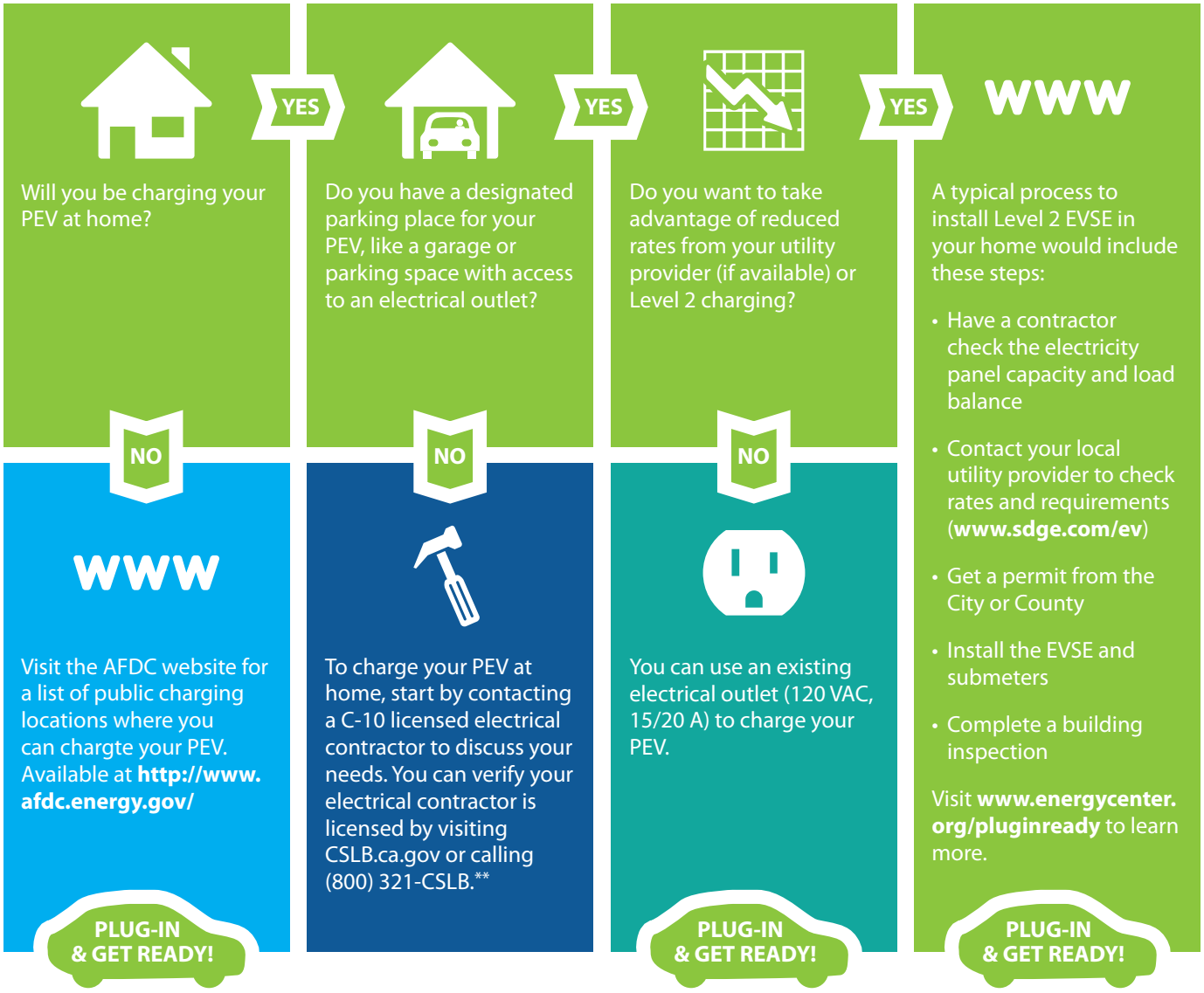
There are many different ways to charge your PEV. You can charge at public charging stations near your work or home, use the existing electrical outlets in your home (Level 1), or install a Level 2 charging station in your home.

Use this guide to help you decide if installing a Level 2 charging station in your home is the right choice for you and learn about the steps needed for Residential Electric Vehicle Supply Equipment (EVSE) installations. At this time, this guide is intended for use by single-famiy residences only. If you rent your home, be sure to discuss any home modifications with the property owner first and visit SDGE's website for more information.

Level 1 (120 volt) — PEVs come with a 120-volt charging cord that enables PEV owners to charge their PEV with any conventional 120-volt three-pronged outlet. While it takes longer to charge, Level 1 (L1) allows PEV drivers to plug in without the installation of a dedicated charging station.

Level 2 (208 to 240 volt) — This level of charging requires a charging station, also known as electric vehicle service equipment (EVSE), be purchased and installed and generally involves the installation of a dedicated circuit at either the PEV owner's home or where a public charging station is installed. Currently, Level 2 (L2) EVSE makes up the majority of public charging stations across California.

To learn more visit www.energycenter.org/pluginready



*Adapted from *Take Charge I: A First Step to PEV Readiness in the Sacramento Region*, a report from SACOG and the Capital Area PEV Coordinating Council on preparing the region for Plug-In Electric Vehicles

** When the electrician arrives, be sure and ask to see a copy of their state certification.

Electric Vehicle Charging for Regional Park-and-Ride Lots and Transit Stations

[NOTE: Any agency or company's sustainability goal(s) could be placed here. This is SANDAG's.]

