FHWA NHTS BRIEF

Electric Vehicle Feasibility

Can EVs take US Households to where they need to go? *JULY 2016*

- **Concerns surrounding Electric Vehicle use often cite higher sticker prices and range feasibility, but technological advancements are continuing to improve this. Today's EVs are capable of serving the needs of almost 99% of household vehicle trips.**
- **Most Electric Vehicle owners primarily charge their vehicles at home, and the number of publically accessible charging stations is growing, which can serve the needs of non-home-based vehicle trips and longer distance home-based vehicle trips.**

Electric vehicles offer many societal benefits: a readily available, cleaner fuel source, higher fuel efficiency and improved air quality. Since 2008, eighteen automobile manufacturers have offered 72 models of EVs for sale in the US.[i] Today's electric vehicles run only on electricity powered by rechargeable battery units and can typically drive 100 miles while consuming only 25-40 kilowatt-hours (kWh) of electricity[ii]. (An average U.S. utility customer consumes about 30kWh daily[iii]). On a single charge, most EVs have a range of 60 to 120 miles[v], which covers 99% of household vehicle trips according to the 2009 National Household Travel Survey [Figure 4].

The 2009 NHTS also shows that 83% of total daily VMT per driver is under 60 miles and 95% is under 120 miles [Figure 1]. This allows most drivers the ability to meet most of their transportation needs without having to stop and recharge their EV battery during their travel day. Similar travel trends have been confirmed in the preliminary 2016 NHTS pilot results.

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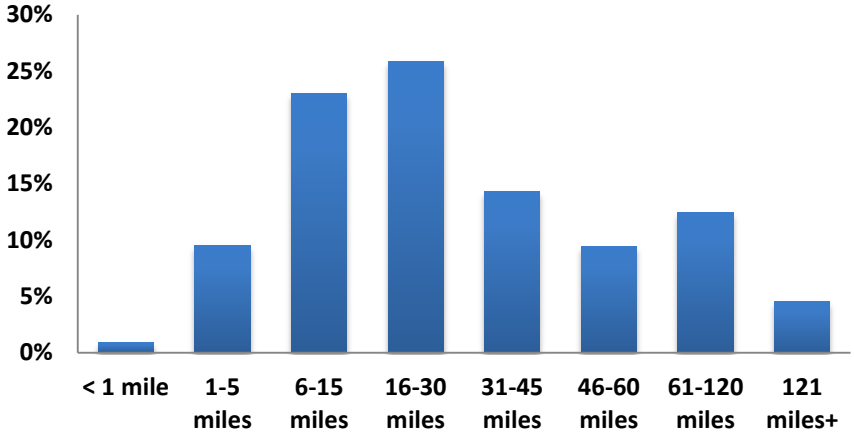
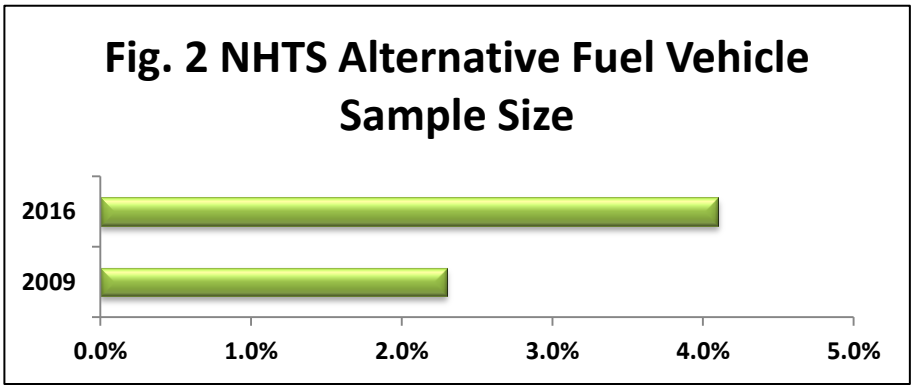
Fig. 1 Daily VMT per Driver Distribution



Data Source: 2009 FHWA NHTS

Coupled with clean energy, EV adoption should significantly lower the transportation sector's demand for fossil fuels and increase U.S. energy independence. According to the DOE, the United States imported about 33% of the petroleum it consumed in 2013, almost 75% of which was used in the transportation sector. In December 2015,

