



Consumer Views: Fuel Economy, Plug-in Electric Vehicle Battery Range, and Willingness to Pay for Vehicle Technology

Mark Singer

April 2017

NREL/PR-5400-68201

Consumer Views August 2015 Study

Overview

This presentation includes data captured by the National Renewable Energy Laboratory (NREL) to support the U.S. Department of Energy's Vehicle Technologies Office (VTO) research efforts. The data capture consumer views on fuel economy, plug-in electric vehicle battery range, and willingness to pay for advanced vehicle technologies.

NREL provides consumer preference data to support the prioritization of development efforts by identifying barriers to and opportunities for new technologies.

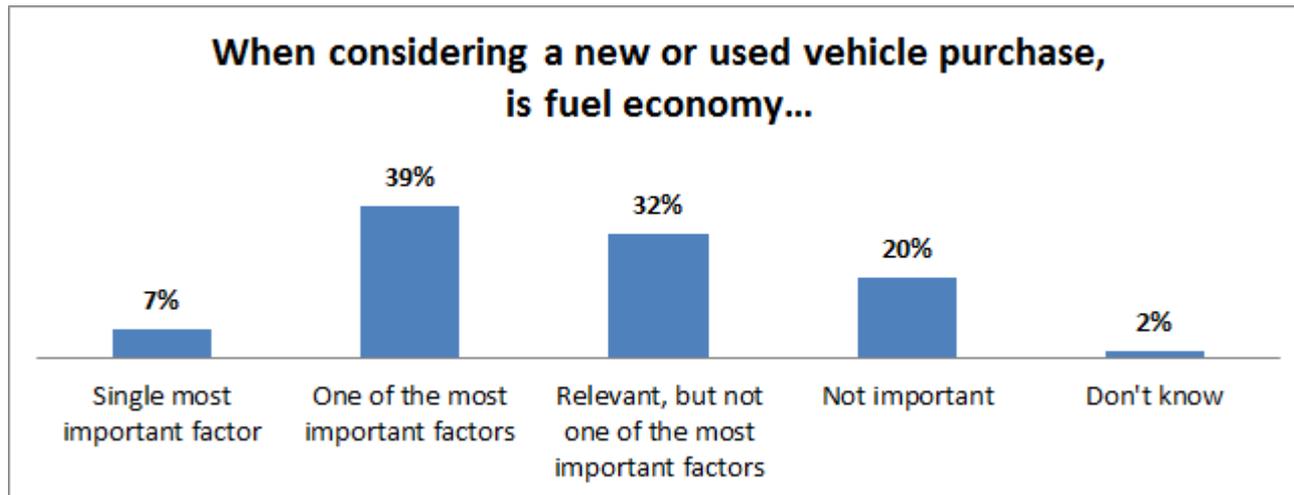
Methodology

The data presented are the results of interviews conducted in August 2015 by the Opinion Research Corporation (ORC) for NREL. The interviews were conducted via telephone with randomly selected telephone numbers. The study used a dual-frame sampling design in which the sample was drawn from independent landline and cell phone sample frames and is based on responses from individuals across the country who were at least 18 years old. Response samples were weight-adjusted to better ensure that the sample reflects the general U.S. population. The study relied on ORC's weighting mechanism, which pulls from data reported in the National Health Interview Survey and the U.S. Census Bureau's Current Population Survey. The August 2015 study included 1,009 respondents and had a margin of error of $\pm 3\%$ at the 95% confidence level. Smaller subgroups of the respondents will have larger error margins.

Fuel economy

The August 2015 study included a set of questions investigating respondent views on fuel economy. The questions were designed to identify how respondents valued fuel economy relative to other vehicle attributes during the vehicle purchase process.

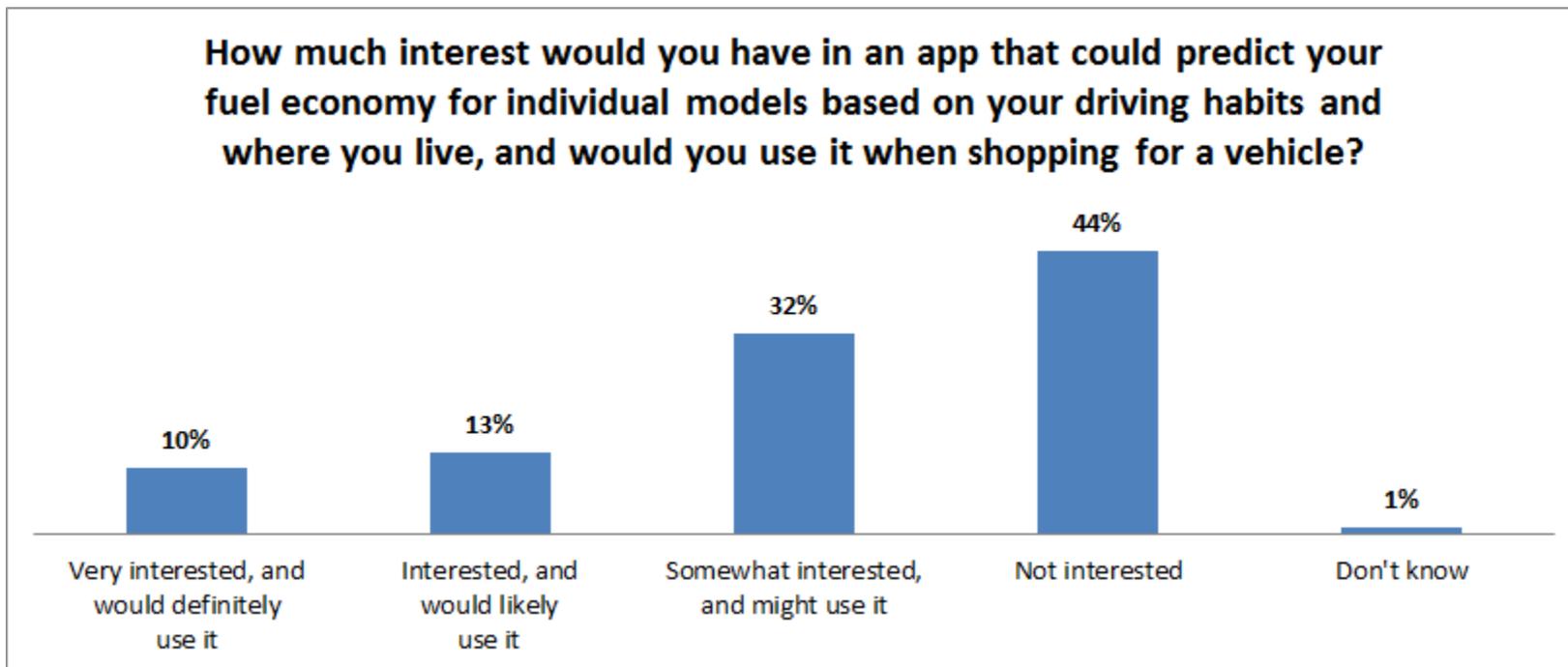
Fuel economy: Importance during vehicle purchase



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Fuel economy was “one of the most important factors” or the “single most important factor” when considering a vehicle purchase for 46% of respondents. Over half of respondents (52%) felt fuel economy was either “not important” or “relevant, but not one of the most important factors”.

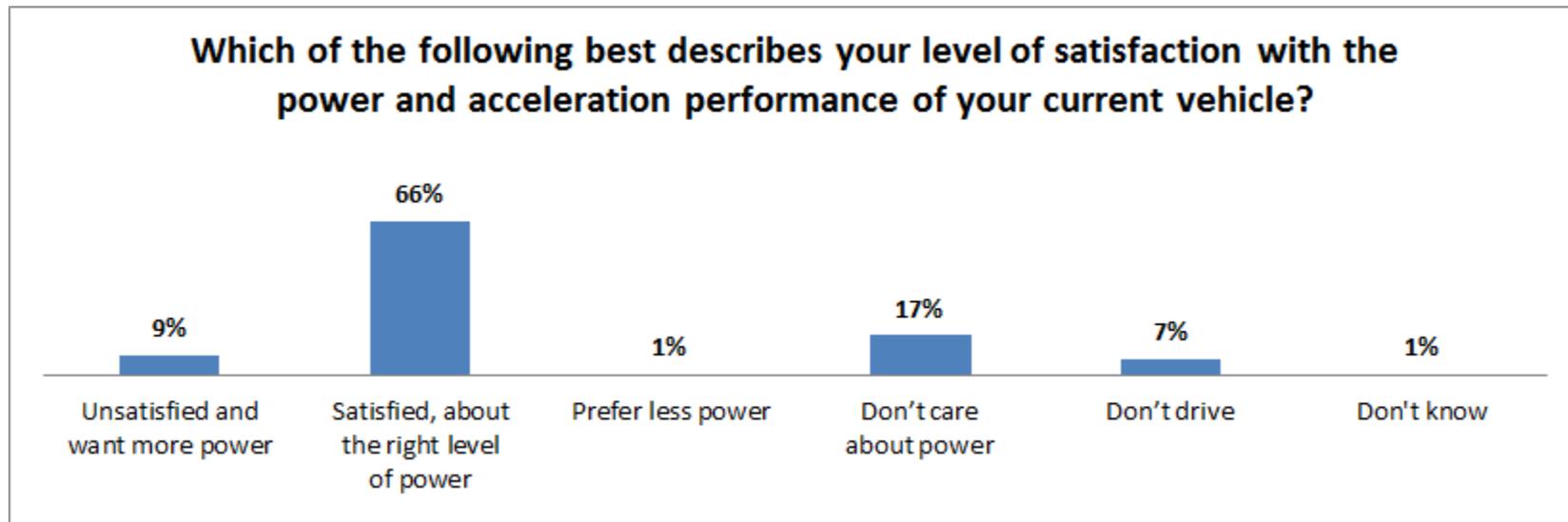
Fuel economy: Interest in a fuel economy app



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

About a quarter of respondents (23%) would definitely or likely use an app to predict their expected fuel economy for a specific vehicle model when shopping for a vehicle. Another 32% stated that they might use the app.

