

Design

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Project Title:
Evaluate Zero-Emission Vehicle
Charging Station at Caltrans Facilities

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Evaluate Zero-Emission Vehicle Charging Stations at Caltrans Facilities

Research Direct Current Fast Charging (DCFC) installation cost, challenges, and opportunities for process improvements for future installations.

WHAT IS THE NEED?

Governor's Executive Order B-16-2012 mandates to reduce greenhouse gas emission. Electric vehicles (EV) offer a clean fuel alternative to meet above mandate. However, range anxiety and charging frequency and gaps between existing charging stations challenges adoption.

California Department of Transportation (Caltrans) is deploying charging stations to fill in gaps between existing charging stations. This effort will provide the data needed for planning process improvement for future installment.

WHAT ARE WE DOING?

The research team will:

1. Identify the types of data to be collected, including usage patterns, vandalism, concerns by the public, non-recoverable electricity costs, and maintenance and operations costs.
2. Monitor the usage monthly and collect and summarize data of the charging stations for a period of two years after construction.

WHAT IS OUR GOAL?

This research will collect data on the implementation, maintenance, and utilization of new charging facilities being deployed to increase the charging coverage throughout California. This information will assist Caltrans to develop policy and procedures regarding the deployment of future charging stations.



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WHAT IS THE BENEFIT?

This project will measure the use of the charger stations and help identify user needs. The demonstrated user demand will validate continued infill of EV service gaps and reduce inconvenience to highway system users. With the information obtained, encouraging movement towards EV infrastructure will provide business opportunity for future providers of charging stations and services.

One of the limitations of zero-emission vehicles is the time required to charge them. Expanded EV infrastructure featuring DCFCs will make EV a practical option for long-distance travel and encourage consumers to move away from internal combustion engines. Usage patterns revealed in this study will help direct future development of facilities in convenient locations, improving the availability of services and quality of travel for EV users.

WHAT IS THE PROGRESS TO DATE?

Task 1: Project Launch and Construction Phase Evaluation

University of California, Davis (UCD), Institute of Transportation Studies (ITS) team is evaluating the progress of the California Department of Transportation (Caltrans) project construction and launch remotely. 5 new sites have become operational during this reporting period. The locations are Northbound Maxwell Safety Roadside Rest Area (SRRA), Southbound Maxwell SRRA in Caltrans District 3 and Westley Northbound SRRA, Westley Southbound SRRA and Lodi Park and Ride in Caltrans District 10. These sites were anticipating new PG&E connection to become operational to the public. These sites have now come online according to secondary sources from the Plug Share application and Charger usage reports received by Caltrans.

Table 1 is a summary of the status of the construction and launch phase of each site.

Table1: Status of the sites as of 10/12/2021

Location	Caltrans District	County	Route	Description	Number of DCFC Stations	Status
1	01	Lake	20	Clear Lake Oaks Maintenance Station	1	Completed on 9/29/20
2	01	Humboldt	96	Willow Creek Maintenance Station	1	Completed 12/31/20
3	02	Siskiyou	5	Randall Collier Safety Roadside Rest Area	1	Completed in October 2020
4	02	Trinity	299	Moon Lim Lee Safety Roadside Rest Area	1	Completed in November 2020
5	03	Glenn	5	Willows Safety Roadside Rest Area (Northbound)	1	Completed. But currently closed for construction until January 2022.
6	03	Glenn	5	Willows Safety Roadside Rest Area (Southbound)	1	Completed. But currently closed for construction until January 2022.
7	03	Colusa	5	Maxwell Safety Roadside Rest Area (Northbound)	1	Completed and operational
8	03	Colusa	5	Maxwell Safety Roadside Rest Area (Southbound)	1	Completed and operational
9	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Eastbound)	1	Completed and operational
10	03	Nevada	80	Donner Summit Safety Roadside Rest Area (Westbound)	1	Completed and operational
11	05	Monterey	101	Camp Roberts Safety Roadside Rest Area (Northbound)	1	Completed
12	05	Monterey	101	Camp Roberts Safety Roadside Rest Area (Southbound)	1	Completed
13	05	San Luis Obispo	46	Shandon Safety Roadside Rest Area	1	Completed
14	06	Madera	99	Madera Maintenance Station	2	Completed
15	06	Fresno	99	Caltrans District 6 District Office	4	Completed
16	06	Kings	5	Kettleman City Maintenance Station	2	Completed
17	06	Tulare	99	C.H. Wadlow Safety Roadside Rest Area	2	Completed
18	06	Tulare	99	Philip S. Raine Safety Roadside Rest Area (Northbound)	2	Completed
19	06	Tulare	99	Philip S. Raine Safety Roadside Rest Area (Southbound)	2	Completed
20	06	Kern	99	Delano Maintenance Station	2	Completed
21	06	Kern	58	Route 58/184 Park & Ride	2	Completed
22	06	Kern	5	El Tejon Safety Roadside Rest Area (Southbound)	2	Completed
23	06	Kern	5	El Tejon Safety Roadside Rest Area (Northbound)	2	Completed
24	08	San Bernardino	15	Clyde V. Kane Safety Roadside Rest Area (Eastbound)	1	Completed
25	08	San Bernardino	15	Clyde V. Kane Safety Roadside Rest Area (Westbound)	1	Completed
26	08	San Bernardino	15	Valley Wells Safety Roadside Rest Area (Eastbound)	1	Completed
27	08	San Bernardino	15	Valley Wells Safety Roadside Rest Area (Westbound)	1	Completed
28	09	Kern	58	Boron Safety Roadside Rest Area (Eastbound)	1	Completed
29	09	Kern	58	Boron Safety Roadside Rest Area (Westbound)	1	Completed
30	09	Inyo	395	Casa Junction Safety Roadside Rest Area	1	Completed
31	09	Inyo	395	Division Creek Safety Roadside Rest Area	1	Completed
32	09	Inyo	395	Caltrans District 9 District Office - Bishop	1	Completed
33	10	Stanislaus	5	Westley Safety Roadside Rest Area (Northbound)	1	Completed
34	10	Stanislaus	5	Westley Safety Roadside Rest Area (Southbound)	1	Completed
35	10	Merced	5	John "Chuck" Erreaga Safety Roadside Rest Area (Northbound)	1	Further delayed/ new estimated completion date - 6/1/22
36	10	Merced	5	John "Chuck" Erreaga Safety Roadside Rest Area (Southbound)	1	Further delayed/ new estimated completion date - 6/1/22
37	10	San Joaquin	99	Lodi Park & Ride	1	Completed

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*Shading color codes:

- Green indicates completed sites or almost completed
- Yellow indicates sites awaiting electrical connection to be active or sites estimated to be complete within the next quarter.
- Red: Delayed

UC Davis ITS team interviewed D3 and D10 design engineer Jaswinder (Sunny) Gil to understand the delays and cost changes to the sites in D10. The delay is in power procurement from Pacific Gas and Electric Company (PG&E) and some initial onsite electrical design changes made by the contractor that needed approval from PG&E.

Task 2: Charger Operation Data and Analysis

As per the last progress report, UC Davis ITS team is receiving charger usage data Caltrans on a monthly basis. ITS team is in the process of organizing the information and analyzing the usage session data to better understand and study the infrastructure performance including down time, power performance, energy dispensed, charging profiles, etc.

Task 3: Maintenance and Operation Phase

UC Davis ITS team have started reviewing maintenance agreements between BTC Power and Caltrans.