

Clean Vehicle Assistance Program Final Report

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California Air Resources Board and Beneficial State
Foundation

Prepared by
Center for Sustainable Energy



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Energy™

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I. Executive Summary

The Clean Vehicle Assistance (CVA) Program provides grants and loans to low- to moderate-income individuals who purchase an eligible new or used conventional hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV), or battery electric vehicle (BEV) – collectively referred to as “clean vehicles.” The program is administered by Beneficial State Foundation (BSF) on behalf of the California Air Resources Board (CARB). All CVA Program participants are invited to complete an “adoption survey” soon after purchasing their vehicle as well as an “ownership survey” approximately one year after purchasing their vehicle. The goals of these surveys include improved understanding of CVA Program participant motivations, concerns, and experience regarding their clean vehicle and the CVA Program.

The results section of this report summarizes three groups of CVA Program participants. First, the vehicle types are summarized for all program participants for the lifetime of the program and comparisons are made between Phase 1 and Phase 2. Next, the adoption survey results cover respondents who participated in the CVA Program from October 2020 through November 2021. Finally, the ownership survey results cover respondents who participated in the CVA Program in 2020. These survey respondents are all part of Phase 2 of the CVA Program.

Key findings include the following.

- A large majority (86%) of adoption survey respondents would not have purchased their clean vehicle without the CVA Program.
- Satisfaction with the CVA Program continues to be high. The share of respondents who were very satisfied with the online application process is 76%, and the share of respondents who were very satisfied with their customer experience is 80%.
- The program experienced a dramatic shift in the types of vehicles purchased during Phase 2. In Phase 2 the vehicles are much more likely to be new versus used and much more likely to be BEVs. The most common model changed from the Nissan LEAF to the Tesla Model 3.
- In this report we segment participants by two groups based on their federal poverty level (FPL) – over and under 225% of the FPL. We find that participants in the lower income group (at or below 225% of the FPL) are more likely to be female and are younger. They are less likely to own their home and less likely to live in a detached home.
- Participants whose household income is at or below 225% of the FPL indicate on the ownership survey that they are less likely to charge at home.
- Another difference between income group was the method of charging. Participants whose household income is at or below 225% of the FPL are more likely to report using a 120V outlet to charge at home rather than a Level 2 (240V) charger.
- The top three concerns for BEV and PHEV owners were cost, electric range, and battery lifespan, respectively. These concerns have remained consistent throughout the lifetime of the program.

- Ownership survey results show that after owning their vehicle for approximately one year, 92% of respondents would “definitely” or “probably” recommend their vehicle to a friend.
- Most BEV drivers (67%) reported that their vehicle’s range had been insufficient for some desired trips; however, this is a large decline from the 87% in the 2020 report.

II. Introduction

The Clean Vehicle Assistance (CVA) Program provides grants and loans to low- to moderate-income individuals who purchase a new or used conventional hybrid electric vehicle (HEV), plug-in hybrid electric vehicle (PHEV), or battery electric vehicle (BEV). Participants who purchase a BEV or PHEV are also eligible for a free charging station and installation from GRID Alternatives. The program, administered by Beneficial State Foundation (BSF) on behalf of the California Air Resources Board (CARB), began in June 2018. The grants and loans are available to California residents with a maximum annual household income equivalent to 400% of the federal poverty level (FPL). Loans are available through Beneficial State Bank (BSB) or participants can secure a loan from a lender of their choosing.

Participants are surveyed twice after receiving their grant. The first survey, known as the adoption survey, takes place approximately one month after the CVA Program application is complete. This survey focuses on the participants’ motivations for adopting a clean vehicle, concerns they had prior to the purchase, and impact of the CVA Program on their decision to purchase their vehicle. The second survey, referred to as the ownership survey, takes place approximately one year later. This survey focuses on participants’ experience owning and operating their clean vehicle.

This report is a follow-up to the 2020 evaluation report (referred to herein as the 2020 report) which summarized the survey findings through October 2020. This 2021 report covers approximately a one-year period, summarizing the findings from participants who completed either the adoption or ownership survey between October 2020 and November 2021.

III. Survey Objectives

Adoption Survey

The objectives of the CVA Program adoption survey are to understand participant:

- Household demographics;
- Travel behavior before and after acquiring their clean vehicle;

- Primary motivations for clean vehicle adoption and the factors that enabled their clean vehicle adoption;
- Barriers to adoption such as model selection, charging availability, range, and costs of insurance and fuel;
- Travel needs and how they would have been met had the program not existed; and
- Vehicle charging behaviors.

Ownership Survey

The objectives of the CVA Program ownership survey are to understand participant:

- Clean vehicle usage and how it meets their current transportation habits and needs;
- Clean vehicle ownership experience and travel behaviors;
- Access to vehicle charging and charging behaviors;
- Satisfaction with clean vehicle range compared to pre-ownership perceptions;
- Assess challenges, including fuel choice, costs of insurance and fuel, and maintenance.
- Satisfaction with the CVA Program loan.

IV. Methods

Sampling and Administration

Adoption Survey

The CVA Program adoption survey is administered on a monthly basis, with invitations sent to all program participants by email approximately one month after they acquire their clean vehicle. Up to two email reminders are sent to participants that have not yet completed the survey. To increase the response rate of the survey, all participants who complete the survey are entered into a random, twice-annual drawing for a \$100 Visa gift card.

Ownership Survey

The CVA Program ownership survey is administered approximately one year after program participants acquired their clean vehicle. Up to two email reminders are sent to participants that have not yet completed the survey. All participants who complete the survey are entered into a random, twice-annual drawing for a \$100 Visa gift card.

Response Rate and Representativeness

Since only a portion of program participants answered the survey, the responses are potentially not representative of all program participants (i.e., non-response bias). Response weights can be created to adjust for bias and lack of representation among groups in the data. For both the adoption and the ownership surveys, weights were calculated based on the vehicle's new or used status, the FPL group, and the technology type of the vehicle.

V. Results

Program Participation

This section summarizes the vehicle choices and demographic information of all program participants in Phase 1 and Phase 2. These participants had grants issued between July 2018 and September 2021. The program had a much higher volume in phase 2, as shown in Table 1.

Table 1. Program Dates for Phase 1 and Phase 2

	Grant Issued Dates	Number of Participants
Phase 1	July 2018 – October 2019	453
Phase 2	March 2020 – September 2021	3939

New or Used Status

Overall, 70% of adoption survey respondents purchased a new vehicle. The share of new vehicles grew significantly from Phase 1 to Phase 2, as shown in Table 2.

Table 2. New or Used Status by Program Phase

	Phase 1	Phase 2
New	17%	76%
Used	83%	24%

Technology Type

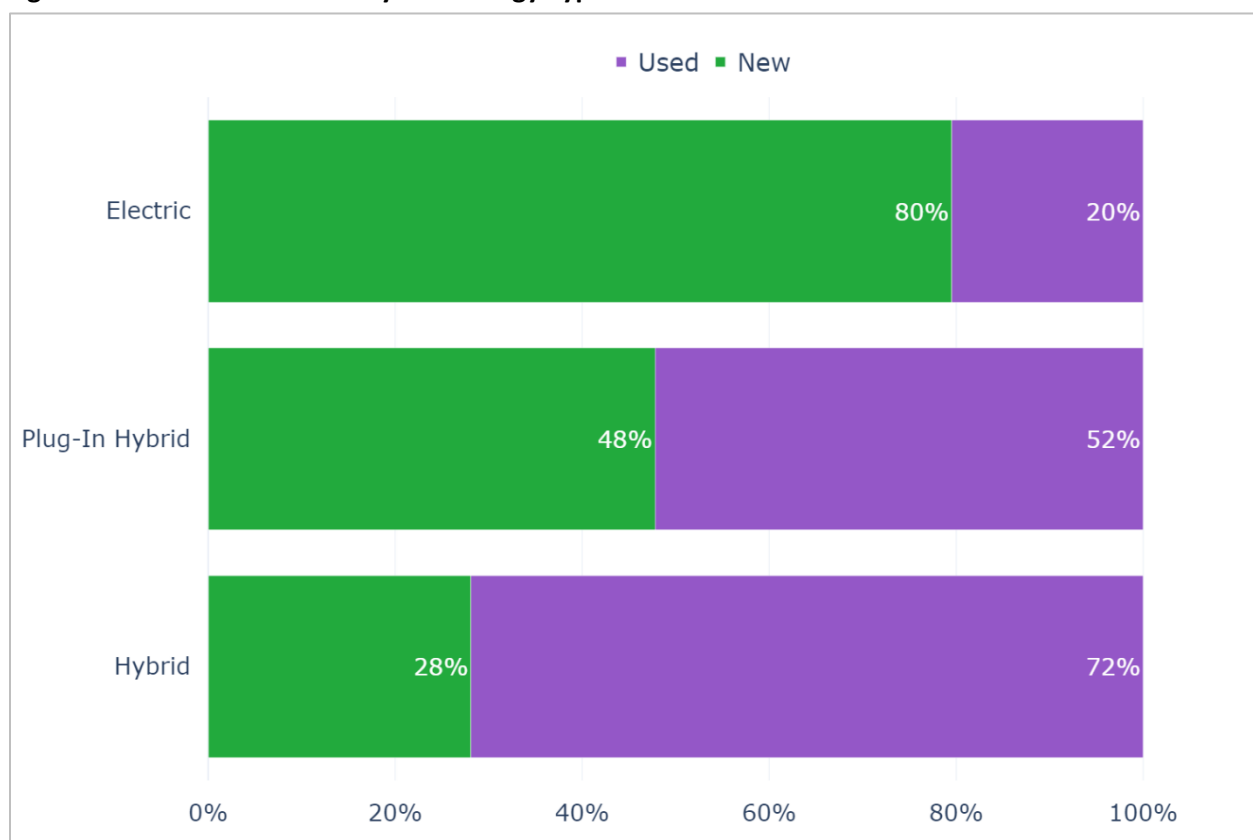
Plug-in vehicles (BEVs and PHEVs) made up 97% of the vehicles purchased through CVA Program, with conventional hybrids (HEVs) making up less than 3% and fuel cell electric vehicles (FCEVs) making up less than 1%. The share of BEVs grew significantly from Phase 1 to Phase 2, while the share of PHEVs and HEVs declined (Table 3).