The 2050 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), adopted by SANDAG in October 2011, included the following actions to be implemented:

> "Support planning and infrastructure development for alternative fueling stations and plug-in electric vehicle (EV) chargers."
>
> "Integrate alternative fuel considerations into the development of the regional transportation network by, for example, integrating infrastructure for electric vehicle charging into regional park-and-ride lots and transit stations."

To achieve this, it is recommended that any time a park-and-ride or transit station parking lot/structure is newly constructed or undergoing renovation, that SANDAG/ Caltrans/ MTS/ NCTD:

1. **At a minimum, pre-wire parking facilities for EV charger capabilities during construction,**
2. **Seek opportunities to install plug-in electric vehicle chargers at these sites, and**
3. **Investigate additional sustainability options like high efficiency lighting, solar photovoltaic (PV) shading structures, and water-efficient irrigation systems.**

EV readiness can be achieved for the very low cost of pre-installed conduit, and properly sized electric panels. This can be very cheap for new construction or for anytime a parking lot is repaved, sidewalks moved or replaced, or structures renovated.

The following tables provide general "rules of thumb" pertaining to plug-in EV chargers (technically referred to as electric vehicle supply equipment or EVSE). Charging equipment is now available from a variety of vendors. Again, *the most optimal time to install charging at the lowest possible cost is during parking lot resurfacing or new construction*. Here are some resources for finding charging equipment:

- Plug-in America http://www.pluginamerica.org/
- Go Electric Drive http://goelectricdrive.com/

Charging Equipment (EVSE)	Typical user profile	Equipment cost[1] (avg. per unit)	Install cost[2] (avg. per unit)
Level 1	Parked for 6-8 hours	$300-$700	<$1,000
Level 2	Parked for 2-4 hours	$1,000- $2,500	$3,000-5,000
DC Fast Charge (DCQ)	Quick stop for 5-30 minutes	$25,000-$35,000	$14,000-20,000

1. Equipment costs will be more for 2-4 ports and combination units.
2. Installation cost is for minimal trenching needs and no service upgrades. Costs increase for sites requiring trenching and/or electrical panel upgrades.

over

Charging Basics

There are three basic levels to charge plug-in electric vehicles. The vehicles from every manufacturer are equipped with standardized connectors. How long it takes to charge at each level depends on how far a car is driven and the size of the battery on board. Charging speed is governed by the size of the on-board charger and power lever of the charging equipment.

Charging Equipment (EVSE)	Power Supply	Charging Power	Miles of Range for 1 Hour of Charge
Level 1	120 VAC (volts AC) Single Phase	1.4 kW at 12 amp (on-board charger)	3-4
Level 2	240 VAC Single Phase Up to 19.2 kW (up to 80 amps)	3.3 kW (on-board) 6.6 kW (on-board)	8-10 17-20
DC Fast Charge (DCQ)	200-450 volts DC Up to 90 kW (~200 amps)	45 kW (off-board)	50-60

For Assistance

[Note: This section was written with SANDAG project managers in mind.]

For site specific installation information and power availability, contact Randy Schimka, San Diego Gas & Electric (SDG&E), RSchimka@semprautilities.com, (858) 248-3515. SANDAG's Energy Team can provide additional assistance related to other site considerations, standards, and RFP/RFQ language for EV chargers. Contact Susan Freedman, susan.freedman@sandag.org, (619) 699-7387.

CALGreen

The CALGreen code sections relevant to electric vehicle charging infrastructure installation and referenced below can be found in the California Building Standards Commission 2012 Supplement:[12]

EVSE Codes for Residential Buildings

The voluntary code calls for at least three percent of the total parking spaces, but not less than one, in low-rise multi-family dwellings be prepared to support electric vehicle charging infrastructure in the future. This entails installing any underground conduit that would be needed for future installations. Single/dual-family homes are suggested to install a raceway to accommodate a dedicated branch circuit.

A4.106.6.1 One-and two-family dwellings.
Install a listed raceway to accommodate a dedicated branch circuit. The raceway shall not be less than trade size 1. The raceway shall be securely fastened at the main service or subpanel and shall terminate in close proximity to the proposed location of the charging system into a listed cabinet, box or enclosure. Raceways are required to be continuous at enclosed or concealed areas and spaces. A raceway may terminate in an attic or other approved location when it can be demonstrated that the area is accessible and no removal of materials is necessary to complete the final installation.

A4.106.6.2 Multifamily dwellings.
At least 3 percent of the total parking spaces, but not less than one, shall be capable of supporting future electric vehicle supply equipment (EVSE).

A4.106.6.2.1 Single charging space required.
When only a single charging space is required, install a listed raceway capable of accommodating a dedicated branch circuit. The raceway shall not be less than trade size 1. The raceway shall be securely fastened at the main service or subpanel and shall terminate in close proximity to the proposed location of the charging system into a listed cabinet, box or enclosure.

A4.106.6.2.2 Multiple charging spaces required.
When multiple charging spaces are required, plans shall include the location(s) and type of the EVSE, raceway method(s), wiring schematics and electrical calculations to verify that the electrical system has sufficient capacity to simultaneously charge all the electrical vehicles at all designated EV charging spaces at their full rated amperage. Plan design shall be based upon Level 2 EVSE at its maximum operating ampacity. Only underground raceways and related underground equipment are required to be installed at the time of construction.