Fuel economy: Satisfaction with vehicle power

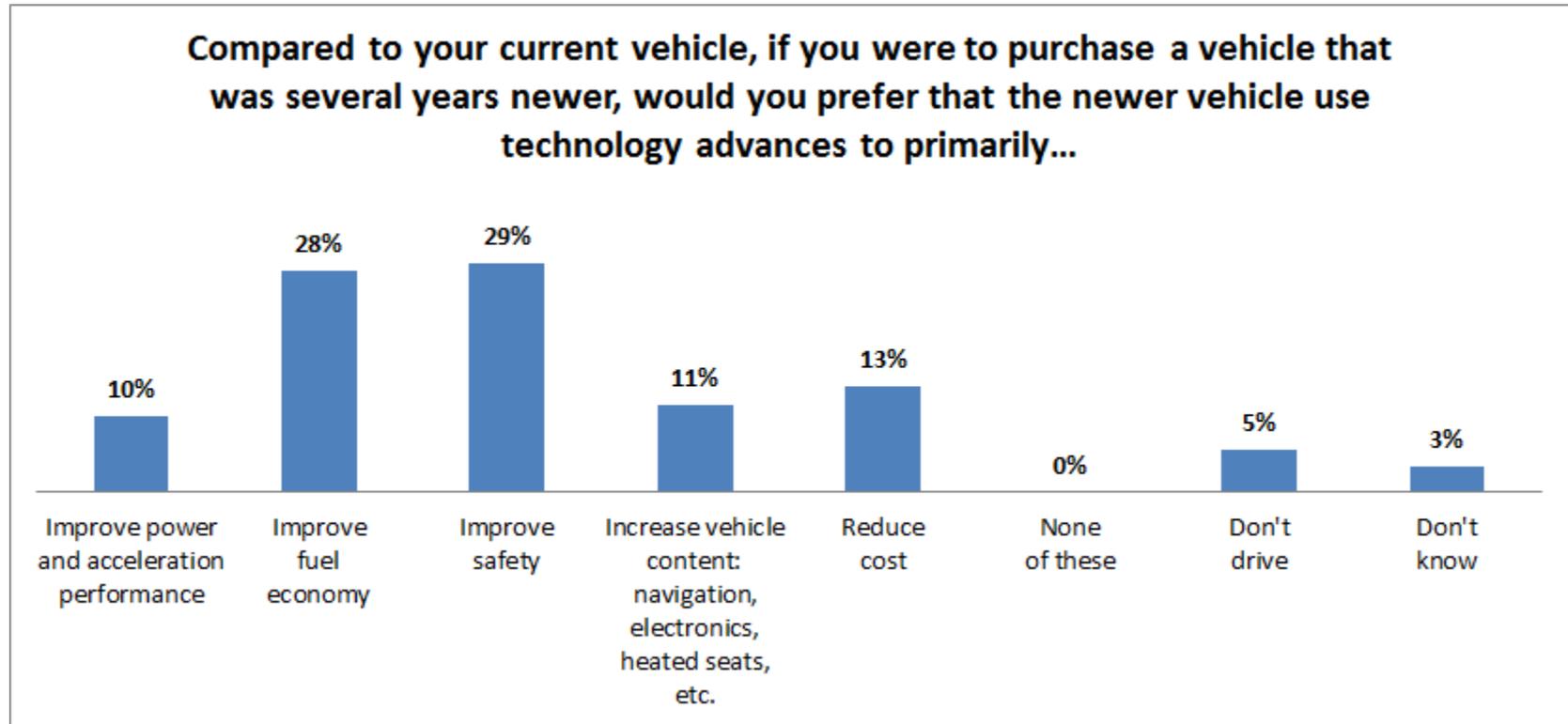


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

A large majority (84%) of respondents do not want more power for their vehicle – they are satisfied with their vehicle's power, prefer less power, or do not care about their vehicle's power.

Fuel economy: Preferences for technology advances

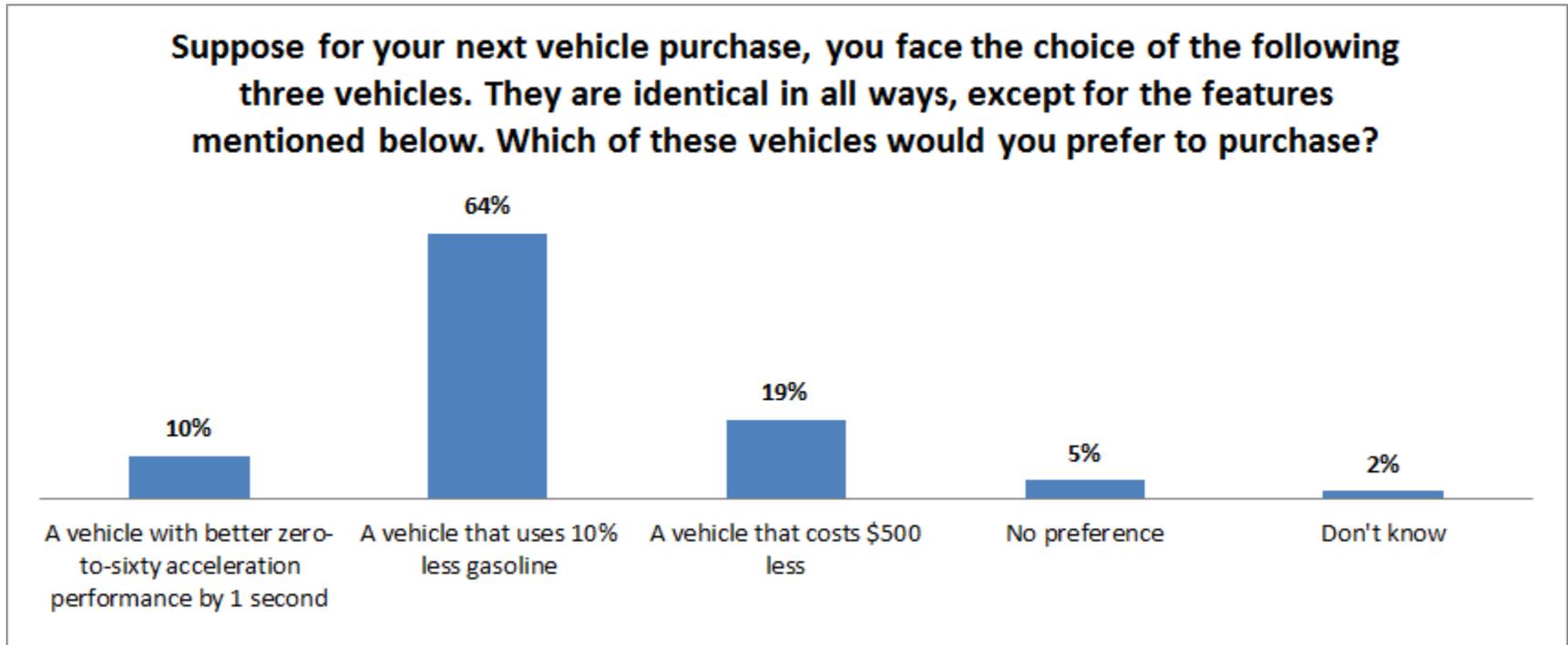


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

Compared to other vehicle attributes respondents would most prefer that vehicle advances improve safety (29%) or fuel economy (28%). Reduced costs (13%) increased vehicle content (11%) and vehicle power and acceleration (10%) rated similarly.

Fuel economy: Importance compared to power and cost



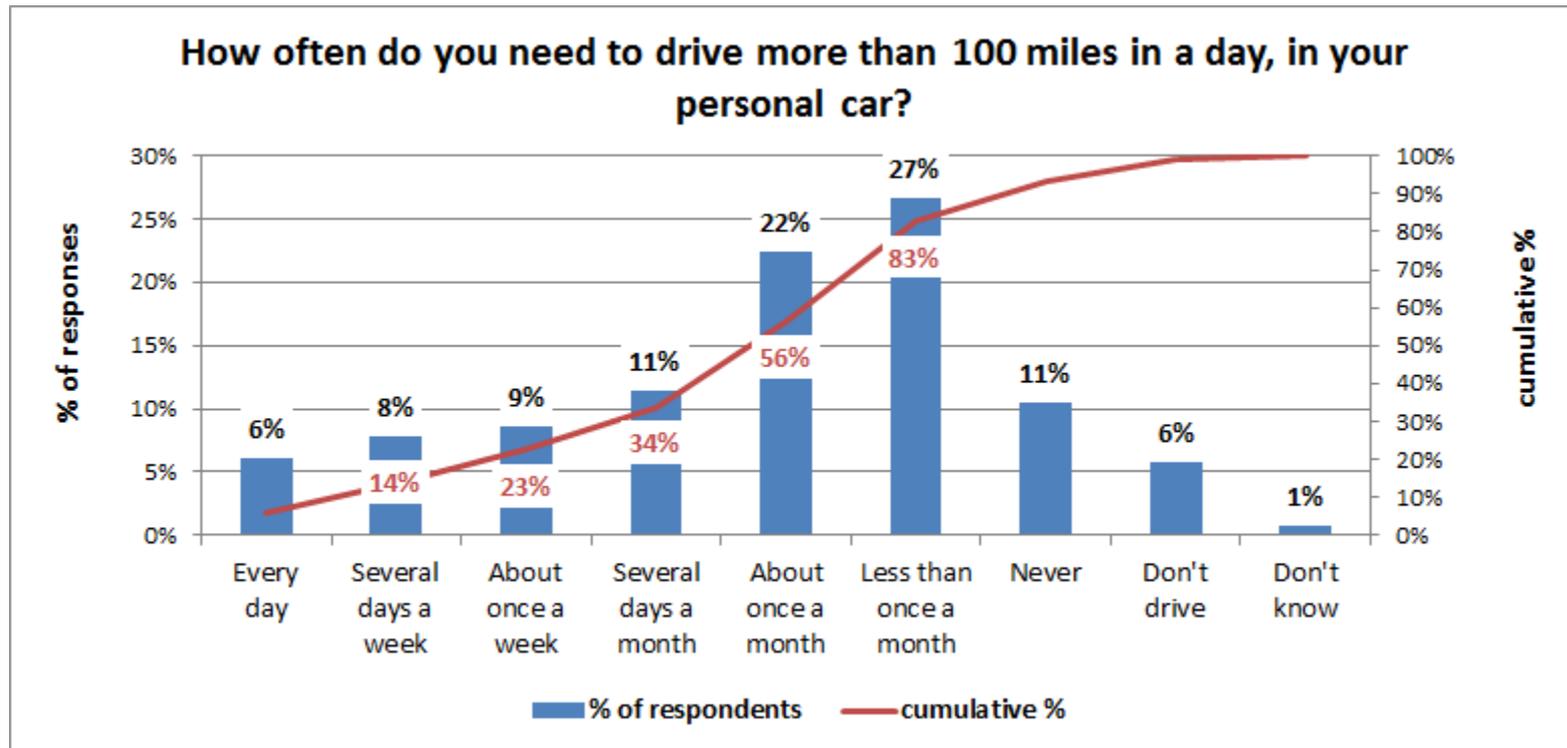
Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A majority of respondents (64%) would prefer a vehicle that uses 10% less gasoline than one that costs \$500 less or has a 1-second better zero-to-sixty time.