Table 3. Technology Type by Program Phase

	Phase 1	Phase 2
BEV	44%	77%
PHEV	44%	21%
HEV	13%	2%
FCEV	0%	1%

Note. Percentages in table may not add up to 100% due to rounding.

The proportion of new versus used vehicles varied by technology type, with BEVs being more likely to be purchased new than PHEVs or HEVs. (Figure 1).

Figure 1. New or Used Status by Technology Type

Federal Poverty Level Status

CVA Program collects information on applicants' income as part of the grant criteria. We grouped participants using a cutoff at 225% of the federal poverty level (FPL) to examine the purchasing decisions by income group. This was a natural cutoff point because participants whose household income is below 225% of the FPL were eligible for a higher grant. The proportion of grant recipients who had a household income greater than 225% of the FPL increased from 30% in Phase 1 to 48% in Phase 2 (Figure 2).

Unsurprisingly, the moderate-income group (households with incomes over 225% and up to 400% of the FPL) was more likely to purchase a new car (Figure 3). The moderate-income group was also more likely to purchase a BEV and less likely to purchase a PHEV, HEV, or FCEV (Figure 4).

Figure 2. FPL Status by Program Phase

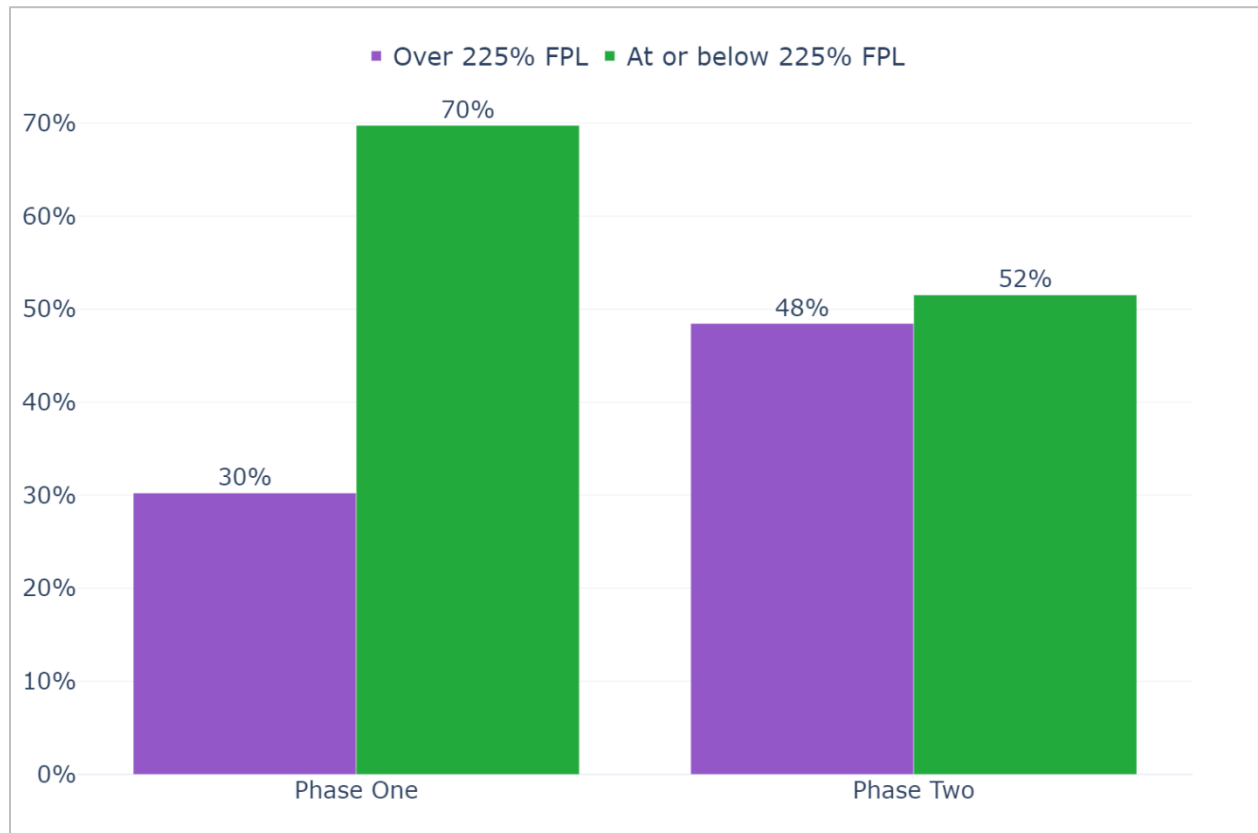


Figure 3. New or Used Vehicle by FPL Status

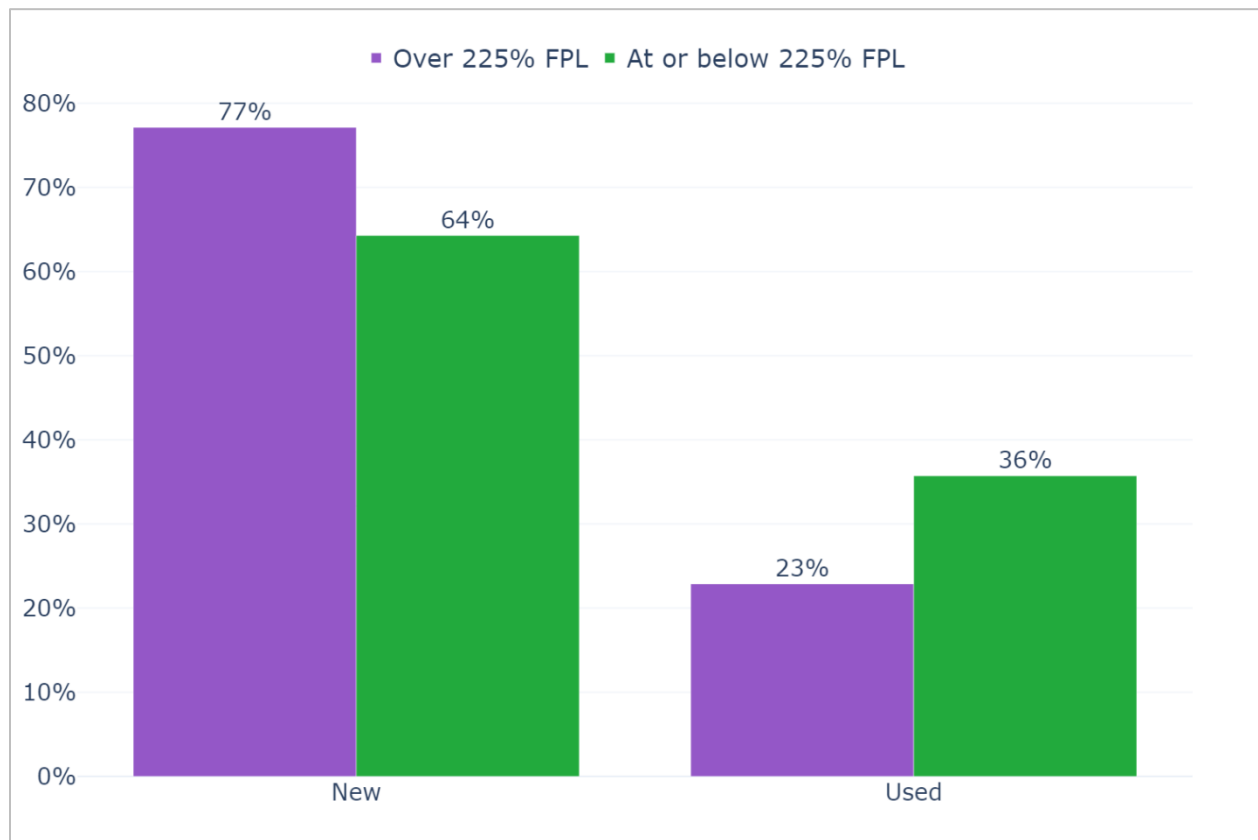
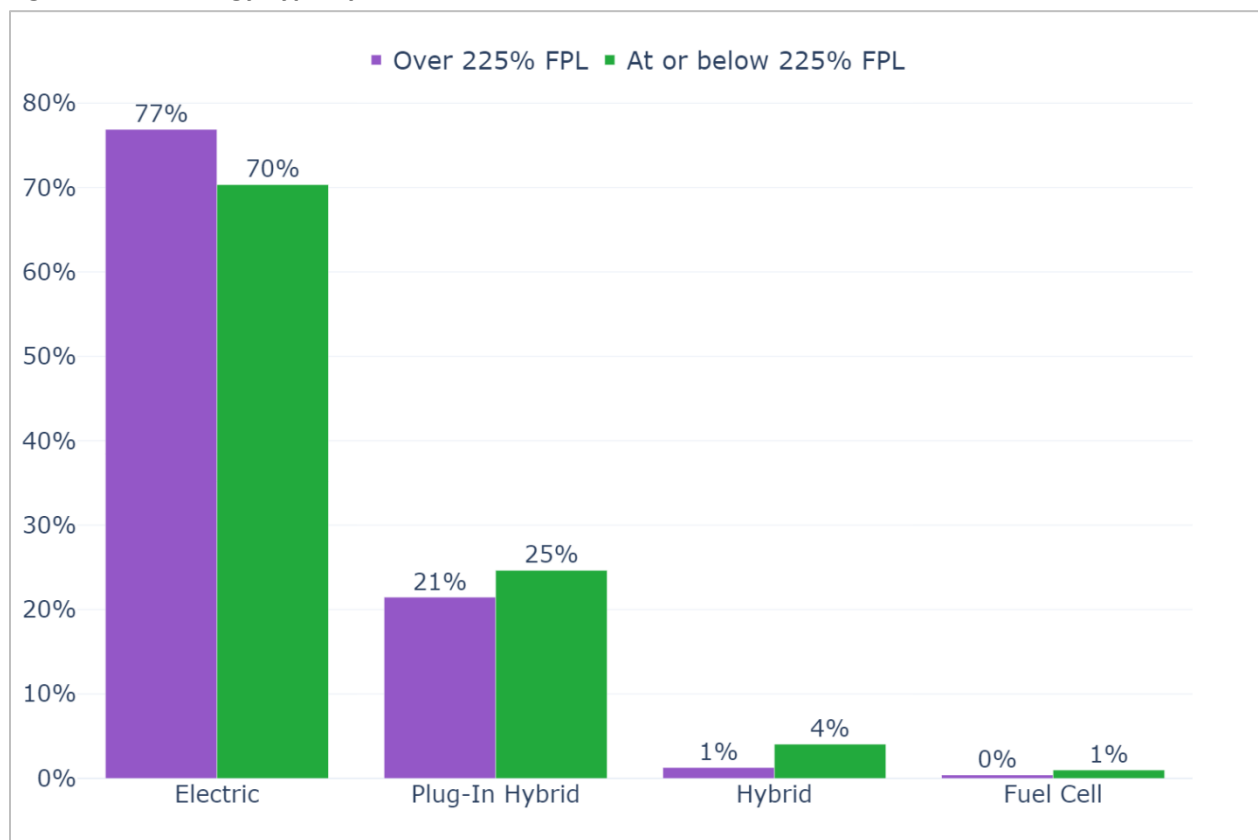


