

# **Clean Transportation Market Evaluation: EV Rebate Program Market Evaluation**

*Final Report*

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# 1 Introduction to the EV Rebate Program

NYSERDA's CEF Electric Vehicles initiative consists of two programs, an Electric Vehicle (EV) Rebate program and an EV Innovation program. Combined, the primary goal for both programs is to expand market adoption of EVs. This report addresses the market assessment of the EV Rebate program, which seeks to achieve its goals by growing consumer awareness of EV advantages; reducing the initial cost of EVs; and overcoming other market barriers. The Clean Energy Fund (CEF) Clean Transportation Chapter outlines several testable hypotheses and goals for the EV Rebate program. Market Evaluation Team systematically aligned the hypotheses and goals with NYSERDA's evaluation objectives and questions, and developed approaches to gathering and analyzing data required to address them.

**Table 1** displays the testable hypotheses, goals, and evaluation questions covered by this evaluation report. This report serves in part as an update to and expansion upon the Market Evaluation Team's initial efforts to report on progress towards these hypotheses, presented in the *2021 NYSERDA Clean Transportation Market and Impact Evaluation: Early Findings Report*.<sup>1</sup> The market research in that report leveraged the results of recently conducted survey research that had been done on behalf of NYSERDA along with additional market research conducted by the Market Evaluation Team.

This current report relies predominantly on the 2021 Personal Vehicle Customer (PVC) Market Survey. This survey was designed and distributed by the Market Evaluation Team to PVCs across New York State who are not currently EV owners, and specifically focused on collecting market insights that could directly measure progress towards NYSERDA's testable hypotheses. The survey was primarily designed to collect information that was not available for the Early Findings Report. Although some questions were designed with intentional overlap where the Market Evaluation Team and NYSERDA identified a value in collecting more recent data or in providing deeper insights on previously measured topics.

In addition to the PVC Market Survey, this report also utilizes data collected from the 2021 EV Driver Survey (a survey aimed directly at EV owners in New York State that was also implemented by the Market Evaluation Team) and to a lesser extent on data from NYSERDA's existing data collection efforts and external datasets. Additional information sources include data from the U.S. Census Bureau and New York Department of Motor Vehicle (DMV).

Throughout this report, where possible, the Market Evaluation Team draw comparisons to the *2020 EV Market Insights Study*, which was also conducted on behalf of NYSERDA and was a key data source for

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<sup>1</sup> IEC. 2021. Clean Transportation Market and Impact Evaluation: Early Findings Report. Prepared on behalf of NYSERDA. To request a copy of the Early Findings Report, please contact [evaluation.questions@nyserdera.ny.gov](mailto:evaluation.questions@nyserdera.ny.gov).

this work.<sup>2</sup> The *2020 EV Market Insights Study* also collected market insights by surveying non-EV owning PVCs in New York State. In areas where this study overlapped with our current efforts, the Market Evaluation Team examined the differences between results to look for evidence of shifts in the market. Additional detail on methods is available in **Methods Section** of this report. The **Market Characterization and Assessment Results Section** of this report presents the results by evaluation question listed in **Table 1**. In some cases, there are multiple metrics per evaluation question.

**Table 1.** Testable Hypotheses, Goals, and Evaluation Questions for the EV-Rebates Program Addressed in this Report.

EV – Rebates
<p><b>Testable Hypothesis: <i>If NYSERDA provides rebates for EV purchases that bring the upfront costs closer to those of gasoline vehicles, then more consumers will purchase EVs.</i></b></p>
<p><b>Goal:</b> The cost of EVs falls to be competitive with gasoline-powered vehicles given a three- to five-year ownership period</p> <ul style="list-style-type: none"> <li>• Would the buyer have purchased the EV had the rebate not been available?</li> <li>• How important was the rebate program for customers making purchasing decisions?</li> </ul> <p><b>Goal:</b> At least 40% of drivers report having had some personal experience with an EV, either through test drives, family, friends, neighbors, or co-workers<sup>3</sup></p> <ul style="list-style-type: none"> <li>• What percent of NYS residents are personal vehicle customers (PVCs)?</li> <li>• Where do consumers get their information from?</li> <li>• How aware of EVs are PVCs in NYS?</li> <li>• How much experience do PVCs in NYS have with EVs?</li> <li>• What influence does customer experience with EVs, and demographic factors have on their perceptions of EVs and their intent to purchase?</li> <li>• What do PVCs view to be the value proposition of EV ownership?</li> <li>• What are the main detractors?</li> </ul>

## 2 Summary of Market Characterization and Assessment Metrics

This section of the report provides a summary of findings by evaluation question. **Table 2** reports the year-to-year progress made towards each EV Rebate program initiative indicator as specified in the evaluation methodology. It also outlines the data sources that the Market Evaluation Team used to measure progress and other relevant notes.

<sup>2</sup> Essence Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

<sup>3</sup> This goal is tied to the EV – Innovation program but since it is directly related to understanding the EV – Market it is included in this report.

**Table 2. EV Rebates Program Market Evaluation Indicators**

NA = Not Available.

Indicators	Metric from IP?	Baseline	2019 Progress	2020/1 Progress To-Date	2022 Target	Data Sources	Status/ Other Comments
Number of rebates issued	Y	-	22,529	41,586	46,000	EvaluateNY – Rebate Data; NYSERDA Salesforce data	Updated from Early Findings Report. Cumulative values as of July 2021.
Number and percent of NYS residents that are PVCs	N	NA	NA	<b>49%</b>	-	DMV Registration Data; U.S. Census Bureau	Updated from Early Findings Report based on alternative sources.
Percent of rebate recipients completing follow-up surveys	Y	-	26%	<b>24%</b>	25%	EvaluateNY – Rebate Data; EV Adoption Survey (2018, 2020)	Copied from Early Findings Report.
Number of EVs currently registered in NYS	Y	16,131	46,400	<b>59,828</b>	150,000	EvaluateNY – DMV Snapshots	Cumulative values. Values reflect the number of active registrations as of Dec. 2020. Copied from Early Findings Report.
EV market share (EV sales as a percentage of total car sales in NYS)	Y	0.6%	1.4%	<b>2.0%</b>	5.0%	Auto Alliance – Advanced Technology Vehicle Sales Dashboard	Data through Sep. 2020. Copied from Early Findings Report.
Proportion of buyers that would have purchased vehicle if rebate not available	N	NA	<b>BEV: 52% PHEV: 49%</b>	<b>EV: 59%</b>	-	EV Adoption Survey (2018, 2020); <b>PVC Market Survey 2021</b>	Updated from Early Findings Report.
Number of EV models for sale out of total number of EV models available	N	NA	NA	<b>56 out of 56</b>	-	EvaluateNY – Vehicle Deep Dive; Cars.Com	With two models available online only. Copied from Early Findings Report.
EV market share of each model	N	NA	NA	Top model is Tesla Model 3 with <b>18%</b> of EV market in NYS	-	EvaluateNY – Vehicle Deep Dive	Copied from Early Findings Report.
Proportion/number of new car dealers in NYS selling EVs	N	NA	NA	<b>51%</b>	-	NYSERDA Participating Dealers; DMV Dealership Data	Copied from Early Findings Report.
Percent of newly registered EVs in NYS with rebates	N	NA	<b>50%</b>	<b>68%</b>	-	EvaluateNY – Rebate Data; NYSERDA Salesforce data	Copied from Early Findings Report.

Indicators	Metric from IP?	Baseline	2019 Progress	2020/1 Progress To-Date	2022 Target	Data Sources	Status/ Other Comments
Relative importance of rebate program on Likert scale	N	NA	NA	<b>83%</b>	-	EV Adoption Survey (2020); <b>EV Driver Survey 2021</b>	Updated from Early Findings Report.
Types of consumer sources of information about EVs by frequency	N	NA	NA	Top source of information: 73% of non-EV owners that seek information about EVs use <b>online reviews</b>	-	<b>PVC Market Survey 2021</b>	Updated from Early Findings Report.
Consumer awareness with EVs • Awareness of PHEV makes/models • Awareness of BEV makes/models	N	NA	NA	PHEV: <b>19%</b> of non-EV owners can correctly identify a PHEV BEV: <b>7%</b> of non-EV owners can correctly identify a BEV	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs in NYS with EV experience by type	N	NA	NA	PHEVs: <b>69%</b> of non-EV owners report some type of experience BEV: <b>61%</b> of non-EV owners report some type of experience	-	<b>PVC Market Survey 2021</b>	New metric
Satisfaction levels with EV experience by experience type	N	NA	NA	PHEVs: At least <b>53%</b> rated their experiences with PHEVs as “very” or “extremely” satisfying across all experience types. BEVs: At least <b>68%</b> rated their experiences with BEVs as “very” or “extremely” satisfying across all experience types.	-	<b>PVC Market Survey 2021</b>	New metric
Likelihood of EV purchase by EV type • PHEV • BEV	N	NA	NA	PHEV: <b>37%</b> of non-EV owners are “likely” or “extremely likely” to purchase a PHEV. BEV: <b>34%</b> of non-EV owners are “likely” or “extremely likely” to purchase a BEV.	-	<b>PVC Market Survey 2021</b>	New metric
Vehicle features of importance reported by PVCs • EVs • Non-EVs	N	NA	NA	Reliability was the most frequently named factor of importance when considering both an ICE ( <b>56%</b> ) or an EV ( <b>53%</b> ).	-	<b>PVC Market Survey 2021</b>	New metric

Indicators	Metric from IP?	Baseline	2019 Progress	2020/1 Progress To-Date	2022 Target	Data Sources	Status/ Other Comments
Type of benefits identified by EV owners	N	NA	NA	Reducing environmental impacts; saving money on fuel costs; saving money overall	-	EV Ownership Survey (2018, 2020)	Copied from Early Findings Report.
Type of detractors identified by EV owners	N	NA	NA	Range limitations, speed of charging, performance in cold weather, overall cost of ownership	-	EV Ownership Survey (2020)	Copied from Early Findings Report.
Proportion of PVCs more likely to purchase EV when provided information on actual EV maintenance costs • PHEV • BEV	N	NA	NA	PHEV: <b>48%</b> of non-EV owners are more likely to purchase BEV: <b>28%</b> of non-EV owners are more likely to purchase	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs more likely to purchase an EV if same first cost as conventional vehicle • PHEV • BEV	N	NA	NA	PHEV: <b>67%</b> of non-EV owners are more likely to purchase BEV: <b>53%</b> of non-EV owners are more likely to purchase	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs by home parking situation type and reduced likelihood to purchase an EV	N	NA	NA	<b>30%</b> of non-EV owners less likely to purchase because of their home parking situation.	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs with access to EV charging stations at work by reduced likelihood to purchase an EV	N	NA	NA	<b>53%</b> of non-EV owners with no charging at work less likely to purchase.	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs with access to EV charging stations at local retailers by reduced likelihood to purchase an EV	N	NA	NA	<b>59%</b> of non-EV owners with no charging at local retailers less likely to purchase.	-	<b>PVC Market Survey 2021</b>	New metric
Proportion of PVCs with access to EV charging stations along regularly traveled highways by reduced likelihood to purchase an EV	N	NA	NA	<b>66%</b> of non-EV owners with no charging along highways less likely to purchase.	-	<b>PVC Market Survey 2021</b>	New metric

### 3 Market Characterization and Assessment Results

#### 3.1 Would the buyer have purchased the EV had the NYS rebate not been available?

A slight majority of EV owners, 59%, would have purchased an EV in the absence of the Drive Clean rebate; of the 59%, 43% would have purchased the exact EV, and 16% reported that they would have purchased a less expensive version of the same model. From the remaining respondents, 27% of respondents said that they would have purchased a different vehicle, while 14% would not have purchased a new vehicle at all. The Federal Tax credit seems to have a larger effect: fifty-five percent of EV adopters were influenced by the federal tax credit in choosing a model. Of these, 36% of respondents said that they would have purchased a different vehicle had the federal tax credit been unavailable, and 19% would not have purchased a new vehicle at all. Twenty-nine percent would have purchased the exact same vehicle, while an additional 16% would have opted for a cheaper version of the same model (Figure 1).

**Figure 1.** Purchase/Lease Decision with no NYS Drive Clean Rebate or Federal Tax Credit.

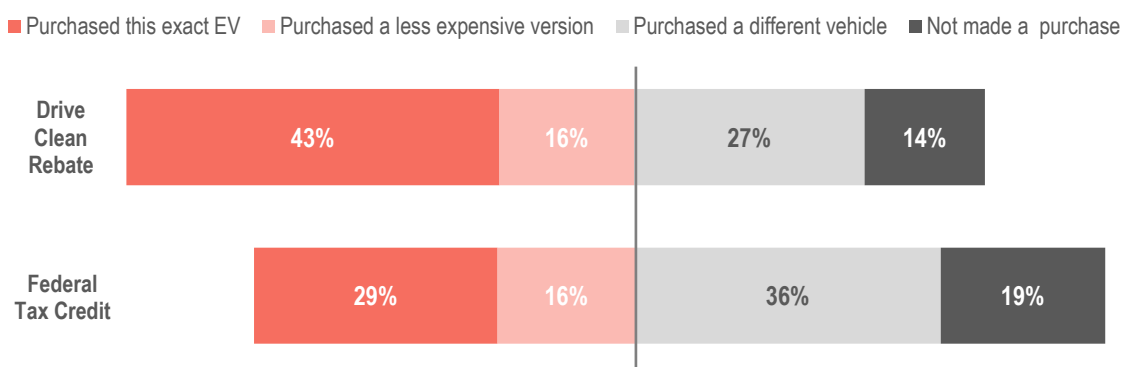
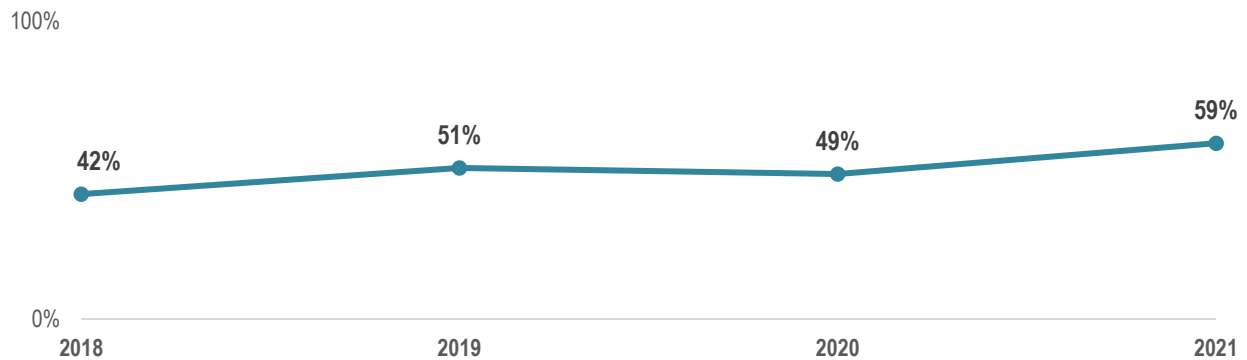


Figure 2 shows the annual percentage of EV owners who indicated that they would have purchased the same EV had the Drive Clean rebate not been available, dating back to 2018.<sup>4</sup> The influence of the rebate seems to be diminishing over time, but the question was asked slightly differently in the 2021 survey, which was the first year where “would have purchased a less expensive version of the same model” was available as an option. This relatively high percentage of respondents who would have purchased a version of the same model EV without the rebate may indicate that consumers are becoming more willing

<sup>4</sup> Results prior to 2021 from: Center for Sustainable Energy. 2020. NYSERDA Drive Clean Rebate Adoption Survey 2018-2019 Results. Jun. 2020.

to purchase EVs with fewer incentives as the technology becomes better and more affordable, although as shown above, the federal tax credit still appears to be a strong factor influencing adoption.