Plug-in electric vehicle battery range

The August 2015 study included a set of questions investigating respondent views on the battery range of plug-in electric vehicles. The questions were designed to capture current driving behaviors that might affect battery range requirements and ultimately the battery range respondents stated they would require in order to consider purchasing a plug-in electric vehicle.

Battery range: Frequency of 100 mile travel days

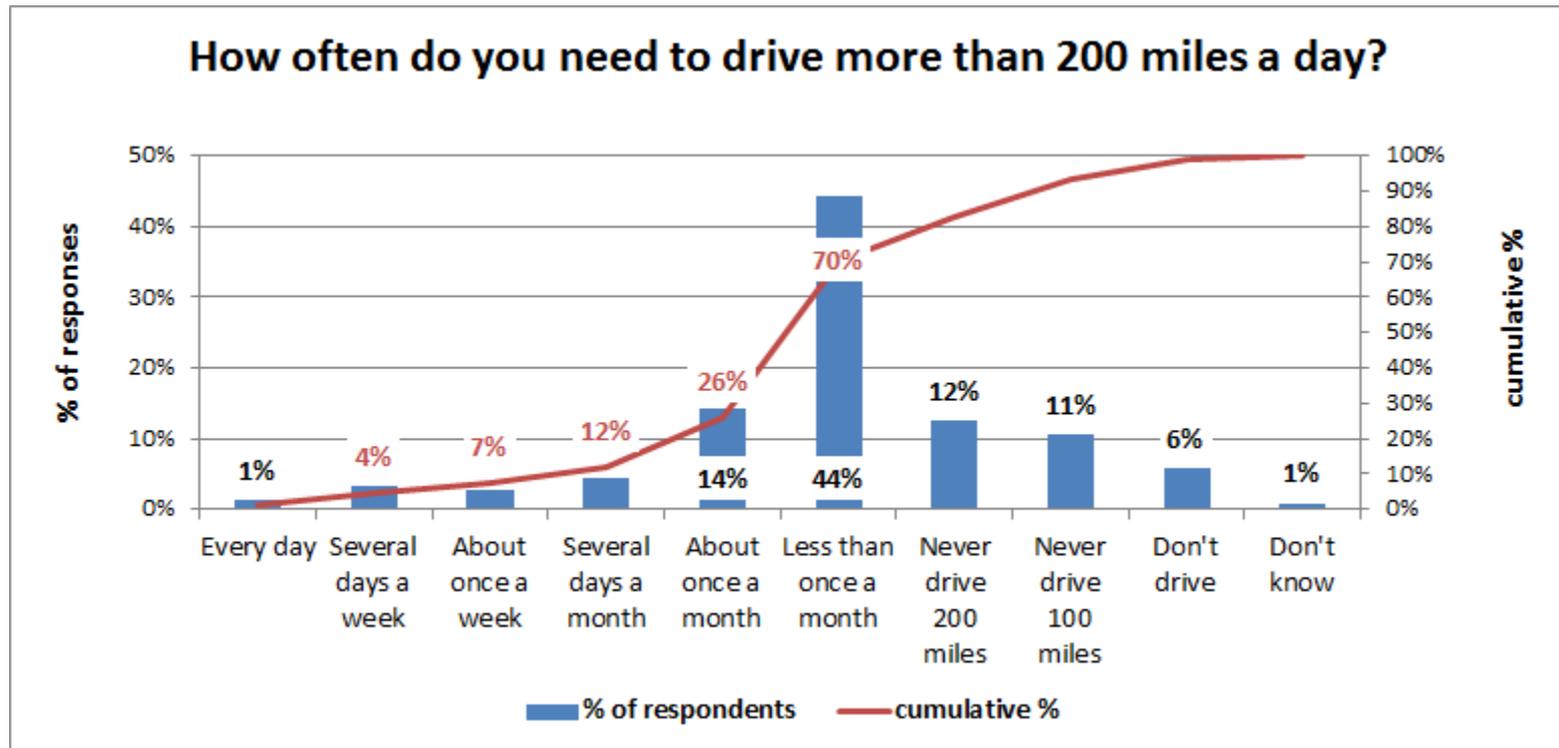


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

A majority of respondents (56%) drive 100 miles in a day in their personal car about once a month or more frequently. A minority (37%) drive 100 miles in a day less than once a month or never at all.

Battery range: Frequency of 200 mile travel days

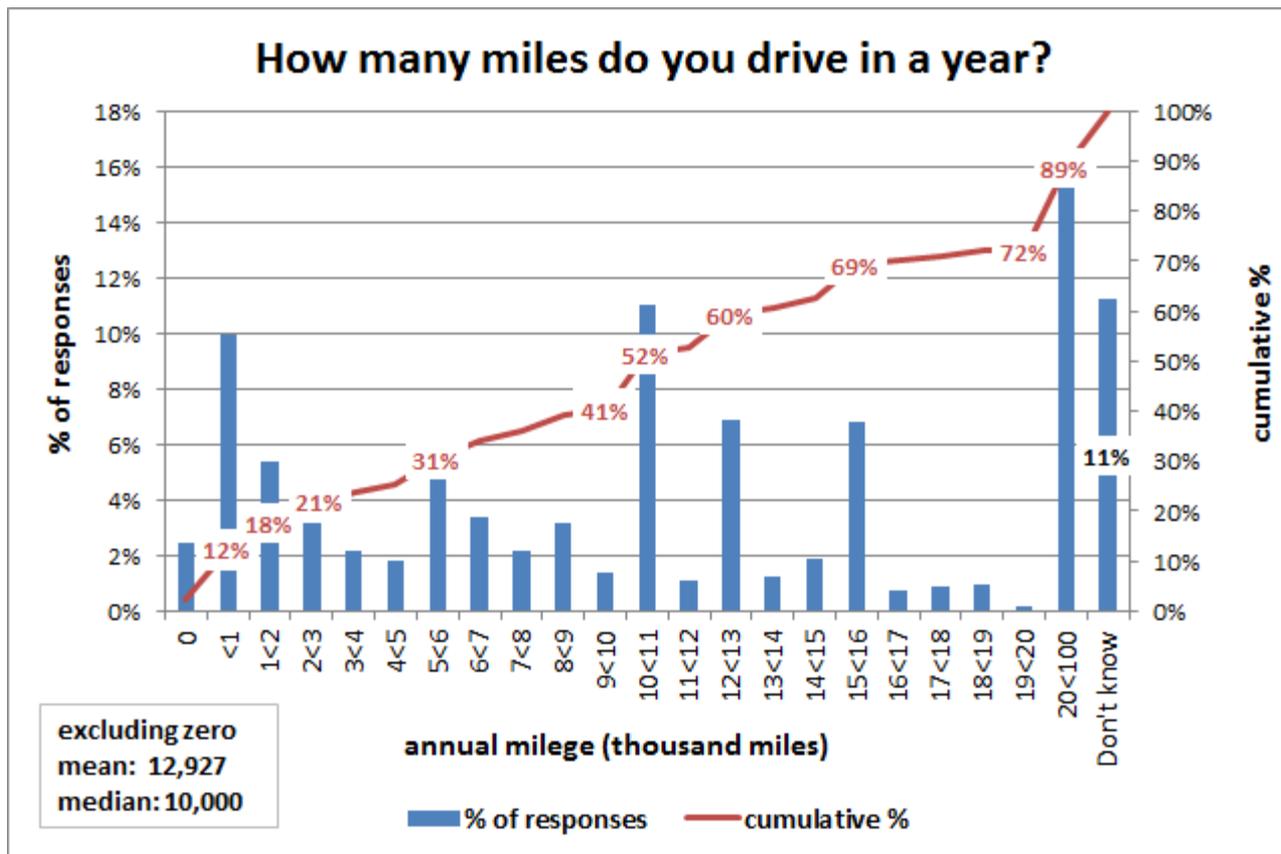


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

About a quarter or respondents (26%) drive 200 miles in a day in their personal car about once a month or more frequently. A large majority (67%) drive the distance less than once a month or never drive 100 or 200 miles in a day.

