Recommendations

Workplace Charging Database

Currently there is no database that specifically tracks workplace charging stations in California. This lack of data makes it difficult to assess key metrics and trends for workplace charging such as how far along the state is to meeting the 100,000 chargers goal, the rate of workplace charger adoption, and where there is unmet demand. We recommend that:

- California requires that all workplace chargers be registered in a centralized database
- Registration includes data on location, ownership, and usage to assist in future planning
- The registration process would be streamlined by requiring charging companies to be the registering party
- The database be made available to businesses, researchers, and the public

First Charger Rebate Program

While several funding opportunities exist at the local and state level, they favor larger companies by requiring companies install a minimum number of chargers, with the minimum often being as many as ten charging units. Because a key to increasing EV visibility and demand is incentivizing companies to install their *first* charger, we suggest a funding program to do just that. We recommend that:

- Funds be set aside for a First Charger Rebate Program to incentivize the adoption of the first workplace charging unit for businesses who need help overcoming the cost barrier.
- A new structure for the rebate program that covers 50% of the equipment and labor cost for businesses to install their first charger.

City EV Readiness Plan

Regional Readiness Plans, voluntary plans developed by a leading agency (e.g. an Air Pollution Control District), are currently being funded by the CEC. However, these plans often overlook individual cities where additional workplace-accessible charging is needed the most. We recommend that:

- Cities can apply for funding from the CEC by developing City EV Readiness Plans
- Successful plans will incorporate charger installation into city planning to give employees parking in city-owned parking lots access to EV charging.
- City EV Readiness Plans include the location and number of chargers, permitting information, technical infrastructure specifications, and the cost of plan implementation.

Acknowledgements

We would like to sincerely thank everyone who assisted us along the way. Specifically, our faculty advisor Dr. Sarah Anderson, our client Mr. Tyson Eckerle from Governor's Office of Business and Economic Development, our PhD. advisor Ms. Jessica Perkins, our external advisors James Hall from General Motors, Commissioner Janea Scott, and Rhetta deMese from California Energy Commission. Also, we would like to thank Yardi for their generosity in funding this project.

BREN SCHOOL
ENVIRONMENTAL SCIENCE & MANAGEMENT
UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Project Members:
Kathryn Collins | Tori Greenen
Adrienne Harris | Real Wen
Heather Martin

Project Advisors:
Dr. Sarah Anderson *and* Dr. James Frew

WORKPLACE CHARGING TO SUPPORT ONE MILLION ZERO EMISSION VEHICLES IN CALIFORNIA BY 2020

GROUP PROJECT BRIEF

http://www.gozero2017.com

SPRING 2017

Background & Significance

Currently in California commercial and personal vehicles account for well over half of the emissions that contribute to local air pollution and roughly 40% of the state's greenhouse gas (GHG) emissions. As the country's leader in climate policy, California has set forth ambitious targets of reducing its GHG emissions to 40% below 1990 levels by 2025 and 80% below 1990 levels by 2050. However, California cannot meet this goal without decarbonizing the transportation sector, so in 2013 Governor Jerry Brown signed an executive order (B-16-2012) to help bring one million zero emission vehicles (ZEVs) on the road by 2020 and 1.5 million by 2025. Most of these ZEVs will be plug-in electric vehicles (PEVs) which will need a robust charging network to support them.

Figure 1. Air pollution in Los Angeles.

Figure 2. Charging infrastructure is key to support adoption of electric vehicles.

The current lack of such a charging network is a widely acknowledged deterrent to purchasing a PEV. A 2014 study conducted by the California Energy Commission (CEC) and the National Renewable Energy Laboratory (NREL) confirmed a generally accepted order of charging priorities: PEV drivers will utilize home charging first, followed by workplace second, and public charging last. Their analysis also uncovered a significant gap in workplace charging, crucial infrastructure for the 34% of Californians who live in multiunit dwellings and may not have access to home charging or those who drive far enough that they must charge at work.