EVSE Codes for Non-Residential Buildings

For non-residential development, it is mandatory to provide designated parking for low-emitting, fuel-efficient, and carpool/vanpool vehicles, including electric vehicles (A5.106.5.1). Voluntary standards identify designated parking spaces for 10 percent of parking spaces (Tier 1) or 12 percent (Tier 2).

A5.106.5.3 Electric Vehicle Charging.

Provide facilities meeting Section 406.7 (Electric Vehicle) of the California Building Code and as follows:

A5.106.5.3.1 Electric vehicle supply wiring.

For each space required in Table A5.106.5.3.1, provide panel capacity and dedicated conduit for one 208/240V 40 amp circuit terminating within 5 feet of the midline of each parking space.

Table A5.106.5.3.1

Total number of parking spaces	Number of required spaces
1-50	1
51-200	2
201 and over	4

Assembly Bill 1092[13], if adopted, would mandate PEV-ready standards for multi-family residential and non-residential new buildings to take effect in January 2017. The bill would also adopt CALGreen electric vehicle voluntary codes as as mandatory state standards.

Building Code Resources

Many local jurisdictions in California have established mandatory building codes requiring conduit and wiring for EVSE to be installed during in the construction phase of a project. These policies enable communities to become more PEV-ready by removing the high construction costs from home and business owners. No jurisdiction in the San Diego region has yet to adopt building codes that require pre-wiring for EVSE. The following are examples from two southern California cities that have:

City of Los Angeles

Mandatory Green Building Code Standards for Newly Constructed Residential and Non-Residential EVSE:

Low-rise residential building: *Electric Vehicle Supply Wiring 99.04.106.6.*

1) For one-or two- family dwellings and townhouses, provide a minimum of:
    a. One 208/240 V 40 amp, grounded AC outlet, for each dwelling unit; or
    b. Panel capacity and conduit for future installation of a 208/240 V 40 amp, grounded AC outlet, for each dwelling unit
2) Residential occupancies where there is a common parking area, provide:
    a. Provide a minimum number of 208/240 V 40 amp, grounded AC outlet(s), that is equal to 5% of the total number of parking spaces. The outlet(s) shall be located in the parking area; or
    b. Panel capacity and conduit for future installation of electrical outlets. The panel capacity and conduit size shall be designed to accommodate the future installation, and allow the simultaneous charging, or a minimum number of 208/240 V 40 amp, grounded AC

outlets, that is equal to 5% of the total number of parking spaces. The conduit shall terminate within the parking area; or

c. Additional service capacity, space for future meters, and conduit for future installation of electrical outlets. The service capacity and conduit size shall be designed to accommodate the future installation, and allow the simultaneous charging, or a minimum number of 208/240 V 40 amp, grounded AC outlets, that is equal to 5% of the total number of parking spaces. The conduit shall terminate within the parking area

Non-residential and high-rise residential building: *Electric Vehicle Supply Wiring 99.05.106.5.2*

1) Provide a minimum number of 208/240 V 40 amp, grounded AC outlet(s), that is equal to 5% of the total number of parking spaces. The outlet(s) shall be located in the parking area

City of Temecula

Circuits for electric vehicle charging stations shall meet all the requirements of California Electrical Code Article 62540. Residential garages shall have a minimum three quarter (3/4) inch metal flex conduit ran from meter box to the garage fire wall and terminated in a metal box at forty-two (42) inches above finished floor for future electric vehicle charging station.[14]

Towing Alternative Fuel Vehicles Presentation

Presented By: Greg Newhouse
Advanced Transportation Technology & Energy Program – San Diego Miramar College
gnewhous@sdccd.edu

Alternative Fuel Vehicles Provide a Key Value in relation to:

Public Health and Environment

- Lower greenhouse gas (GHG) emissions
- Lower particulate pollution
- Lower carcinogens

Energy Security

- Alternative Fuels Plentiful in U.S.
- Existing infrastructure

In Regards to Roadside Assistance- Safety is the Key Issue

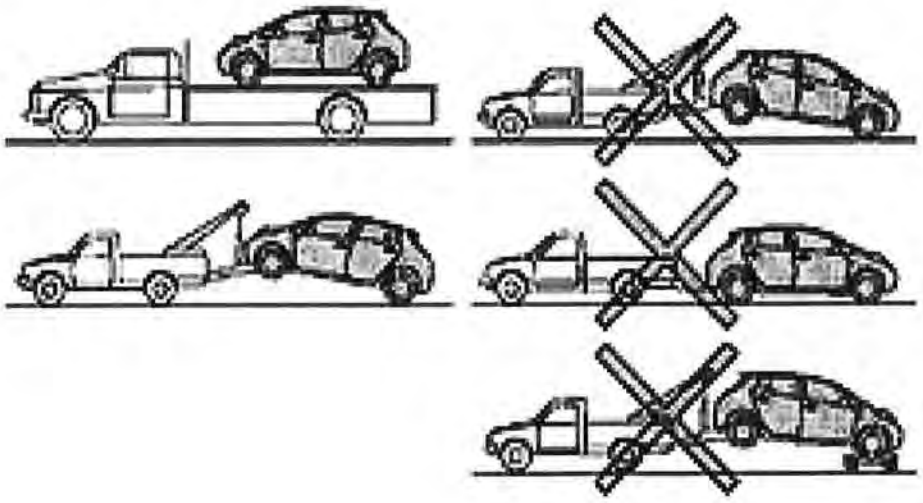
For Electric, Hybrid and Plug-in Hybrid

- Do not touch the orange wires
- Do not assume even if the vehicle has not been operated that the battery is fully discharged. High voltage capacitors can hold the electrical charge for up to 10 minutes after a vehicle shut down.
- Consider all orange coded cables to be energized until proven otherwise.