**Figure 2.** Annual Percentage of NY EV Owners who Would Have Purchased Same EV with no Drive Clean Rebate<sup>5</sup>



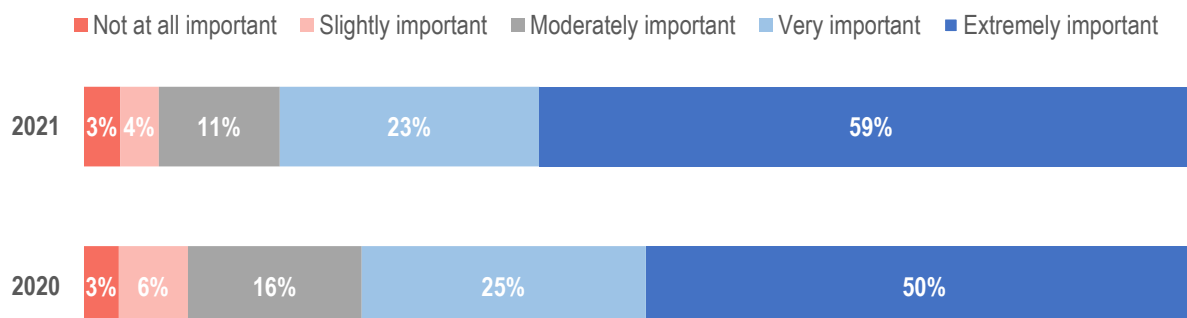
### 3.2 How important was the rebate program for customers making purchasing decisions?

From the EV Driver Survey 2021, 82% of EV owners reported that the Drive Clean rebate was “very” or “extremely” important in making it possible for the recipient to acquire their EV, see **Figure 3**. This was an increase from the 75% that reported this in the 2020 EV Adoption Survey.<sup>6</sup> In 2021, eleven percent described it as “moderately important,” and only 7% described the rebate as slightly or not at all important. These findings seem to contradict the data from **Section 3.1**: 59% of EV owners found the rebate extremely important, but only 43% of them would not have made the same purchase decision in absence of it. It should be noted that the rebate has both a direct effect on PVC decision-making, as well as an indirect market signaling effect on PVCs who have more exposure to EVs on the road and in their community because of the existence of the rebate. Additional exposures of PVCs to EVs is also critical for realizing market transformation. Indirect effects are explored in the accompanying impact evaluation.

<sup>5</sup> Results prior to 2021 include respondents who answered “yes” to the question: “Would you have purchased/leased your electric car without the State car rebate (Drive Clean Rebate)?” For the 2021 survey, these results include respondents who indicated that they “would have purchased the same exact vehicle” and “would have purchased a less expensive version of the same model”

<sup>6</sup> Center for Sustainable Energy. 2020. NYSERDA Drive Clean Rebate Adoption Survey 2018-2019 Results.

**Figure 3.** Importance of Drive Clean Rebate in Deciding to Purchase an EV.



### 3.3 What percent of NYS residents are Personal Vehicle Customers (PVCs)?

Understanding the percentage of NYS residents that are PVCs helps define the universe of decision-makers for the overall NYS vehicle market. The Market Evaluation Team determined the number of New York residents who are PVCs using several data sources including U.S. Census data (including American Community Survey), and the NYS DMV Driver License, Permit, and Non-Driver Identification Cards dataset. The Market Evaluation Team does not use the number of licensed drivers as a proxy for the number of PVCs because not everyone with a license has a vehicle; members of the same household may share a vehicle, or individuals may maintain a license for rentals but do not own. Our estimates indicate that approximately 9.6 million persons or 49% of NYS residents are PVCs.<sup>7</sup> **Table 3** presents the total numbers and percent estimate.

**Table 3.** Statewide Vehicle, and Ownership Statistics

Metric Component	Value
Number of Driver's Licenses in New York State <sup>1</sup>	12,194,360
Number of Estimated Driver's Licenses (PVCs) Owning a Vehicle	9,603,475
New York State Population <sup>2</sup>	19,453,561
<b>Percent of NYS Residents that are PVCs</b>	<b>49%</b>

<sup>1</sup> New York Department of Motor Vehicles (DMV). 2019. Driver License, Permit, and Non-Driver Identification Cards Issued as of August 30, 2017. <https://data.ny.gov/Transportation/Driver-License-Permit-and-Non-Driver-Identificatio/a4s2-d9tt>. Accessed Aug. 2021.

<sup>2</sup> U.S. Census Bureau. 2019. QuickFacts: New York. <https://www.census.gov/quickfacts/NY>. Accessed Aug. 2021.

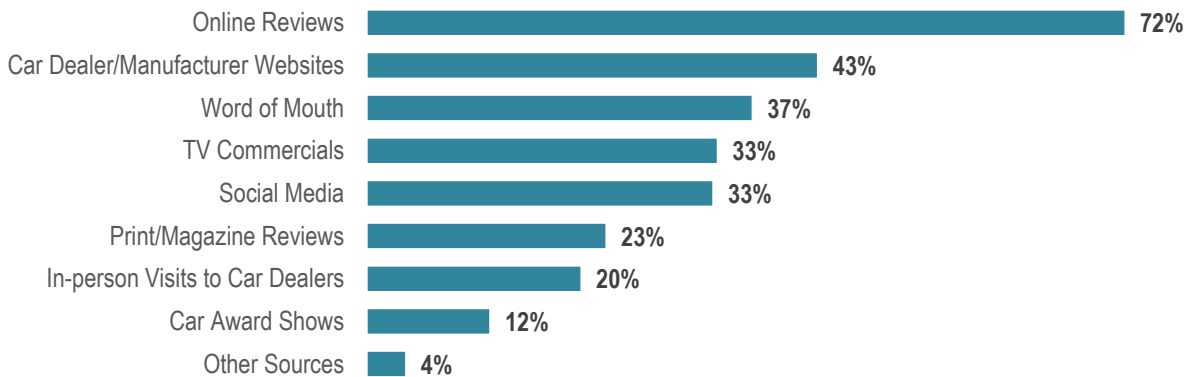
<sup>7</sup> To calculate percent of PVCs, the Market Evaluation Team determined the average number of vehicles per driver's license by dividing the average number of vehicles per household by the average number of licenses per household. The Market Evaluation Team relied on NYS DMV license data and U.S. Census American Community Survey data to determine these ratios. The Market Evaluation Team used household ratios rather than directly linking licenses to the direct population to account for the differing number of drivers and vehicle within each household. The Market Evaluation Team multiplied this ratio by the total number of licenses in the state to estimate that 9.6 million drivers own a vehicle or have frequent access to a vehicle.



### 3.4 Where do consumers get their information from?

The PVC Market Survey results indicate that a slight majority (55%) of respondents have not sought out information about PHEV or BEV vehicles. Of the 45% of respondents who have searched for materials about these types of vehicles, online reviews were the most common source of information (72%). **Figure 4** shows the additional sources of information that consumers used to learn more about BEVs and/or PHEVs, which includes car dealer/manufacturer websites (43%), word of mouth (37%), TV commercials (33%), and social media (33%), as the next most-common responses. Multiple response answers also centered around online reviews. Online reviews and websites (17 responses) was the most frequent multiple response combination. Survey respondents were allowed to select multiple sources when reporting the channels through which they have sought information. These results were also supported by findings from the 2020 Market Insights Survey, which found online reviews to be the most frequently reported influence, followed by word of mouth for informing a respondent’s car purchase.<sup>8</sup>

**Figure 4.** Sources of Information sought by PVCs interested in PHEVs or BEVs



### 3.5 How aware of EVs are PVCs in NYS?

Based on the 2021 PVC Market Survey, it appears that consumers tend to overestimate their knowledge about electric vehicles. Respondents were asked if they could name up to three PHEV and BEV models, respectively. **Figure 5** shows a breakdown of these responses for each EV technology. The Market Evaluation Team divided these responses into four groups:

- Respondents able to correctly identify at least one vehicle with no mistakes (highest awareness of EVs).

<sup>8</sup> 2020 Question: What or who else typically influences which car you might want to buy, before you arrive at the showroom? (Pick all that apply)” Essense Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

- Respondents able to correctly identify at least one vehicle with some mistakes.
- Respondents who gave all incorrect responses.
- Respondents that did not attempt to respond (lowest awareness of EVs).

While 67% of respondents reported that they could name at least one PHEV, only 28% were successfully able to correctly identify at least one PHEV model (a correct response included both make and model).<sup>9</sup> Of these respondents, roughly one-third (9.7%) also named at least one vehicle that was **not** a PHEV (e.g., many consumers correctly identified a PHEV but also listed “Tesla”). This suggests market confusion about PHEVs vs. BEVs, even among respondents who have some familiarity with PHEVs. Anticipating a lack of consumer awareness regarding differences in types of EVs, the Market Evaluation Team included an infographic at the start of the survey to explain the differences in PHEVs and BEVs (see **Section 5.4** for the full survey). The 67% of respondents indicating they could name at least one PHEV is a similar finding to the percentage of respondents who self-reported familiarity with PHEVs (72%) from the *2020 EV Market Insights Survey*.<sup>10</sup> The inability of respondents to correctly identify PHEV models shows the disconnect between perceived and actual familiarity.

A slightly lower percentage of respondents reported that they could name at least one BEV (54%), which was slightly lower than the 68% who self-reported familiarity with BEVs in the *2020 EV Market Insights Survey*. Despite this, compared to PHEV responses, a greater percentage of respondents were able to correctly identify at least one BEV (40% compared to 28%). This was largely due to consumer’s familiarity with Tesla vehicles. Of the 40% of respondents correctly identifying a BEV, 75% (or 30% of the full survey population) identified only Tesla vehicles, while the remaining 25% (10% of the overall population) provided responses that included non-Tesla BEVs.<sup>11</sup> As shown in **Figure 5**, only 7% of respondents were able to correctly identify at least one BEV model (including make) without also incorrectly identifying other vehicles or choosing not to respond. This percentage was slightly higher, for PHEVs (19%).

Sixty percent of PVCs were unable to correctly identify any BEV models (including respondents who only gave incorrect answers and those who did not attempt to answer the question), while 71% were unable to name any PHEVs. Only 3% of respondents of all respondents were able to correctly name three

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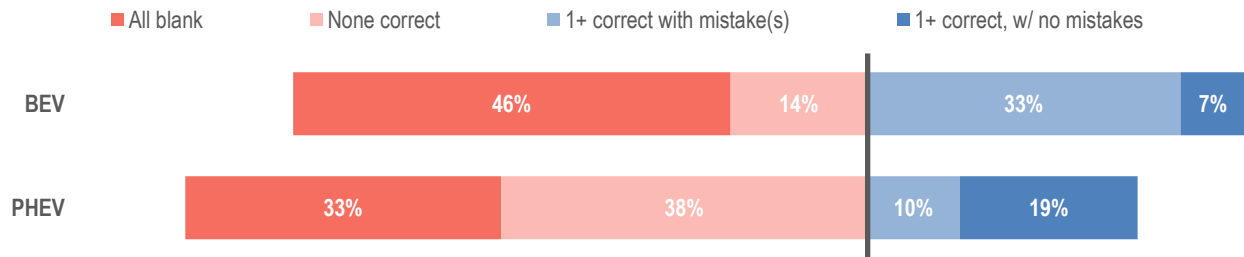
<sup>9</sup> Forty-nine percent of respondents were able to correctly name at least one make (i.e., manufacturer) of PHEVs (e.g., “Ford”), however without the model it is unclear if these respondents were fully aware of what vehicles are PHEVs.

<sup>10</sup> Essence Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

<sup>11</sup> This includes respondents who correctly identified Tesla and a different make and model of BEV, and respondents who identified only non-Tesla make and model(s) of BEVs correctly.

makes and models of either BEVs or PHEVs. This likely suggests that the share of the general population with a high level of awareness about EV technologies is small, although since the PVC Market Survey does not include EV owners, it underestimates EV awareness across the full population, since some drivers with interest in the technology have already adopted EVs.

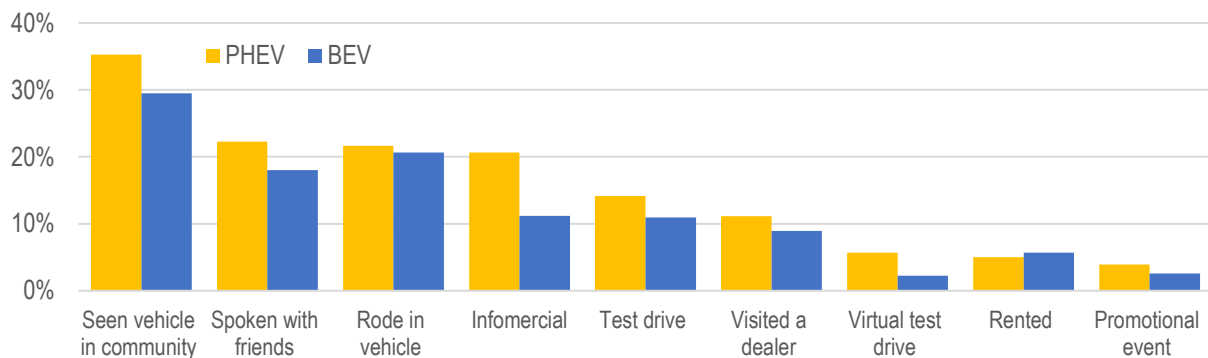
**Figure 5.** Number of BEVs/PHEVs Correctly Identified by PVCs



### 3.6 How much experience do PVCs in NYS have with EVs?

Over two-thirds of PVCs reported having at least one experience with PHEVs (69%), slightly higher than those reporting engagement with BEVs (61%). Seeing a vehicle in the community was the most frequently reported experience with both PHEVs (35%) and BEVs (30%). Respondents reported speaking with friends or family about a PHEV and riding in a PHEV as the next most common types of experiences (22% each, respectively). These two experiences also made up the remainder of the top-three most common experiences that PVCs had with BEVs, although the order was switched: 21% reported that they had ridden in a BEV, slightly more than those who had spoken with friends about such vehicles (18%). A higher percentage of respondents reported having experiences with PHEVs across all categories except for renting a vehicle. (Figure 6).