Battery range: Annual mileage

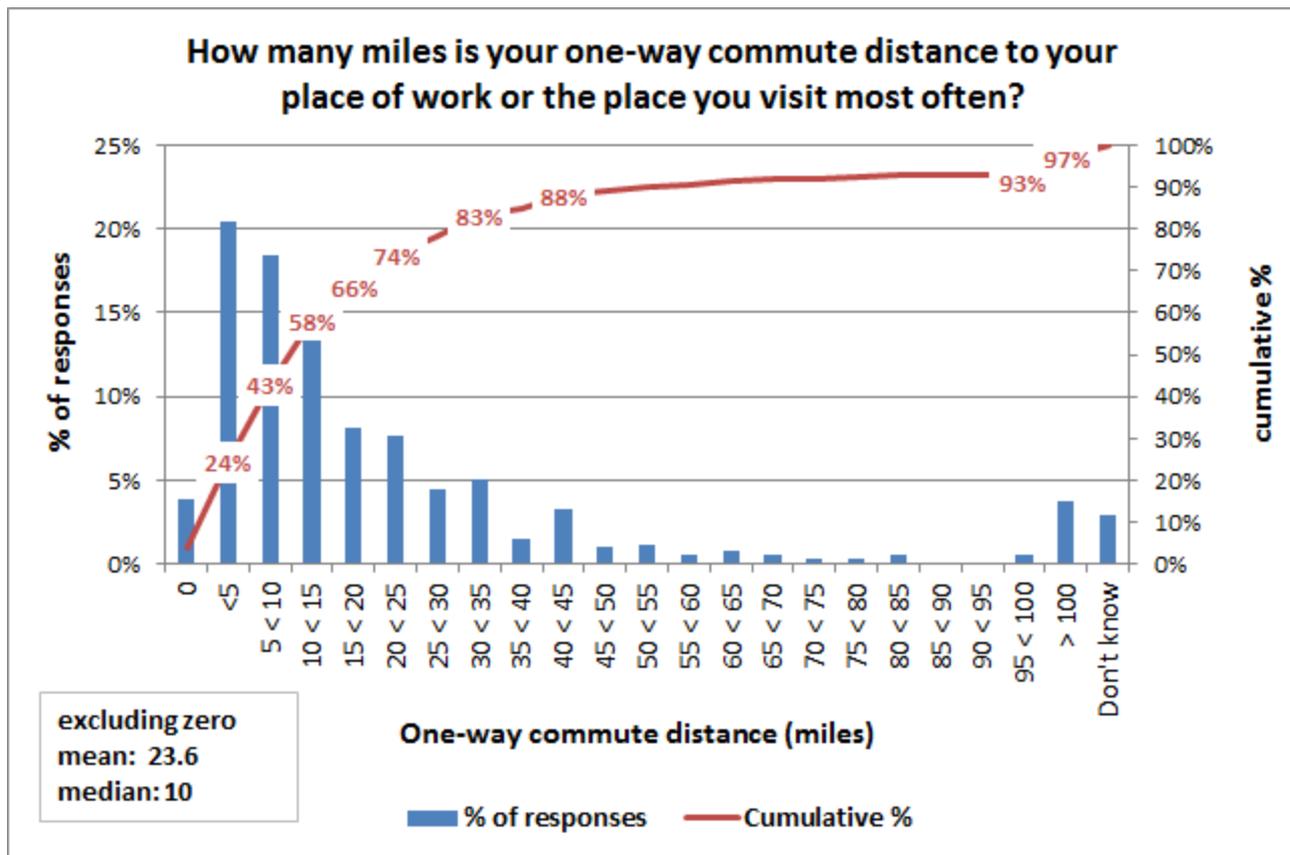


Source: ORC for NREL (August 2015), Study No. 724328, N=951.

Note: Only respondents that did not respond “Don’t drive” in the frequency of 100 mile travel days question were asked for their annual mileage.

Respondents provided a wide range of annual vehicle mileages. The median annual mileage was reported as 10,000 miles.

Battery range: Commute distance

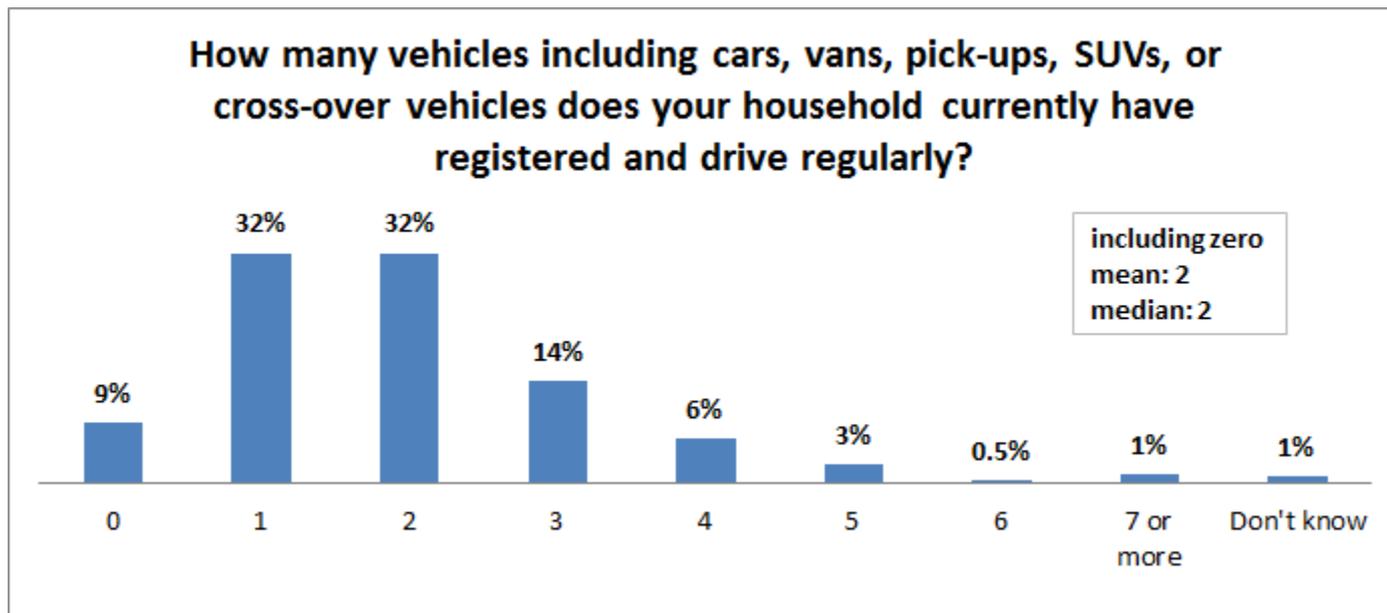


Source: ORC for NREL (August 2015), Study No. 724328, N=951.

Note: Only respondents that did not respond "Don't drive" in the frequency of 100 mile travel days question were asked for their annual mileage.

Two-thirds of respondents (66%) reported a one-way commute distance of less than 20 miles. The mean commute distance was 23.6 miles.

Battery range: Household vehicle ownership

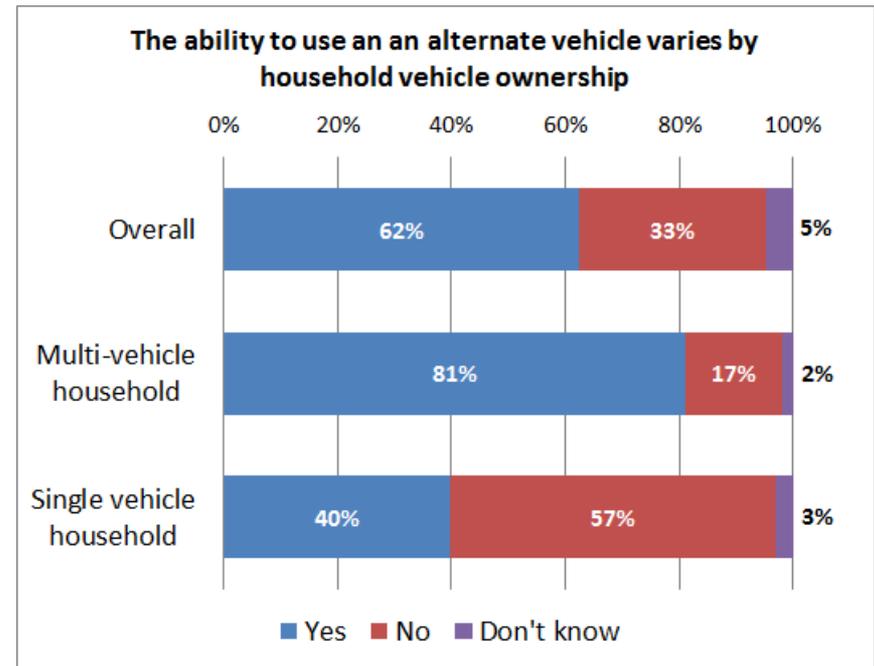
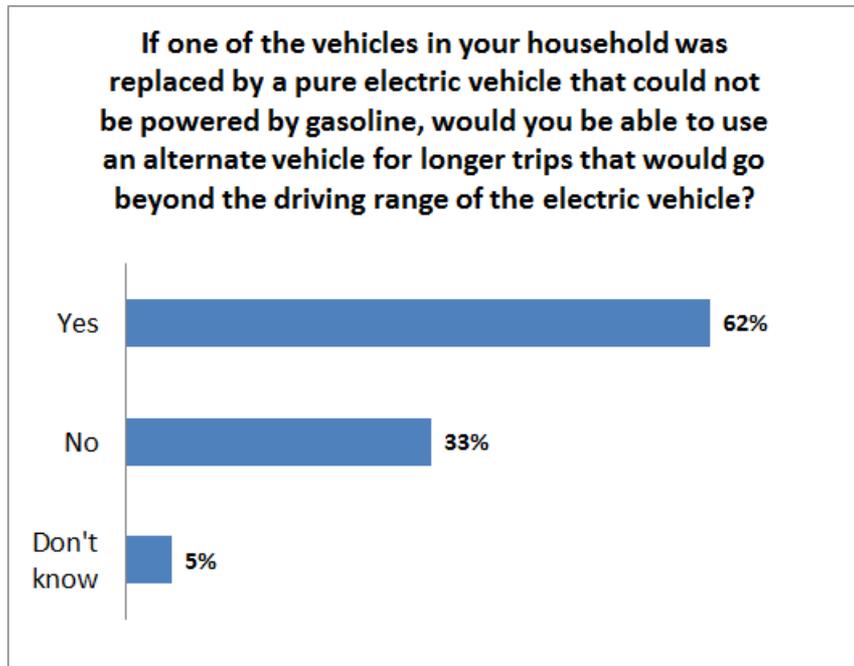


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

About two-thirds of respondents (65%) reported their household owned 1 or 2 vehicles. A small minority (11%) reported owning more than 3 vehicles.

