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Caltrans Division of Research, Innovation and System Information

Research Results

Understanding the Early Adopters of Fuel Cell Vehicles

A deeper understanding of the consumer adoption of fuel cell vehicles by presenting data about early adopters' sociodemographic characteristics.

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JULY 2019

Project Title:
Understanding the Early Adopters of Fuel Cell Vehicles

Task Number: 3316

Completion Date: June 30, 2019

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WHAT WAS THE NEED?

The market introduction of fuel cell vehicles (FCVs) is dependent on the vehicles being purchased by consumers. The first consumers to buy any new product are early adopters. The early adopters of battery electric vehicles (BEVs) are well understood thanks to several years of research into the BEV market. No research has been undertaken to understand who the early adopters of FCVs are. This study will analyze data gathered by the Plug-in Hybrid & Electric Vehicle (PH&EV) center for the electric Vehicle Miles Traveled (eVMT) project to understand the early adopters of FCVs. The data includes information on household sociodemographic (income, education, age, gender, household size etc.), household vehicles, travel patterns (commute distance, long distance trips), and locality to hydrogen fueling stations for more than 400 household that drive FCVs.

This study will analyze this data to understand more about the consumers who are currently purchasing or leasing FCVs. This information will be useful to policy makers as it will help them understand which consumers are purchasing the vehicle, where they live, and their travel patterns.

WHAT WAS OUR GOAL?

The research findings will help policymakers understand in greater detail what impact FCVs will have on the vehicle market, and whether the policies to promote FCVs adoption are having the desired impact on the market.

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Moreover, the study will reveal if the introduction of FCVs will affect the demand for the ZEV, BEVs, and PH&EVs markets. The results will help in planning incentives, station locations, and other policies aimed to increase the total number of ZEVs.

WHAT DID WE DO?

The project will involve the following:

• Data Analysis

Generating descriptive statistics on the socio-economic status, ownership of previous alternative fuel vehicles (AFVs), household travel patterns, and attitudes towards sustainability for FCV adopters. The research analysts will adopt the Analysis of variance (ANOVA) to compare FCV adopters to battery electric vehicle (BEV) adopters.

• White Paper Preparation

The research team will develop a white paper with the survey data results, which will be submitted to a journal, such as the International Journal of Hydrogen Energy.

• Data Storage

The researchers will store the research results and data in accordance with the data management plan.

WHAT WAS THE OUTCOME?

This study found early adopter FCV owners are mostly middle aged, high income, male, highly educated car buyers living in detached houses with more than 2 vehicles in the household. More than half have owned an alternative fuel vehicle previously. They have one-way commute distances of 19.1 miles and drive 12,445 miles per year on average. The research found some key differences between battery electric vehicle and FCV households. FCV households have slightly longer commutes, higher annual vehicle miles travelled, and more of them live in a rent home or apartment. Beyond these differences other factors may be more important to the decision making on purchasing a FCV. One factor is the proximity to a hydrogen refueling station, which was not investigated in this study.

WHAT IS THE BENEFIT?

FCVs are one new vehicle technology that can contribute to reducing energy consumption, greenhouse gas emissions, and criteria emissions from transportation. For this reason, policymakers are supporting their market introduction with investments in hydrogen refueling infrastructure and with purchase incentives for consumers. Policy makers may consider FCVs as viable AFVs for those who reside in Multiple Unit Dwellings (MUDs) or do not have charging options from home. More consideration is needed on the role that FCVs play in the transition to ZEVs in California and beyond.