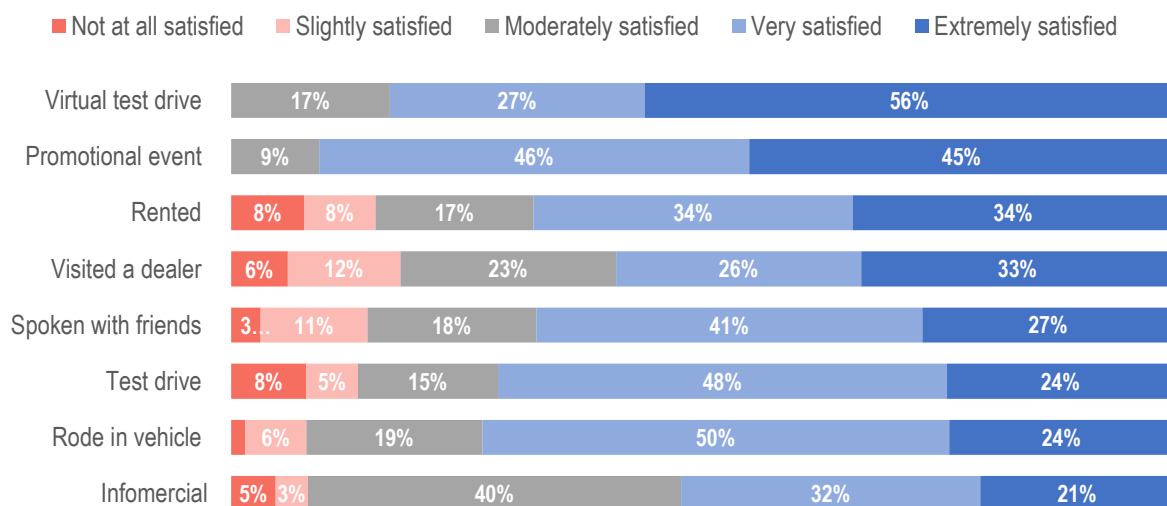
**Figure 6.** Percentage of PVCs Reporting Specific Experiences with PHEVs and BEVs.



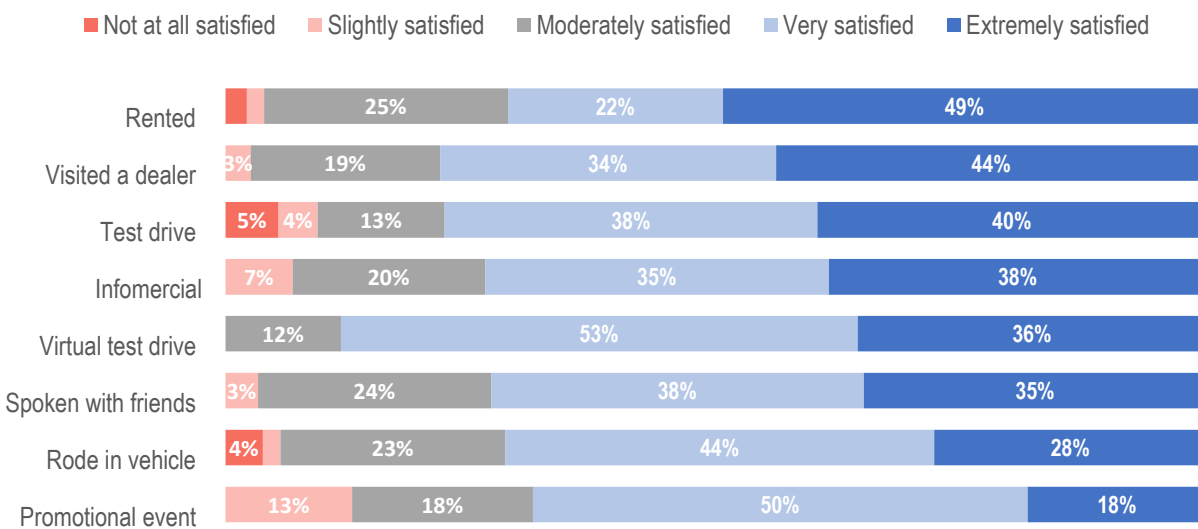
When asked to rate their level of satisfaction with EV experiences, respondents indicated high levels of satisfaction across all experiences and technologies. **Figure 7** and **Figure 8**. show that at least 53% of all respondents rated their level of satisfaction as “very” or “extremely” satisfied with each specific experience that they had with EVs. In most cases, these positive responses represented over two-thirds of all satisfaction ratings. Similarly, the two lowest rating categories offered in the survey (“slightly” or “not at all” satisfied) comprised no more than 18% of ratings for any experience type. Ninety-one percent of respondents reported that they were “very” or “extremely” satisfied with PHEV promotional events, slightly ahead of those giving the highest ratings to their experiences with PHEV virtual test drives (83%). Consumers who had experiences with BEVs gave their highest satisfaction ratings to their virtual test drive experiences (89% rating as “very” or “extremely” satisfied), followed by their experiences with visiting a dealer (78%) and in test driving a BEV (78%).

While responses tended to be similar across both technologies, PVCs indicated that they were substantially more satisfied with their BEV-related dealer visit experiences compared to PHEVs. Seventy-eight percent of respondents who visited BEV dealers rated this experience as “very” or “extremely” satisfying, compared to just 59% of PHEV respondents. Eighteen percent of respondents with PHEV experiences rated their dealer visit experience as “slightly” or “not at all” satisfying, a response given by just 3% of respondents with BEV experiences. While it is difficult to identify the reason for these differences, it may be because respondents with BEV experiences visited Tesla dealers, where sales representatives may have had greater familiarity with the technology as compared to dealerships where ICE vehicles dominate.

**Figure 7. Satisfaction Levels Reported by PVCs who have had Select Experiences with PHEVs.**



**Figure 8.** Satisfaction Levels Reported by PVCs who have had Select Experiences with BEVs

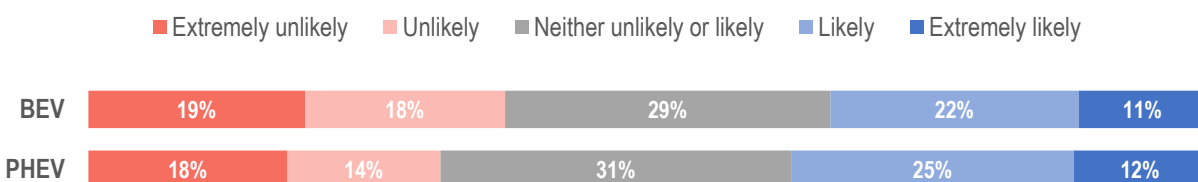


### 3.7 What influence does customer experience with EVs, and demographic factors have on their perceptions of EVs and their intent to purchase?

The results of the PVC Market Survey suggest that additional experience, awareness, and understanding of EV vehicles and technology increases consumers’ likelihood to adopt. This section presents the overall likelihood of non-EV owners to purchase an EV as their next vehicle and the influence of previous EV experience, vehicle cost, and customer demographic characteristics – in the context of barriers to adoption – on likelihood to purchase.

The survey asked respondents to rate their likelihood to purchase a PHEV and/or BEV based on their current knowledge. **Figure 9** shows respondent’s initial likelihood to purchase an EV. PVCs were slightly more likely to purchase a PHEV than a BEV, with 37% reporting that they were “likely” or “extremely” likely to purchase a PHEV, compared to 34% for BEVs. A slightly higher percentage of respondents indicated that they were “unlikely” or “extremely unlikely” to purchase a BEV (37%) compared to a PHEV (32%).

**Figure 9.** PVC Likelihood to Purchase a PHEV or BEV as their Next Vehicle.

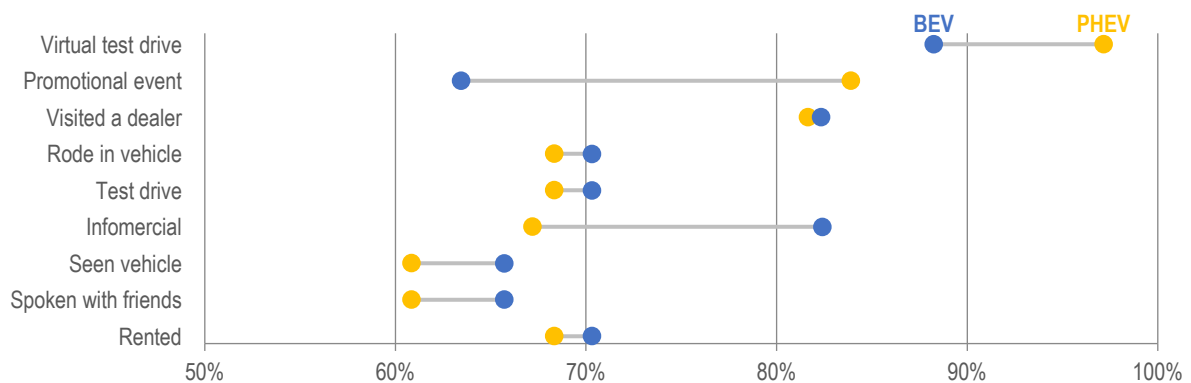


### 3.7.1 Influence of Engagement and Experiences on Likelihood of EV Purchase

The Market Evaluation Team analyzed how engagement and experiences with PHEVs and BEVs corresponded with respondents' likelihood to adopt. **Figure 10** shows that respondents who had experiences with PHEVs or BEVs expressed high levels of interest in adopting the given technology. Over 60% of respondents reported that they were “likely” or “extremely likely” to purchase an EV after having a given experience with a vehicle of that technology type. Respondents who engaged with PHEV or BEVs through virtual test drives were the most likely to express interest in adoption; 97% of respondents that had a PHEV virtual test drive experience and 88% of respondents that had a BEV virtual test drive experience reported that they were likely to purchase an EV for their next vehicle. Notably, when examining only consumers who reported positive experiences, 97% of respondents who had a positive rental experience reported that they were likely to purchase a PHEV, slightly higher than the 90% of respondents who had positive rental experiences with BEVs and said they were likely to purchase.<sup>12</sup>

It is likely that respondents who were already interested in EVs are more likely to seek out experiences with these vehicles, so it is unsurprising that these individuals reported higher likelihoods to adopt than the general survey population. However, these results suggest that increased exposure and experiences may have some impact on all PVCs, as likelihood to adopt remained high across other experience types such as promotional events, which were less likely to have been actively sought out by consumers who were already conducting research towards purchasing an EV.

**Figure 10.** Percent of Respondents Indicating they are “Likely” or “Extremely Likely” to Purchase a PHEV or BEV by the Type of Customer Experience (e.g., attended a promotional event, etc.).



<sup>12</sup> Number of respondents that engaged in the activities: BEVs: 45 test drove, 24 rented; PHEVs: 58 test drove, 25 rented.

### 3.7.2 Influence of EV Ownership Experience on Likelihood of Future EV Purchase

To achieve market transformation to EVs, not only do PVCs need to adopt EVs at higher rates, but EV adopters also need to continue purchasing EVs over ICEs for future purchases. A recent study in California found that “[EV] discontinuance in California occurs at a rate of 20% for plug-in hybrid electric vehicle owners and 18% for battery electric vehicle owners.”<sup>13</sup> While these rates are not especially high, if one in every five EV adopter reverts to an ICE vehicle, market transformation towards EVs will be slowed substantially. The study found several factors were statistically significant when comparing those who continued to purchase EVs versus those who returned to ICE vehicles. Specifically, these were:

- Level of satisfaction with the convenience of charging.
- Presence of less efficient vehicles in the household.
- Access to Level 2 (240-volt) charging at home.
- Number of household vehicles (homes with more vehicles were more likely to continue their EV ownership).
- Gender (females were less likely to re-purchase).

Many of these factors align with the barriers to initial adoption including hesitation due to lack of charging availability, home charging options, and gender discussed in the 2020 NYSERDA Drive Clean Market Research Insights Survey.<sup>14</sup> This suggests that any efforts NYSERDA takes to reduce charging barriers or promote EVs to hesitant groups who have not yet adopted will have the added benefit of reducing barriers that may prevent EV owners from continuing to purchase EV vehicles.

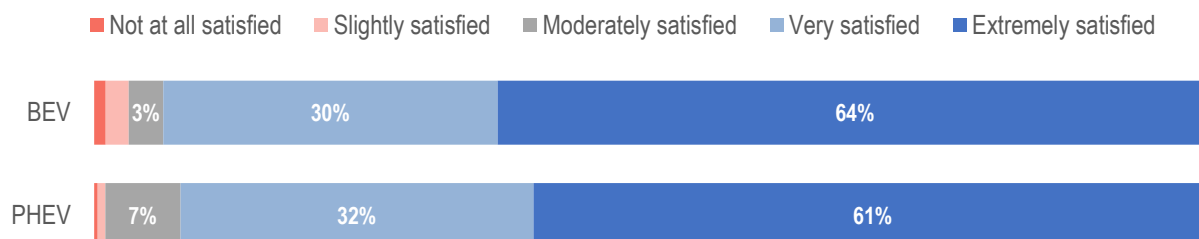
The 2020 EV Ownership Survey asked EV Owners in New York about both their satisfaction and likelihood to purchase another EV. As **Figure 11** shows, both PHEV and BEV owners reported high levels of satisfaction, with 94% of BEV owners reporting that they were “very” or “extremely” satisfied with the vehicles, just ahead of the 92% of PHEV owners who gave those responses. Despite these high levels of satisfaction, some NYS EV owners still expressed some hesitation towards purchasing another EV.

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<sup>13</sup> Hardman, S. and Tal, G. 2021. Understanding discontinuance among California’s electric vehicle owners. *Nature Energy*. Vol. 6, pp. 538-545. <https://www.nature.com/articles/s41560-021-00814-9>.

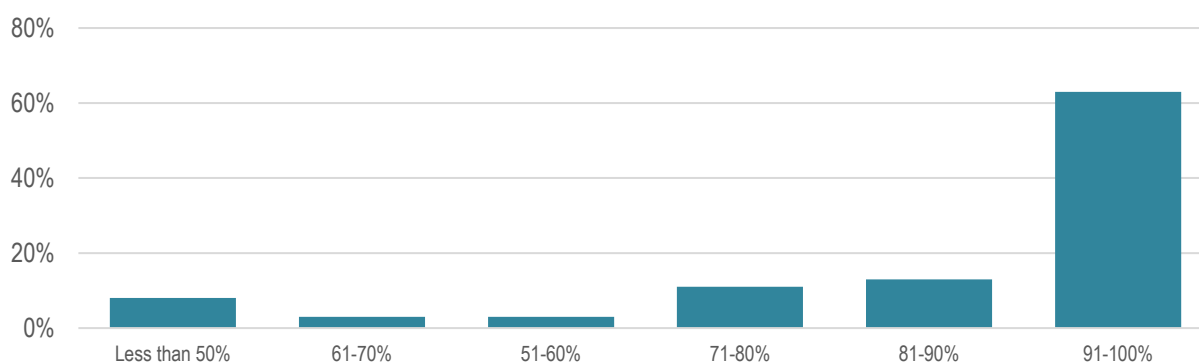
<sup>14</sup> Essense Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

**Figure 11.** PHEV and BEV Owner Satisfaction in NYS



While 63% of owners rated their likelihood to purchase, another EV as “91-100%,” one-quarter of respondents rated their likelihood as “71-80%” or lower, including 8% who indicated less than 50% (Figure 12). Although most respondents appear to be more likely than not to purchase another EV, the 37% of respondents who gave answers below “91-100%” suggests that there are some remaining barriers, dissatisfaction, or areas of uncertainty that need to be addressed to ensure that EV adopters will continue to opt for the technology.