Figure 4. Technology Type by FPL Status



Top Make/Models

While no Tesla model was in the top 10 most frequently rebated models in the 2020 report, Figure 5 shows that Teslas have now taken over the top two spots (Model 3 and Model Y). The most commonly purchased PHEV remained the Chevrolet Volt (Figure 5). Figures 6 and 7 show the top 10 models by FPL group and by new or used status, respectively.

Figure 5. Most Frequently Purchased Vehicle Make/Models

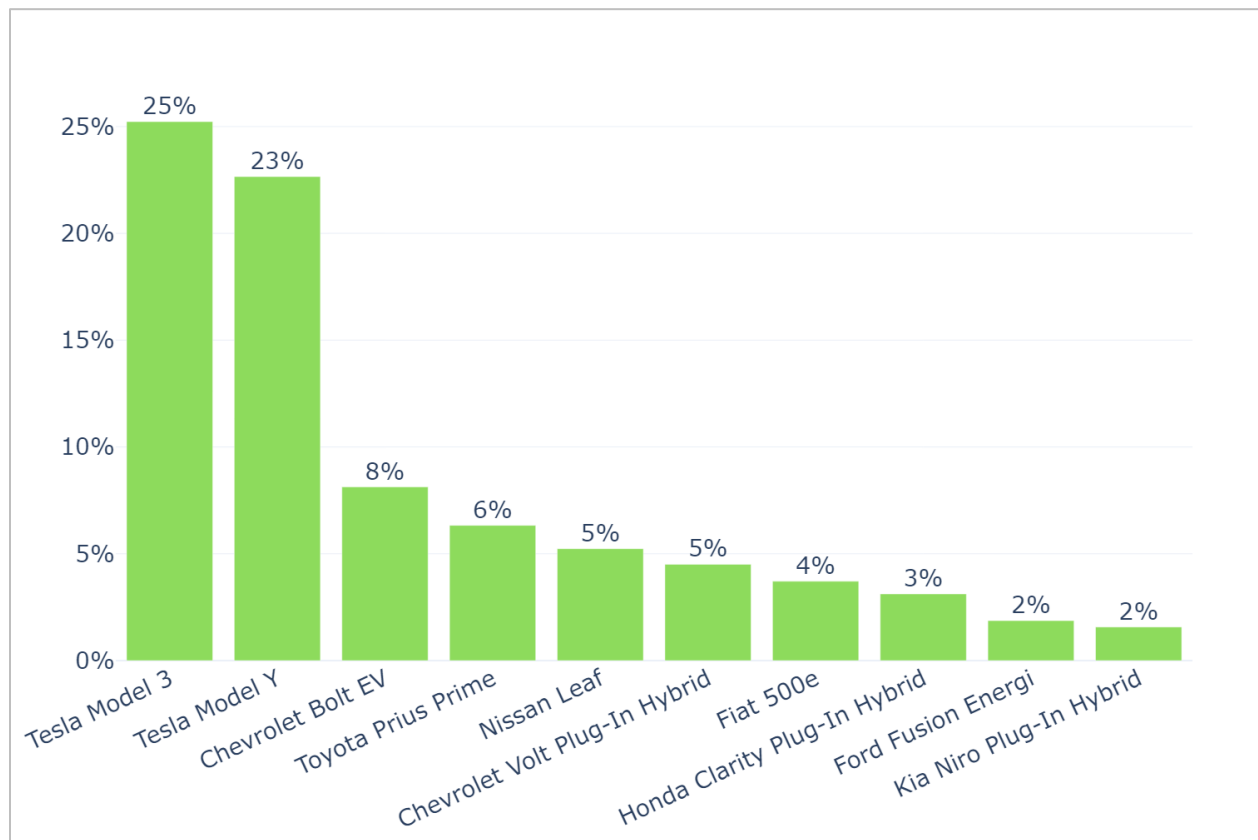


Figure 6. Top 10 Make/Models by FPL Status

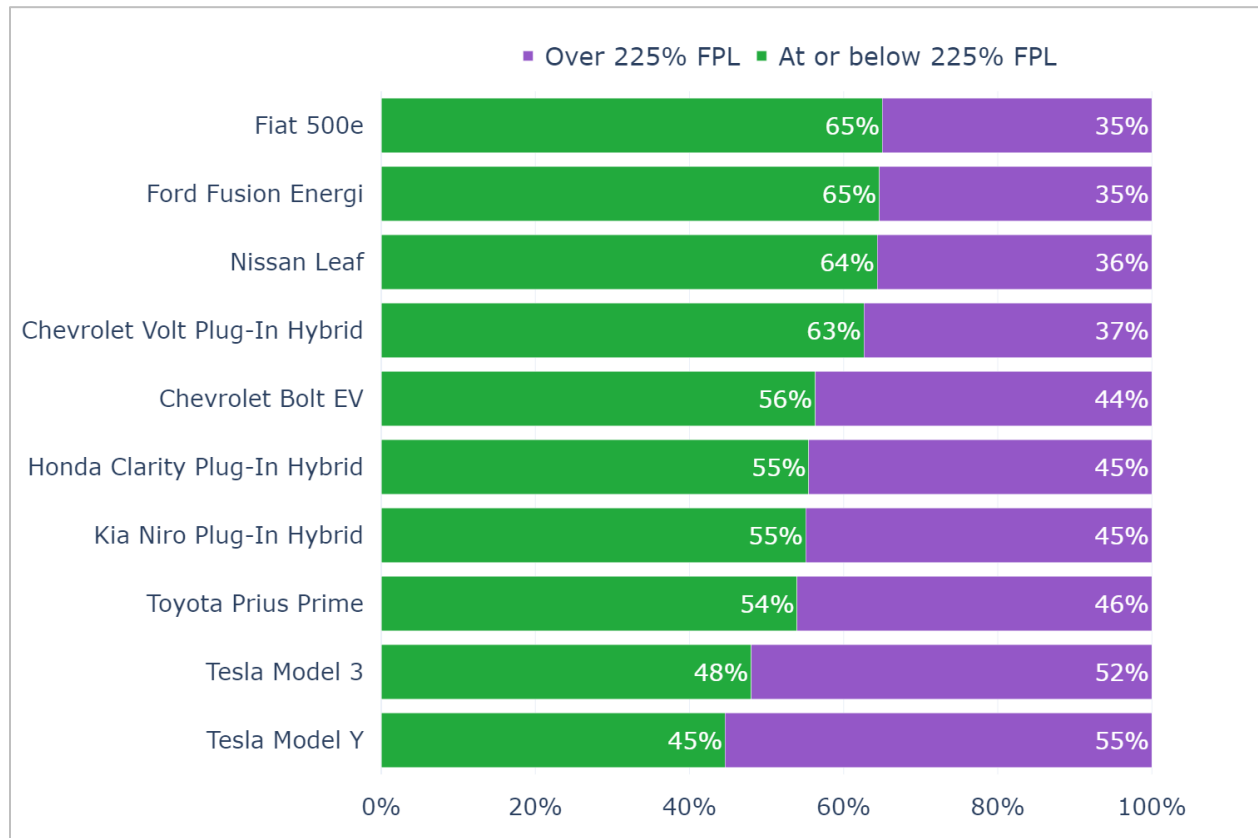
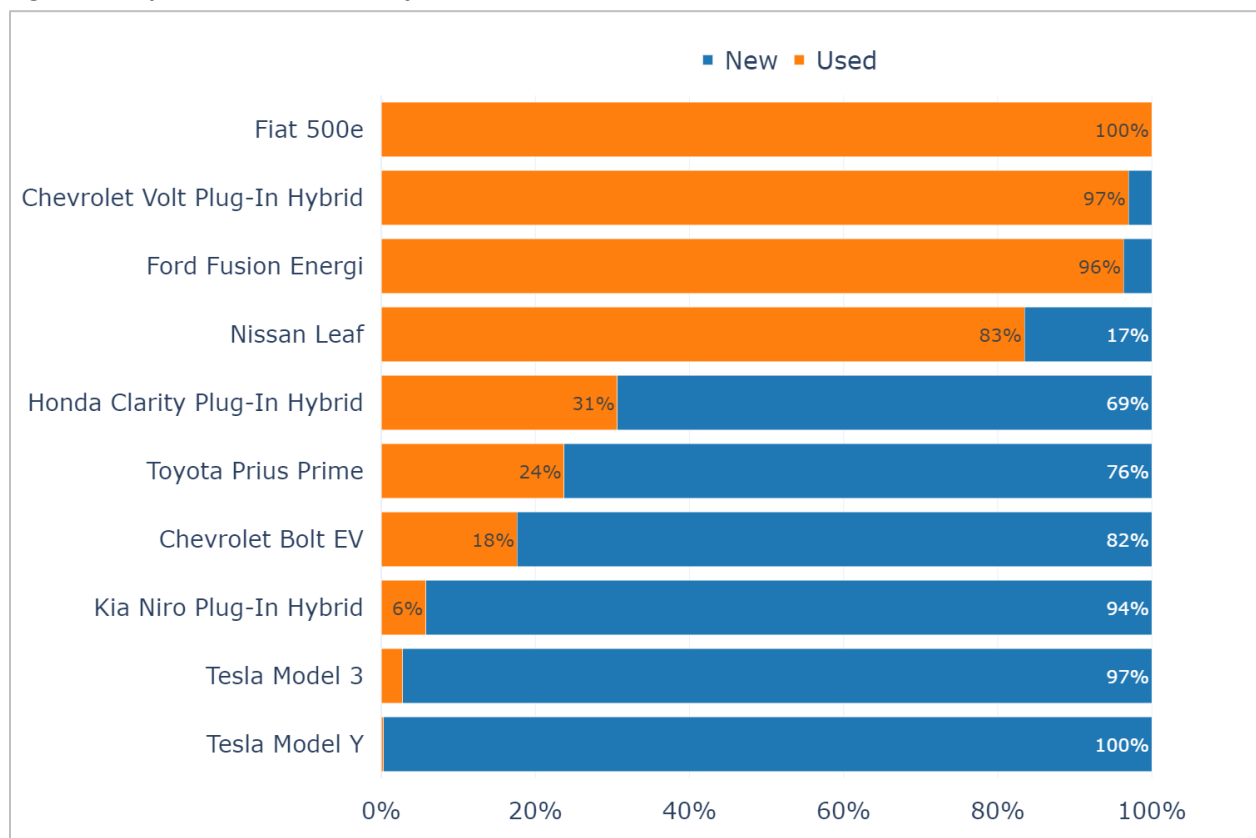


