Employers' Guide to Installing Workplace Charging for Plug-in Electric Vehicles



Are you thinking about installing plug-in electric vehicle charging stations at your company? Workplace charging offers many benefits to employers, employees and the broader community. This guide provides steps to implement a workplace charging program and a list of additional resources.

Research Options and Develop a Plan

Choose a System

Create and Follow an Installation Checklist Establish and Follow WPC Policies and Procedures

Evaluate and Monitor Program

Figure 1. Steps to implement a workplace charging program.

Step 1: Research Options and Develop a Plan

- Review key resources on workplace charging (WPC), including Best Practices for Workplace Charging and Amping Up California Workplaces: 20 Case Studies on Plug-in Electric Vehicle Charging at Work. (See Figure 1a and Additional Resources.)
- Survey your employees to determine their current and future interest in purchasing plug-in
 electric vehicles (PEVs) and charging at work. This will help you determine how much and
 what kind of WPC is best suited for your workplace. Questions could include employees'
 daily commute distance, whether they currently own or are considering buying a PEV and
 their willingness to pay for charging. A sample survey can be found in Best Practices for
 Workplace Charging. (See Additional Resources.)





Figure 1a.

- If you lease the office building or parking lot, talk to your landlord or other facility managers to obtain permission to install charging.
- Evaluate electrical connections to determine whether system upgrades will be needed.
- Create a budget that includes the equipment purchase, installation and operating costs.
- Contact your local electric utility to discuss available rate options, including any special PEV rates.
- Explore any available incentives or tax credits.
- · Plan for future growth.
- Create an advisory or user group to help verify that practices and policies are on target and to act as a sounding board when considering changes.
 - -Take advantage of any parking area construction to add capacity for future workplace charging.
 - Install oversized conduit for future expansion.



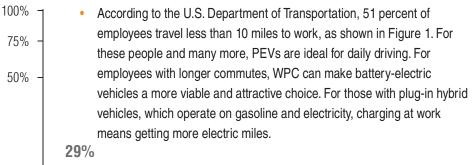
Step 2: Choose a System

• There are three basic levels of charging. Each differs by charging rate and therefore the amount of time it takes to "fill up" a PEV's batteries, as shown in Table 1.

Type of Charging	Power Levels (installed circuit rating)	Miles of Range per Hour of Charging*
AC Level 1	110/120VAC at 15 or 20 Amps	~4-6 miles/hr.
AC Level 2		
3.3 kW (low)	208/240VAC at 30 Amps	8-12 miles/hr.
6.6 kW (medium)	208/240VAC at 40 Amps	16-24 miles/hr.
9.6 kW (high)	208/240VAC at 50 Amps	24-36 miles/hr.
19.2 kW (highest)	208/240VAC at 100 Amps	> 60 miles/hr.
DC Fast Charging * Refer to vehicle specifications for	200-500VDC at up to 200 Amps	Generally up to 80% charge in less than 30 minutes

Table 1. Charging levels for workplace applications. Source: Adapted from *Plug-in Electric Vehicle Charging Infrastructure Guidelines for Multi-unit Dwellings*, California Plug-In Electric Vehicle Collaborative (2013).

Charging stations are known formally as electric vehicle supply equipment (EVSE). There
are many makes and models to choose from. Which station or combination of stations is
right for your workplace will depend on how far your employees travel to work (and
therefore how much charging they need), whether you intend to charge a fee for use,
and other features you might want such as network access, management and reporting.
Refer to the Additional Resources list below for details.



What Level of Charging is Best?

Employers may wish to install a variety of charging levels based on how far employees drive, whether they rely on the workplace as their primary charging venue and how long they park. For example, an employee who drives 20 miles roundtrip may find Level 1 sufficient, while an employee who drives 60 miles roundtrip but lives in an apartment building without home charging may benefit from Level 2 or even DC Fast Charging.

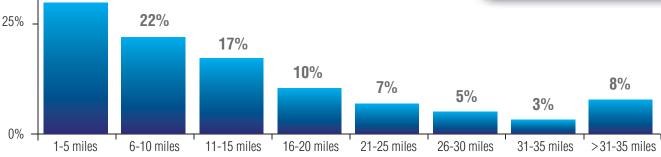


Figure 2. One-way distance traveled by the average commuter from home to work on a typical day. Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *Omnibus Household Survey* (2003).