For Natural Gas

- Check whether or not there is a smell of natural gas – if there is, do not tow.

Towing – flatbed is the most recommended approach



RESOURCES – there are still many individual differences in all the alternative fuel vehicles – here are some resources:

- Honda Emergency Response Guide for CNG Civic

  https://techinfo.honda.com/rjanisis/pubs/web/Y0661.pdf

- General Motors Emergency Response Guide for Volt

  http://boronextrication.com/files/2010/11/2011-Chevrolet-Volt-Emergency-Response-Guide_ERG.pdf

- Toyota Prius Emergency Response Guide – Hybrid 2012

  http://boronextrication.com/files/2010/11/2012_Toyota_Prius_V_Hybrid_Emergency_Response_Guide.pdf

- Honda EV Fit Emergency Response Guide
- http://evsafetytraining.org/~/media/Electric%20Vehicle/Files/PDFs/Fit%20EV%20Response%20Guide.pdf
- Ford Focus Electric – Emergency Response
- http://boronextrication.com/files/2010/11/2012_Focus_Electric_Emergency_Response_Guide.pdf
- Nissan LEAF Emergency Response Guide
- http://boronextrication.com/2011/01/nissan-leaf-emergency-response-guide-erg/
- Ford Wrecker Towing Manual

  http://www.motorcraftservice.com/vdirs/quickref/2012_WreckerTowing_Manual.pdf

FireFighter Nation 2007

http://my.firefighternation.com/profiles/blogs/889755:BlogPost:24782?q=profiles/blogs/889755:BlogPost:24782

- **Alternative Fuel Emergency Response Guides:** Download Hybrid Response Guide - Chevrolet Malibu
  Download Hybrid Response Guide - Ford Escape
  Download Hybrid Response Guide - Honda - All Models
  Download Hybrid Response Guide - Lexus 450h
  Download Hybrid Response Guide - Lexus RX400h
  Download Hybrid Response Guide - Nissan Altima
  Download Hybrid Response Guide - Saturn Aura
  Download CNG Response Guide - Toyota Camry - CNG
  Download Hybrid Response Guide - Toyota Camry
  Download Hybrid Response Guide - Toyota Fuel Cell Hybrid Combo
  Download Hybrid Response Guide - Toyota Highlander
  Download Hybrid Response Guide - Toyota Prius - Generation 1
  Download Hybrid Response Guide - Toyota Prius - Generation 2
  Download Hybrid Response Guide - Toyota Rav4

Electric Vehicle Infrastructure Training Program (EVITP) Summary

On January 29, 2013, at SDG&E's Energy Innovation Center, there was a great turn-out for the Electric Vehicle Infrastructure Training Program (EVITP) seminar. Participants from electrical contractors, planners to inspectors and government officials all came by to learn more about Electric Vehicle (EV) infrastructure and upcoming public charging station projects in the San Diego region.

The following presentations were given during the course of the seminar:

- Introduction to EV Infrastructure Training and Instructors (Bernie Kotlier, EVITP)
- EV Codes and Standards (Rubio Rubio, EVITP)
- Site Assessments, Load Calculations, and Safety (Rubio, Rubio)
- EV Permitting (Bernie Kotlier and Tyler Petersen, CCSE)
- Introduction to Utility Notification (Bernie Kotlier)
- San Diego Gas & Electric Utility Presentation (Joel Pointon, SDG&E)
- "PEV-Ready" Policy Recommendations (Tyler Petersen)
- City of San Diego (Martin Montessoro, Development Services Department)
- City of Chula Vista (Andrew McGuire, Sustainable Communities Outreach Program)
- NRG Energy, eVgo San Diego Project (Jill Brandt)
- Charge Point America, MultiCharge San Diego project (Michael Jones)
- ECOtality (Andy Hoskinson)
- The California Fleets and Workplace Alternative Fuels Project, San Diego (Kevin Wood, CCSE/San Diego Regional Clean Cities)

Attendees were given presentations that ranged from EV codes and standards, and information about on-site assessments to load calculations and safety guidelines for the installation of charging stations. Attendees learned about how and where electricians can be trained to properly install Electric Vehicle Supply Equipment (EVSE), the best practices of EVSE permitting and inspection, how cities can best accommodate EVs in their new policy, and what new EV projects are taking root in the San Diego region.

eVgo presenter, Jill Brandt, stated that San Diego will be the first region in California to see eVgo's "Freedom Stations", which will include a DC Fast Charger and level 2 charging options. ChargePoint America presenter, Michael Jones, provided audience members with an overview of the Multi-Charge San Diego project, which will install approximately 200 level 2 EVSE charging stations at multi-family locations within the County of San Diego. The project will also create a Load Research Monitoring pilot program that will provide data on load management and demands on transformers to aid utilities in developing capital infrastructure plans.

Additionally, during lunch time, attendees got a chance to look at EVs on display, such as the all-electric Toyota RAV-4 and the Ford C-MAX plug-in hybrid, and browse samples of charging equipment as well.