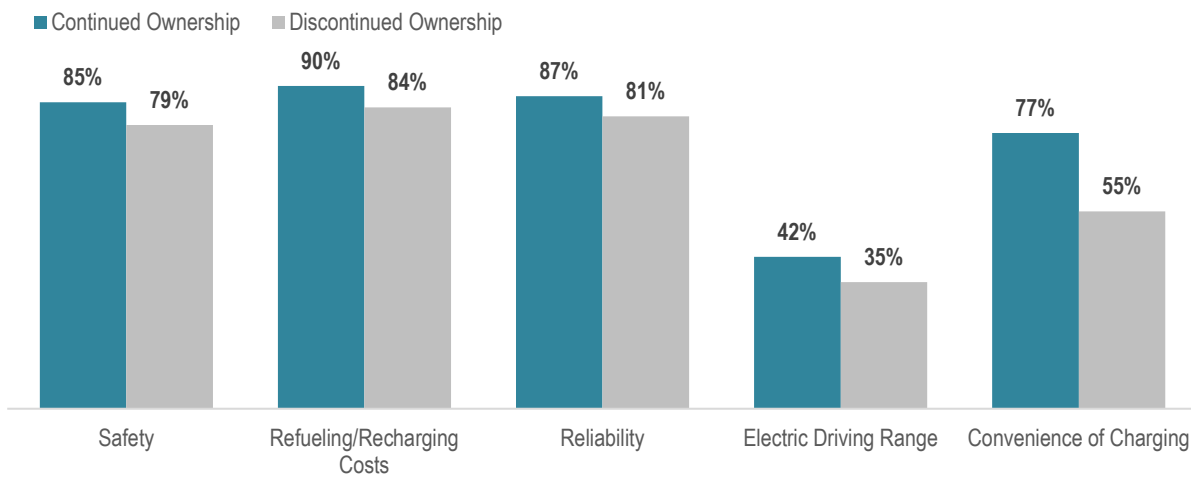
**Figure 12.** NYS EV Owner Likelihood to Purchase/Lease Another Electric Vehicle



The California study further supported the importance of convenience of charging as a standout compared to other vehicle features. While EV owners who continued ownership were more satisfied with their EVs across all features considered in the study, satisfaction levels were fairly similar between the two groups when rating safety, refueling/recharging costs, reliability, and the electric driving range of their vehicles (Figure 13). However, the groups differed significantly when asked about their satisfaction with the convenience of charging, with 77% of continuing owners giving “satisfied” or “very satisfied” ratings, compared to just 55% of those who reverted to ICEs. This suggests that lack of charging availability may be the greatest barrier to continual EV ownership and likely impacts adoption as well.

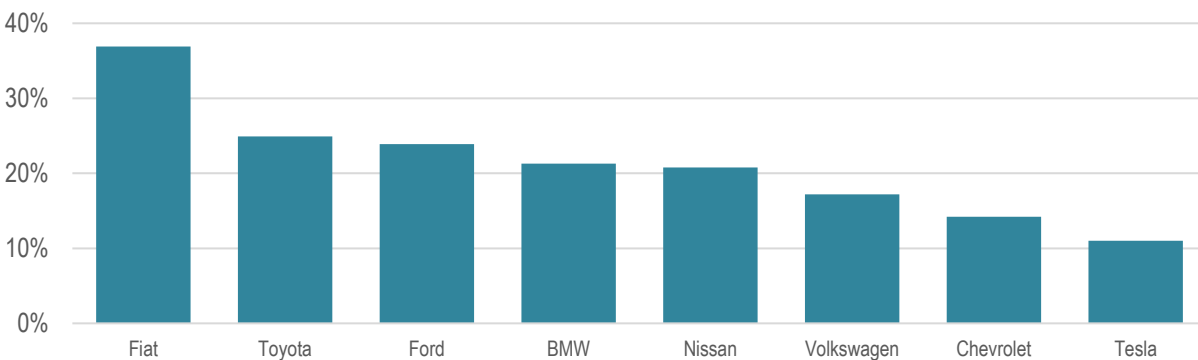


**Figure 13.** Percentage of EV Owners who gave “Satisfied” or “Very Satisfied” Responses when asked about features during their time of EV ownership. <sup>15</sup>



Finally, the vehicles themselves are also likely tied closely to consumer’s experiences. The California study further identified substantial differences across consumers who chose to purchase another EV versus those who reverted to an ICE vehicle based on the manufacturer of the consumer’s original EV. As shown in **Figure 14**, 37% of Fiat-EV owners surveyed returned to an ICE compared to just 11% of Tesla owners. Chevrolet (14%) and Volkswagen (17%) also had fewer owners reverting to ICEs, while Toyota (25%) and Ford (24%) owners also returned to ICEs at relatively high rates.

**Figure 14.** Percentage of California EV Owners who Returned to ICEs, by Manufacturer of EV<sup>16</sup>



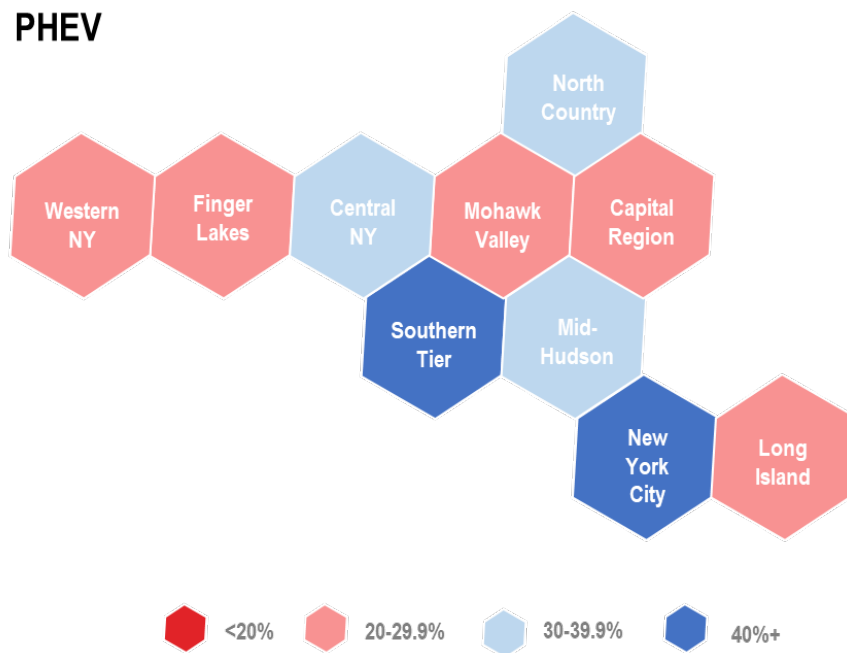
<sup>15</sup> Source: Hardman, S. and Tal, G. 2021. Understanding discontinuance among California’s electric vehicle owners. Nature Energy. Vol. 6, pp. 538-545. <https://www.nature.com/articles/s41560-021-00814-9>.

<sup>16</sup> Hardman, S. and Tal, G. 2021.

### 3.7.3 Influence of Geography on Likelihood of EV Purchase

Beyond income, the Market Evaluation Team finds additional demographic differences between those likely and unlikely to purchase an EV as their next vehicle. Geographically, downstate residents were twice as likely to indicate that they are “likely” or “extremely likely” to purchase a PHEV (44%) or BEV (41%) compared to their upstate counterparts (27% and 23%, respectively).<sup>17</sup> Over half of all New York City residents participating in the survey indicated that they are likely to purchase a PHEV (54%) or BEV (53%), the highest of any New York State region (**Figure 15** and **Figure 16**). Downstate areas and Long Island tended to have higher interest in adoption than their upstate, central, and western New York counterparts. However, the Market Evaluation Team notes that income and geography are likely somewhat correlated. Manhattan has the highest median income of \$86,500; and mid-Hudson is also high income with a median income of \$75,200.<sup>18</sup>

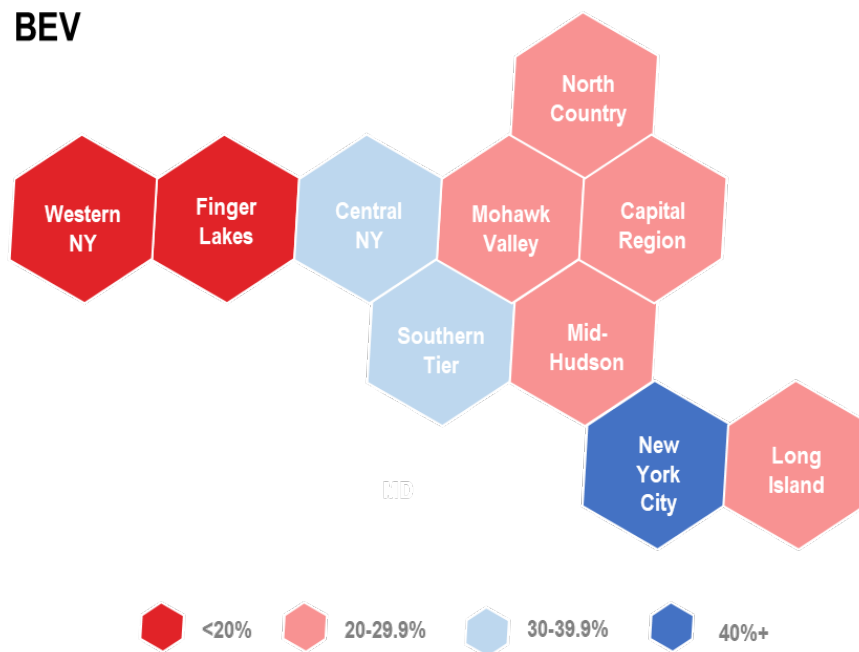
**Figure 15.** Percent of Respondents “Likely” or “Extremely Likely” to Purchase a PHEV by Geographic Region.



<sup>17</sup> For purposes of this study ‘Downstate’ refers to Long Island, New York City, and the Mid-Hudson regions; ‘Upstate’ refers to the Southern Tier, Capital Region, Mohawk Valley, North Country, Central NY, Finger Lakes, and Western NY regions.

<sup>18</sup> U.S. Census Bureau. 2019. QuickFacts: New York. <https://www.census.gov/quickfacts/NY>. Accessed Aug. 2021, and Mid-Hudson Valley Community Profiles. 2021. Financial Stability: Median Household Income (2019 dollars). [https://mhvcommunityprofiles.org/financial\\_stability/median-household-income](https://mhvcommunityprofiles.org/financial_stability/median-household-income). Accessed Aug. 2021.

**Figure 16.** Percent of Respondents “Likely” or “Extremely Likely” to Purchase a BEV by Geographic Region.



### 3.7.4 Influence of Age on Likelihood of EV Purchase

**Table 4** shows that younger respondents also reported that they were more likely to adopt an EV. Sixty-seven percent of respondents in the 30- to 34-year-old age group reported that they were likely to purchase a PHEV, followed by 65% of those in the 35- to 39-year old age group and 62% of those between the ages of 25 and 29. These were also the age groups most likely to purchase BEVs, with over 50% of all three age groups reporting that they were considering purchasing a BEV. No other age group exceeded 42%. Respondents aged 55 and older were the least likely to consider adopting an EV, with no groups reporting a likelihood of purchasing a PHEV or BEV of over 21%, except for 29% of the 60- to 64-year-old age group reporting that they are considering a BEV. These results were similar to those in the *2020 Market Insights Study*, where 57% of respondents between ages 30-49 reported considering an EV, substantially higher than those in older age groups.

Comparing these findings to the age of actual EV owners, the Market Evaluation Team finds that EV owners tend to be older than PVCs interested in purchasing. Seventy-seven percent of PHEV owners who received a rebate through NYSERDA and completed the EV Ownership Survey were forty years of age or

older, while 71% of BEV owners were at least forty at the time of purchase.<sup>19</sup> The higher level of interest from younger PVCs in the market survey compared to actual ownership numbers may suggest that market barriers are preventing additional adoption.<sup>20</sup>

### 3.7.5 Influence of Gender on Likelihood of EV Purchase

Finally, responses also differed by gender. As **Table 4.** shows, a substantially higher percentage of males indicated that they were considering a PHEV or BEV (48% and 45%, respectively) for their next vehicle, as compared to females (27% and 23%). This comports somewhat with actual EV ownership; 80% of current BEV owners and 65% of PHEV owners in NYS identify as male. While it is not fully evident why this difference between genders may exist, the *2020 EV Market Insights Report*, suggested that this may be due to the perception of risk. Out of all respondents who described EVs as “risky” in that report, 61% were female compared to 39% male.<sup>21</sup>

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<sup>19</sup>Note that the survey was administered within two weeks of purchasing an EV so differences between age when completing the survey and purchasing the vehicle are likely minimal

<sup>20</sup>It is possible that the difference may also reflect general vehicle purchasing patterns. According to a 2021 study, the age groups that comprise the greatest share of new, light-duty vehicle purchasers are 39-55 (38%) and 55-74 (30%). This led the 25-38 (24%), 75 and older (6%), and 24 and younger (2%) year old age groups. See: Cox Automotive. 2021. Cox Automotive Car Buyer Journey Study: Pandemic Edition. Available: <https://www.coxautoinc.com/wp-content/uploads/2021/02/Cox-Automotive-Car-Buyer-Journey-Study-Pandemic-Edition-Summary.pdf>.

<sup>21</sup> Essense Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

**Table 4.** Demographic Characteristics of Respondents “Likely” or “Extremely Likely” to Purchase an EV.

Demographic Variable	PHEV	BEV
<b>Gender</b>		
Female	27.1%	23.3%
Male	47.7%	44.6%
<b>Geographic Area<sup>22</sup></b>		
Upstate	27.1%	22.8%
Downstate	44.1%	41.2%
<b>Age</b>		
18 – 24	42%	42%
25 – 29	62%	60%
30 – 34	67%	60%
35 – 39	65%	53%
40 – 44	34%	35%
45 – 49	50%	42%
50 – 54	41%	34%
55 – 59	13%	17%
60 – 64	19%	29%
65 – 69	20%	16%
70 – 74	19%	6%
75+	14%	14%

### 3.7.6 Influence of Income on Likelihood of EV Purchase

Among low-income consumers, respondents indicated that they were less likely to purchase a PHEV (28%), compared to 39% of middle- and higher-income individuals (**Figure 17**), or a BEV (24%), compared to middle- and higher-income individuals (36%).<sup>23</sup> Similarly, 40% of low-income respondents reported being “unlikely” or “extremely unlikely” to purchase either a BEV or PHEV, higher than the share of middle- and higher-income respondents who gave those responses (30% PHEV and 37% PHEV). Considering the higher up-front cost for new EV’s compared to similar ICE vehicles, this response is expected.

<sup>22</sup> For purposes of this study ‘Downstate’ refers to Long Island, New York City, and the Mid-Hudson regions; ‘Upstate’ refers to the Southern Tier, Capital Region, Mohawk Valley, North Country, Central NY, Finger Lakes, and Western NY regions.

<sup>23</sup> Low income is defined as annual gross income of less than \$40,000, middle as \$40,000 to \$149,999, and high-income as annual gross income of \$150,000+.

