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Innovation and System Information

Research

Notes

Planning  
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Project Title:  
Deployment of Sustainable Fueling/  
Charging Systems at California Highway  
Safety Roadside Rest Areas

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## Deployment of Sustainable Fueling/Charging Systems at Roadside Rest Areas

Examining the feasibility of the deployment of sustainable fueling/  
charging systems at California Highway Safety Roadside Rest Areas

### WHAT IS THE NEED?

In the transportation sector, plug-in electric vehicles (PEV) and hydrogen fuel cell vehicles (FCV) are key players in the electrification of the automobile industry to achieve greenhouse gas (GHG) reduction by 80% by 2050. However, the transportation and electricity sectors are facing challenges shifting towards a sustainable future. There is a need to deploy hydrogen fueling stations and DC fast charging stations in the suburban areas and along inter-state highways to give FCV and PEV drivers "range confidence" that fueling/charging is available when they need to travel between communities or make long distance trips.

The electricity sector is increasing the share of total electricity generated from renewable sources such as wind and solar. The efficient use of renewable energy resources relies on the ability to store energy when it is produced and disburse it when it is needed. All of these new technologies pose challenges to decades-old fueling infrastructures and electrical grid systems. Building vehicle fueling/charging stations and installing grid-level energy storages to deal with the increasing renewables are extremely expensive and requires long-term and smart infrastructure investment.



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## WHAT ARE WE DOING?

This research will study the feasibility of the deployment of renewable hydrogen fueling/fast electric vehicle (EV) charging stations at California Highway Safety Roadside Rest Areas (SRRAs), and of their integration with the utility grid as energy storage to lower the infrastructure construction cost and accelerate the usage of renewable energy in the California transportation sector.

First, the research team will investigate the costs of installing, operating, and maintaining hydrogen fueling/electric charging stations on state highway facilities. This task will review present renewable fueling/charging facilities, collect data associated with the development, installation, and operation of the facilities, and consult with companies that install and maintain fueling/charging equipment. Then, the research team will model and analyze the costs and benefits of renewable hybridized fueling/charging stations at SRRAs. Based on the collected data, a spreadsheet model will be developed for estimating the capital and operating costs, and the projected improvement of technologies and cost reduction will be considered in the short and long term. Finally, the team will compare and evaluate the costs and benefits of provision of hydrogen fueling/electric charging, with and without hydrogen or battery storage, and with or without onsite or remote renewables integration on SRRAs.

## WHAT IS OUR GOAL?

The goal of this study is to test the feasibility of deploying hydrogen fueling/electric charging stations, renewable electricity generation, and hydrogen energy storage on a single site, at California State SRRAs. The expected outcome of this integrated design and operation will generate less GHG emissions, is accessible to PEV and FCV owners, will make efficient use of land and natural resources, and is cost effective and easy to scale up.

## WHAT IS THE BENEFIT?

The benefit of this research is to highlight a way to improve FCV and PEV driver "range confidence", which is expected to increase the sales and usage of these sustainable vehicles. As a consequence, their contribution to the reduction of GHG emissions will be enhanced. Additionally, the results of the research will inform the policy and future program decisions of the agencies in the areas of advanced vehicle infrastructure and grid energy storage.

## WHAT IS THE PROGRESS TO DATE?

This Task Order was given Notice to Proceed on October 23, 2015, and has thus just recently begun. The first task will review present hydrogen refueling and EV fast charging facilities, collect data associated with the development, installation, and operation of the facilities, consult with companies that install and maintain fueling/charging equipment, and assess the technologies and designs of various fueling/charging stations and their compatibility to different vehicle applications.