Lessons Learned

With the wide variety of presentations given from experts across the industry, the following are significant outcomes and lessons learned that attendees walked away with:

- The EVITP representatives highlighted the importance of having properly trained electricians to install EVSE's.
- With the assistance of Bernie Kotlier, Tyler Petersen of CCSE identified the need to streamline the permit and inspection process of residential EVSEs.
- Joel Pointon of SDG&E identified the importance of utility notification of an EVSE installation.
- Martin Montessoro and Andrew McGuire provided a municipality perspective and highlighted the internal benefit of adopting EVSE permitting and inspection best practices.

- Representatives from ECOtality, eVgo and ChargePoint displayed their businesses and identified their next steps towards the installation of EVSE's across San Diego County through projects such as the Multi-Charge San Diego project, The EV Project and "Freedom Station" installations.
- With the framework already in place in Houston Texas, eVgo highlighted the potential for a large amount of multi-unit dwelling installations across San Diego County.

Electric Vehicle Infrastructure Training Program (EVITP) Presentations

Introduction to EV Infrastructure Training and Instructors *EV Codes and Standards/Site Assessments, Load Calculations, and Safety Guidelines*	
Description	The EVITP program is a structured platform for delivering training and certification for the installation of (EVSEs) in and around Residential, Commercial & Public Facilities. EVITP is a non-profit, volunteer, EV industry, collaborative training program that addresses the technical requirements, safety imperatives, and performance integrity of industry partners and stakeholders. The EVITP provides training on EV codes and standards, will teach electricians how to properly complete a site assessment and load calculation while highlighting safety as a top priority.
Key Items	The detailed EVITP program provides assurance that trained electricians will have the knowledge and skill to properly install an EVSE. Although all EVSE installations must be completed by a California State Licensed electrician, it currently is not a requirement that the electrician be EVITP certified. With the amount of detail and the associated skills needed to complete an EVSE installation, it is highly encouraged that all electricians working in the electric vehicle industry receive this training.
Next Steps	If you are interested in locating an EVITP certified electrician, please contact Bernie Kotlier directly to receive a list of contractors who employ these electricians. • Bernie Kotlier, EVITP • lmccenergy@gmail.com

Permitting for Electric Vehicle Supply Equipment (EVSE) Installations*	
Description	The typical cost of a residential EVSE installation ranges from $300 to $1,900 in California, according to Mr. Kotlier. Associated permit fees typically contribute to 5% - 20% of the total cost of the installation. According to national data from SPX, permit fees have ranged from $0 to $625, with the average permit fee in California among the highest in the nation.
Key Items	Because of the high and unpredictable cost of permits, it is imperative that the industry work to standardize processes in an attempt to provide consistency throughout all the different regions. According to the Plug-In Electric Vehicle Collaborative, a "Best Practice" permitting process for EVSEs would include the following elements: 1. A Unique Permit Application 2. Online (if available) or Over-the-Counter Permit Process 3. Template Based Forms 4. A Unique EVSE Permit Fee 5. Avoid Electrician Required Attendance at Inspection 6. Develop Outreach and Training Plans
Next Steps	For more information, please go to www.energycenter.org/pluginready for more information jurisdiction issuance time and permit cost for EVSE installations in the San Diego region.

**EVSE is also referred to as electric vehicle supply stations*

Introduction to Utility Notification/San Diego Gas & Electric Utility Presentation	
Description	While using electricity as a source to fuel electric vehicles, it is important that the utility be notified when an EVSE is being installed in their territory. As the infrastructure for EV's continues to grow, the demand on the grid will grow as well.
Key Items	It is important that customers are aware of the different EV rates that are provided by the utility. San Diego Gas & Electric customers who have an EV can sign up for an Electric Vehicle Time-of-Use (EV-TOU) rate and receive lower rates for charging their vehicle during off-peak hours, between midnight at 5 A.M. EV-TOU rates are offered to encourage customers to limit daytime usage of electricity, when demand for electricity is highest. By opening up the communication lines between customers who install an EVSE and the utility, customers have a greater opportunity for learning about all the available electricity rates for EV owners.
Next Steps	Download a copy of the For more information, please go to www.energycenter.org/pluginready

San Diego PEV Readiness Assessment & City PEV Projects Updates

"PEV-Ready" Policy Recommendations	
Description	The San Diego Regional PEV Readiness Assessment was recently released. This assessment evaluates the regional state of PEV readiness focusing on five core issues: 1. Zoning & Parking 2. Streamline Permitting and Inspection 3. Building Codes 4. Training and Education 5. Outreach to Local Businesses and Residents
Key Items	Based on the research conducted, the following recommendations have been proposed: • Implement consistent general service and regulatory signage for PEVs • Expand safety training for emergency first responders • Adopt/update prewiring for EVSE in residential and nonresidential new construction • Develop a PEV resources page on regional municipal websites
Next Steps	The complete assessment can be found at the following site: www.energycenter.org/pluginready

City of San Diego, Development Services Department	
Description	Martin Montessoro from the City of San Diego's Development Services Department presented to the group the city's Technical Policy 11B-1 along with a guide on "How to Obtain a Permit for Electric Vehicle Charging Systems". The City of San Diego is one of the first in the San Diego region to issue such policies.