Figure 7. Top 10 Make/Models by New or Used Status



Adoption Survey

The respondents analyzed in this section of the report are those who received their grant in Phase 2 and were not included in the 2020 report. Respondents who answered the adoption survey prior to October 23, 2020 were included in the 2020 report. Table 4 summarizes the survey response rate and key dates.

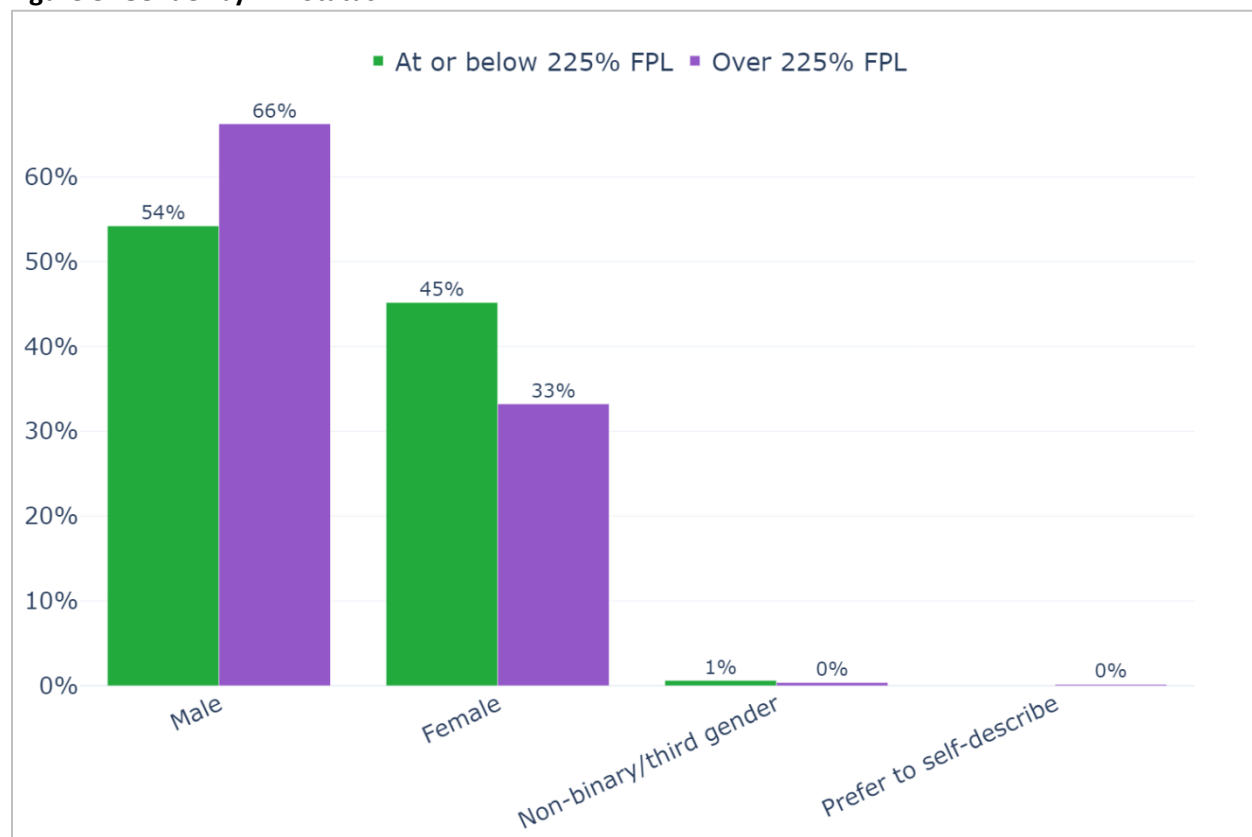
Survey responses were segmented by FPL group (over and under 225% of the FPL), and by technology type (BEV or PHEV). HEVs are excluded from the technology type segmentation due to their small sample size, and FCEV drivers were excluded from all analysis due to their small sample size. These segmentations are shown in the report if the difference between the groups is statistically significant based on a chi-squared test. Otherwise, aggregate percentages are shown.

Table 4. CVA Program Adoption Survey Administration Dates for Data Presented in this Report

Survey Invite Dates	10/6/2020 – 10/21/2020
Response Dates	10/23/2020 – 10/25/2021
Vehicle Purchase Dates	5/14/2020 – 7/24/2021
Grant Issued Dates	7/10/2020 – 8/30/2021
Program Participant Population	3,884
Survey Responses	1,603
Response Rate	41%

Demographics

The overall gender split has remained similar to the 2020 report, with males making up 60% of the grant recipients. There are significant differences in gender ratios when segmenting the data by FPL status, as shown in Figure 8. Among program participants whose income is below 225% of the FPL almost half (45%) are women, while for those above 225% of the FPL only 33% are women.

Figure 8. Gender by FPL Status

CVA Program participants in the lower-income group (at or below 225% of the FPL) are younger than those in the moderate-income group (Figure 9). Age also differs by technology type, with BEV drivers tending to be younger than PHEV drivers (Figure 10).

Figure 9. Age by FPL Status

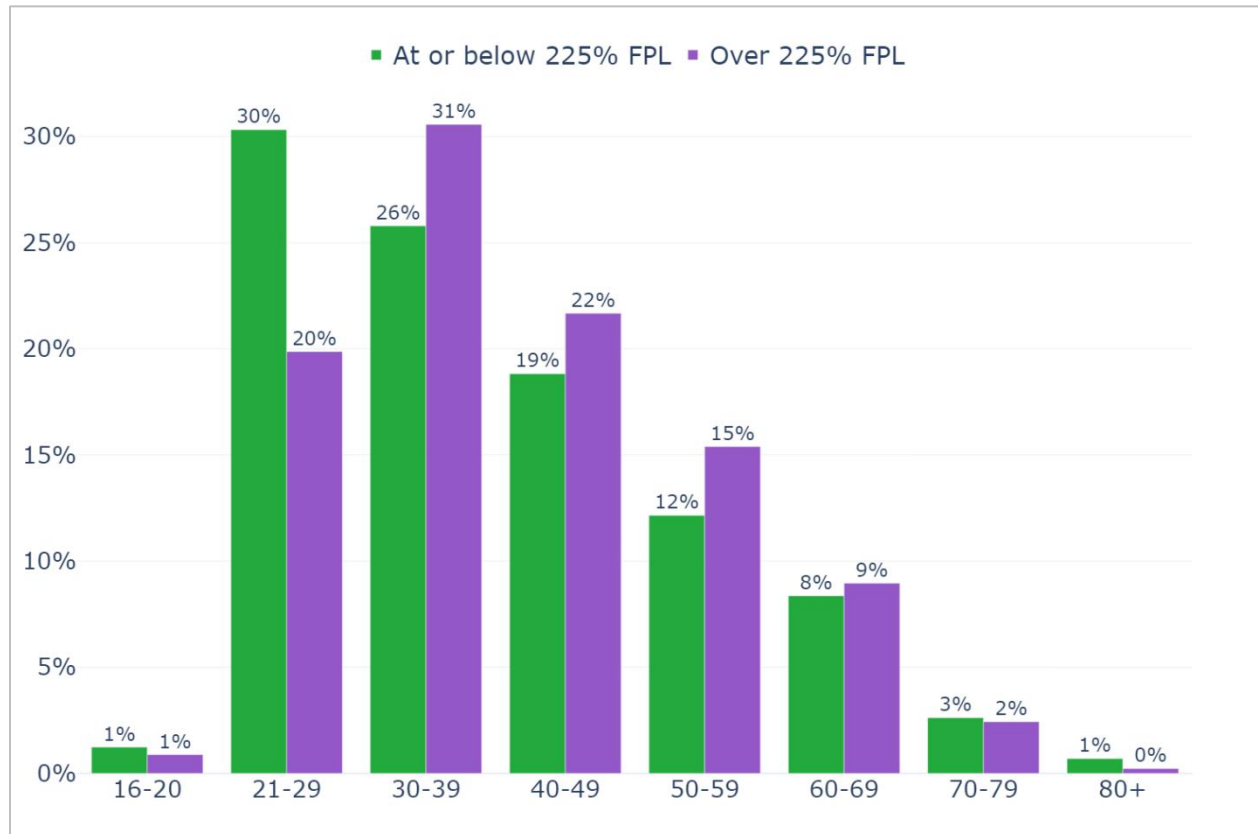
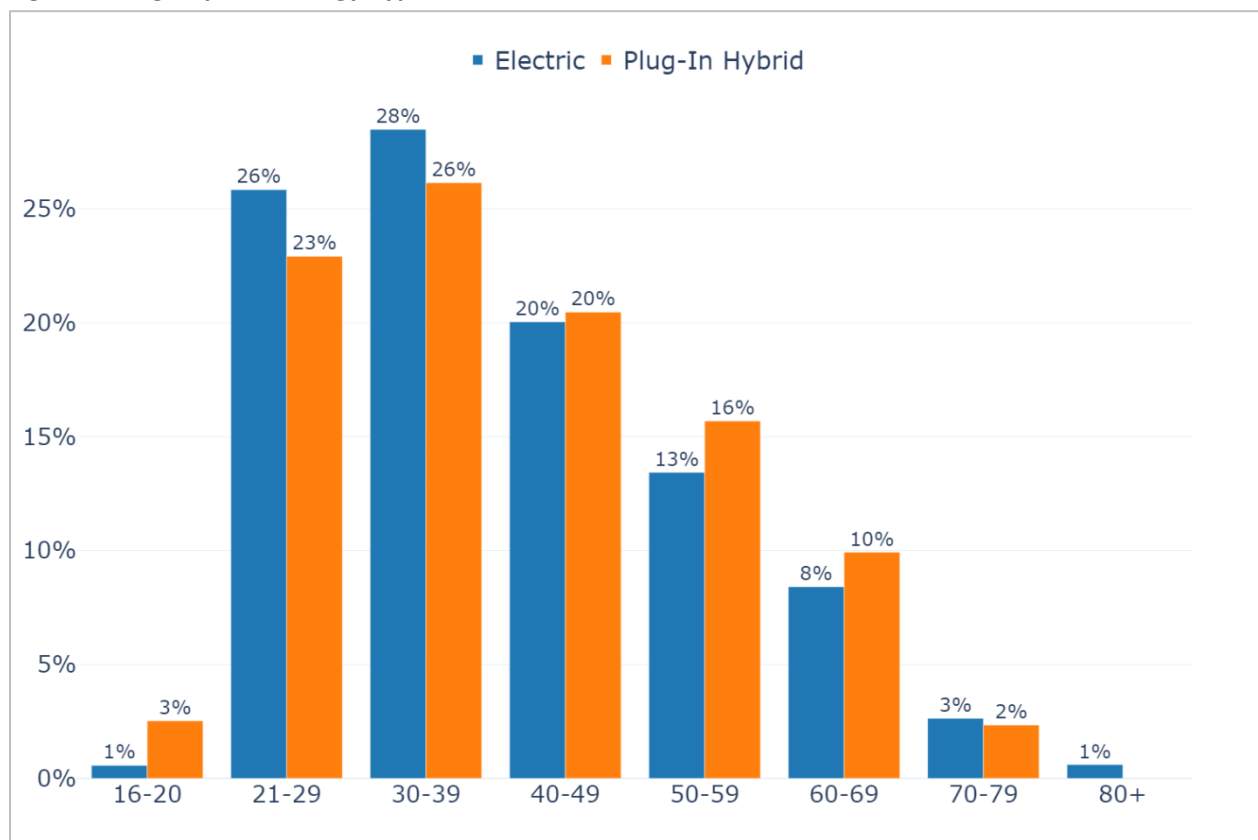