Aggregated data cover activities for the month prior to the survey.



Step 3: Create and Follow an Installation Checklist

- Conduct a site assessment to determine the charging site(s).
- Check compliance with the Americans with Disabilities Act (See Additional Resources for Universal Charging Access Guidelines).
- Estimate the electrical load.
- Coordinate with your local utility.
- Contact equipment suppliers.
- Hire prime contractor and verify subcontractor credentials.
- Have contractor pull all necessary construction permits.
- Install charging equipment.
- Activate system.



Evernote provides 10 Level 2 charging stations and one DC Fast Charger for employees.

Cost Considerations

Installation costs will vary depending upon power requirements, siting considerations, the choice of equipment and availability of WPC incentives.

Operational costs include the electricity, demand charges, charging network costs and transaction fees.

Step 4: Establish and Follow WPC Policies and Procedures

- Establish clear internal policies and procedures in order to manage your WPC program effectively.
- As outlined in *Best Practices for Workplace Charging*, issues to consider include:
 - Payment options

Free charging

Hourly fee (\$/hr)

Electricity usage charge (\$/kWh)

Tax implications

Research any tax implications of offering charging as an employee benefit (See Additional Resources)

Access priorities

Employee-only vs. public use

Fleet vehicles vs. employee vehicles vs. public vehicles

Dedicated charger vs. charger shared by multiple employees

System optimization

Manage use among multiple employees

- Determine maximum charging time per vehicle
- Install signage to indicate PEV parking only, time limits, etc.

Establish schedules to avoid charging during critical peak load times

Evaluate usage data and make adjustments if needed

Integrate PEV charging with the building electricity load

CHARGING

7AM TO 6PM

- Evaluate your WPC program, employee response, system use, etc.
- Review data to make adjustments and plan next phase.





Additional Resources

- Advanced Energy, Project Insights: Real-World Charging Behavior at the Workplace (2013)
 http://www.advancedenergy.org/transportation/resources/PEVUsageStudyIR_WorkplaceCharging.pdf?_cldee=bWFyeUBicmF6ZWx
- California Governor's Office of Planning and Research, Plug-In Electric Vehicles: Universal Charging Access Guidelines and Best Practices (2013)
 - http://opr.ca.gov/docs/PEV_Access_Guidelines.pdf
- California Plug-In Electric Vehicle Collaborative, Amping Up California Workplaces: 20 Case Studies on Plug-in Electric Vehicle Charging at Work (2013)
 - http://www.pevcollaborative.org/workplace-charging" www.pevcollaborative.org/workplace-charging
- California Plug-In Electric Vehicle Collaborative, Employers' Guide to Workplace Charging (2013)
 www.pevcollaborative.org/workplace-charging
- California Plug-In Electric Vehicle Collaborative, How Can I Get Charging at My Workplace? (2013) www.pevcollaborative.org/workplace-charging
- California Plug-In Electric Vehicle Collaborative, Workplace Charging: Why and How? (2012) http://www.pevcollaborative.org/sites/all/themes/pev/files/Comm_guide7_122308.pdf
- California Plug-In Electric Vehicle Collaborative, Why Employers Should Install Workplace Charging (2013)
 www.pevcollaborative.org/workplace-charging
- CALSTART, Best Practices for Workplace Charging (2013)
 http://www.calstart.org/Libraries/Publications/Best_Practices_for_Workplace_Charging.sflb.ashx
- Electric vehicle supply equipment (charger) listings
 http://www.pluginamerica.org/accessories
 http://www.pluginrecharge.com/p/electric-vehicle-supply-equipment-evse.html
 http://www.aqmd.gov/tao/Demonstration/ElectricHybrid/SoCalEV Ready Program.htm
- Internal Revenue Service fringe benefit information http://www.irs.gov/publications/p15b/ar02.html#en_US_2013_publink1000193740
- PEV Resource Center, Resources for Businesses
 http://www.driveclean.ca.gov/pev/Resources For Businesses.php
- UC Davis Institute of Transportation Studies, Charging for Charging: The Paradox of Free Charging and Its Detrimental Effect on the Use of Electric Vehicles (2013)
 - http://www.its.ucdavis.edu/?page_id=10063&pub_id=1919
- U.S. Department of Energy workplace charging resources http://www1.eere.energy.gov/vehiclesandfuels/electric_vehicles/resources.html