

Identifying Likely Electric Vehicle Adopters

Electric Transportation

Abstract

The adoption of electric vehicles (EVs) has emerged as a unique and timely opportunity for the electric utility industry. Electrification of the transportation sector could accelerate electricity sales growth while simultaneously improving air quality and reducing greenhouse gas emissions. Electric utilities could play a critical role both in generating the electric fuel that would power this new economy and in managing some or all of the infrastructure through which it is delivered. The results presented here are part of a larger study that examined the effectiveness of EV incentives on EV adoption on a utility-by-utility basis. This document provides an analysis of the survey results on a national level and includes survey statistics, identification of likely adopters, and some further findings. The survey results offer insight regarding demographic characteristics of the likely EV adopters. This information can be useful for developing targeted marketing/outreach campaigns or when promoting EV adoption incentives.

Keywords

Electric vehicle (EV)
Transportation electrification
Electric vehicle incentives
Electric vehicle adoption
Battery electric vehicle (BEV)
Plug-in hybrid electric vehicle (PHEV)

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The results presented here are part of a larger study that examined the effectiveness of EV incentives on EV adoption on a utility-by-utility basis. This larger study included

- Development of a survey with discrete choice capabilities¹
- Conducting the survey in eight utility regions (3,200 surveys total).
- Analysis of the survey results using a discrete choice modeling framework
- Development of a regional EV adoption tool targeting the years 2020–2030, which allows utilities to test the effectiveness of different incentives (and incentive levels). National modeling results are summarized in EPRI report 3002017549.²

This document presents an analysis of the survey results on a national level and includes survey statistics, identification of likely adopters, and some further findings.

Survey Insights into Likely EV Adopters

The survey results provide insight regarding demographic characteristics of the likely EV adopters. This information can be useful for developing targeted marketing/outreach campaigns or when promoting EV adoption incentives.

Survey respondents generally fell into one of three categories. One portion of the population indicated that they would buy an EV in all 10 choice options presented to them, referred to here as “EV Only.” Another portion of the population indicated that they would buy a gasoline vehicle in all 10 choice options, referred to here as “Gasoline Only.” The rest of the population exhibited variable preferences depending on the package of options offered, referred to here as “Variable Preferences.” Across all eight utilities in this study, the population is roughly 16% EV Only, 35% Gasoline Only, and 49% Variable Preferences.

It is useful to analyze how the EV Only customers differ from the rest of the sample. Figure 1 summarizes these results for the entire sample.

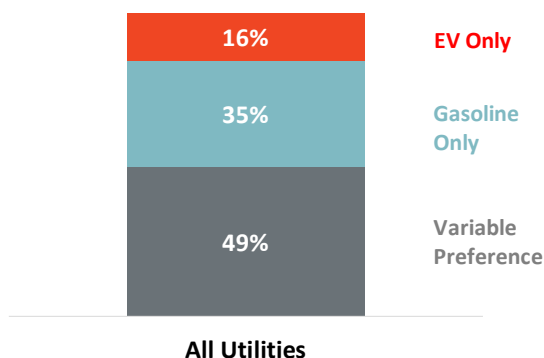
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¹ *Discrete Choice Experiment Instruments – Guidelines and Application in Electric Vehicle Preference*. EPRI, Palo Alto, CA: 2018. 3002013355.

² *The Impact of Incentives on Electric Vehicle Adoption: National Average Results*. EPRI, Palo Alto, CA: 2019. 3002017549.

Share of Survey Respondents



Demographic Concentration

	EV Only	Gasoline Only	All Utility Average
Democrat	45%	28%	34%
Caucasian	70%	68%	67%
Under 40 Years Old	42%	22%	36%
Previous Exposure to EVs	47%	21%	32%
College Graduate	41%	25%	35%
Family Income > \$100k	22%	17%	20%

Figure 1. Segmentation of survey respondents (sample average)

Note: Percentages in the table indicate the share of the indicated segment (EV Only, Gasoline Only, or Utility Average) that fall into the designated demographic categories. College graduate includes graduates of a four-year institution and post-graduate program.

Common Findings

Analysis of the pooled data across all utilities provides nuanced insight about factors driving EV adoption. The following findings from the pooled dataset were also generally observed for individual utilities:

- **Age:** Holding all other considerations constant (such as income and education), younger customers are more likely to purchase an EV. This relationship is stronger for battery electric vehicles (BEVs) than for plug-in hybrid electric vehicles (PHEVs).
- **Income:** Higher income households are more likely to adopt a BEV. The effect of income on likelihood is not significant for PHEVs.
- **Political affiliation:** People identifying as Democrats are most likely to adopt an EV, with Republicans being the least likely.
- **Education:** Interest in an EV increases very consistently with education. This relationship is slightly stronger for PHEVs than for BEVs.
- **Prior ownership:** Prior ownership of a BEV increases the likelihood that the customer will purchase a BEV again in the future. However, prior EV ownership does not strongly influence likelihood to adopt a PHEV.
- **Prior exposure to an EV:** People who have ridden in an EV are more likely to purchase a BEV or a PHEV. This provides support for the possibility that “ride and drive” events would increase EV adoption.
- **Preference for vehicle type:** Customers seeking a passenger car are the most likely to adopt an EV, with those who are seeking a pickup truck being the least likely. This observation could partly be explained by the current lack of availability of electric trucks, as respondents potentially could have had difficulty expressing interest in a purely hypothetical vehicle type.
- **Population density:** People living in cities and towns (i.e., more densely populated areas) are more likely to adopt a BEV than those living in suburbs or rural areas.