Battery range: Ability to use alternate vehicle

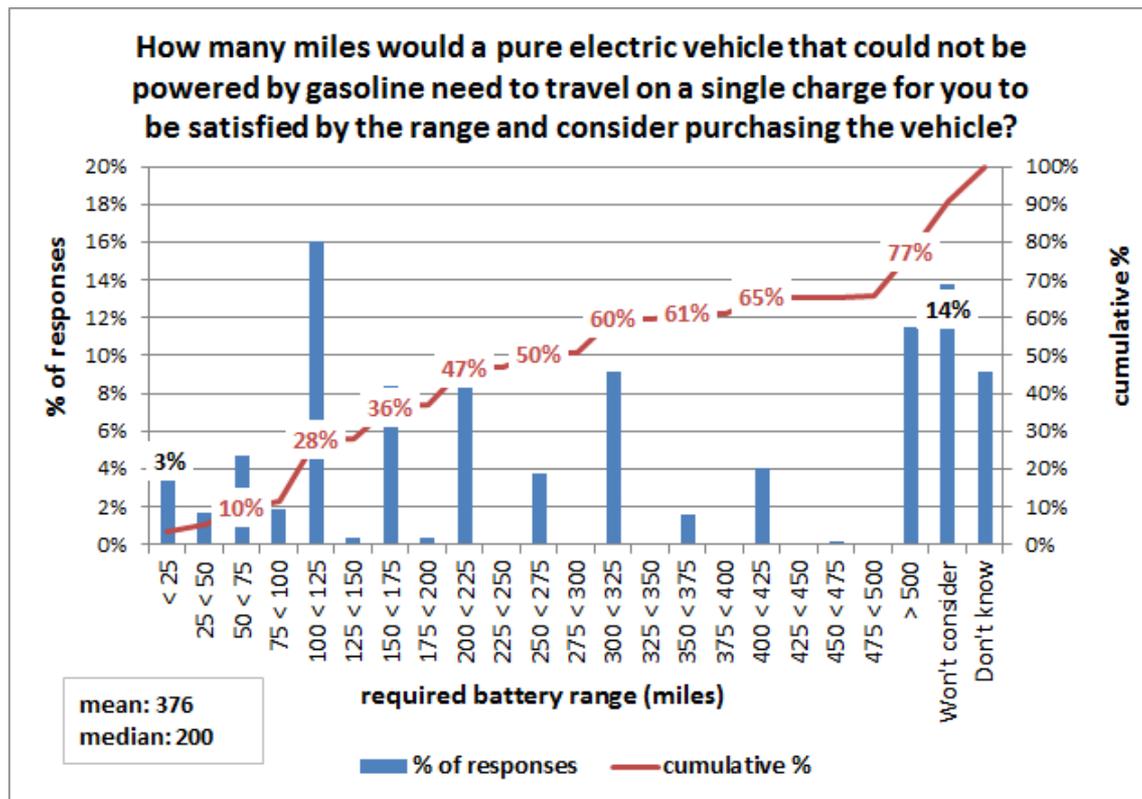


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Multi-vehicle household sample size N = 584; Single vehicle household sample size N = 328.

A majority of respondents (62%) would be able to use an alternate vehicle for longer trips if one of their vehicles was restricted by battery range. Multi-vehicle households reported a higher percentage (81%) that would have access to an alternate vehicle than single vehicle households (40%).

Battery range: Required electric vehicle battery range



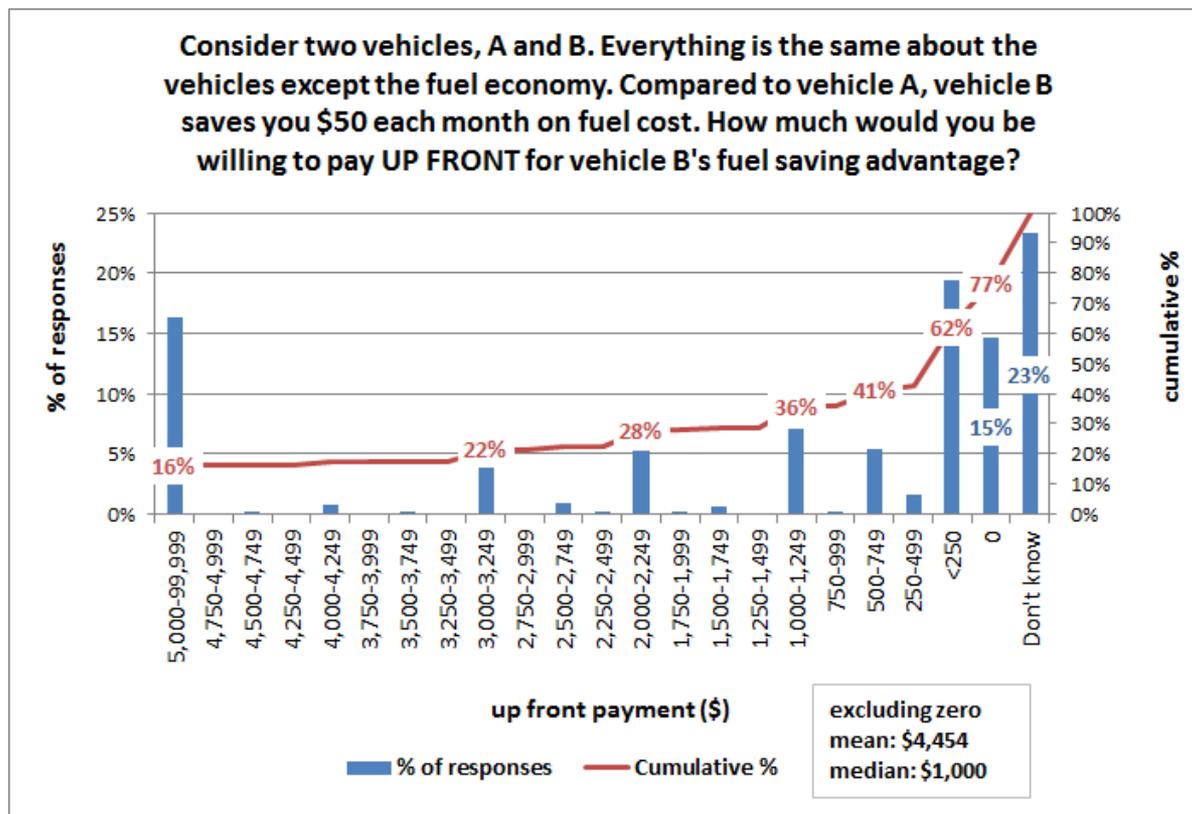
Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Respondents provided a wide array of battery ranges that would be necessary for them to consider an electric vehicle that could not be powered by gasoline. The median battery range for those providing a range was 200 miles. A minority (14%) reported they would not consider an electric vehicle that could not run on gasoline.

Willingness to pay

The August 2015 study included a set of questions investigating respondent's willingness to pay for advanced vehicle technologies. Respondents were asked about their willingness to pay for different vehicle battery ranges, fuel economy improvements, and generic new vehicle technologies. Additionally respondents were asked about their willingness to pay an upfront payment versus monthly payments over a 3-year car loan. The study also captured respondents' current fuel costs.

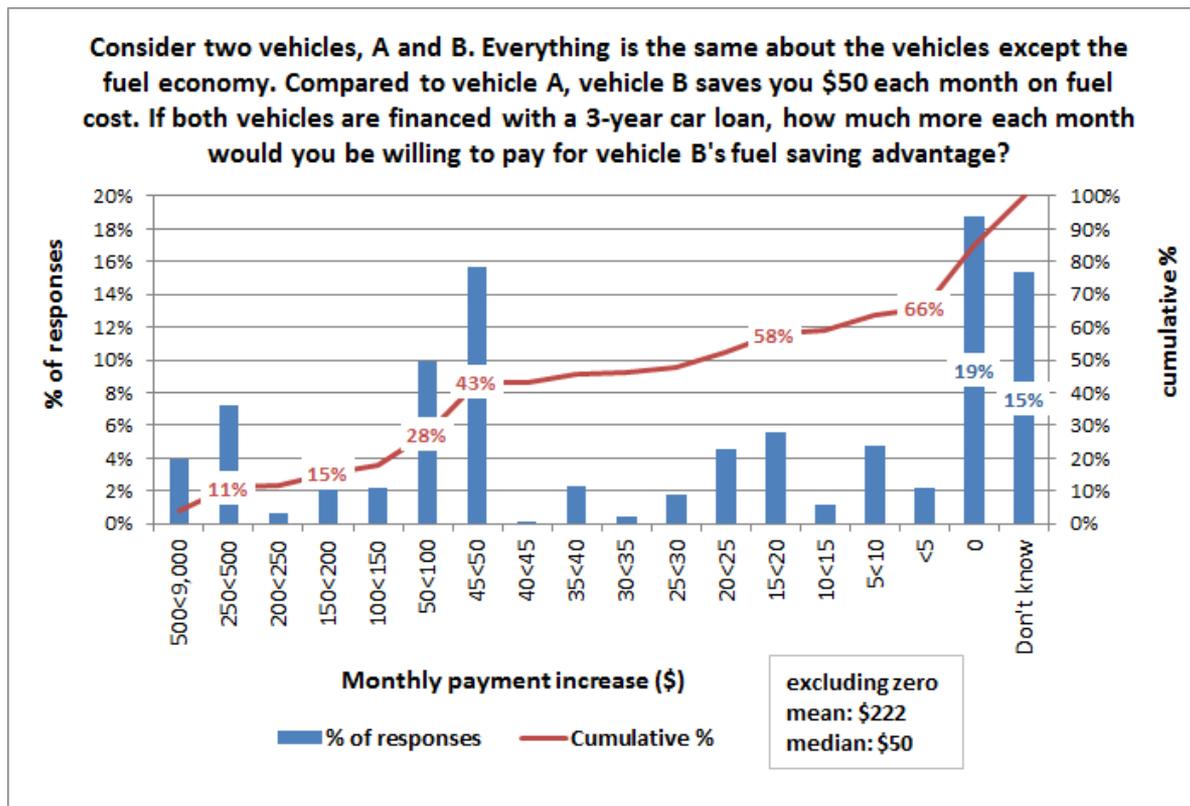
Willingness to pay: Up front payment for fuel economy



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A majority of respondents (62%) would be willing to pay an up front vehicle cost increase for fuel cost savings over the life of the vehicle. A minority (28%) would be willing to pay \$2,000 or more for the \$50 a month savings. Of those reporting an amount, the median up front vehicle cost increase was \$1,000.