Key Items	Technical Policy 11B-1, "Accessibility to Electrical Vehicle Charging Stations" was issued on April 19, 2012. The City of San Diego's policy applies to the installation of EV Charging Stations in both new and existing construction and is currently available for review. The policy also includes information on accessibility standards. The "How to Obtain a Permit for Electric Vehicle Charging Systems" is an informational bulletin that describes the permitting and inspection process for the installation of an Electrical Vehicle Charging system (EVCS) on an existing site or building.
Next Steps	The Technical Policy 11B-1 can be found at the following site: https://www.sandiego.gov/development-services/pdf/industry/tpolicy11b1.pdf The "How to Obtain a Permit for Electric Vehicle Charging Systems" can be found at the following site: http://www.sandiego.gov/development-services/pdf/industry/infobulletin/ib187.pdf

City of Chula Vista	
Description	In September of 2012, the City of Chula Vista submitted an informal request for quotes for a turn-key electric vehicle charging stations. The informal request for quotes were seeking service-oriented vendors to fully fund, install, operate, maintain, and market electric vehicle (EV) charging stations at municipal parking lots for public use.
Key Items	After reviewing the submittal proposals, the City of Chula Vista awarded ECOtality with this project with whom they are currently working with to install EVSEs at the 24 potential sites.

San Diego Regional Electric Vehicle Infrastructure Projects

NRG Energy, eVgo San Diego Project	
Description	eVgo, a subsidiary of NRG Energy, has committed to build hundreds of eVgo Freedom Station sites and the infrastructure for thousands of individual eVgo Level 2 charging stations throughout the state. These installations will take place at offices, multi-family communities and more throughout major metropolitan cities California. Each eVgo's Freedom Station site have installed – one L2 station, one DC fast charging station and one "pre-install" for a second DC fast charger.
Key Items	eVgo is just getting started in the California market so in order to install these chargers throughout the state, eVgo will need to make connections with local municipal staff and become educated on the permitting processes and build the necessary network in order to identify potential installation sites.
Next Steps	In order to expedite these installations, it is important for eVgo to connect with municipal staff to learn the permitting process for their respective jurisdiction and streamline the DC fast charger installations. At events such as this, eVgo was able to make these connections.

Charge Point America, MultiCharge San Diego Project	
Description	Charge Point America received a California Energy Commission EVSE Infrastructure Grant for $499,512 plus matching commitments. The program will begin in Q2 of 2013 through community outreach and request for applications. These installations are expected to begin in Q3 2013 and complete in Q2 2014.
Key Items	For this project, Charge Point is expecting to install approximately 200 L2 EVSE charging stations at multi-dwelling unit (MDU) locations within the County of San Diego. Additionally, with this funding, a Load Research Monitoring pilot program is being created in order to provide data on load management and demands on transformers to aid utilities in developing capital infrastructure plans.
Next Steps	Charge Point America highlighted the importance of collaborating with the City of San Diego, SDG&E and The San Diego Association of Governments in order to streamline the permitting process for installing EVSE infrastructure at MDU locations.

ECOtality, MultiCharge San Diego Project	
Description	Managing the largest deployment of electric vehicles and charging infrastructure in history, ECOtality provided a summary and update on The EV Project. In August 2009, ECOtality was awarded a $99.8 million dollar grant from the U.S. Department of Energy which launched in October of 2009. As of today, more than 300 Blink stations have been installed in San Diego through The EV Project subsidies.
Key Items	The EV Project has given the industry a great jump start to the installation of EVSEs; however, it has also exposed barriers in the San Diego market that will need to be continually addressed in order to expand the PEV market.
Next Steps	The EV Project is in the process of completing the installations for its subsidy program in the San Diego region. The next steps will study the utilization of the charging stations in its network. These studies will likely be published as white papers on the EV Project website by Q4 2013.

The California Fleets and Workplace Alternative Fuels Project, San Diego	
Description	The California Fleets and Workplace Alternative Fuels Project are multiple efforts aimed at eliminating the barriers to deployment of alternative fuel vehicles. Best practices, training initiatives and market development and outreach are just a few steps that are being taken to reach the program goals.
Key Items	In order to reduce barriers, best practice toolkits are being created for the permitting of Natural Gas stations, hydrogen stations and fleet deployment of alternative fuel infrastructure. Additionally, it is imperative that training needs around alternative fuel and advanced technology vehicles be assessed and the appropriate trainings be coordinated.
Next Steps	At the first part of this year, the project is really focusing on training needs and assessments. Moving into the summer months, the focus will shift onto best practices development. In the Fall of this year, the program focus will transition to trainings and best practice workshops.

Plug-in Electric Vehicles

San Diego Regional Nonresidential Charging Infrastructure Study

As the market for plug-in electric vehicles (PEVs) develops, it will be critical that existing and potential charging infrastructure site hosts, industry stakeholders, and policy makers better understand the value of hosting a public or workplace charging station. The California Center for Sustainable Energy (CCSE) has produced a draft report that provides insight into the value proposition for companies and institutions in the San Diego region that install charging infrastructure, known as electric vehicle supply equipment (EVSE).[1]

Study Scope and Design

CCSE's study of nonresidential charging infrastructure hosts was designed to answer three key questions:

- What is the cost of hosting Level 2 charging equipment?
- Are PEV drivers willing to pay sufficient fees to cover these costs?
- What is the significance of non-revenue benefits to charging infrastructure hosts?

Methods of Data Collection

To answer the above questions, CCSE leveraged several methods of data collection:

- A survey was administered to San Diego workplaces and public locations hosting Level 2 EVSE to analyze their motivations and costs incurred (43 locations contacted, 22 responded)
- Discounted cash flow modeling to analyze project economics[2]
- San Diego PEV owners were surveyed to gather data on their willingness to pay for nonresidential Level 2 charging (4,270 drivers contacted, 1,040 responded)

San Diego PEV Drivers' Willingness to Pay for Charging

The table below displays regional PEV owners' reported willingness to pay (WTP) for daily charging and occasional PEV charging based on two billing methods: $ per one hour and dollars per kilowatt hour (kWh).