**Figure 17.** PVC “Likely” or “Extremely Likely” to Purchase a PHEV or BEV as their Next Vehicle by Income Level.



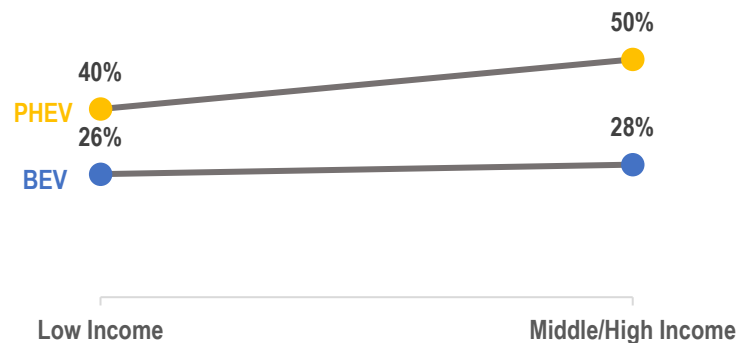
### 3.7.7 Influence of Total Cost of Ownership Information on Likelihood of EV Purchase

After asking about initial likelihood to purchase an EV, the PVC Market Survey then provided the following statement to participants, with a link to the cited article:

*Consumer Reports recently developed a comprehensive analysis indicating that the total cost of ownerships for electric vehicles (including both plug-in hybrid vehicles and battery electric vehicles) and conventional cars is the same when comparing maintenance costs and fuel/electricity costs. If gas prices increase, electric vehicles will be cheaper to own compared to a conventional car over their lifetime.*

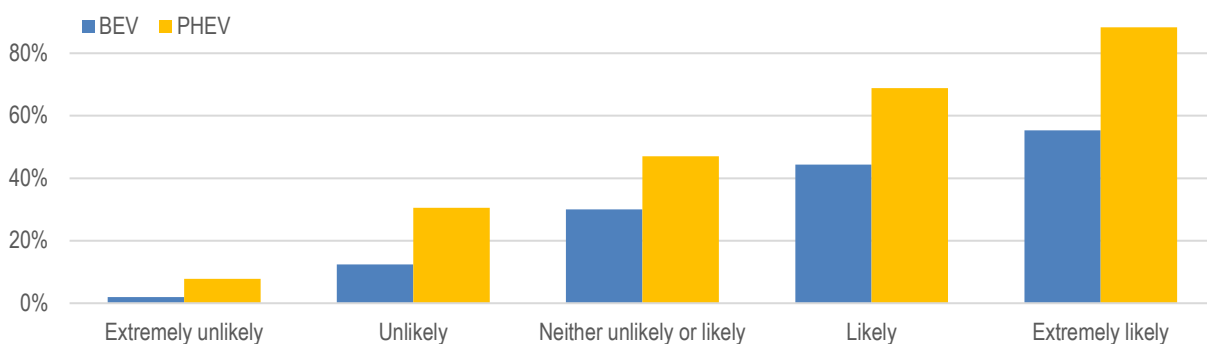
After being provided this information, 16% of respondents indicated that they were more likely to purchase either a PHEV or a BEV, while 32% reported being more likely to purchase a PHEV but not a BEV and 12% indicated they were more likely to purchase a BEV but not a PHEV. Overall, 60% of respondents answered “yes” to being more likely to purchase at least one of the two vehicle technologies. **Figure 18** shows that these responses varied slightly by income. Middle- and higher-income respondents were slightly more likely to consider a PHEV or BEV after reading the Consumer Reports study information. Half of all middle/high-income respondents indicated a higher likelihood to purchase a PHEV, while 28% were more likely to consider a BEV. These were both slightly higher than the percentage of low-income respondents who reported being swayed by the new information. Overall, 40% of low-income respondents were more likely to purchase a PHEV and 26% a BEV.

**Figure 18.** Percent of Respondents by Income status who were More Likely to Purchase an EV after reading Consumer Reports Information.



To further examine how additional information affects consumers’ likelihood to adopt, the Market Evaluation Team analyzed how responses changed based on their initial likelihood (i.e., prior to reading the Consumers Report information) to purchase an EV. **Figure 19** shows that respondents’ increased likelihood to adopt generally corresponded with their initial likelihood. Respondents who were already “extremely likely” to purchase a BEV or PHEV reported they were more likely to purchase after reading the Consumer Reports information at higher rates compared to those in less likely categories. Cost of ownership information increased likelihood of 8% of respondents who were extremely unlikely to purchase a PHEV and 2% of those extremely unlikely to consider a BEV. However, 47% of participants who reported they “neither unlikely or likely” indicated that they were more likely to purchase a PHEV after reading the statement. This suggests that providing total cost of ownership information to consumers is likely to increase their likelihood to adopt, except for those most strongly against buying an EV.

**Figure 19.** Percent of Respondents Indicating they are More Likely to Purchase a BEV or PHEV after receiving Information from Consumer Reports binned by their Initial Likelihood to Purchase



### 3.7.8 Influence of Sticker Price on Likelihood of EV Purchase

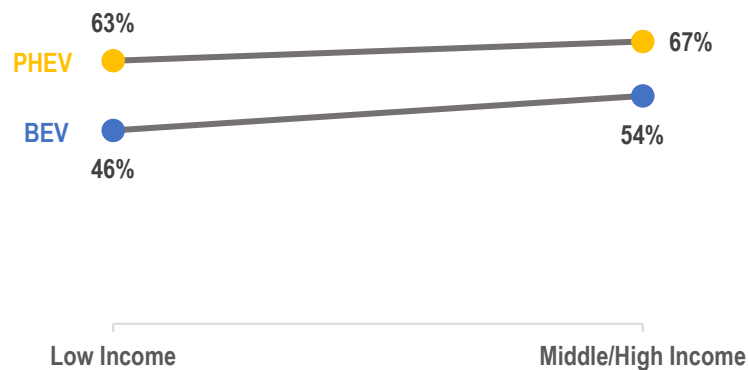
The survey asked PVCs if they would purchase a PHEV or BEV version of their preferred car if the price were the same as the ICE version. Overall, 67% of respondents reported that they would purchase a

PHEV, and 53% stated that they would opt for a BEV. These responses varied only slightly by income group. As **Figure 20** shows, the difference between high- and low-income groups was only 8% for BEVs and 4% for PHEVs.

This high interest in purchasing a similarly priced EV version of respondents' preferred vehicle models, coupled with the Consumer Reports information that costs between EVs and ICEs are similar, suggests that many consumers are ready and willing to adopt EVs but have a lack of understanding of costs, which may be the limiting factor. This could also be an area where NYSERDA could work to improve messaging regarding differences in purchase prices after the Drive Clean Rebate and highlight the impact of the rebate in achieving greater purchase price parity. However, the difference in responses across PHEVs and BEVs is also substantial, and PVCs consistently reported lower likelihood of BEV adoption compared to PHEVs. This may suggest that limiting factors include concerns outside of costs (e.g., concerns about charging ability and/or range anxiety, see **Section 3.9** for more).

Lack of understanding about similarity of costs appears to be a persistent problem. In the *2020 EV Market Insights Study*, 83% of non-EV Owners reported that they think EVs are more expensive than non-electric vehicles.<sup>24</sup> Additionally, 62% believed that EVs require more maintenance than ICE vehicles, likely suggesting that they also believed maintenance costs to be higher. These ongoing misconceptions serve as barriers to EV adoption and may continue to do so until costs of ownership and the value proposition are more widely understood.<sup>25</sup>

**Figure 20.** Percent of Respondents Indicating they would Purchase the EV version of their Preferred Car if it were the same price, by Income Status.



<sup>24</sup> Essense Partners. 2020. NYSERDA Drive Clean Market Research Insights Survey. Apr. 2020.

<sup>25</sup> Even with clear market understanding of total cost of ownership for new EVs; these vehicles may still be out of reach for low-income persons relying on cheaper secondary vehicle market.

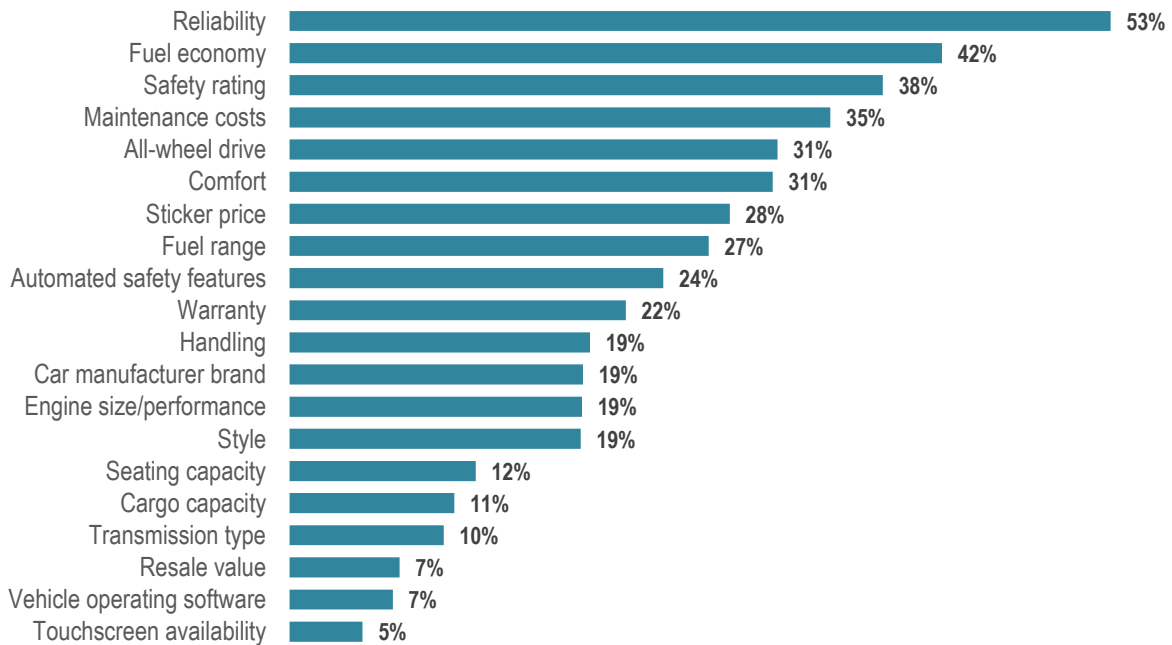


### 3.8 What do PVCs view to be the value proposition of EV ownership?

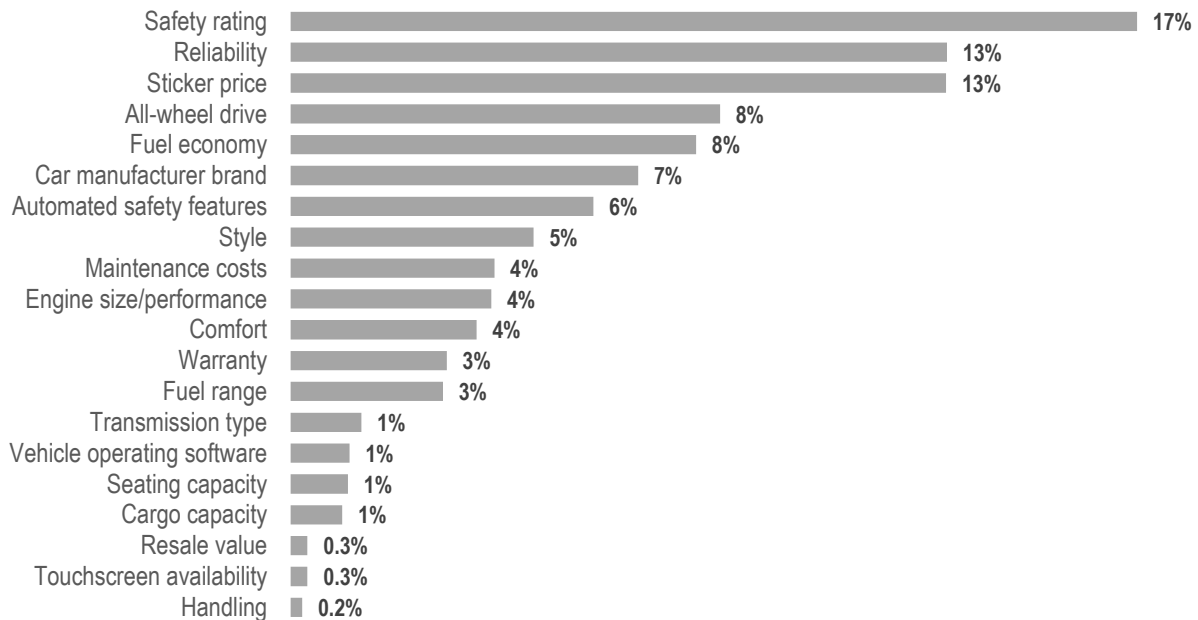
**Figure 21** shows the vehicle features that PVCs most frequently considered when purchasing an ICE vehicle (respondents were able to name up to five features). Reliability was the most reported factor (53%), followed by fuel economy (42%), safety rating (38%) and maintenance costs (35%). Consumers were also separately asked to rate the *most* important feature when purchasing an ICE vehicle. These results were similar, with 17% reporting safety rating as the most important factor, followed by 13% finding reliability to be most important (**Figure 22**). Sticker price was rated as the *most important* feature by 13% of respondents. When looking generally at the features that PVCs most frequently consider when purchasing ICE, sticker price was just the seventh most reported feature overall (28%). This may suggest that a substantial portion of consumers consider price alone when shopping for a new vehicle, whereas those not considering sticker price are more interested in considering multiple features.

As part of the 2020 EV Ownership Survey EV owners generally provided similar responses when asked to rate the factors that influenced their purchasing decision. Unsurprisingly, EV owners were more interested in fuel economy (59%) and fuel range (56%) compared to PVCs rating ICE features. EV owners also gave higher ratings to manufacturer brand (31%), and vehicle operating software (19%). These trends also applied to the most important feature ratings. Specifically, 33% of EV owners rated fuel economy as the most important feature compared to just 8% of ICE owners.

**Figure 21.** Vehicle Features Rated as Important when Considering Purchasing an ICE Vehicle.<sup>26</sup>



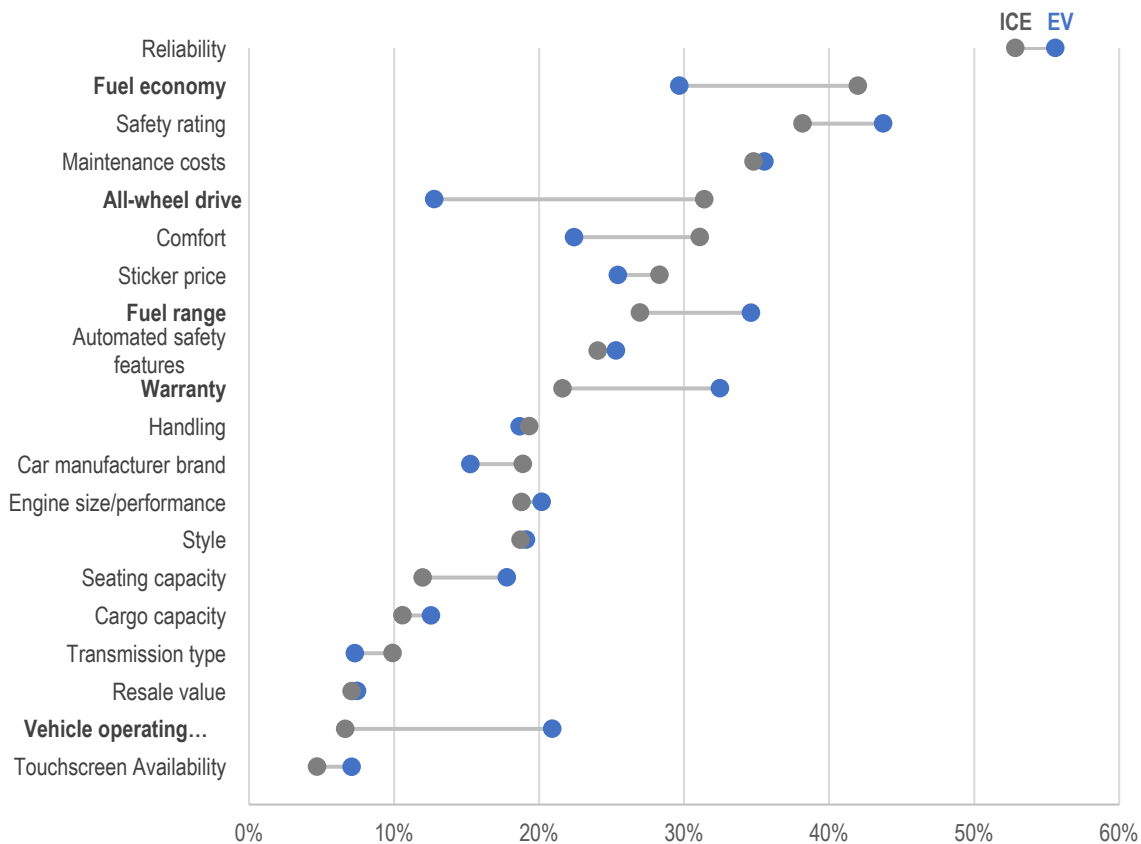
**Figure 22.** Vehicle Features Respondents Rated as the **Most Important** Factor when Deciding to Purchase an ICE Vehicle.