The relationships between each of the above factors and EV adoption are illustrated in Figure 2, which is generated from some of the discrete choice analysis (DCE). Specifically, each chart in the figure quantifies the

relative impact of the attributes shown, all other factors being held equal. For example, households that have previously owned an EV are around 60% more likely to buy an EV as their next vehicle relative to those households that have not previously owned an EV.

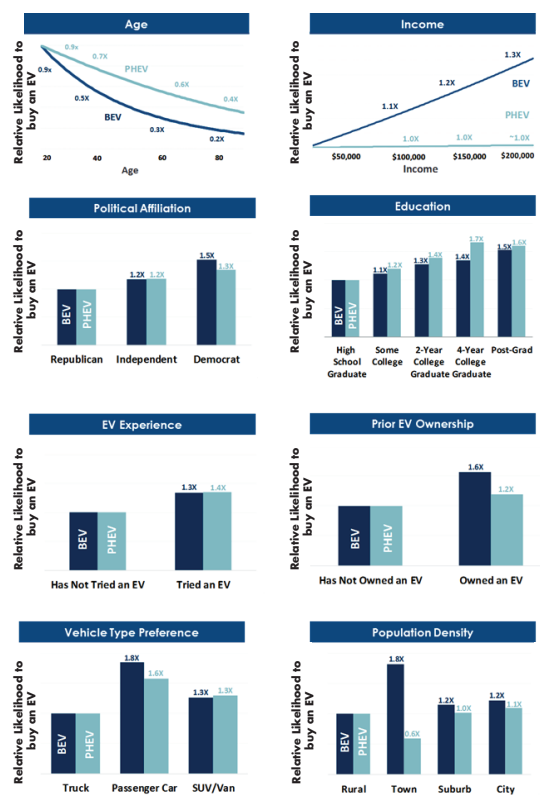


Figure 2. Key drivers of EV interest

The figures show the relative likelihood to buy an EV across demographics. The left most demographic values are chosen at random while the rest of the demographic variables are plotted in comparison to the first value. For the ‘Age’ comparison, 1.0 is for age 18 yrs.

While understanding the exact reasoning behind the vehicle choices of survey respondents is impossible—especially since purchasing a vehicle can be a very emotional decision—it is possible to examine how these trends might shift as the industry evolves. For example, the relationship between income level and EV interest should become less pronounced as EVs drop in price point. Additionally, as more EVs and chargers come on the market, some of the other relationships may change simply because EVs will no longer be perceived as a new technology. For example, in Figure 2, survey respondents with a preference for trucks show the least relative EV interest; however, as these drivers see electric trucks on the road and electric trucks are no longer an abstract concept their perceptions may change. How the influence of education will change preferences over time remains to be seen, but smart education campaigns as well as EV acceptance may cause a shift.

Summary of Survey Results

A summary of the statistics used to develop the above analysis are shown below representing the combined responses from the eight utility regions. The results shown reflect the application of population weights to ensure accurate representation of the general population. Table 1 provides a summary of the combined customer base of the eight utilities according to several key demographic characteristics. All averages shown are weighted to reflect the community population. All analyses shown in this work are filtered for those who plan to buy a new vehicle in the next five years.

Table 1. Customer demographics (sample average)

Political Identification		Employment Status	
Democrat	34%	Full-time	47%
Republican	28%	Part-time	10%
Independent	27%	Retired	23%
Other/Not sure	10%	Other	21%
Age		Family Income	
Under 25	7%	Less than \$40,000	30%
Ages 25-39	29%	\$40,000-\$80,000	33%
Ages 40-59	32%	\$80,000-\$150,000	21%
Ages 60-79	30%	Over \$150,000	8%
80 or older	2%	Prefer not to say	8%
Education Level		Number of Cars per Household	
No HS	3%	0	3%
High school graduate	29%	1	35%
Some college	22%	2	40%
College degree	34%	3	14%
Post-grad	12%	4	5%
Prefer not to say	0%	5 or more	2%

*“Other” Employment Status consists of students, the temporarily laid off, homemakers, the permanently disabled, the unemployed, and respondents who answered “other.”

*Due to rounding, totals may not sum to 100 percent.

Table 2 summarizes the respondents’ general vehicle preferences. As in Table 1, the values reflect weighting of survey results to the broader population.

Table 2. Customer vehicle preferences and experience (sample average)

Buy vs. Lease Future Vehicles	
Buy	90%
Lease	10%
Purchase (Lease) Price of Future Vehicle	
Less than \$20,000 (\$250/Month)	40%
Between \$20,000 (\$250/Month) and \$40,000 (\$500/Month)	50%
Between \$40,000 (\$500/Month) and \$60,000 (\$750/Month)	8%
Over \$60,000 (\$750/Month)	2%

Conclusions

The findings of this study serve as a valuable basis for targeted marketing or customer outreach initiatives. The demographic data of survey respondents could be explored further to identify additional characteristics of customers who may be interested in purchasing an EV or may be otherwise persuaded by the provision of various incentives. A similar analysis of the used EV market would be helpful as that provides a cost-effective way to market EVs to more buyers. Furthermore, repeating a study such as this in a couple years when there are many more electric SUVs and trucks would help reveal how customer views of EVs are changing over time.

While not shown in detail here, the results of this survey were combined with a vehicle modeling tool to show how the incentives impacted different utility regions over time. Due to differing regional constraints, the effectiveness of incentives varied. For example, in regions where traffic is difficult, EV access to an HOV lane increased future EV adoption more than places where traffic isn’t so much of an issue. These projections together with costs of implementing utility programs are helping the utilities who participated in this research to identify the most cost effective ways to increase EV adoption in their service territories.

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