Figure 10. Age by Technology Type



The percentage of respondents identifying as white or Caucasian has decreased to 35%, down from 43% in the 2020 report (Figure 11). This decrease has corresponded with an increase in participants who identify as East Asian or Southeast Asian. The percent of respondents who identify as Latinx remains similar to the 2020 report and was not significantly different by FPL status or technology type (Figure 12).

Figure 11. Racial Identity

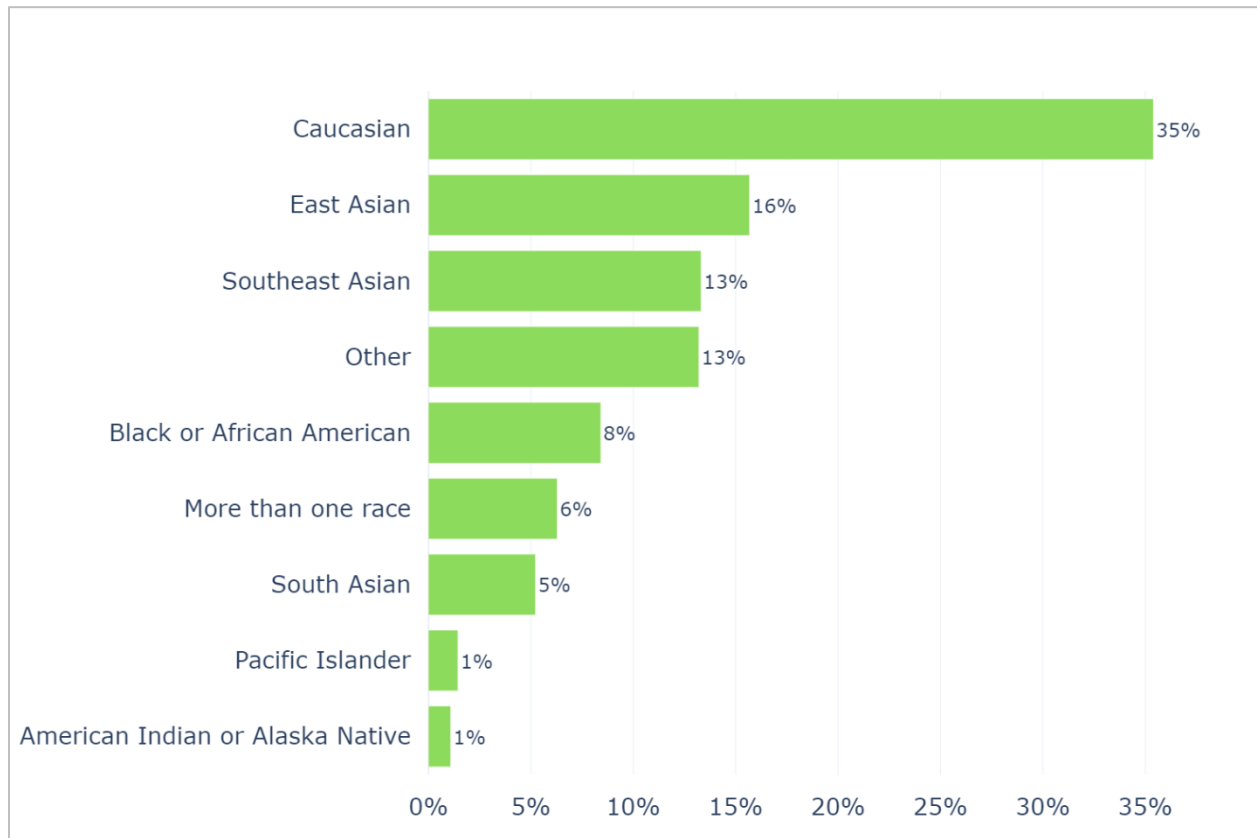
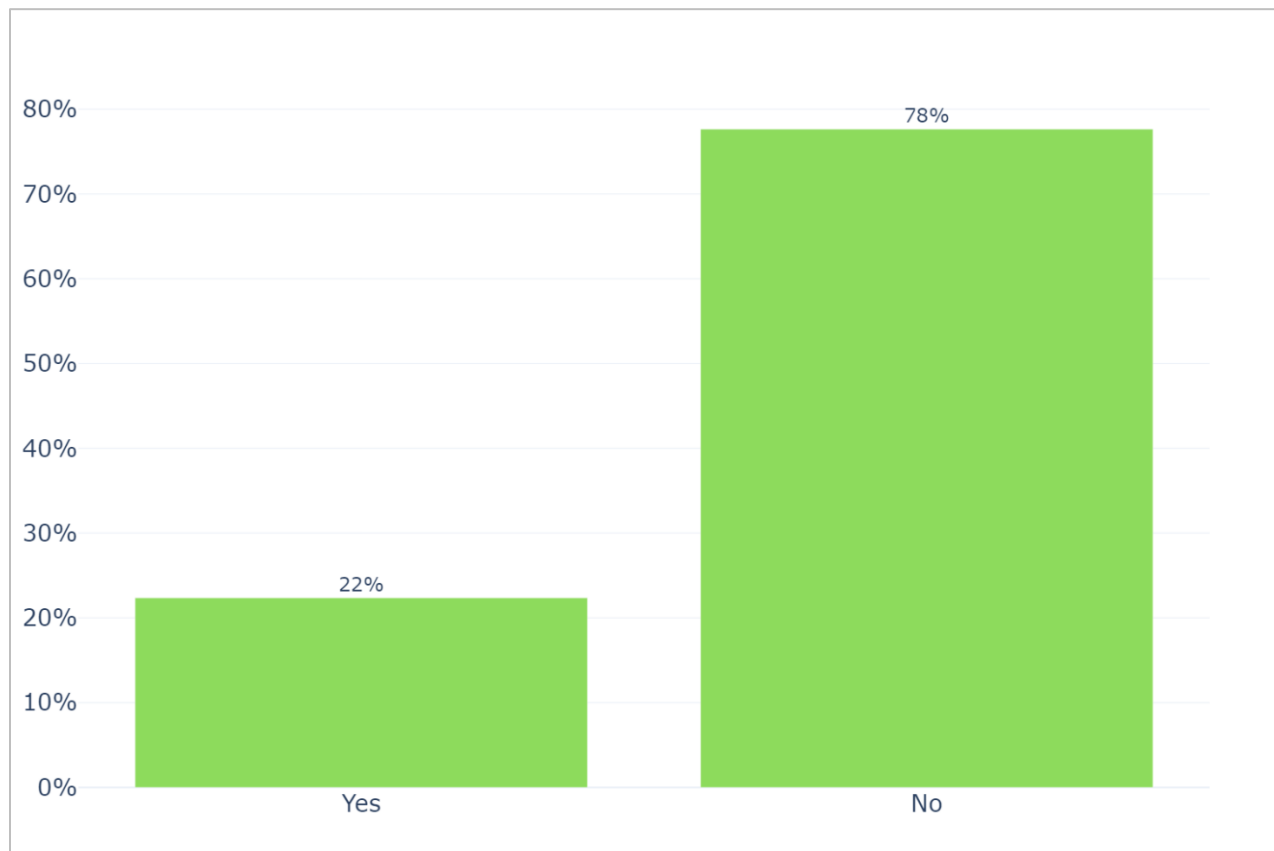
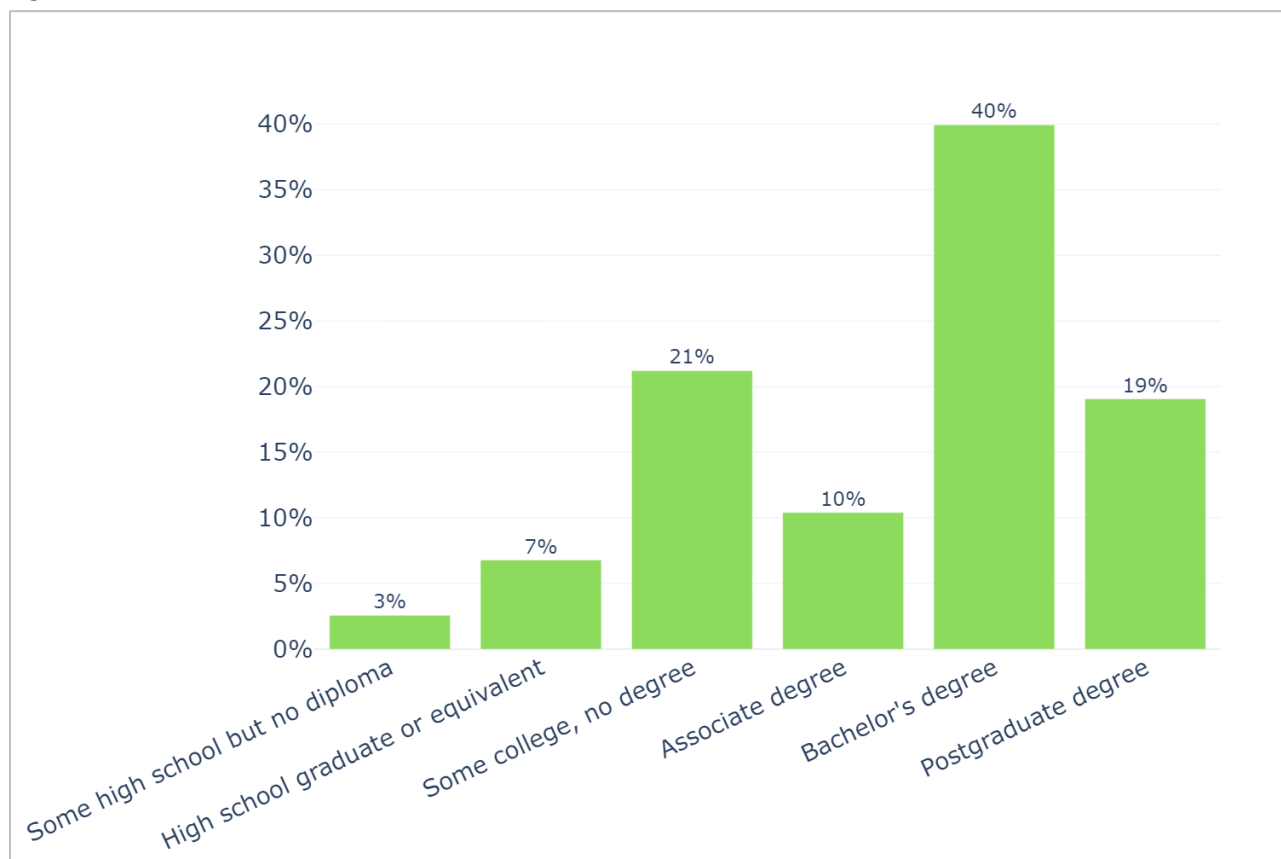