<sup>26</sup> Percentages exceed 100% because multiple responses allowed.

Thirty-eight percent of respondents indicated that the vehicle features that they consider important would change if they were considering an EV rather than an ICE vehicle. Although this represents less than half of all survey respondents, it is a similar proportion to those considering purchasing an EV for their next vehicle, which may suggest that PVCs who are actively considering EVs are more likely to be interested in the different features that EVs have to offer. Other survey data also supports this: 60% of respondents who said they are considering an EV indicated that they consider features differently between EVs and ICEs, versus just 24% who are not considering an EV for their next vehicle. **Figure 23** shows the differences in importance of factors for ICEs and EVs as rated by PVCs who said they would rate EV features differently. The factors of importance with the greatest positive differences for EV-specific ratings (i.e., the factors that were more frequently rated as important by PVCs who considered EVs and ICEs differently) included vehicle operating software (+14%), warranty (+10%), fuel range (+8%), seating capacity (+6%), and safety rating (+6%). All wheel drive (-19%), fuel economy (-12%) and comfort (-9%) were the factors with the biggest negative differences in comparison to ICE vehicles ratings.

**Figure 23.** Percent of Respondents Indicating a Vehicle Feature as Important when Considering an ICE Vehicle Compared to an EV for Purchase.



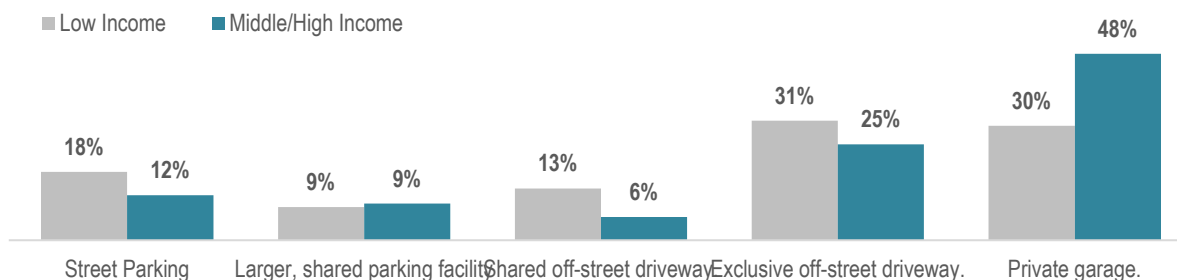
Fuel range was the feature that had the greatest positive difference as the “most important” factor (+19%) in consumer importance ratings between EVs and ICEs. Seating capacity (+16%), maintenance costs (+11%), resale value (+8%) and operating software (+8%) also all had a greater share of respondents rating these as the “most important” factors when considering an EV as opposed to an ICE. The greatest negative difference between EV and ICE ratings of the “most important” factor (i.e., factors that were more important for ICE than EVs) was vehicle manufacturer brand (-24%). This was followed by sticker price (-11%), engine size/performance (-9%), fuel economy (-7%) and automated safety features (-7%). These changes suggest that potential EV purchasers are less concerned about initial price than ICE consumers, but that they are interested in lifetime costs of the vehicle as shown by their interest in maintenance costs and resale value. Potential EV customers also appear more interested in technological features compared to vehicle performance features, as shown by the greater interest in vehicle software in EVs, and the decreased interest in engine size/performance.

### 3.9 What are the main detractors?

As discussed above, concerns about upfront and lifetime costs, along with a general lack of experience with EVs, appear to be detractors but ones that can be mitigated by providing consumers with additional information about EVs. Results of the PVC Market Survey also suggest that perception of EV ownership and likelihood to adopt are heavily influenced by charging considerations and accessibility. This applies to both at-home and public charging access.

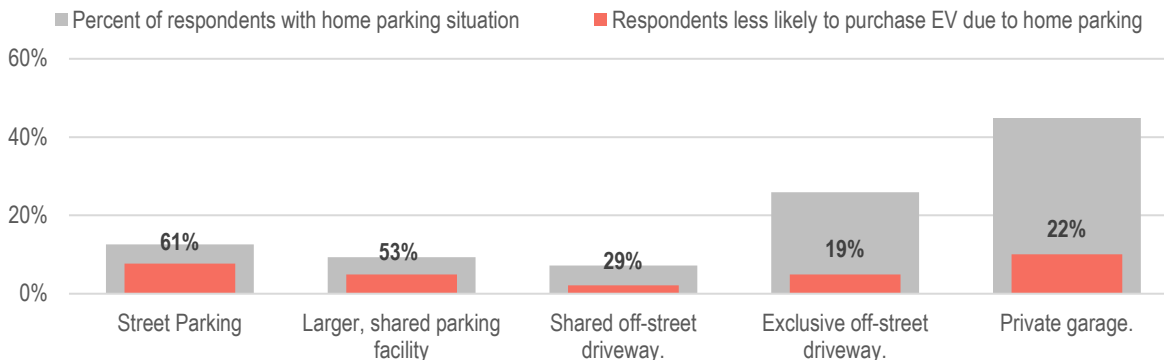
During the survey, respondents were asked to describe their home parking situation, **Figure 24** shows the results, which differed slightly across income groups. Middle/high-income respondents most frequently parked in a private garage (48%), but only 30% of low-income respondents had this parking arrangement. Low-income respondents more frequently parked in exclusive off-street driveways (31%), which was also the second most common response for middle/high-income respondents (25%). Low-income respondents were also more likely to park on the street (18% versus 12%) or in a shared off-street driveway (13% versus 6%) compared to middle-high income respondents.

**Figure 24.** Current Home Parking Situation by Income Level.

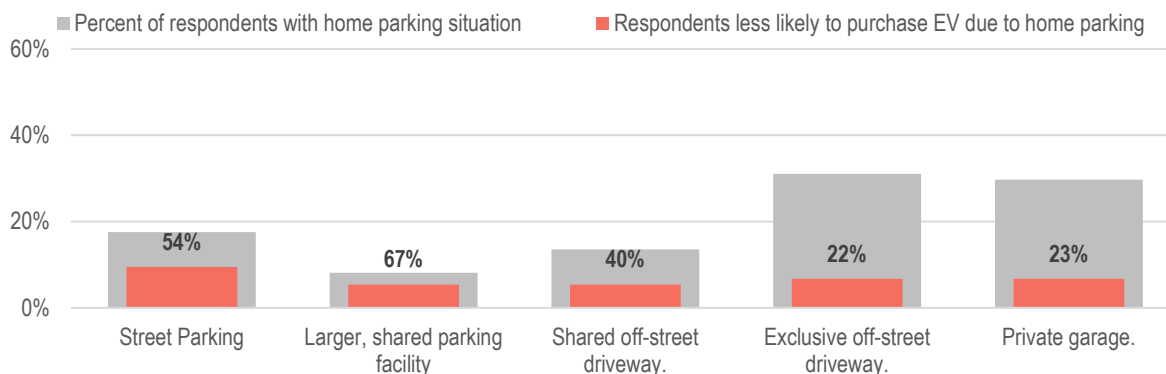


These parking arrangements proved important when respondents were asked if they were less likely to purchase an EV due to their home parking situation (**Figure 25**). Sixty-one percent of respondents who parked on the street reported being less likely to purchase an EV, although this tended to be a greater concern for middle/high income respondents (64%) compared to low-income (53%). Over half of all respondents who parked in a larger, shared parking facility also indicated that they were less likely to purchase an EV (52%). Amongst respondents who parked in a larger, shared parking facility without a charger in the facility, those less likely to purchase an EV totaled 67%. Conversely, exclusive off-street driveways and private garages were less likely to detract from interest in EV adoption. Just 19% of respondents who parked in exclusive off-street driveways said that they were less likely to purchase an EV because of it, and only 23% of private garage parkers reported a decreased likelihood of adopting. These responses were similar across income groups. **Figure 26** shows these responses for low-income respondents only. As the figure shows, low-income respondents had greater concerns about adopting EVs when they primarily parked in a larger shared parking facility (67%) or an off-street driveway (40%), as compared to all respondents. Although low-income respondents did not report street parking as a barrier at a higher rate than the general population, more low-income respondents primarily park on the street.

**Figure 25.** Percentage of All Respondents less likely to Purchase an EV based on Home Parking Situation.

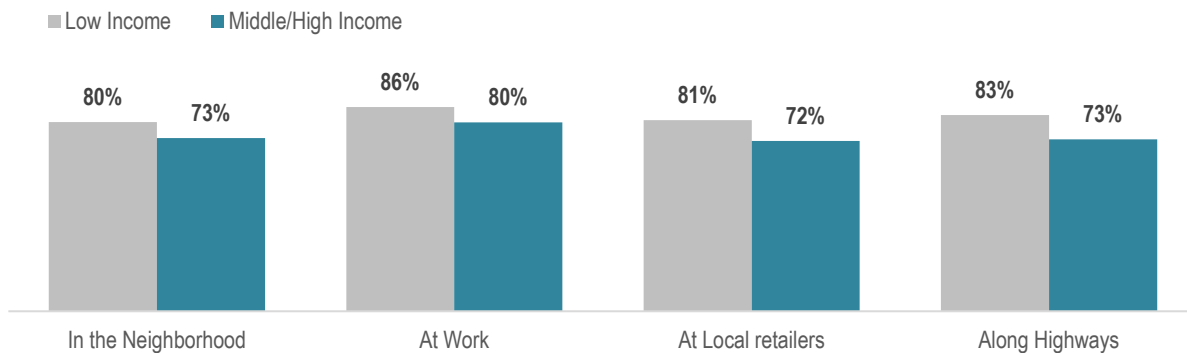


**Figure 26.** Percentage of Low-Income Respondents less likely to Purchase an EV based on Home Parking Situation.



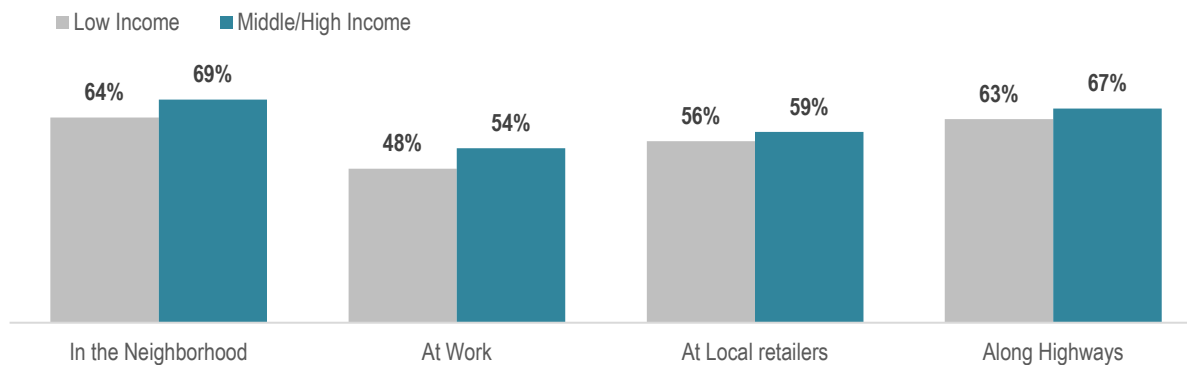
Outside of home parking arrangements, concerns about public access to charging also proved to be a barrier to EV adoption. The PVC Market Survey asked respondents if they lacked access to EV charging in any frequently visited areas (specifically: neighborhood, work, local retailers, and/or along regularly traveled highways), and if a lack of charging access at any of these locations has caused them to be less likely to purchase an EV. Overall, 65% of respondents reported that they were less likely to purchase an EV because of at least one location that lacked charging access; this finding is similar across income groups. **Figure 27** shows the percentage of respondents who did not or did not know if they have charging access at these locations. At least 73% of respondents indicated that they did not have access or were unsure of charger availability at all four locations, respectively. Workplace charging was the area where the greatest number of respondents did not have access or were unsure (81%). Limited access and/or lack of awareness of charging infrastructure was an even greater problem for low-income respondents, of whom at least 80% answered that they were not aware of access across each of the four location types. The *Equity of Access to Public EV Charging Stations* report indicates that among urban populations, on average, in comparison with the population without access to charging, the with-access group consists of a greater portion of low-income households. This may indicate a disconnect between awareness of charging stations and availability of charging stations for low-income residents. However, since the population for the PVC Market Survey is not restricted to urban populations it could also reflect low-income respondents in more rural areas.

**Figure 27.** Percentage of Respondents with no Access (or unaware of access) to Public Charging by Income Level.



This lack of access (or uncertainty) seems to represent a substantial barrier towards EV adoption. Respondents across all location types indicated that this was a limiting factor. **Figure 28** shows that 68% of respondents who reported a lack of charging access in their neighborhood were less likely to purchase an EV. This was a slightly higher detractor for middle/high income respondents (69%) compared to low-income (64%). Most respondents also indicated that they were less likely to purchase an EV due to lack of access on highways (66%), at local retailers (59%), and at work (53%). Again, middle/high income respondents reported that lack of charging at these locations was a barrier at slightly higher rates than low-income respondents.

**Figure 28.** Percentage of Respondents less likely to Purchase an EV based on lack of Public Charging Availability by Income Level.



## 4 EV Rebate Program Market Overall Findings and Recommendations

Looking across the data collected for this evaluation, including primary data collection and previous analysis of existing data, the Market Evaluation Team notes the following overall findings and poses recommendations below.

## 4.1 NYSERDA's rebate has some effect on the NYS EV market

NYSERDA had a 2022 cumulative goal of 46,000 issued rebates, which they exceeded by the end of 2021, with over 54,000 rebates issued<sup>27,28</sup> NYSERDA issued nearly 20,000 rebates in 2021 alone to reach this goal, a substantially higher number than any previous year.

