

## What is The EV Project Experience with Workplace Charging?

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### Key Conclusions

Workplace charging presents significant opportunities for the expansion of alternating current Level 2 electric vehicle supply equipment (EVSE). There are variations in workplace applications that distinguish them from other commercial EVSE siting. The EV Project developed models to deal with these variations. The following conclusions were drawn about workplace charging:

- Business-based charging (i.e., visitor, employee, and fleet) has characteristics different from other commercial applications.
- Visitor chargers at workplace locations operate in a manner similar to other commercial public charging.
- Employee charging was in its infancy during The EV Project; therefore, many businesses did not have enough employees with electric vehicles to warrant EVSE installations.
- Workplace EVSE need to have defined processes and procedures for shared use.

### The EV Project Workplace Applications

The EV Project offered three types of workplace charging: visitor, employee, and fleet (along with variations on each).

#### Visitor

A common experience with workplace charging during The EV Project was visitor-designated chargers at business host locations. These were typically publicly accessible chargers in the visitor portion of the host employer's parking lot. The employer/host's motivation to install visitor charging varied. Some wanted to use a visitor's charger to charge his/her own vehicle. Others were interested in adding an attraction for leaseholders and/or making a statement about the facility's position on sustainability that would appear positive to the local community.

Workplace visitor charger installations were physically more difficult than other types of installations when their location was in a visitor parking area distant from the source of electrical power. Typically, workplace chargers were sited in locations near the building's entrance and included restrictive signage. Workplace installs were least expensive when the decision to make the installation occurred prior to or during construction of the workplace facility itself.

Analysis of charging data indicated that because workplace visitor chargers were often in places not observable from

the street and the sites were less frequented than a retail location, the public was less aware of their availability, consequently receiving less use. Even when shown on website maps to aid in locating the EVSE, the site typically offered nothing for most electric vehicles drivers to do, except charge. Businesses that were not retail establishments generally did not have an interest in electric vehicles coming to their location to charge and occupy a parking space if they did not have a reason to visit that was related to the business of one of the tenants. Overall, businesses provided The EV Project with a receptive host for a visitor workplace charger, but with lower traffic flow and fewer plug events.

#### Employee

Many employers were interested in providing plug-in electric vehicle charging for their employees. Employers were interested and committed time to working with The EV Project on how chargers might be sited and paid for. However, they often did not actually go ahead with the installation. A good deal of the hesitation was over the low number of electric vehicles seen in their area. Because the employers did not see many (if any) electric vehicles in their employee lot, they did not generally translate interest into action. There were notable exceptions, with tech companies that more often did have employees driving electric vehicles to work or believing the availability of workplace charging would increase the attractiveness of their company as a place to work.

Employee charging presented several challenges. First, the employer needed to deal with any tax implications of providing a service that had monetary value to some, but not all, employees. Second, because a full recovery charge from a commute to work would usually only take an hour or two, there needed to be a method of rotating electric vehicles on and off the charger(s) in order to maximize charger use. Finally, many businesses were interested in combining utilization of the chargers as both visitor and employee chargers. Because the visitor and employee parking were usually separate areas, this "combination" was often not possible or resulted in visitor charging buried deep in an employee parking area (Figure 1).

#### Fleet

Fleet applications were the most complex of the workplace models launched by The EV Project. Workplace discussions were often held with business managers whose job relied on vehicles. Typically, each host management team introduced a number of requirements dictated by very individual ideas on how the process ought to be structured. Fleets desired a good deal more reporting and information produced from the charger (through the Blink network) than other hosts. Fleet owners also wanted a system that alerted them when an electric vehicle was fully charged, allowing

them to rotate in another electric vehicle. The EV Project worked with a number of fleet owners/managers to create programs for fleets that would best accommodate their needs. In spite of the complexity and idiosyncrasies of each program, The EV Project did develop complete processes and procedures for fleet charging applications that were field-tested in several different formats.



Figure 1. Combined visitor/employee charger installation.

## Discussion of Results

During the term of The EV Project, motivations for employers to host workplace charging included credits toward Leadership in Energy and Environmental Design certification; providing amenities for employees/customers that encourage loyalty; credit toward greenhouse gas reduction targets; and reduction of fleet costs. Difficulties for employers included avoiding preferential treatment of some employees, limiting parking at EVSE to “EV Only” (Figure 2), tax implications of benefits provided, cost of installation and operation of EVSE, electrical infrastructure limitations, and managing offsite charging of fleet vehicles. There were also cost considerations for employers, including additional electrical load (and corresponding demand charges from their energy provider) and loss of general parking spaces to “EV-Only” parking restrictions, which sometimes led to adding parking spaces to meet local zoning codes.

Businesses showed a great deal of interest in PEV charging for visitors, employees, and fleets. Interestingly, most of the chargers sited at businesses were for visitors, while most of the interest was in fleet charging. The reasons for this relate to what was easy versus what was complicated. Adding chargers for visitors was a straightforward decision. The agreement and installation were the same as for other public chargers.

Fleet charging came with various complications. The fleet manager needed to decide whether the fleet chargers would be open to employees and/or visitors. They had to

decide if they wanted to use offsite charging by using the publicly accessible charging network and, if so, how that would be paid for. The fleet manager had to consider what type of reporting information was needed and the project had to determine if it could be provided. These issues resulted in many discussions with The EV Project; however, it did not result in many fleet installations.



Figure 2. Employee internal combustion vehicles parked at charging locations.

Visitors fit in with other publicly accessible commercial chargers, with the exception that some businesses discouraged use by electric vehicle users that were not visitors to their facilities. This turned out to be more of a theoretical problem than an actual one. Commercial office buildings and other types of workplace hosts sometimes indicated they did not want “outsiders” using the chargers that they were installing for their visitors. In actual practice, once the chargers were installed, The EV Project did not get complaints from users or hosts over “outsider” charging.

## About The EV Project

The EV Project was the largest plug-in electric vehicle infrastructure demonstration project in the world, equally funded by the United States Department of Energy (DOE) through the American Recovery and Reinvestment Act and private sector partners. The EV Project deployed over 12,000 alternating current Level 2 charging stations for residential and commercial use and over 100 dual-port direct current fast chargers in 17 U.S. regions. Approximately 8,300 Nissan Leafs™, Chevrolet Volts, and Smart ForTwo Electric Drive vehicles were enrolled in the project.

Project participants gave written consent for The EV Project researchers to collect and analyze data from their vehicles and/or charging units. Data collected from the vehicles and charging infrastructure represented almost 125 million miles of driving and 4 million charging events. The data collection phase of The EV Project ran from January 1, 2011, through December 31, 2013. Idaho National Laboratory is

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responsible for analyzing the data and publishing summary reports, technical papers, and lessons learned on vehicle and charging unit use.

## Company Profile

Idaho National Laboratory is one of DOE's 10 multi-program national laboratories. The laboratory performs work in each of DOE's strategic goal areas: energy, national security, science, and the environment. Idaho National Laboratory is the nation's leading center for nuclear energy research and development. Day-to-day management and operation of the laboratory is the responsibility of Battelle Energy Alliance.

For more information, visit <https://avt.inl.gov/project-type/ev-project>.