Figure 12. Latinx



The percent of survey respondents who have a bachelor's degree or higher has increased from 50% in the 2020 report to 59% (Figure 13).

Figure 13. Education



Overall, 37% percent of CVA Program participants are homeowners. This is lower than the state average of 55%¹, which is likely due to the income criteria for the CVA Program. Figure 14 shows the difference in home-ownership rate by FPL status. For respondents whose income is under 225% of the FPL, only 29% own their home. This increases to almost half (46%) for those whose incomes are above 225% of the FPL.

While most respondents did not own their home regardless of which type of vehicle they purchased, Figure 15 shows that the home-ownership rate was higher for those who purchased BEVs versus PHEVs (39% versus 30%).

¹ <https://fred.stlouisfed.org/series/CAHOWN>

Figure 14. Home Ownership by FPL Status

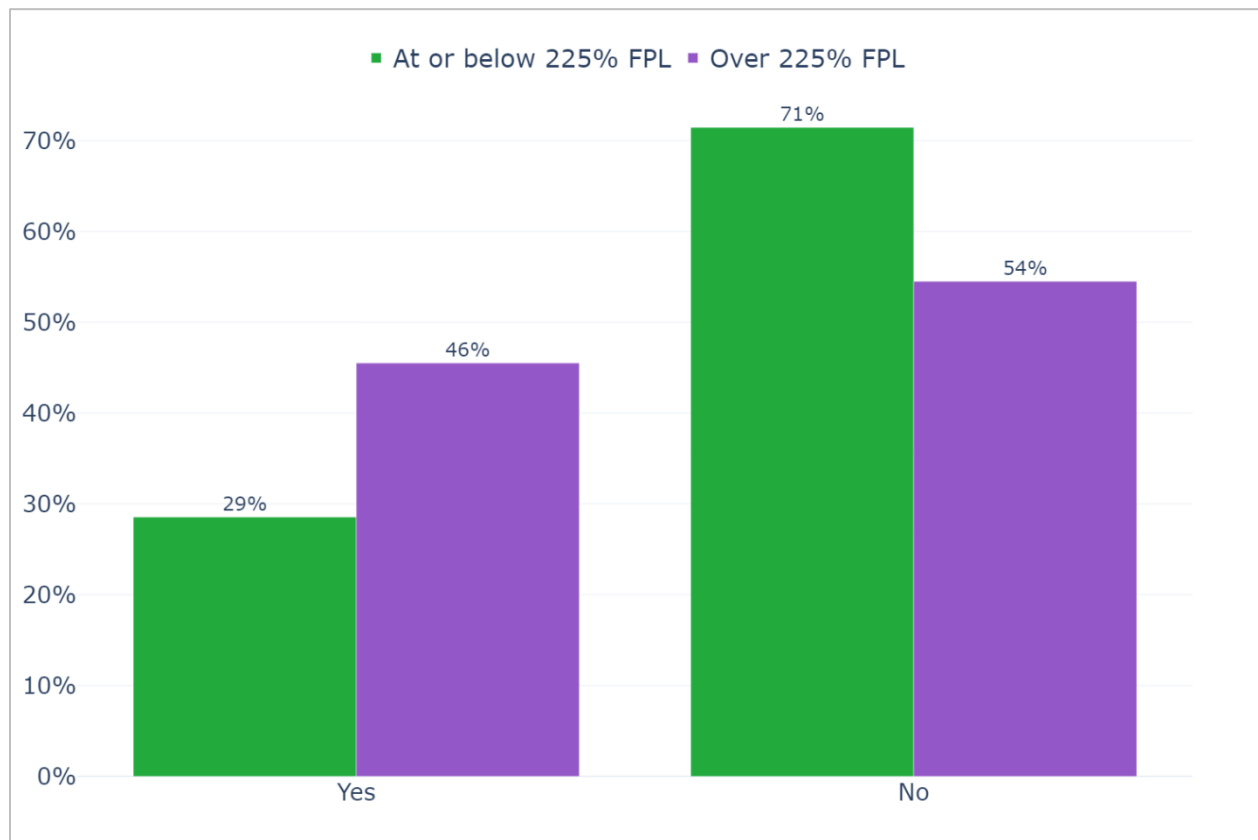
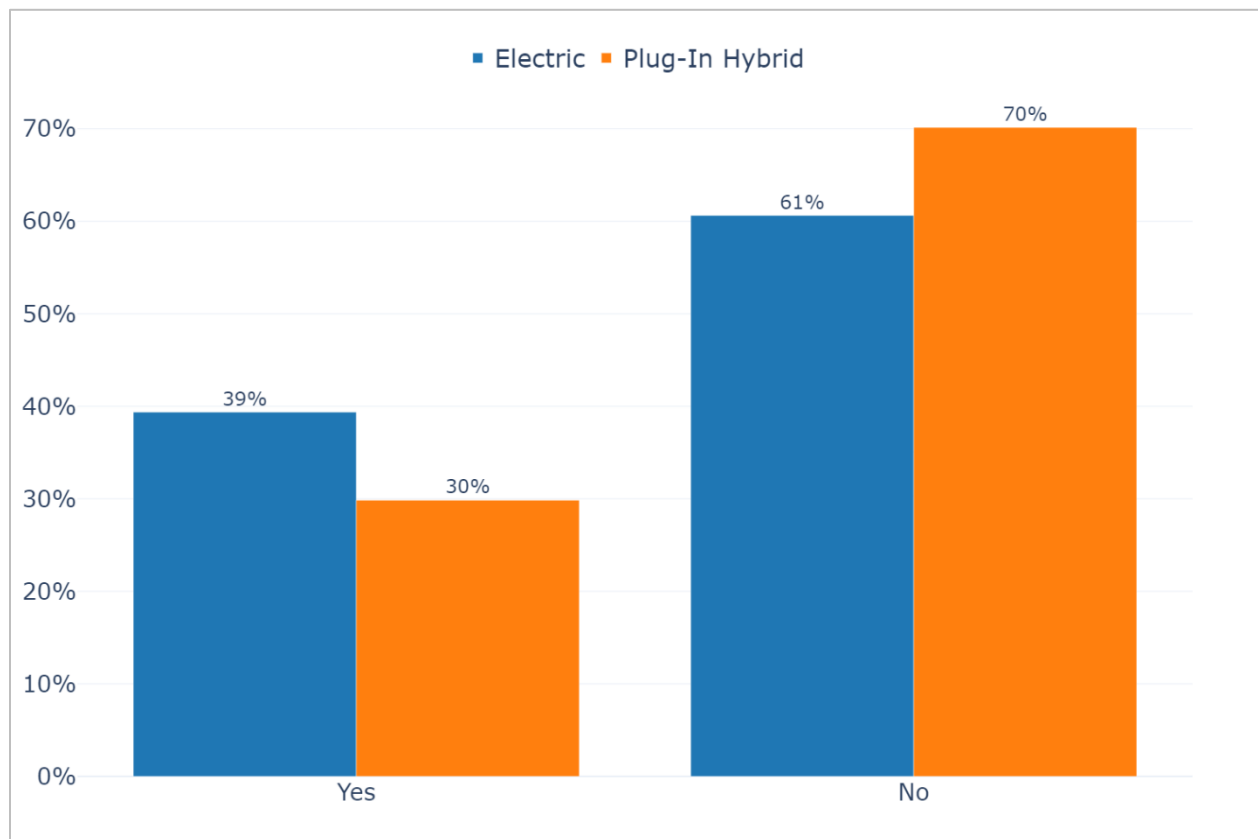
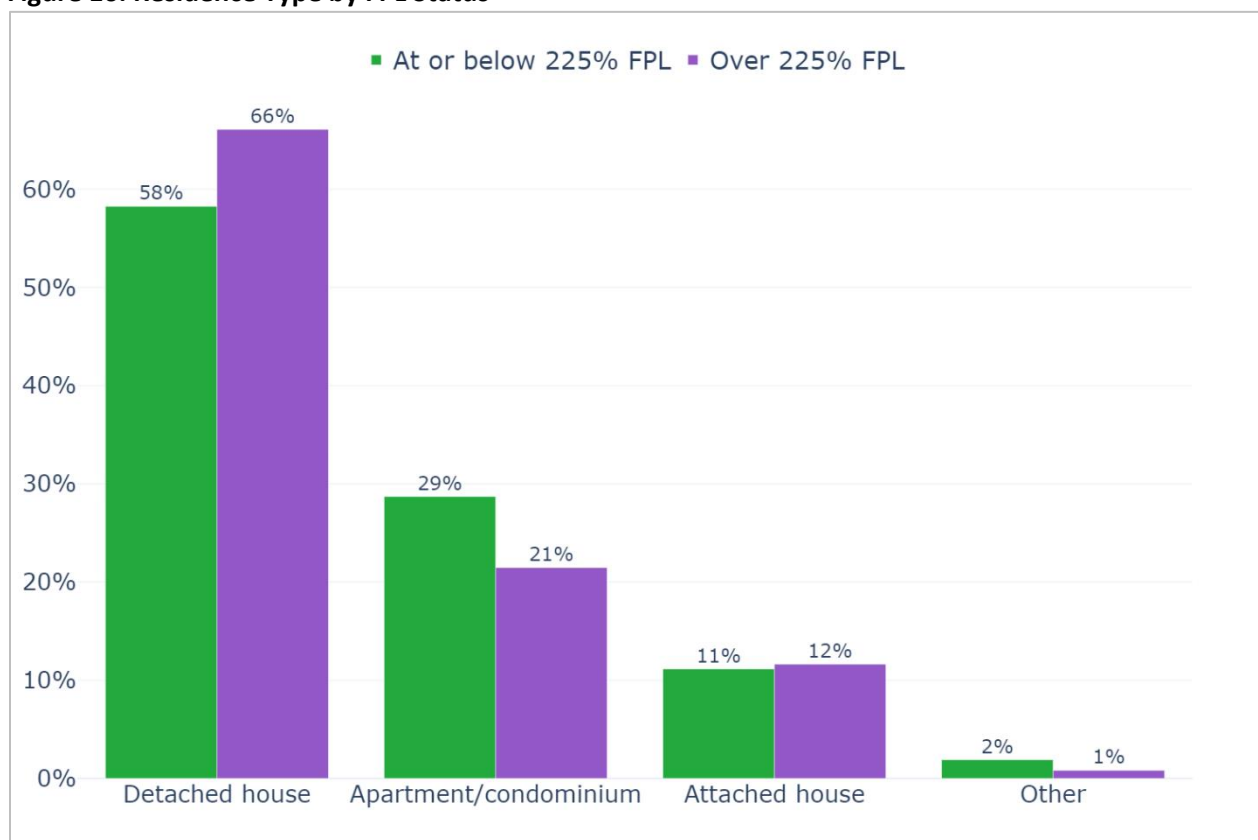