The EV Owner's responses to the EV Driver Survey indicates the NYSERDA rebates had some impact on adoption. Eighty-three percent of EV owners reported that the Drive Clean rebate was "very" or "extremely" important in making it possible for the recipient to acquire their EV.<sup>29</sup> However, 43% of respondents that said they would have purchased the same model of vehicle in the absence of the rebate, and the 16% indicating they would have purchased a cheaper version of the same model. The Federal Tax credit seems to have a larger effect than the Drive Clean rebate: only 28% of EV owners would have purchased the same vehicle without the federal tax credit (16% also said that they would have purchased a cheaper version of the same model). These findings may be at least in part due to the relative size of the federal tax credit, which is worth up to \$7,500, compared to the up-to-\$2,000 Drive Clean Rebate. This suggests that the amount of the rebate is not ideal because of the potential for free ridership. As the market continues to develop, the efficacy of the current rebate size will continue to diminish. Ideally, the rebate would be increased, although the Market Evaluation Team acknowledges that the maximum dollar amount is not controlled by NYSERDA. In the near term the Market Evaluation Team suggests means testing to target consumers that are far less likely to purchase an EV in absence of significant subsidy. Currently the eligibility requirements for the rebate to limit the rebate amount to electric cars with MSRP > \$42,000 to a \$500 rebate. The Direct and Indirect Impacts reports provide more data and discussion of benefits from the NYSERDA program.

**Recommendation 1: Update the EV rebate amount and eligibility to better target consumers that are less likely to purchase an EV in absence of significant subsidy.** In the near term, consider ways to restrict eligible recipients to further reduce the rebate amount available for EVs with MSRP >\$42,000.

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<sup>27</sup> Goals are presented in the NYSERDA. 2018. Electric Vehicles Indicator Tracking Report: 2018 Update, Final.

<sup>28</sup> NYSERDA. 2022. Drive Clean Rebate Primary Statistics. Accessed 1/7/22 at: <https://www.nyserda.ny.gov/All-Programs/Drive-Clean-Rebate/Rebate-Data/Rebate-Stats>.

<sup>29</sup> Based on a review of the EV Driver's Survey data, NYSERDA has issued rebates on at least 49 of 56 EV models available in New York (equal to the total number of models available in the U.S.). The vehicles not included in this list tended to be luxury and/or niche type vehicles including BEVs and/or PHEVs manufactured by: BYD, Cadillac, Fisker, Karma, Land Rover, Lincoln, and McLaren.



**NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.

## 4.2 Consumers have high levels of exposure to EVs

Over two-thirds of PVC Market Survey respondents reported having at least one experience with PHEVs (69%), while 61% reported engagement with BEVs. Respondents' main interactions with PHEVs included seeing the vehicles in the community (35%), speaking with friends/family that own an EV (22%) and riding in a PHEV (22%). PVCs had similar experiences with BEVs. Seeing BEVs in the community was the most frequent interaction (30%), followed by riding in a BEV (21%), and speaking with friends about the technology (18%). When asked to rate their satisfaction with these experiences, respondents indicated that these interactions with EVs were overwhelmingly positive. At least 53% of all respondents rated their satisfaction level as “very” or “extremely” satisfied across all specific experience types that they had with PHEVs or BEVs.

Although it is encouraging that most respondents indicated some type of experience with EVs, this is dominated by the passive “seen a vehicle in the community” interaction, which does not allow for dissemination of information about EVs in a substantive manner. NYSERDA’s efforts in the innovation space on expanding awareness and user experiences may be well focused.

## 4.3 Cost remains a major barrier to market penetration, but providing additional information on actual EV costs may increase adoption

Respondents' high levels of interest in purchasing a similarly priced EV version of their preferred vehicle model (67% and 53% for PHEV and BEV, respectively) suggests that many consumers are ready and willing to adopt EVs, but that first cost remains a major barrier to EV adoption. Additionally, the 60% of respondents who stated that they were more likely to purchase a BEV and/or a PHEV after learning that lifetime ownership costs are comparable to ICE vehicles further demonstrates increased interest in adoption if concerns about costs are eliminated. This also suggests that a large proportion of consumers are still unaware of the actual similarities in lifetime ownership costs.

As such, efforts to offer education and increase consumer awareness could be highly valuable in increasing EV ownership across the State. One way that this barrier may be addressed would be through improved messaging at dealerships offering EVs. While Window/Monroney Stickers (i.e., the stickers listing official vehicle information displayed on new vehicles) show fuel savings for Electric Vehicles, they do not address total cost of ownership (see **Figure 29** for an example). The lack of comparison to the

‘average new vehicle’ on maintenance costs and total cost of ownership means that consumers are not seeing this key piece of information when shopping for a new vehicle.

**Recommendation 2: NYSERDA should supplement standard information provided at dealerships, and online, with simple messaging comparing total cost of ownership between the EV and a similar ‘average’ new vehicle.<sup>30</sup>**

**Figure 29.** Sample BEV Window Sticker<sup>31</sup>



**NYSERDA Response to Recommendation:** Rejected. There is already a lot of information about electric vehicles. NYSERDA will not add anything novel to the readily available existing materials.

#### 4.4 Other informational barriers persist in dampening demand for EVs

As described in the results section, several informational barriers beyond cost issues persist and limit EV uptake, including a disconnect between consumer perception of EV technologies and actual EV characteristics, and a general lack of knowledge about EV make and model options. When asked if they were able to name at least one (and up to three) PHEVs (make and model), 67% of survey respondents indicated that they were able to do so, but only 29% of the full survey population successfully identified at least one PHEV. This shows substantial room for additional education to increase awareness of EV options, which should increase likelihood to adopt. Also, the differences in openness to PHEVs versus BEVs was substantial across survey questions; respondents consistently reported lower likelihood of BEV

<sup>30</sup> This recommendation would only affect persons seeking new vehicles, rather than used vehicles.

<sup>31</sup> Source: <https://www.myeve.com/research/ev-101/how-to-read-an-electric-vehicles-window-sticker>

adoption compared to PHEVs. These findings suggest that concerns such as range anxiety are a limiting factor (which may be an informational barrier). Concerns about charging ability are also a likely underlying factor (see finding below).

**Recommendation 3: NYSERDA should utilize online resources to better educate PVCs about EV technology.**<sup>32</sup> To improve upon NYSERDA's existing Electric Vehicle Calculator, NYSERDA should advertise this tool to all PVCs interested in purchasing a new vehicle, not just those explicitly interested in EVs; this may also include building in the opportunity to compare to specific non-EV vehicles.<sup>33</sup> To address concerns about range anxiety, NYSERDA should also include reference to their Electric Vehicle Station Locator tool in their Electric Vehicle Calculator tool.<sup>34</sup>

**NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.

#### **4.5 Lack of access to charging negatively affects likelihood of adoption and disproportionately impacts low-income persons**

Respondents who parked in shared off-street driveways, on the street, or in large, shared parking facilities are less likely to adopt EVs because of their home parking situations, compared to those who parked in private garages or driveways. Sixty-two percent of respondents who parked on the street and 52% of those who parked in larger, shared parking facilities indicated that they were less likely to purchase an EV because of their home parking situation. These data may indicate additional barriers to EV adoption for low-income consumers, beyond initial price. Only 30% of low-income respondents park in private garages compared to 48% of middle and high-income earners, meaning that fewer low-income residents have parking arrangements that facilitate easy EV adoption.

Respondents also indicated that lack of public charging options are a barrier to EV adoption. Nearly two-thirds (64%) of all respondents indicated that they were less likely to purchase an EV due to a lack of charging infrastructure (or uncertainty about the presence of such infrastructure) in their neighborhood, work, local retailers, or on their frequently driven stretches of highway. This high proportion of responses may be driven by a lack of awareness about where charging stations are available. At least 15% of respondents indicated that they did not know if chargers were available across each of these four

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<sup>32</sup> PVCs indicated online reviews (72%) as their top source of information for obtaining information on EVs.

<sup>33</sup> Source: <https://www.nyserdera.ny.gov/All-Programs/Programs/Drive-Clean-Rebate/About-Electric-Cars/Electric-Vehicle-Calculator>.

<sup>34</sup> Source: <https://www.nyserdera.ny.gov/all-programs/programs/drive-clean-rebate/charging-options/electric-vehicle-station-locator#/find/nearest>.

locations. Highways had the greatest percentage of “don’t know” responses; 42% of respondents indicated that they did not know if chargers were available along the stretches of highway that they frequent. Greater awareness of public charging availability, along with expansion of public charging particularly in on-street locations, would likely reduce concerns about charging availability and increase EV adoption.<sup>35</sup>

Home and public charging barriers are interrelated: increased access to nearby (less than 5 minutes walking) public charging options may reduce concerns from those that rely on street parking, more common amongst low-income PVCs. Increasing installation of chargers in larger, shared facilities may also reduce hesitance to adopt for all income levels since 67% of those without access to a charger in their facility reported less likelihood to adopt.

**Recommendation 4: Increase access to charging stations and increase awareness of access to charging stations.** NYSERDA should coordinate with ongoing Federal efforts to increase the number of charging stations in geographies where drivers rely on street parking or larger, shared facilities for their “at home” parking, and improve the prominence of charging stations in public spaces. Increasing prominence of charging stations in public places through better signage and location provides an opportunity to inform non-EV drivers of the accessibility of charging stations in their community.

**NYSERDA Response to Recommendation:** Pending. This recommendation is under review for feasibility of implementation.

## 5 Methods

### 5.1 Data Sources and Overview

To address the market evaluation questions posed by NYSERDA the Market Evaluation Team undertook an initial effort to conduct primary data collection of non-EV owners and recipients of the EV rebate. The findings presented in this report were the result of a follow-up effort to collect primary data that could answer questions that were not accessible through the initial data available. To conduct this analysis used in this report, the Market Evaluation Team relied primarily on the following data sources:

- Statewide driver and demographic data from the U.S. Census Bureau and the NYS Department of Motor Vehicles (DMV).

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<sup>35</sup> Other Evaluation Team analysis indicates NYSERDA has done well in locating EVSE in areas that are closer to LMI households, but it is not clear how accessible the specific EVSE is (i.e., whether there are hours limitations or access constraints).

- 2021 EV Driver Survey of EV owners in New York State.
- PVC Market Survey of non-EV vehicle owners in New York State.

The driver and demographic data primarily fed into Section 3.1 (percentage of NYS residents that are PVCs), while the Market Evaluation Team used the 2021 EV Driver Survey to inform Section 3.2 (Importance of the Rebate Program). All other findings presented in Section 3, along with most of the key findings in Section 4 were derived from the results of the PVC Market Survey. For each of these information sources, the Market Evaluation Team reviewed the data and conducted analysis aimed at answering the specific NYSEDA testable hypothesis to which they corresponded. Whenever possible, the Market Evaluation Team analyzed additional cross-tabulations or breakouts to better understand market trends, opportunities, and barriers. This specifically focused on the low-income market, along with finding differences between geographic regions in New York State, to determine how well EV information was reaching hard to reach customers, and to understand the relevant barriers to adoption within these segments.

The Market Evaluation Team developed and distributed the PVC Market Survey to current, non-EV, vehicle owners across New York State, in coordination with Research and Marketing Strategies, Inc. (RMS) who led the distribution effort. This web survey was ultimately distributed to 1,865 residents and yielded 429 completes, a 23% completion rate. As an incentive, customers were entered into a drawing for a chance to win one of four \$100 Amazon gift cards. RMS targeted a balanced mix of downstate (Long Island, New York City, and Mid-Hudson) and upstate residents (all other regions), low- (Annual gross income of less than \$40,000), middle- (\$40,000 to \$149,999) and high-income (\$150,000+) residents, and tenure (renters versus owners). The Market Evaluation Team developed the questions asked in the PVC Market Survey by reviewing each market evaluation question and their levels of “completeness” (i.e., had the testable hypotheses been adequately answered in the first data collection/review effort). For each question that had not been adequately answered, the Market Evaluation Team developed a single, or set of questions that could address that specific area of the potential EV market. The Market Evaluation Team worked in close coordination with NYSEDA to develop these efforts and reviewed similar surveys and existing market metrics to determine what data were needed to accurately provide useful market indicators and to report on the testable hypotheses. The full survey instrument is available in **Section 5.4**.

## 5.2 Weighting

Although responses were divided relatively evenly across region, income level, and tenure, these did not align directly with the demographics across the state of New York. To account for this, the Market Evaluation Team weighted responses based on the proportion of the population of New York with access to a vehicle using U.S. Census data.<sup>36</sup> While the decision to limit the population to those with vehicle access only likely increased the accuracy of the survey results to PVCs, it also diminished the weights of low-income respondents, who were less likely to have access to a vehicle compared to the full statewide population. **Table 5** shows the weights. Middle-income renters living downstate were the most underrepresented group relative to the full population and were therefore assigned the greatest weight (3.16). Upstate, middle-income renters were also underrepresented and received the second greatest weight (2.34). High-income renters living upstate were the most overrepresented group in the survey population and were weighted to 0.19, a slightly smaller weight than high-income owners living upstate (0.43) who were overrepresented as well.

**Table 5.** PVC Market Survey Weighting

Region	Ownership	Income	Survey %	Statewide Vehicle Population %	Weight
Downstate	Own	Low	6.8%	3.4%	0.50
Downstate	Own	Middle	13.2%	18.9%	1.43
Downstate	Own	High	15.1%	17.1%	1.14
Downstate	Rent	Low	10.1%	4.6%	0.45
Downstate	Rent	Middle	3.8%	11.9%	3.16
Downstate	Rent	High	1.9%	3.2%	1.70
Upstate	Own	Low	8.9%	4.7%	0.53
Upstate	Own	Middle	14.4%	20.1%	1.40
Upstate	Own	High	14.4%	6.1%	0.43
Upstate	Rent	Low	7.1%	4.3%	0.61
Upstate	Rent	Middle	2.4%	5.5%	2.34
Upstate	Rent	High	2.1%	0.4%	0.19

In addition to weighting the PVC Market Survey data, the Market Evaluation Team also applied weights to the EV Driver’s Survey data. These weights were based on vehicle model, ownership status (lease versus own), county, and technology type. Additional details can be found in the EV Driver’s Survey.

<sup>36</sup> U.S. Census Bureau. 2021. Explore Census Data: Custom Tables. <https://data.census.gov/cedsci/>. Accessed Jun. 2021.

### 5.3 Survey Demographics

**Table 6** provides the full demographic breakdown from the PVC Market Survey. While the survey was generally representative across all demographic groups, respondents tended to center in the following:

- **Income Level:** 48.5% of respondents earned between \$50,000 and \$149,999. Respondents in the \$100,000-\$124,999 income bracket were the most represented (11.2%).
- **Age Range:** Respondents in their sixties were the most represented (22.1%), slightly ahead of those in their thirties (20.8%) and forties (16.6%).
- **Gender Identity:** Females made up 51.9% of respondents, slightly higher than males (47.3%). Three respondents provided other responses.
- **People Living in Household:** Most respondents lived in one to three person households (72.9%). Roughly one-quarter (25.6%) lived in four to six person homes, while 1.3% lived in homes with seven or more residents.
- **Household Vehicles Owned or Leased:** A slight majority of respondents lived in homes with two or three vehicles (49%). Zero or single vehicle homes were a close second (44.8%), while just 6.2% of respondents lived in homes with four or more homes.
- **Tenure:** Most respondents owned their homes (69.9%).
- **Home Type:** Most respondents lived in detached single-family homes (65.9%). Roughly one-third of respondents lived in multifamily homes, comprised of 17.4% living in large multifamily dwellings (more than four units) and 15% living in small buildings.