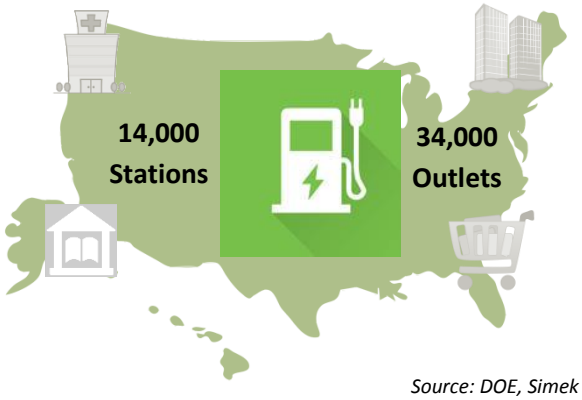
Congress approved multiyear extensions of renewable energy tax credits, thus making clean power more affordable to U.S. households. As the cheaper energy source, electricity serves as the more economical fuel option for household vehicles.



Data Source: 2009 FHWA NHTS & 2016 NHTS Pilot

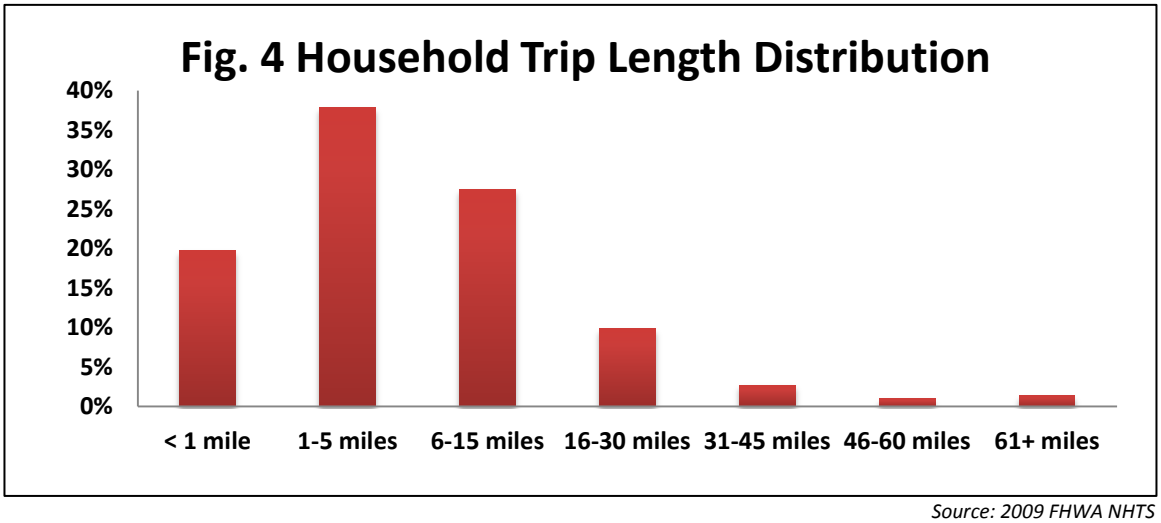
Though today's electric vehicle sticker prices are still higher on average than conventional automobiles, EV manufacturing is on the rise and prices have been dropping. The Department of Energy's EV Everywhere initiative has the technical goal of the U.S. becoming the first in the world to produce EVs that are reasonably priced for American households by 2022. EV Everywhere is looking to produce a 5-passenger, affordable American electric vehicle with adequate mileage range and ability to quickly charge so that average Americans can have their household transportation needs met more easily and at a lower cost. The 2009 National Household Travel Survey (NHTS) showed that 2.3% of its sampled household vehicles were hybrids or alternative fuel vehicles. The 2016 NHTS preliminary pilot results signaled an increase in alternative fuel vehicle adoption; 4.1% of sampled household vehicles were hybrids or alternative fuel vehicles (including EVs) [Figure 2].

Fig. 3 Publicly Accessible EV Charging Stations in 2016



Source: DOE, Simek

Successful Electric vehicle adoption relies heavily on the accessibility of charging stations. EV supporters have been rapidly introducing a growing network of publicly accessible charging stations. [Figure 3] The majority of plug-in vehicle owners will do most of their charging at home[iv] while some will charge their vehicles at work. EV Everywhere's Workplace Charging Challenge has the goal of a tenfold