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

For daily charging, survey respondents reported a median WTP of about $0.15 per kWh, which is about a $0.02 per kWh markup over the average California residential rates of $0.13 per kWh. For occasional charging, survey

[1] CCSE's Research and Analysis team presented the draft report *Providing a Place to Plug In: The Value Proposition of Hosting Level 2 Nonresidential 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

[2] The discounted cash flow model developed for this study estimates cash flows to the EVSE host – that is, a private company, public agency, or other institution – who purchases the EVSE equipment, pays for the equipment installation, operates the equipment, covers electricity costs associated with the EVSE, and covers the cost of billing users.

respondents reported an average willingness to pay of about $0.30 per kWh, which is about a $0.17 per kWh markup over the typical California residential rates.

Utilization and Cost Recovery Assumptions

How much a host would have to charge to recover installation and operation costs largely depends on how often their EVSE are used. The study used the following assumptions to estimate the breakeven user fees needed for both a workplace and public utilization setting.[3]

- Public Level 2 setting assumes four charge events per day for 1.5 hours per charge event, or a 25 percent utilization rate
- Workplace Level 2 setting assumes three charge events per day for two hours a day, or a 17 percent utilization rate
- Hosts received no subsidies or tax credits for the EVSE

Non-Financial Benefits of Hosting Charging Infrastructure

The study examines the motivations of San Diego companies and public institutions that invest in EVSE, and what non-revenue benefits they experience by hosting charging infrastructure.

- The primary reasons companies invested in EVSE were to enhance part of an established sustainability plan and to provide a service to their customers/clients
- 90 percent of the hosts interviewed believe that the EVSE investment had a positive impact on the company or institution's brand
- Almost 60 percent reported that hosting EVSE increased visitation to their business

Key Conclusions

- Breakeven user fees are very sensitive to utilization rates of charging infrastructure
- PEV owners' WTP of $0.30/kWh for "occasional charging" is in line with the breakeven user fees for hosts that invest in a lower cost EVSE[4]
- PEV owners' WTP of $0.15/kWh for "daily charging" is not high enough to recoup EVSE costs
- Non-revenue benefits are important to early adopters of EVSE
- Hosts may be willing to subsidize charging costs to enjoy the non-revenue benefits of hosting EVSE

Resources

California Center for Sustainable Energy. (2012). California Plug in Electric Vehicle Owner Survey. Retrieved from https://energycenter.org/programs/clean-vehicle-rebate-project/vehicle-owner-survey/july-2012-survey

California Energy Commission. (2012). California Electricity Statistics. Retrieved Dec 19, 2012, from Statewide Electricity Rates by Utility, Class and other data: http://energyalmanac.ca.gov/electricity/index.html

U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. (2012). *Plug-In Electric Vehicle Handbook for Public Charging Stations Hosts* available at http://www.afdc.energy.gov/pdfs/51227.pdf

[3] The discounted cash flow model was used to estimate the breakeven user fee.

[4] A lower cost EVSE assume total equipment and installation costs at $2,000, billing costs at $0.40 per transaction and 3% user fee. A higher cost EVSE assume total equipment and installation costs at $10,000, billing costs at $0.50 per transaction and 7.5% user fee.

SAN DIEGO REGIONAL PLUG-IN ELECTRIC VEHICLE (PEV) READINESS PLAN

APPENDIX D

Contents: Resources and Terms

Resources

1. San Diego's Phase One Regional PEV Assessment, California Center for Sustainable Energy

   CCSE received Department of Energy (DOE) funding to perform an assessment of the region's PEV readiness. It contains an evaluation of how prepared jurisdictions in the region are for PEV deployment. Regions across state took survey for DOE project.

   www.energycenter.org/sites/default/files/docs/nav/programs/pev-planning/San_Diego_PEV_Readiness_Planning_Guide.pdf

2. Statewide and Regional PEV Readiness Reports, California PEV Collaborative

   The California PEV Collaborative, a multi-stakeholder public-private partnership, is working together to ensure a strong and enduring transition to a PEV market in California.

   www.pevcollaborative.org/pev-readiness-reports

3. The EV Project

   The EV Project collects and analyzes data to characterize PEV use in diverse conditions, evaluates EVSE effectiveness, and conducts trials of various revenue systems for PEV chargers. The Project releases its analyses and quarterly reports on the status of PEV usage in its project areas, including San Diego.

   www.theevproject.com/documents.php

4. Taking Charge: Establishing California Leadership in the Plug-In Electric Vehicle Marketplace, California PEV Collaborative

   www.pevcollaborative.org/sites/all/themes/pev/files/docs/Taking_Charge_final2.pdf

5. Community PEV Readiness Toolkit, California PEV Collaborative

   This statewide toolkit offers tangible best practices examples and case studies from communities and stakeholders throughout California and abroad.

   www.pevcollaborative.org/sites/all/themes/pev/files/docs/toolkit_final_website.pdf

6. Ready, Set, Charge California: A Guide to EV–Ready Communities, Bay Area Climate Collaborative

   This guide is intended to assist California governments with the planning of and development for deployment of PEV infrastructure through a consistent framework.

   www.baclimate.org/images/stories/actionareas/ev/guidelines/readysetcharge_evguidelines.pdf

