TRACKING NATIONAL HOUSEHOLD VEHICLE USE

by Type, Age, and Area in Support of Market Assessments for Plug-in Hybrid Electric Vehicles

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OVERVIEW

We examined the use of household vehicles to support an assessment of the market potential of plug-in electric vehicles (PEVs), which require high rates of use to pay off the investment in the technology. One issue for the buyer of such vehicles is the warranted life of the battery pack, which is 8 years for the Nissan Leaf and Chevrolet Volt. If a pack needs to be replaced, the buyer may choose to scrap the vehicle because of the high cost of replacing the pack.

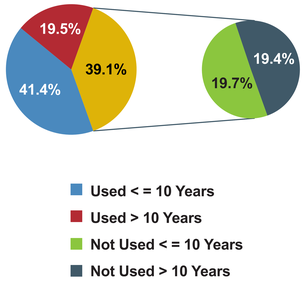
The target market would therefore be buyers who drive their vehicles intensively (high miles per day). Such vehicles would need to be replaced at about the same time as the end of the useful battery life.

Another consideration is battery "cycle" life, which is believed to be about 3,000 cycles. An assumption of charging a vehicle overnight for 90% of days over 8 years would lead to 2,630 cycles, indicating such vehicles could be charged more than once per day on average, but not twice each day.

OVERALL VEHICLE USAGE

According to the 2009 National Household Travel Survey (NHTS), about 40% of household vehicles were not used on the survey travel day. Of the 60.6% of vehicles used, 19.5% are vehicles greater than 10 years old, while 41.4% are relatively new vehicles (<= 10 years old).

However, of the 39.1% vehicles not used, percentages of old vehicles and new vehicles are almost identical.



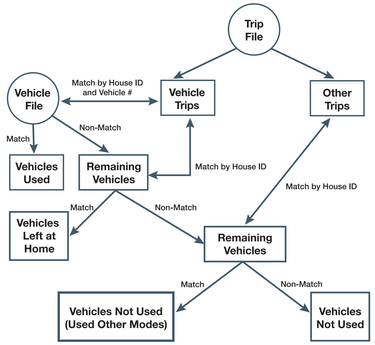
UNIQUE USED/NON-USED VEHICLE RECORDS

The study first separated vehicles as used and not used; next, it analyzed reasons for not using the vehicles.

Vehicles used on survey day with or without a reported travel time and distance in the survey are considered "vehicles used." All others are referred to as "vehicles not used." We divided the "vehicles not used" into three categories:

1. Left at home while other household vehicles were used,
2. Not used because travelers used other modes, and
3. No household trips were made.

The procedure used for this use and non-use identification is shown below.



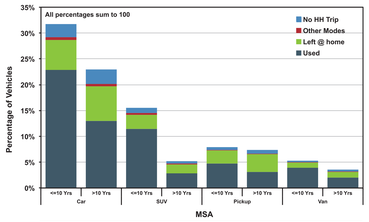
PATTERNS IN HOUSEHOLD VEHICLE USAGE DATA

An examination of vehicle usage by age showed that older vehicles (> 10 years) are more likely to be "left at home" than newer vehicles (<= 10 years). The probability of use of a vehicle drops very sharply from 68% for the <=10-year age group to 50% for the >10-year age group.

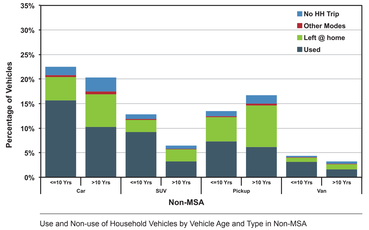
Usage Category	<= 10 Years	> 10 Years	All Ages
Used (10%)	67.8%	50.1%	60.9%
Left at Home (%)	23.0%	36.9%	28.4%
Other Modes (%)	1.7%	1.8%	1.7%
No HH Trip (%)	7.5%	11.1%	8.9%
Total (%)	**100**	**100**	**100**

Further analysis by age, vehicle type, and residential location type showed the following patterns:

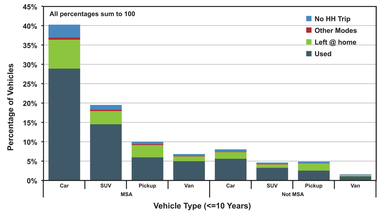
- The passenger car is the most utilized vehicle type, both in and out of an MSA, especially the newer cars (<=10 years). The usage rate drops more sharply from <=10 year old vehicles to >10 year olds in an MSA.
- Newer (<=10 years) SUVs are more frequently used than older 10 (>10 years) SUVs — almost triple the use rate for both MSA and non-MSA. No other vehicle type shows this kind of usage pattern.
- Pickups are the most likely vehicle type to be "left at home," especially older (>10 years) pickups in rural areas.



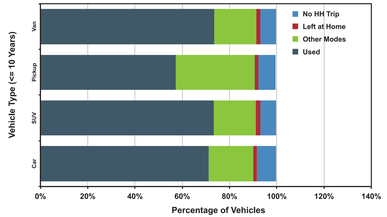
Use and Non-use of Household Vehicles by Vehicle Age and Type in MSA



Use and Non-use of Household Vehicles by Vehicle Age and Type in Non-MSA



Use and Non-use of Household Vehicles (<=10 years) by Vehicle Type in All Areas



Pattern of Use and Non-Use of Individual Vehicle Type (<= 10 years)

Among the newer (<=10 years) vehicles, 71.4% of cars, 73.7% of SUVs, 57.7% of pickups, and 73.8% of vans are used. SUVs and vans are the most-used vehicle type with an almost 74% use rate, while pickups have the lowest use rate. Although SUVs and vans have high use rates, the total number of these two vehicle types is much smaller than the number of cars.

CONCLUSIONS

- Most vehicles not used in the survey are "left at home" because household members own other vehicles or because multiple household drivers ride together and use another vehicle on a given day.
- For all of the four vehicle types, use rates within MSAs are higher than outside MSAs. Newer cars, vans, and SUVs are used 71–74% of time, while pickups are used only 58% of time.
- Cars — especially those <=10 years old — are the most-owned vehicle type, particularly in MSAs. Pickup trucks are used much less intensively, but they are retained for a longer periods, raising their share of the >10 year age group.
- Although vans, SUVs, and cars do not differ significantly in their usage rates, the size of the car market is the largest, followed by the SUV market, which significantly exceedsthe van market. Accordingly, the greatest market potential for PEVs lies in cars and SUVs in MSAs.
- Most pickups are "left at home" while household members use other vehicles to travel, particularly in rural areas. Accordingly, for pickup trucks, there would be a longer payback period for expensive PEVs.

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