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Research

Notes

Planning  
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Project Title:  
The Effectiveness of State and Local  
incentives on Household Ownership of  
Alternative Fuel Vehicles – A SEM Analysis

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## Government Incentives on Ownership of Alternative Fuel Vehicles

Understanding the effectiveness of various government incentives on household ownership of alternative fuel vehicles using generalized path analysis and structural equation models (SEM).

### WHAT IS THE NEED?

The purpose of this project is to analyze the impact of state and local incentives on household ownership of alternative fuel vehicles (AFVs) and hybrid electric vehicles (HEVs) using generalized path analysis and structural equation models (SEM) while accounting for residential self-selection and demographic characteristics.

Limited refueling infrastructure, costs, and range anxiety have hampered the adoption of AFVs. Since alternative technologies are initially more expensive than conventional technologies that benefit from economies of scale and installed infrastructure, incentives are needed to boost demand for AFVs and to subsidize new infrastructure until the number of early adopters is large enough for commercial viability. However, subsidizing new transportation technologies can lead to costly failures, so understanding their effectiveness is critical.

To promote HEVs and AFVs, government at all levels has provided various incentives, such as parking privileges, HOV access exemption, income tax credit, sales tax, and rebates. The effectiveness of these incentives, however, has not yet been analyzed systematically. The purpose of this research is to bridge this gap and to quantify the effectiveness of various incentives on the adoption of HEVs and AFVs using the most recent national and statewide transportation surveys. Understanding the effectiveness of various government policies is important at a time when there is increased interest in promoting AFVs/HEVs to address our dependence on foreign oil, air pollution and global warming.



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## WHAT ARE WE DOING?

For this study, generalized non-recursive structural models will be estimated to explicitly account for the influence of HEV incentive policies on vehicle choice. These incentives can be categorized into two types based on their potential effect on vehicle choices. Direct financial incentives for HEV ownership, such as tax credits, makes HEVs more attractive because they are more affordable. Indirect utility incentives make HEVs more attractive because they give HEV users higher utility level by providing privileges such as parking priority and HOV lane access which was previously reserved for carpooling.

This research will analyze two national datasets complemented by other datasets (e.g., land use, incentives): the 2009 National Household Travel Survey (NHTS) and the 2012 California Household Travel Survey (CHTS). Both datasets offer rich household and person socio-economic characteristics with a high spatial resolution that allows adding land use and neighborhood characteristics, which is necessary to properly account for household's residential self-selection. To correctly account for incentive impacts, the analysis will be restricted to households who purchased a vehicle during the year when either survey was conducted.

## WHAT IS OUR GOAL?

This study will lead to at least one journal paper that will be submitted for publication consideration in Transportation Research Part A, and a summary article in Access Magazine. Moreover, results from this research will be presented at major transportation conferences, including TRB. Finally, after this research is complete, datasets will be made available (except for the private geo-spatial information in the 2009 NHTS and in the 2012 CHTS).

## WHAT IS THE BENEFIT?

Results from this study will inform policymakers about the relative efficiency of various incentives to foster the adoption by households of AFVs and HEVs.

AFVs and HEVs potentially have an important role to play for reducing California's emissions of greenhouse gases (GHG), which is a key policy goal in California since Assembly Bill 32 (signed into law in 2005). AB 32 aims at reducing GHG emissions to 1990 levels by 2020, and then to cut GHG emissions 80 percent below 1990 levels by 2050. Strategies for implementing GHG emission reduction programs and the state's Climate Adaptation Strategy are coordinated by the State's Climate Action Team, which includes the heads of state agencies, boards and departments, led by the Secretary of Cal/EPA.

Results from this project are also potentially of interest to inform regional targets for GHG emissions reductions from passenger vehicle use under the Sustainable Communities and Climate Protection Act of 2008 (SB 375), which aims at reducing GHG emissions through coordinated transportation and land use planning.

Finally, reducing petroleum use in transportation is one of the pillars of the Governor's 2030 GHG reduction goals.

## WHAT IS THE PROGRESS TO DATE?

This study was scheduled to begin on April 1 but was delayed a few weeks for administrative reasons. However, it is back on track.

To date we have collected information about incentives in force during the administration of the 2009 NHTS, and we have created some land use variables for all NHTS households. These variables will be useful for our models (that connect incentives with vehicle ownership). Our next step is to gather better information about incentives in place in California during the administration of the 2012 CHTS, and then to start building generalized structural equation models (GSEM).