7. Ready, Set, Charge California! Linking EVs, Fast Chargers, & Storage to the California Grid, Bay Area Climate Collaborative

   This supplement addresses strategies for charging site hosts to mitigate energy costs and the use of the electric vehicle battery in providing grid-linked services.

   www.baclimate.org/images/stories/actionareas/ev/guidelines/readysetcharge_evfastchargestoragegrid.pdf

Glossary of Terms and Abbreviations

Glossary of Terms, Abbreviations, and Acronyms Abbreviation or Acronym	Description
A	Amperes or amps. The International System of Units base unit of electric current.
AB	Assembly Bill
AC	Alternating current. It is the flow of electric charge which periodically changes directions.
ADA	Americans with Disabilities Act of 1990, which prohibits discrimination based on disability.
ARRA	American Recovery and Reinvestment Act of 2009, which was an economic stimulus package developed as an effort to create and save U.S. jobs.
ATTE	Advanced Transportation Technology and Energy
BEV	Battery electric vehicle. A vehicle fueled entirely by electricity stored in the onboard battery. They often produce zero tailpipe emissions while operating. A BEV is a type of plug-in electric vehicle (see “Plug-in Electric Vehicle, PEV”).
CalETC	California Electric Transportation Coalition
CALGreen	California Green Building standards
CAP	Climate Action Plan
CARB	California Air Resources Board
CCR, Title 24	California Code of Regulations, Title 24. Commonly known as the California Building Standards Code.
CEC	California Energy Commission
CCSE	California Center for Sustainable Energy
Charger	A device that is designed to charge batteries or other energy storage options within electric vehicles.
Charging level	Standardized indicators of electrical force, or voltage, at which an electric vehicle’s battery is recharged and referred to as Level 1 (120 VAC), Level 2 (240 VAC), and Level 3 (or DC/AC Fast Charging).

Circuit breaker	A device that protects and electrical circuit from damage caused by overloaded electrical current or short circuit.
CNCDA	California New Car Dealers Association
CNG	Compressed natural gas
CPUC	California Public Utilities Commission
CVRP	California Air Resource Board's Clean Vehicle Rebate Project
DC	Direct current. Electric current that moves in one direction from anode to cathode.
DMV	Department of Motor Vehicles
DOE	U.S. Department of Energy
EAA	Electric Auto Association
EPRI	Electric Power Research Institute
EVITP	Electric Vehicle Infrastructure Training Program
EVP	The EV Project, managed by ECOtality
EVSE	Electric vehicle supply equipment. This includes the charging station itself and all components required for the installation and use of an electric vehicle charging station, such as: conductors, plugs, power outlets, wiring, ground connectors, etc.
EVSP	Electric vehicle service providers
FHWA	U.S. Department of Transportation Federal Highway Administration
GHG	Greenhouse gas. Any of the gases (e.g., carbon dioxide, methane, ozone, and fluorocarbons) emitted that contribute to the greenhouse effect by absorbing solar radiation once in the atmosphere.
HEV	Hybrid electric vehicle. A motor vehicle that is powered by both an electric propulsion system with a conventional internal combustion engine. A hybrid electric vehicle does not plug into an off-board electrical source.
HOA	Homeowners Association
HVIP	California Air Resource Board's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project

HOV	High occupancy vehicle
ICC	International Code Council
ICE	Internal combustion engine. An engine which combusts petroleum-based fuel to power a vehicle.
IOU	Investor owned utility
J1772	Industry-wide standard EV connector for Level 2 charging.
kW	Kilowatt. A unit of power equal to 1,000 watts.
kWh	Kilowatt hour. A unit of energy commonly used for measuring energy capacity. This is the commonly known billing unit for electricity customers.
LCFS	Low Carbon Fuel Standard
LEV	Low emission vehicle
MUD	Multi-unit dwelling or Multi-family dwelling unit
MOU	Municipally-owned utility
MUTCD	Manual on Uniform Traffic Control Devices
NEC	National Electrical Code
NREL	National Renewable Energy Laboratory
OEM	Original equipment manufacturer
PEV	Plug-in electric vehicle. Any motor vehicle for on-road use that is capable of operating only on the power of a battery (or other storage device that receives electricity from an external source, such as a charger).
PEVC	California Plug-in Electric Vehicle Collaborative
PHEV	Plug-in hybrid electric vehicle. A type of plug-in electric vehicle (see “PEV”) that is fueled by both a battery and another fuel source, usually a gasoline-powered internal combustion engine.
Plan	Plug-in Electric Vehicle (PEV) Readiness Plan
Pre-wiring	The practice of providing sufficient basic infrastructure, such as conduits, junction boxes, adequate lot space, and adequate electrical panel and circuitry capacity, to meet anticipated future demand for EVSE.

the Region	San Diego Region
REVI	San Diego's Regional Electric Vehicle Infrastructure working group.
SAE	Formerly Society of Automotive Engineers
SANDAG	The San Diego Association of Governments
SCS	Sustainable Communities Strategy
SDG&E	San Diego Gas and Electric
TOU	Time-of-use. An electricity billing method with rates based upon the time of electricity usage during the day.
UL	Underwriters' Laboratory
VMT	Vehicle miles traveled
W	Watt. A unit of power, defined as one joule per second, which measures the rate of energy transfer.
ZEV	Zero-emission vehicle. A vehicle that emits no tailpipe pollutants from the onboard source of power.

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