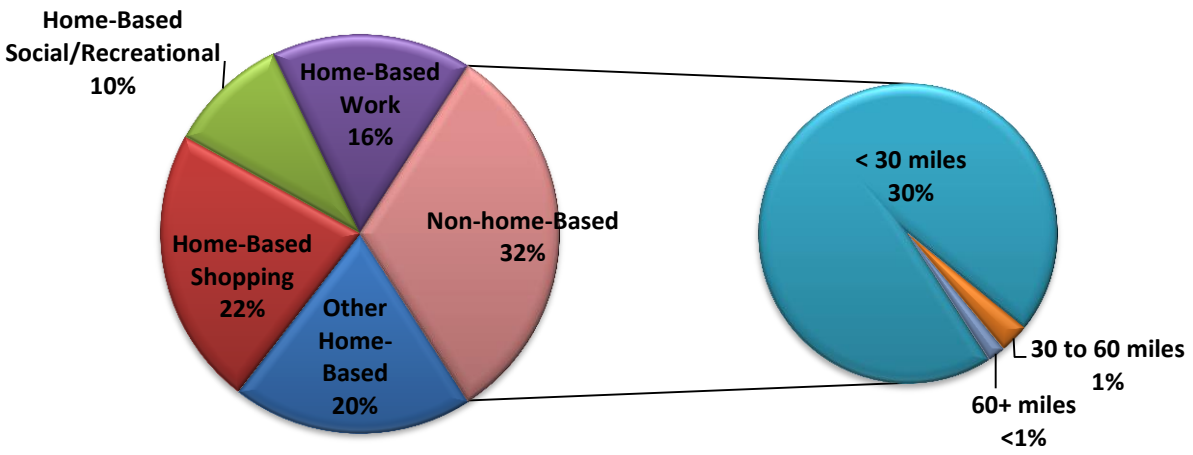


Source: 2009 FHWA NHTS

increase in the number of U.S. employers that offer workplace EV charging by 2018. According to the 2009 NHTS, about 70% of vehicle trips either started or ended at home [Figure 5]. 2013 American Community Survey data shows that 69% of U.S. Households have single-detached or mobile/manufactured homes and 93% have access to onsite (garage, carport, driveway) or off-street vehicle parking.[v] These data indicates a significant opportunity for residential charging units to be accessible whether at home or work.

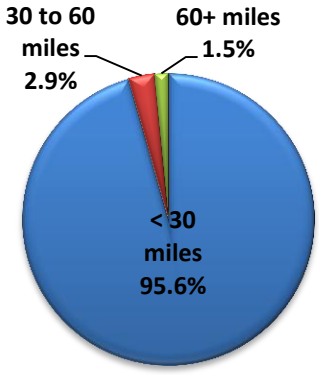
DOE records show that many of today's electric vehicles can drive 60+ miles on a full charge. One especially advanced EV has a registered range of 290+ miles on a full charge. According to 2009 NHTS data, 95% of one-way household vehicle trips are shorter than or equal to 30 miles, which is equivalent to half the range of the lowest capacity EV. Almost 99% of vehicle trips are under 60 miles [Figure 4]. Less than 2% of trips that do not start or end at home are over 30 miles and less than 1% are over 60 miles [Figure 5]. Additionally, only 3.6% of all vehicle trips that either start or end at home are over 30 miles [Figure 6], allowing EVs to serve the needs of most household vehicle trips without the need to stop and recharge.

Fig. 5 Home-Based vs. Non-home-Based Trips



Data Source: 2009 FHWA NHTS

Fig. 6 Home-Based Trips



Data Source: 2009 FHWA NHTS

Not only is the use of the Electric Vehicle growing in the US, energy leaders across the world are promoting its adoption globally in an effort to move towards clean energy and fulfill the mission of the 2015 Paris United Nations Climate Change Conference. As EV battery technology advances, driving ranges increase and the network of charging stations grows, electric vehicles will be able to contribute to cleaner air and effectively meet the transportation needs of households not only in the United States, but across the globe.

For more information, please visit our Website: http://nhts.ornl.gov

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About the National Household Travel Survey

Conducted periodically by the USDOT FHWA since 1969, the survey collects travel data from a sample of U.S. households. The information has been used to understand trends in the nation's trip making and miles of travel by mode, purpose, and time-of-day for use in policy, planning and safety.

Data is collected for household members and for each day of the year, yielding a rich demographic profile linked to daily travel and vehicle characteristics.

The official 2016 NHTS began in April and results will capture many trending transportation topics: Electric Vehicle ownership, telecommuting, internet purchases, bicycle and bikeshare trips, as well as rideshare and carshare usage.

References

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[iv] 81% of Electric Vehicle Charging is Done at Home. (n.d.). Retrieved March 29, 2016, from http://insideevs.com/most-electric-vehicle-owners-charge-at-home-in-other-news-the-sky-is-blue/
[v] U.S. Census Bureau; "American FactFinder" generated by Jasmy Methipara using American FactFinder; http://factfinder2.census.gov (29 March 2016)