Project Objectives

There are still very few policies or specific incentive programs to help businesses rise to the challenge. Therefore, this project seeks to evaluate how GO-Biz can best utilize government resources to facilitate the rapid installation of workplace chargers to that will be necessary if California is to reach its goal of one million zero emission vehicles (ZEVs) on the road by 2020. Our primary project objectives are to:

1. Uncover the barriers preventing more California businesses from installing EV chargers
2. Categorize businesses based on their likeliness to install workplace charging to target recommendations
3. Recommend strategies and policies to incentivize more workplace charger installation in California

Approach: Business Interviews

We conducted interviews with businesses across California with and without chargers to collect both quantitative and qualitative data to uncover the real and perceived barriers businesses face when installing workplace charging.. The selection criteria for our interviews was designed to maximize the number of valuable, diversified interviews we could complete in a six-month period. We interviewed businesses from the five largest general North American Industry Classification System (NAICS) sectors of businesses, services, retail trade, healthcare, manufacturing, and government, and used a combination of convenience and snowball sampling methods.

Interview Development

During our interviews we gathered different types of information, allowing us to analyze trends in workplace charging, the benefits and barriers, and companies' attitudes towards installing EV charging for their employees. The type of data we collected included:

- Business Revenue
- Number of Employees
- Number of EV drivers
- Number of chargers
- Outside funding used
- Charger satisfaction

Survey Design

We ended each interview with a prepared survey that tested funding and policy strategies to overcome a variety of barriers. We asked each participant to rank how much more likely they would be to install additional chargers on a scale from 1 (Not at all more likely) to 10 (Extremely more likely) if the following strategies were in place:

- Covering install cost
- Covering ongoing cost
- Let utilities install & own
- Mobile or solar technology
- Tax credits for chargers
- Carbon credits for chargers

Findings: Adoption Barriers

An analysis of our qualitative interview responses and the quantitative values of our survey revealed three significant barriers keeping businesses from adopting workplace charging:

Lack of Data: No basic data is being gathered on workplace charging stations, hindering research and planning

Lack of parking control: Many companies don't have private parking lots and rely on third-party offsite parking

Cost Sensitivity: Businesses with smaller revenue streams have trouble funding charger installation projects

Lack of demand: If few employees drive EVs to work, there won't be demand for workplace charging stations

Findings: Business Categorization

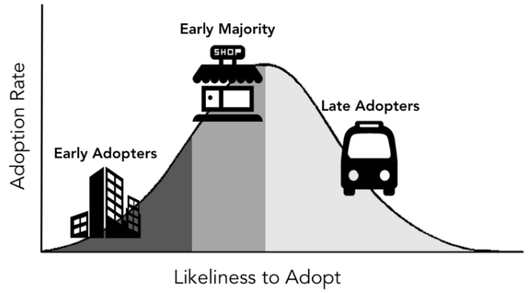

Figure 3. Display of business categories on a technology adoption curve

Using the barriers to workplace charging that our interviews uncovered, we categorized businesses based on their susceptibility to these barriers to determine which businesses our final strategies should target. The final business categories we define are in line with the Technology Adoption Model, a way to visualize the adoption of a new technology over time. The three business categories we established were:

1. **Early Adopters** who are already installing
2. **Early Majority** who are targeted as next to install
3. **Late Adopters** who will not install by 2020

Early Adopters are companies that have or are currently installing EV charging equipment. These companies are typically large, have 250+ employees, and own or lease private onsite parking. Thus all three barriers; cost, lack of parking control, and employee demand are not significant, making charger installation relatively easy.

Late Adopters are companies who will not install chargers by 2020. For these companies, demand is too high of a barrier as their employees are not likely to purchase EVs in the near future. Typically, these companies are located in either rural areas with little access to infrastructure or dense urban centers that rely on public transportation.

Early Majority businesses are critical to the successful launch of new technologies because this area includes one of the technology adoption model's most important features, the chasm. New technologies that fail to gain momentum between the Early Adopters and the Early Majority often fail to reach widespread adoption. The Early Majority are more selective than Early Adopters and require more information and incentives before deciding to adopt a new technology. In the case of this project, the Early Majority businesses are characterized by facing one, some, or all three identified barriers. Creating policies and funding strategies that focus on the Early Majority businesses will help them overcome their barriers, allowing workplace charging to gain the momentum it needs to cross the chasm and become more widespread in its use.

Findings Summary Chart

	Cost Sensitivity	Lack of Parking Control	Lack of Demand
Early Adopters	Low	Low	Low
Early Majority	Variable	Variable	Variable
Late Adopters	Variable	Variable	High

Table 1. Business categories and their relationships with workplace charging adoption barriers.