Willingness to pay: Monthly loan payment for fuel economy

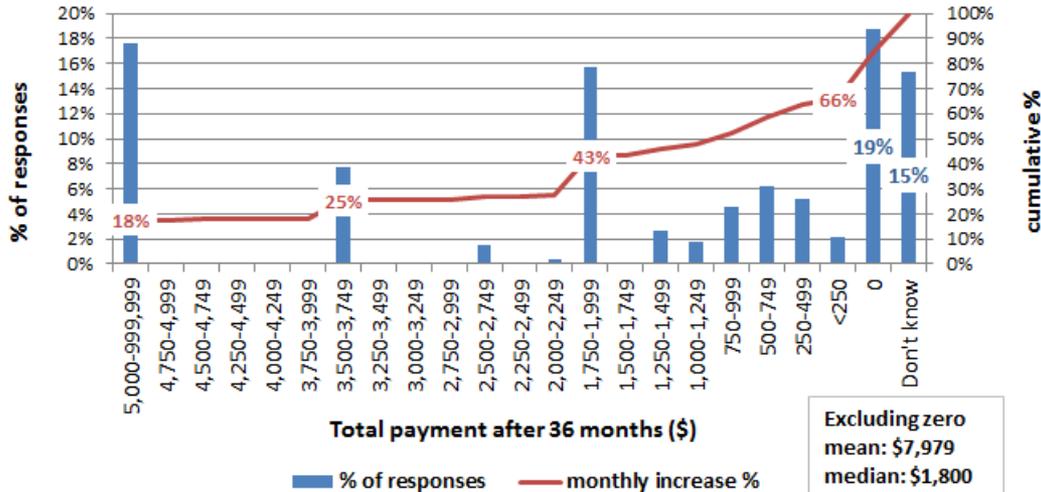


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

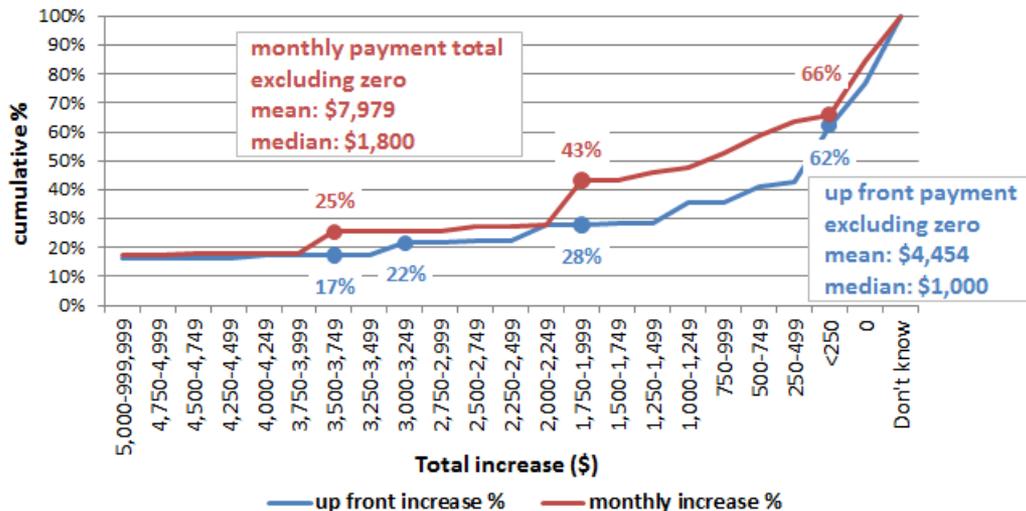
A majority (66%) would be willing to pay an increased monthly payment over the life of a 3-year car loan for a monthly fuel cost savings of \$50 over the life of the car. A minority (28%) would be willing to pay \$50 a month or more over the 3-year loan for the monthly fuel cost savings of \$50. Of those reporting an amount, the median monthly increase was \$50.

Willingness to pay: Up front costs vs. monthly costs

Total increased payment from increased 36 monthly payments over 3-year car loan



Willingness to pay for \$50 per month fuel savings



Respondents were told, “Consider two vehicles, A and B. Everything is the same about the vehicles except the fuel economy. Compared to vehicle A, vehicle B saves you \$50 each month on fuel cost.” The respondents were then asked “How much would you be willing to pay UP FRONT for vehicle B's fuel saving advantage?” and “If both vehicles are financed with a 3-year car loan, how much more each month would you be willing to pay for vehicle B's fuel saving advantage?”

The total payment respondents were willing to spend in the 3-year loan scenario were calculated by multiplying their response by 36 months.

Respondents reported willing to pay a higher total over the 3-year car loan than in the up front cost. The median 36 month total payment was \$1,800 and the median up front payment was \$1,000.

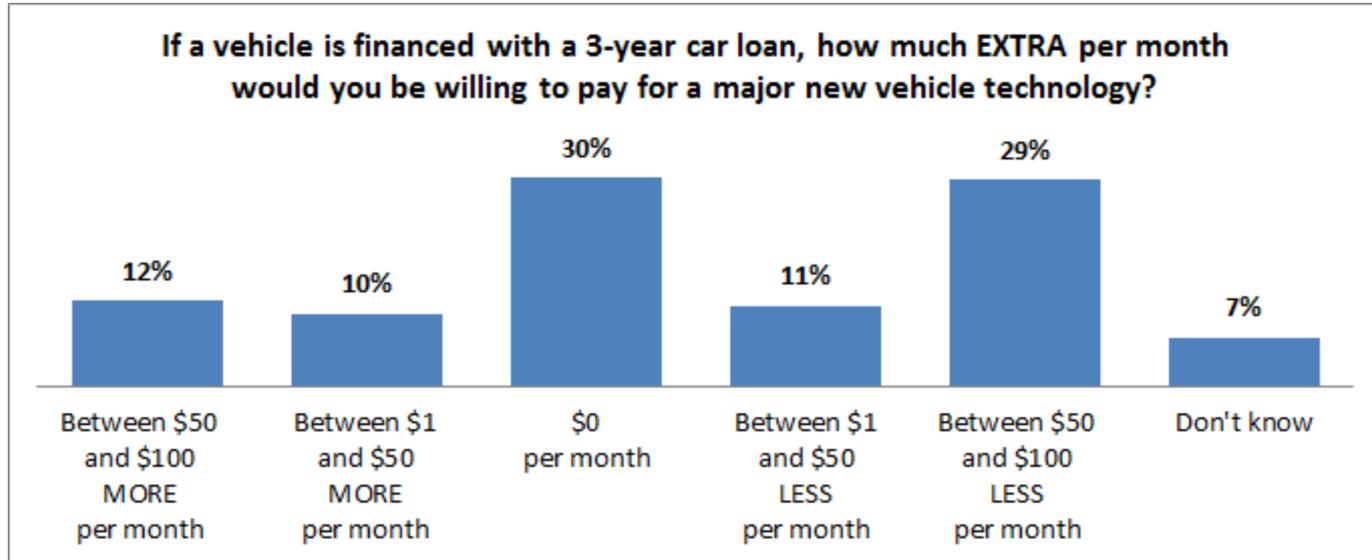
Source:

ORC for NREL (August 2015), Study No. 724328, N=1,009.

Willingness to pay: Monthly payment for new technology

Introductory text provided to respondents:

Some people buy new technologies when they are first available because they enjoy the excitement of being first to own the technology, while other people wait until the new technology is more proven by other peoples' experiences.