**Table 6.** PVC Market Survey Demographics

Demographic	Non-Owners Considering EVs <sup>1</sup>
<b>Gender Identity</b>	
Female	51.9%
Male	47.3%
Other/Unknown	0.8%
<b>Income</b>	
\$500,000 or more	1.4%
\$400,000 - \$499,999	0.9%
\$300,000 - \$399,999	1.6%
\$250,000 - \$299,999	2.1%
\$200,000 - \$249,999	4.8%
\$175,000 - \$199,999	8.3%
\$150,000 - \$174,999	7.6%

<b>Demographic</b>	<b>Non-Owners Considering EVs<sup>1</sup></b>
\$125,000 - \$149,999	5.7%
\$100,000 - \$124,999	11.2%
\$90,000 - \$99,999	6.2%
\$80,000 - \$89,999	4.7%
\$70,000 - \$79,999	7.6%
\$60,000 - \$69,999	5.2%
\$50,000 - \$59,999	7.9%
\$40,000 - \$49,999	7.4%
\$30,000 - \$39,999	5.3%
\$20,000 - \$29,999	6.2%
Under \$20,000	5.9%
<b>Age</b>	
18 - 24	7.1%
25 - 29	5.3%
30 - 34	9.6%
35 - 39	11.2%
40 - 44	7.5%
45 - 49	6.1%
50 - 54	9.1%
55 - 59	7.5%
60 - 64	10.6%
65 - 69	11.6%
70 - 74	8.7%
75+	5.4%
Prefer not to answer	0.3%
<b>Home Ownership Status</b>	
Own	44%
Rent	55%
<b>People Living in Household</b>	
1 to 3	72.9%
4 to 6	25.8%
7 or more	1.3%
<b>Total vehicles household owns or leases</b>	
0 or 1	44.8%
2 or 3	49.0%
4 or more	6.2%
<b>Tenure</b>	
Own	69.9%
Rent	29.6%
Prefer not to answer	0.5%
<b>Home Type</b>	
Detached single family house	65.9%
Large multi-family dwelling (greater than 4 units) - apartment/condominium	17.4%



Demographic	Non-Owners Considering EVs <sup>1</sup>
Small multi-family dwelling (4 units or less) - apartment/condominium	15.0%
Trailer court	0.9%
Prefer not to answer	0.9%

## 5.4 PVC Market Survey Instrument

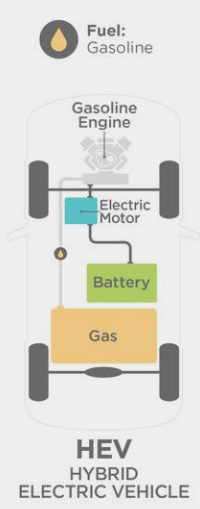
### Survey Introduction

Thank you for your participation in NYSERDA’s market research efforts, your input is valuable to us. In this survey we would like to hear about your experience and thoughts regarding electric vehicles. There are three primary types of electric vehicles on the market today hybrid electric vehicles, plug-in electric vehicles, and battery electric vehicles.

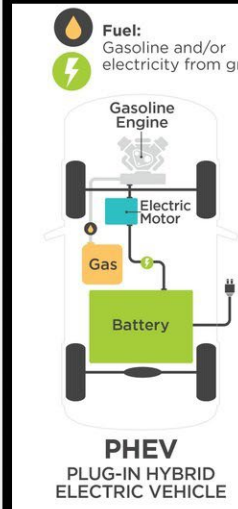
## Types of Electric Vehicles

If you’re looking to purchase an electric vehicle, use this cheat sheet to help you determine the various options. Drivers can choose between three types of electric vehicles (EVs). EVs are classed by the amount of electricity that is used as their energy source.

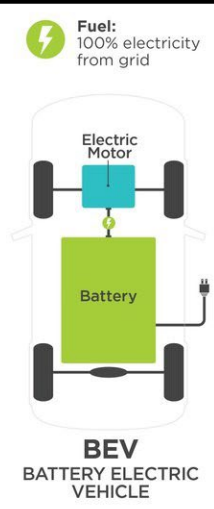
Source: Electric Power Research Institute




**HEV**  
HYBRID ELECTRIC VEHICLE






**PHEV**  
PLUG-IN HYBRID ELECTRIC VEHICLE






**BEV**  
BATTERY ELECTRIC VEHICLE

 **Hybrid electric vehicles.** Relies solely on gasoline for fuel but uses a brake-powered battery as supplemental energy; this vehicle does **not** plug in.

 **Plug-in hybrid vehicles (PHEV).** Includes **both** a gasoline engine and electric motor that has a battery charging port. The gas engine engages when the electric battery power runs out.

  **Battery electric vehicles (BEV).** The electric motor is powered solely by an electric battery which uses a battery charging port.

Our survey today will be focused on **plug-in hybrid vehicles**   and **battery electric vehicles.** 

The survey should take about 10 minutes to complete. In appreciation of your time, we will enter your name into a sweepstakes drawing for a chance to win (1) of (4) \$100 electronic gift cards. If you are selected as a winner, you will receive the gift card within 2 weeks of completing the survey. The information you provide will be kept confidential to the extent permitted by law including but not limited to the Freedom of Information Law (FOIL).

### Screening Questions

1. What is your 5-digit zip code?
2. Are you over the age of 18?
3. Do you hold a valid driver's license?
4. Do you currently own or lease a car?
5. [IF Q4=No] Do you plan to purchase one in the next two years?
6. Do you currently own or lease a plug-in hybrid vehicle or battery electric vehicle?



*[If no to 1,2,3,5, or yes to 6 above, send to disqualification screen, "Thank you for your interest in the survey, based on your responses you do not meet the qualifications for this survey."]*




### Survey Questions

1. What is your current annual gross household income from all sources (i.e., before taxes)?
  - a. Under \$20,000
  - b. \$20,000 - \$29,999
  - c. \$30,000 - \$39,999
  - d. \$40,000 - \$49,999
  - e. \$50,000 - \$59,999
  - f. \$60,000 - \$69,999
  - g. \$70,000 - \$79,999
  - h. \$80,000 - \$89,999
  - i. \$90,000 - \$99,999
  - j. \$100,000 - \$124,999
  - k. \$125,000 - \$149,999
  - l. \$150,000 - \$174,999
  - m. \$175,000 - \$199,999
  - n. \$200,000 - \$249,999
  - o. \$250,000 - \$299,999
  - p. \$300,000 - \$399,999
  - q. \$400,000 - \$499,999
  - r. \$500,000 or more
  - s. Prefer not to answer
2. Have you ever sought out information about plug-in hybrid or battery electric vehicles?
  - a. No
  - b. Yes
    - i. *[If yes]* Where did you get your information from? Check all that apply.


1. Online reviews of vehicles.
2. Print/magazine reviews of vehicles.
3. Word of mouth.
4. TV commercials.
5. Car awards or shows.
6. Social media.
7. Websites of car dealers or manufacturers.
8. In-person visit to car dealers.
9. Other – please explain *[open-text box]*.

3. Can you name any **plug-in hybrid vehicles**    sold in the U.S.? List up to three.  
*[Response options include 3 open-text fields]*

4. Can you name any **battery-electric vehicles**   sold in the U.S.? List up to three.  
*[Response options include 3 open-text fields]*

5. What kinds of experiences have you had with **plug-in hybrid vehicles**   ? Check all that apply.


- a. Rented a vehicle.
  - b. Test drove a vehicle.
  - c. Rode in a vehicle someone else was driving.
  - d. Virtual test drive of a vehicle.
  - e. Watched an infomercial of a vehicle.
  - f. Visited a dealer with intent on learning more about a vehicle.
  - g. Engaged with a vehicle at a promotional event.
  - h. Spoken with friends and family that have a vehicle.
  - i. Have seen them around my community/on the road.
  - j. None. *[if selected, would gray out above options]*
6. *[Based on **each** response option selected above, **except** for i or j.]* Please rate your level of satisfaction with your electric vehicle experience *[insert type of experience indicated above]*.
- a. Not at all satisfied.
  - b. Slightly satisfied.
  - c. Moderately satisfied.
  - d. Very satisfied.
  - e. Extremely satisfied.

7. What kinds of experiences have you had with **battery electric vehicles**  ? Check all that apply.

- a. Rented a vehicle.
- b. Test drove a vehicle.
- c. Rode in a vehicle someone else was driving.
- d. Virtual test drive of a vehicle.
- e. Watched an infomercial of a vehicle.
- f. Visited a dealer with intent on learning more about a vehicle.
- g. Engaged with a vehicle at a promotional event.
- h. Spoken with friends and family that have a vehicle.
- i. Have seen them around my community/on the road.
- j. None. *[if selected, would gray out above options]*

8. *[Based on each response option selected above except for i or j.] Please rate your level of satisfaction with your electric vehicle experience [insert type of experience indicated above]:*


- a. Not at all satisfied.
- b. Slightly satisfied.
- c. Moderately satisfied.
- d. Very satisfied.
- e. Extremely satisfied.

9. Based on what you know now, how likely are you to purchase a **plug-in hybrid vehicle** 



for your next car purchase?







- a. Extremely unlikely
- b. Unlikely
- c. Neither unlikely or likely
- d. Likely
- e. Extremely likely

10. Based on what you know now, how likely are you to purchase a **battery electric vehicle**  for your next car purchase?

- a. Extremely unlikely
- b. Unlikely
- c. Neither unlikely or likely
- d. Likely
- e. Extremely likely





[Consumer Reports](#) recently developed a comprehensive analysis indicating that the total cost of ownerships for electric vehicles (including **both** plug-in hybrid vehicles and battery electric vehicles) and conventional cars is the same when comparing maintenance costs and fuel/electricity costs. If gas prices increase, electric vehicles will be cheaper to own compared to a conventional car over their lifetime.

11. Does this information change your likelihood of purchasing an electric vehicle? Check all that apply.

- a. Yes – more likely to purchase a **plug-in hybrid vehicle**   .
- i. *[If yes]* Based on what you know now likely are you to purchase **plug-in hybrid vehicle**    for your next car purchase?

You previously indicated *[include previous answer]*.




1. Extremely unlikely
2. Unlikely
3. Neither unlikely or likely
4. Likely
5. Extremely likely

- b. Yes – more likely to purchase a **battery electric vehicle**  .
- i. *[If yes]* Based on what you know now, how likely are you to purchase **battery electric vehicle**   for your next car purchase?



You previously indicated *[include previous answer]*.

1. Extremely unlikely
2. Unlikely
3. Neither unlikely or likely
4. Likely
5. Extremely likely

c. No. *[if selected, would gray out above options]*

12. If your preferred make and model of vehicle were available as a **plug-in hybrid vehicle** for the same price, would you purchase the **plug-in hybrid vehicle**    version?

- c. Yes
- d. No

13. If your preferred make and model of vehicle were available as a **battery electric vehicle** for the same price, would you purchase the **battery electric vehicle**   version?

- e. Yes

- f. No
14. What vehicle features are important to you if purchasing a conventional (internal combustion engine) vehicle? Please select up to five. *[program to randomize order of responses]*
- a. Fuel economy.
  - b. Safety rating.
  - c. Car manufacturer brand.
  - d. Style.
  - e. Handling.
  - f. Seating capacity.
  - g. Automated safety features.
  - h. Vehicle operating software (e.g., autonomous technology).
  - i. Cargo capacity.
  - j. Warranty.
  - k. Comfort.
  - l. Engine size/performance.
  - m. Resale value.
  - n. Touchscreen availability.
  - o. All-wheel drive.
  - p. Sticker price.
  - q. Fuel range.
  - r. Maintenance costs.
  - s. Transmission type.
  - t. Reliability
15. *[Show the 5 selected items from above]* Please rank the features in order of importance. *[Forced 1-5 ranking]*
16. Would the vehicle features of importance differ if considering an electric vehicle purchase?
- a. Yes
    - i. *[If yes]* Please select up to five. *[program to include same order as provided above]*
      - 1. Fuel economy.
      - 2. Safety rating.
      - 3. Car manufacturer brand.
      - 4. Style.
      - 5. Handling.
      - 6. Seating capacity.

7. Automated safety features.
8. Vehicle operating software (e.g., autonomous technology).
9. Cargo capacity.
10. Warranty.
11. Comfort.
12. Engine size/performance.
13. Resale value.
14. Touchscreen availability.
15. All-wheel drive.
16. Sticker price.
17. Fuel range.
18. Maintenance costs.
19. Transmission type.
20. Reliability

ii. *[Show the 5 selected items from above]* Please rank the features in order of importance. *[Forced 1-5 ranking]*

b. No

The next set of questions ask about how access to EV charging, or infrastructure that supports charging (e.g., home garage), may affect your likelihood to purchase a plug-in hybrid vehicle or battery electric vehicle. Both these electric vehicle types contain a battery charging port.

17. Please select the option below that best describes your parking situation at home for at least one vehicle.
- a. I park in a private garage.
  - b. I park in a larger, shared parking facility (e.g., multi-dwelling garage).
    - iii. *[If b]* Does this facility have EV charging stations?
      1. Yes
      2. No
  - c. I park in an exclusive off-street driveway.
  - d. I park in a shared off-street driveway.
  - e. I park on the street.
18. Are you less likely to purchase an EV because of your current home parking arrangement?
- a. Yes
  - b. No
19. Do you have access to neighborhood EV charging stations that you would consider useful for regular charging when you are home?

- g. Yes
  - h. No
  - i. Do not know
    - i. [*If no or do not know*] Are you less likely to purchase an EV because of lack of access to neighborhood EV charging stations?
      - 1. Yes
      - 2. No
20. Do you have access to EV charging stations at work?
- j. Yes
  - k. No
  - l. Do not know
    - i. [*If no OR do not know*] Are you less likely to purchase an EV because of lack of EV charging stations at work?
      - 1. Yes
      - 2. No
21. Do you have access to EV charging stations at local retailers that you frequent (e.g., at the grocery store)?
- m. Yes
  - n. No
  - o. Do not know
    - i. [*If no OR do not know*] Are you less likely to purchase an EV because of lack of charging stations at local retailers?
      - 1. Yes
      - 2. No
22. Do you have access to EV charging stations along highways where you tend to travel?
- p. Yes
  - q. No
  - r. Do not know
    - i. [*If no or do not know*] Are you less likely to purchase an EV because of lack of charging stations along highways where you tend to travel?
      - 1. Yes
      - 2. No
23. What is your age range?
- a. 18 - 24
  - b. 25 - 29



- c. 30 - 34
  - d. 35 - 39
  - e. 40 - 44
  - f. 45 - 49
  - g. 50 - 54
  - h. 55 - 59
  - i. 60 - 64
  - j. 65 - 69
  - k. 70 - 74
  - l. 75+
  - m. Prefer not to answer
24. To which gender identity do you most identify?  
*[Open text box]*
25. How many people live in your household including yourself?  
*[Open box restricted to integers]*
26. How many vehicles does your household own or lease in total? Please exclude motorcycles, ATVs, RVs, or any unregistered vehicles.  
*[Open box restricted to integers]*
27. Do you own or rent your residence?
  - a. Own
  - b. Rent
  - c. Prefer not to answer
28. What type of residence do you live in?
  - a. Detached single family house.
  - b. Small multi-family dwelling (4 units or less) - apartment/condominium.
  - c. Large multi-family dwelling (greater than 4 units) - apartment/condominium.
  - d. Trailer court.
  - e. Other, please specify: \_\_\_\_\_
  - f. Prefer not to answer