Figure 15. Home Ownership by Technology Type



Overall, 63% of respondents live in a detached home and 25% live in an apartment. Among those whose income is less than 225% of the FPL, only 58% live in a detached home and 29% live in an apartment (Figure 16). This difference underscores the importance of reducing barriers for apartment dwellers to achieve equity in EV adoption.

Figure 16. Residence Type by FPL Status



Program Impacts

The vast majority (86%) of respondents reported that they would not have purchased their clean vehicle without the CVA Program grant (Figure 17). When asked in more detail what they would have done instead, 33% of respondents would have purchased a new or used clean vehicle. About a quarter (24%) would have purchased a new or used conventional, non-hybrid vehicle instead, and 43% would not have purchased any vehicle. These responses differed by FPL group, with the lower-income group (under 225% of the FPL) more likely to report that they would not have made any purchase and less likely to have purchased a clean vehicle (Figure 18). These responses also differed by technology type; PHEV drivers were more likely to report that they would have purchased a conventional, non-hybrid vehicle than BEV drivers (Figure 19).

Figure 17. “Would you have purchased your clean vehicle if you did not receive a grant through the CVA Program?”

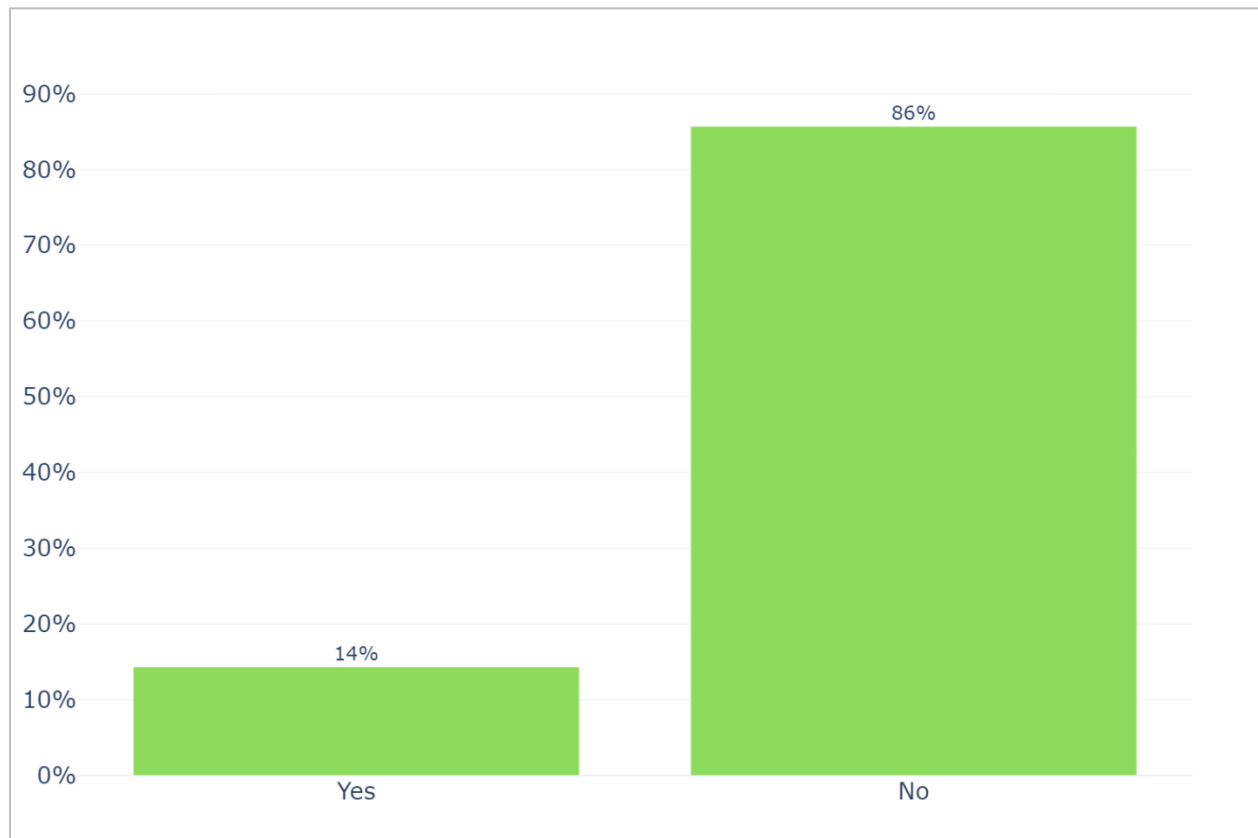


Figure 18. “In the absence of the CVA program, what do you think you would have done instead?” (by FPL status)