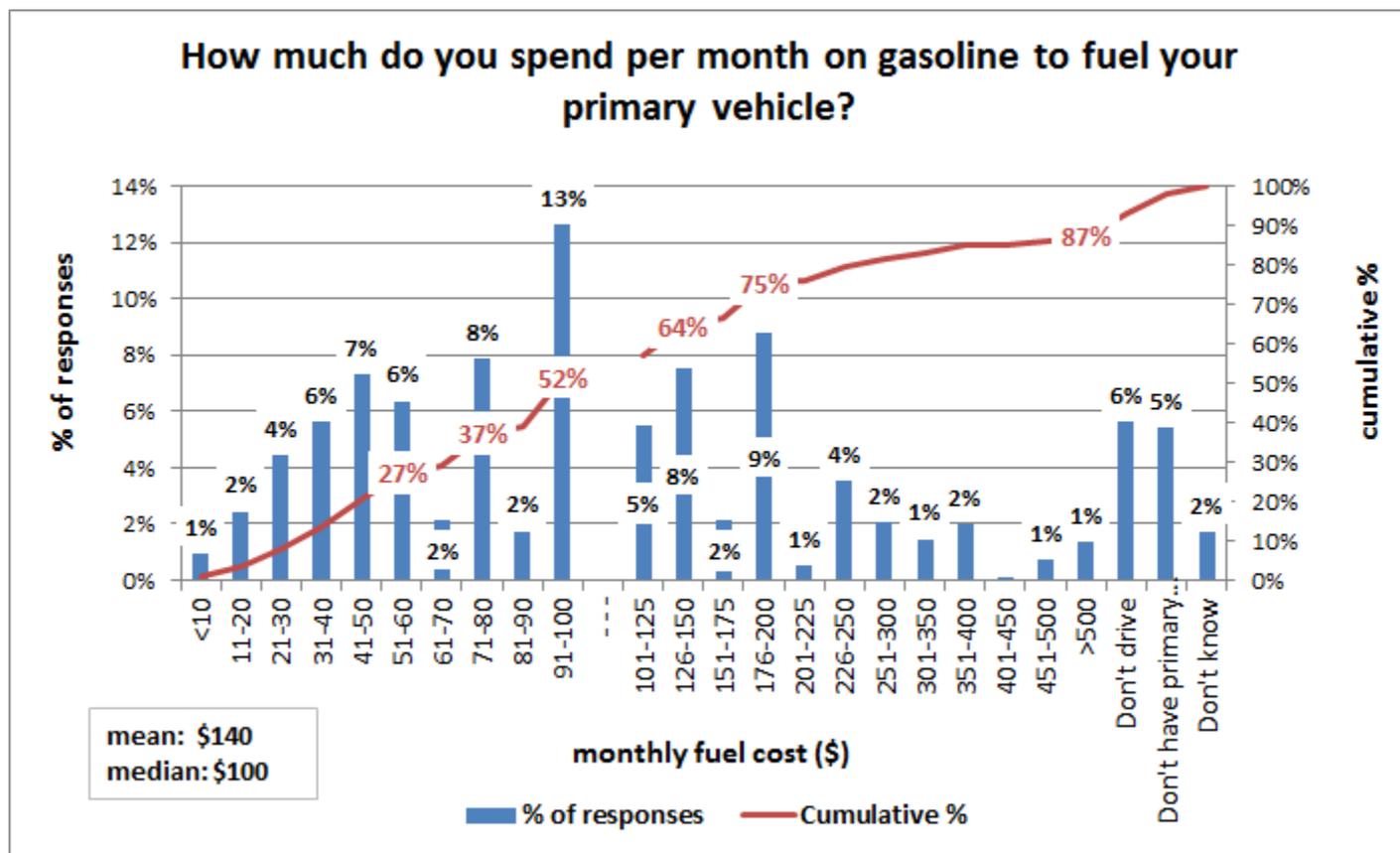


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

A majority of respondents (71%) would not be willing to pay for or would want to pay less for a generic “major new vehicle technology”. A minority (22%) would be willing to pay an incremental monthly cost over a 3-year car loan.

Willingness to pay: Current monthly fuel costs

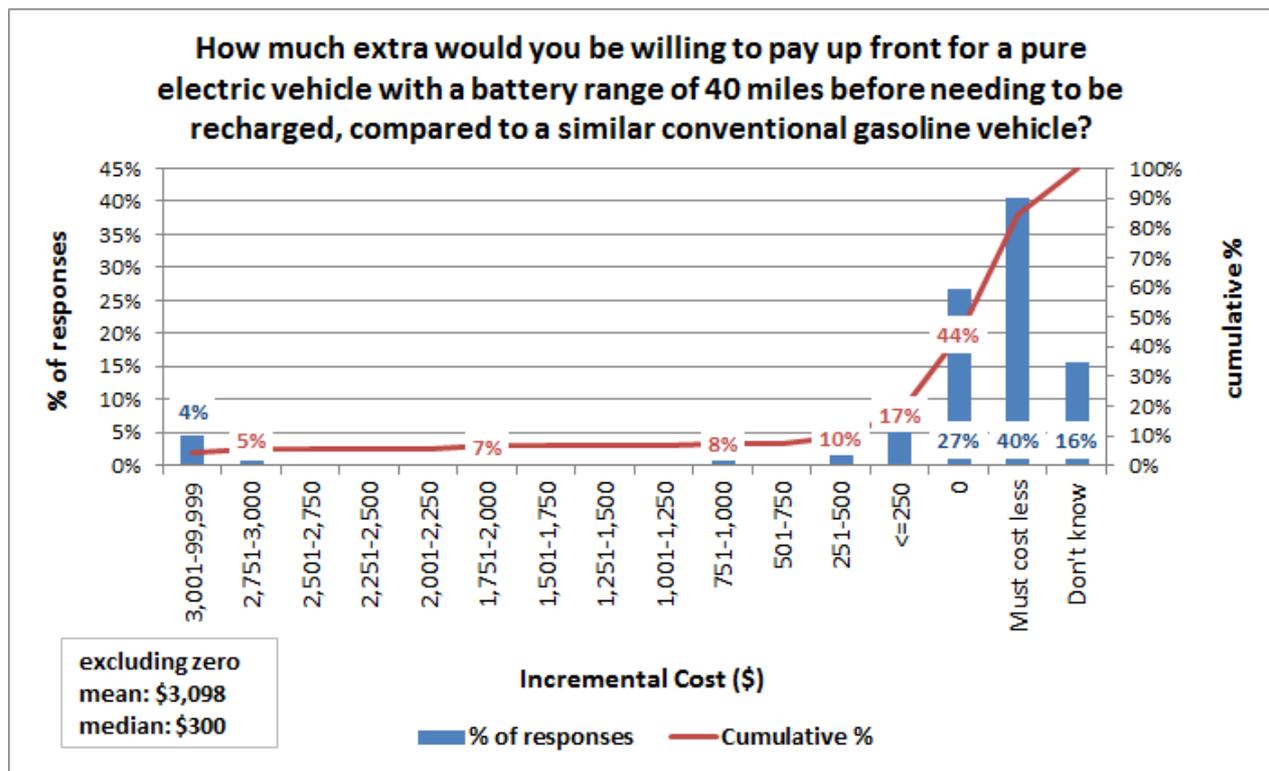


Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Note: Response percentages do not sum to exactly 100% because the raw data are rounded.

Respondents reported a broad range of monthly fuel costs. Of those reporting a monthly fuel cost, the median cost was \$100. A minority (21%) reported spending \$50 or less per month. Similarly 21% reported spending over \$175 a month.

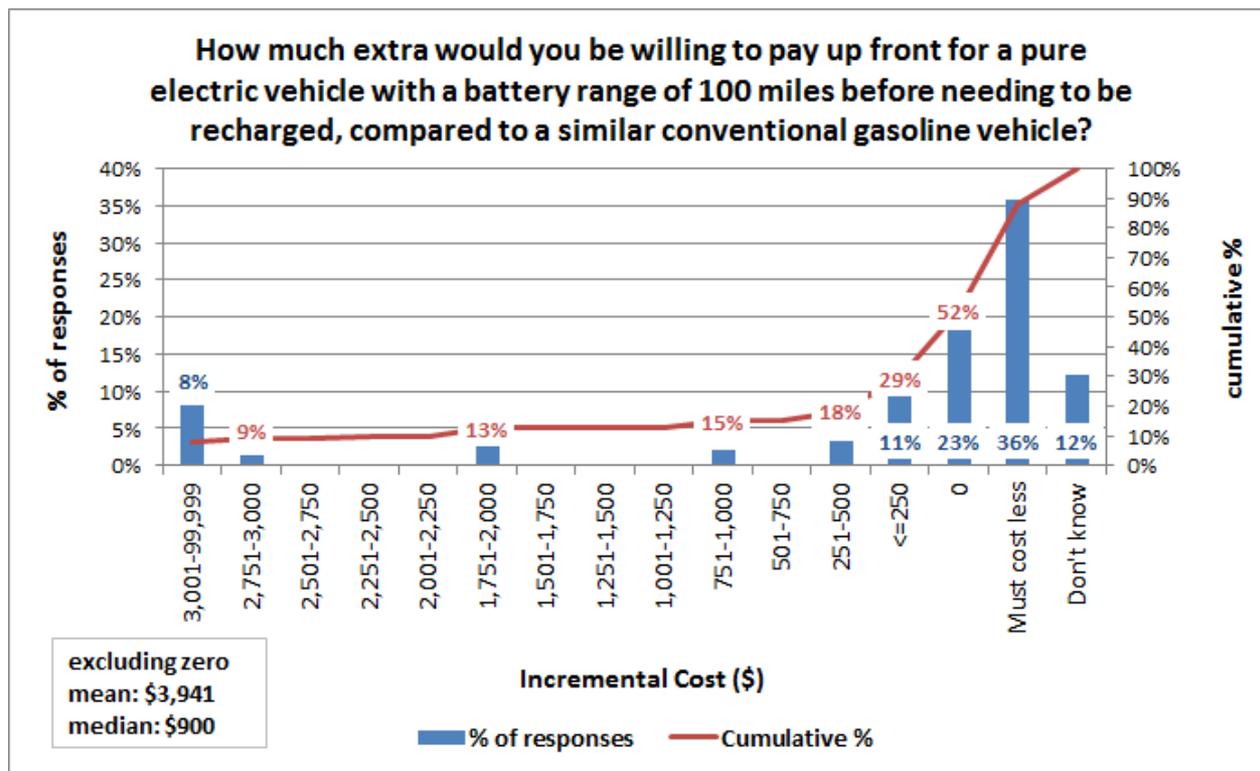
Willingness to pay: 40 miles of battery range



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A minority (17%) of respondents would pay an increased cost compared to a gasoline vehicle for an electric vehicle with a battery range of 40 miles that could not be powered by gasoline. Of those respondents willing to pay an increased cost, the median increase was \$300. An additional 27% of respondents would consider the vehicle if it did not have an increased cost.

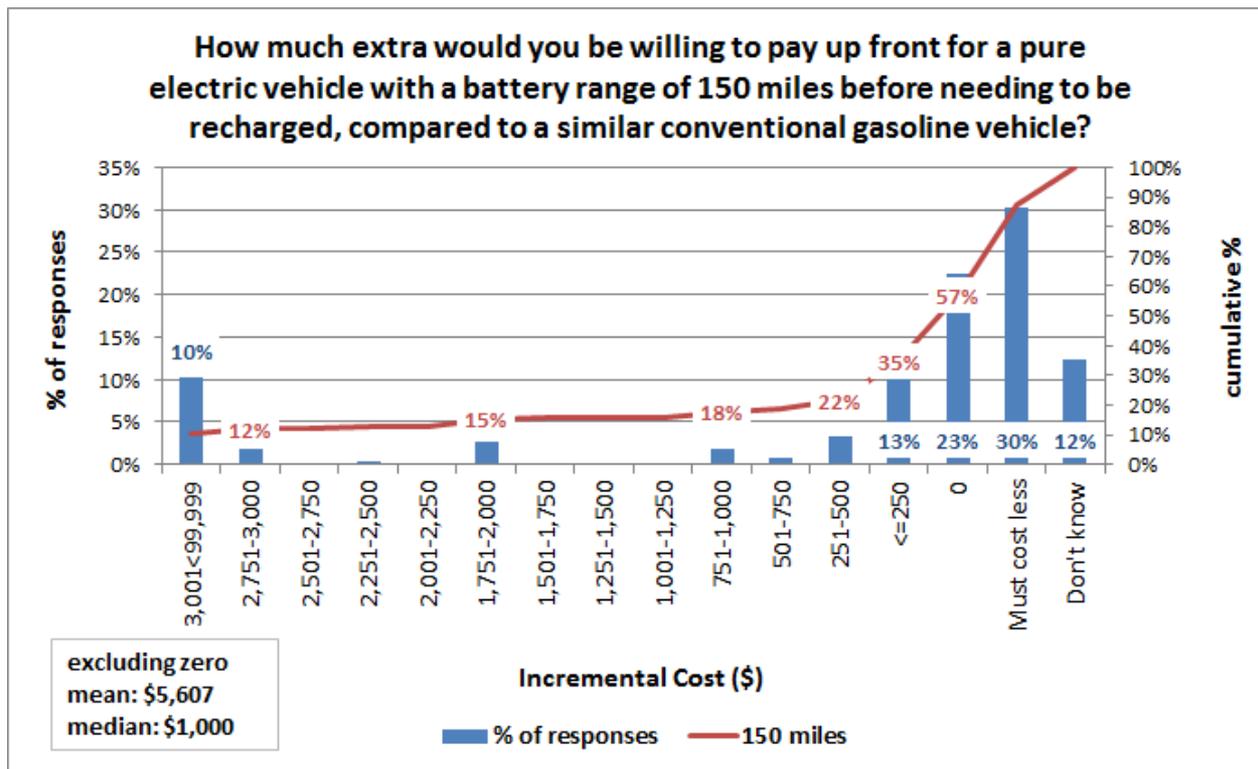
Willingness to pay: 100 miles of battery range



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A minority (29%) of respondents would pay an increased cost compared to a gasoline vehicle for an electric vehicle with a battery range of 100 miles that could not be powered by gasoline. Of those respondents willing to pay an increased cost, the median increase was \$900. An additional 23% of respondents would consider the vehicle if it did not have an increased cost.

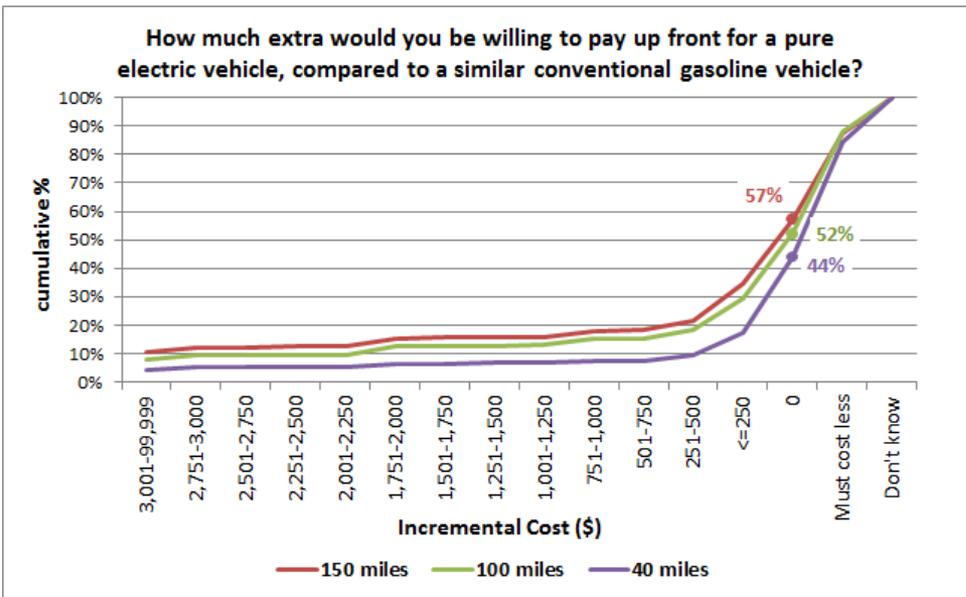
Willingness to pay: 150 miles of battery range



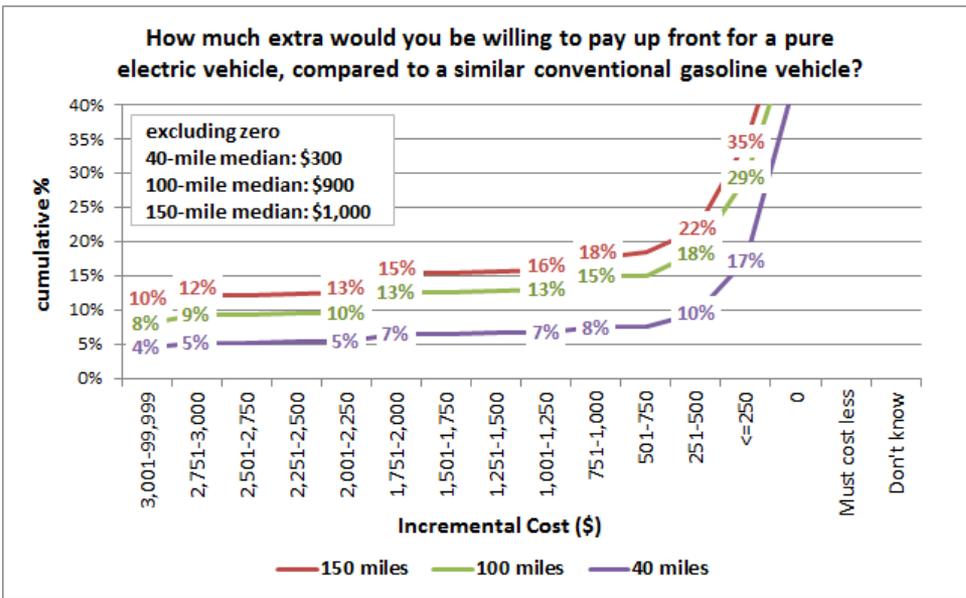
Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A minority (35%) of respondents would pay an increased cost compared to a gasoline vehicle for an electric vehicle with a battery range of 150 miles that could not be powered by gasoline. Of those respondents willing to pay an increased cost, the median increase was \$1,000. An additional 23% of respondents would consider the vehicle if it did not have an increased cost.

Willingness to pay: Variable battery range

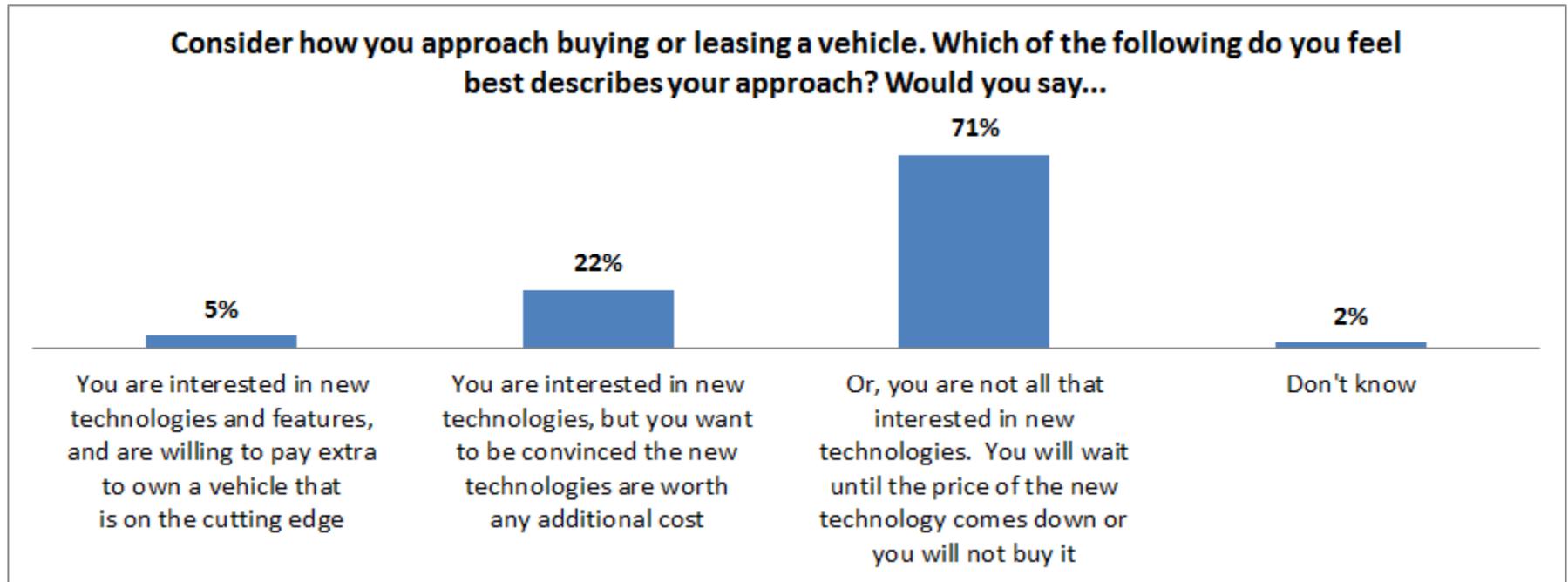


Respondents reported an increased willingness to pay for increased vehicle battery range when they considered ranges of 40 miles, 100 miles, and 150 miles. In all cases a minority of respondents were willing to pay more for the plug-in electric vehicle option than a similar conventional gasoline vehicle. The percentage of respondents willing to pay more than \$1,000 for the plug-in electric vehicle option more than doubled from the 40-mile version (7%) to the 150-mile version (16%).



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

Willingness to pay: Interest in new technologies



Source: ORC for NREL (August 2015), Study No. 724328, N=1,009.

A minority of respondents (27%) would be open to paying for new vehicle technologies either once they were convinced the technology was worth additional cost or because they wanted to own a cutting edge technology. A majority (71%) would wait until the price for the new technology came down before being willing to purchase it.

Mark Singer
Mark.Singer@NREL.GOV

www.nrel.gov