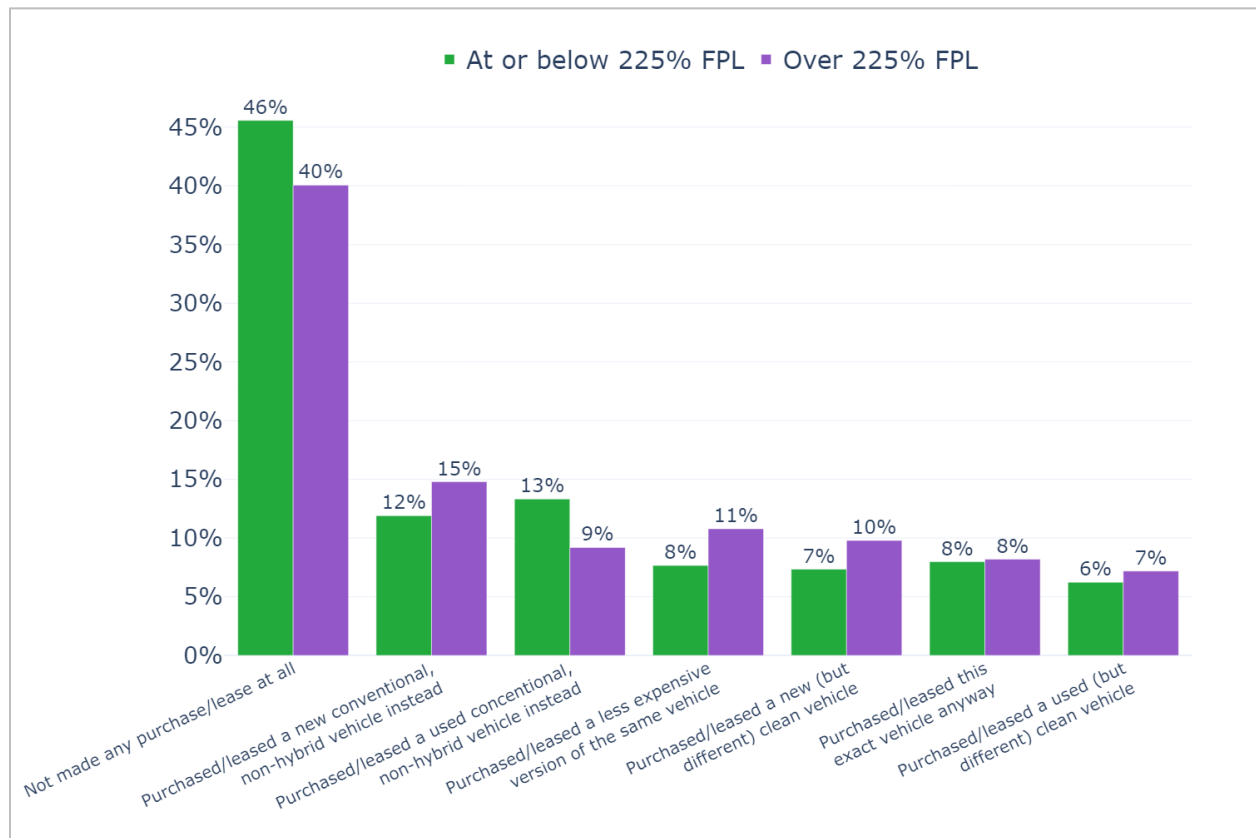
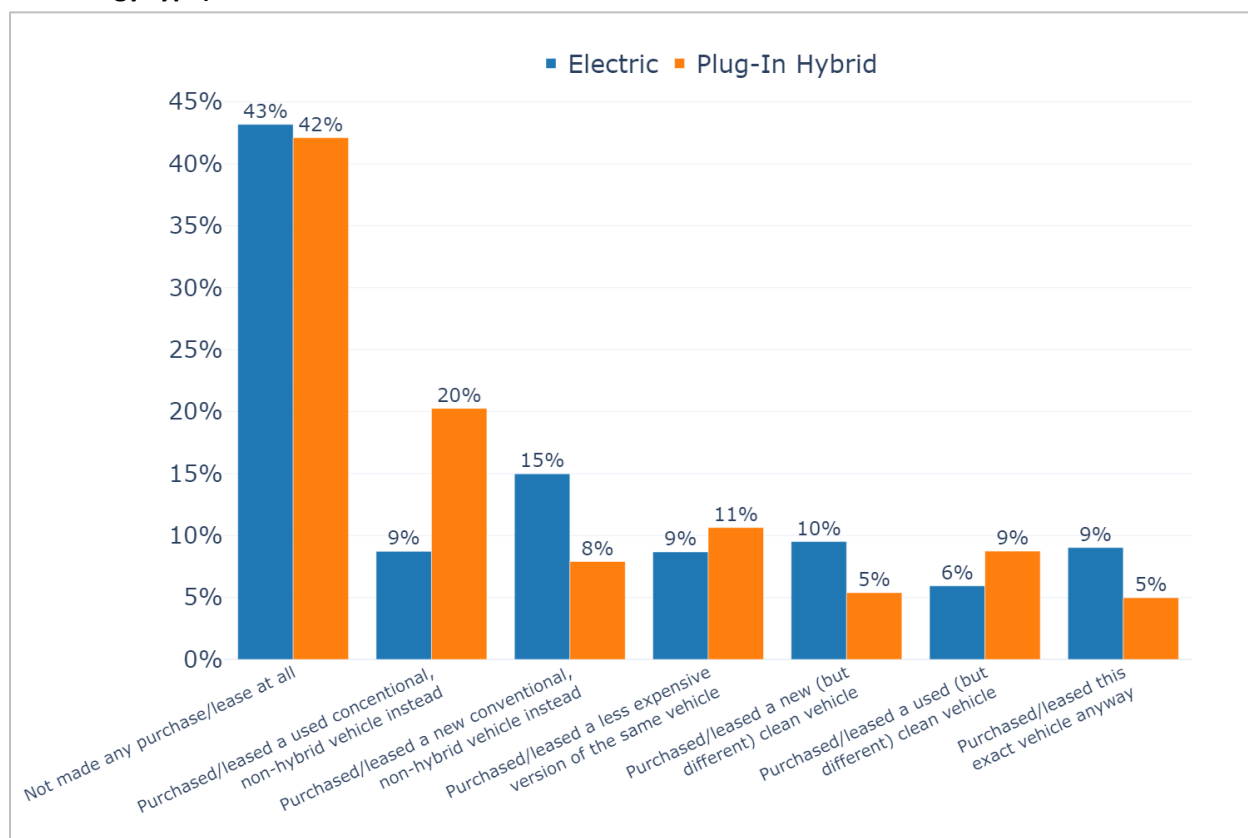
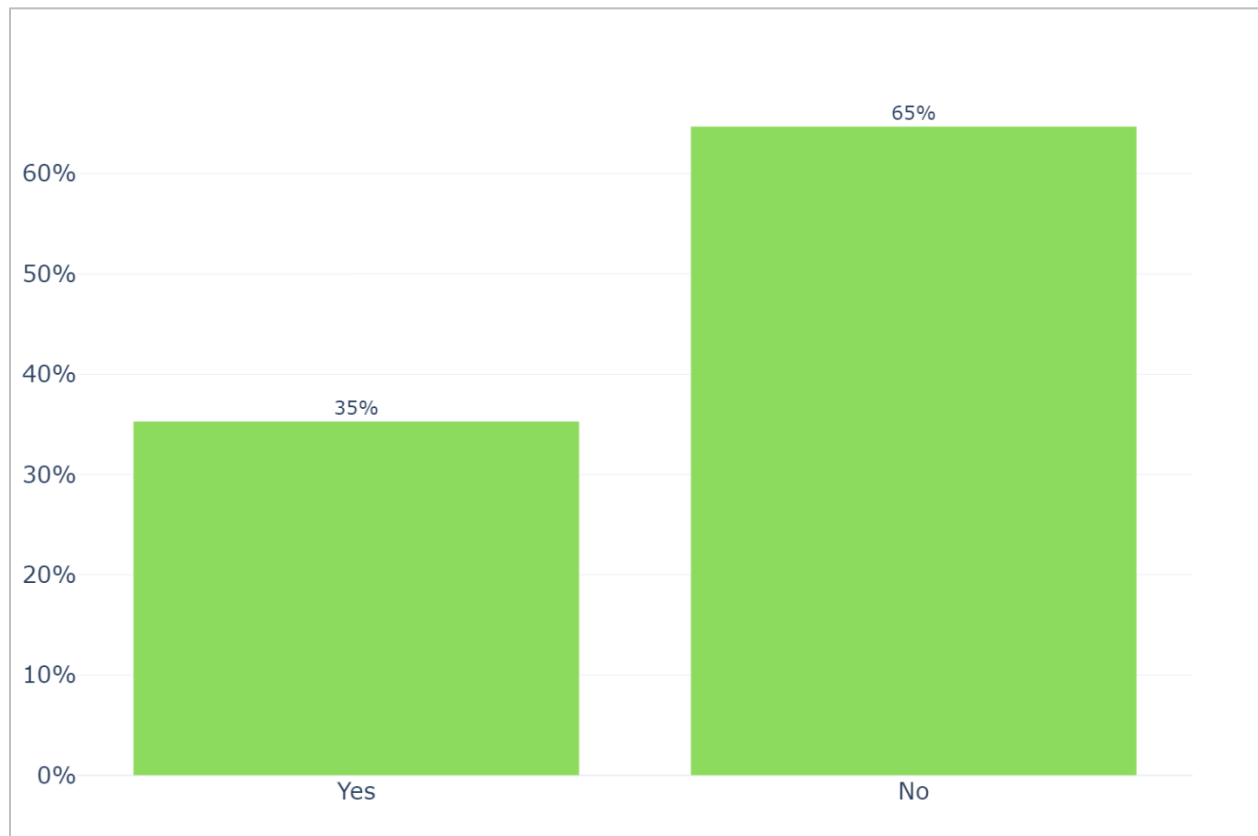


Figure 19. “In the absence of the CVA program, what do you think you would have done instead?” (by technology type)



Of the 103 respondents who received a loan through Beneficial State Bank (BSB), 65% of them would not have purchased their clean vehicle without the financing provided by BSB (Figure 20). This is a large increase from 45% in the 2020 report, highlighting the importance of the BSB loan in facilitating clean vehicle purchases.

Figure 20. “Would you have purchased your clean vehicle if you did not receive a loan through the Beneficial State Bank?”



Program Satisfaction

Satisfaction with the online application process and customer service continues to be high, as shown in Table 5. Respondents’ rating of their dealership experience improved from the 2020 report, with the percent reporting that they were very satisfied increasing from 44% to 61%.

Table 5. Satisfaction ratings

	Online application	Customer service	Dealership
Very satisfied	76%	80%	61%
Satisfied	18%	13%	19%
Neither	5%	5%	14%
Dissatisfied	0%	1%	4%
Very dissatisfied	0%	1%	3%

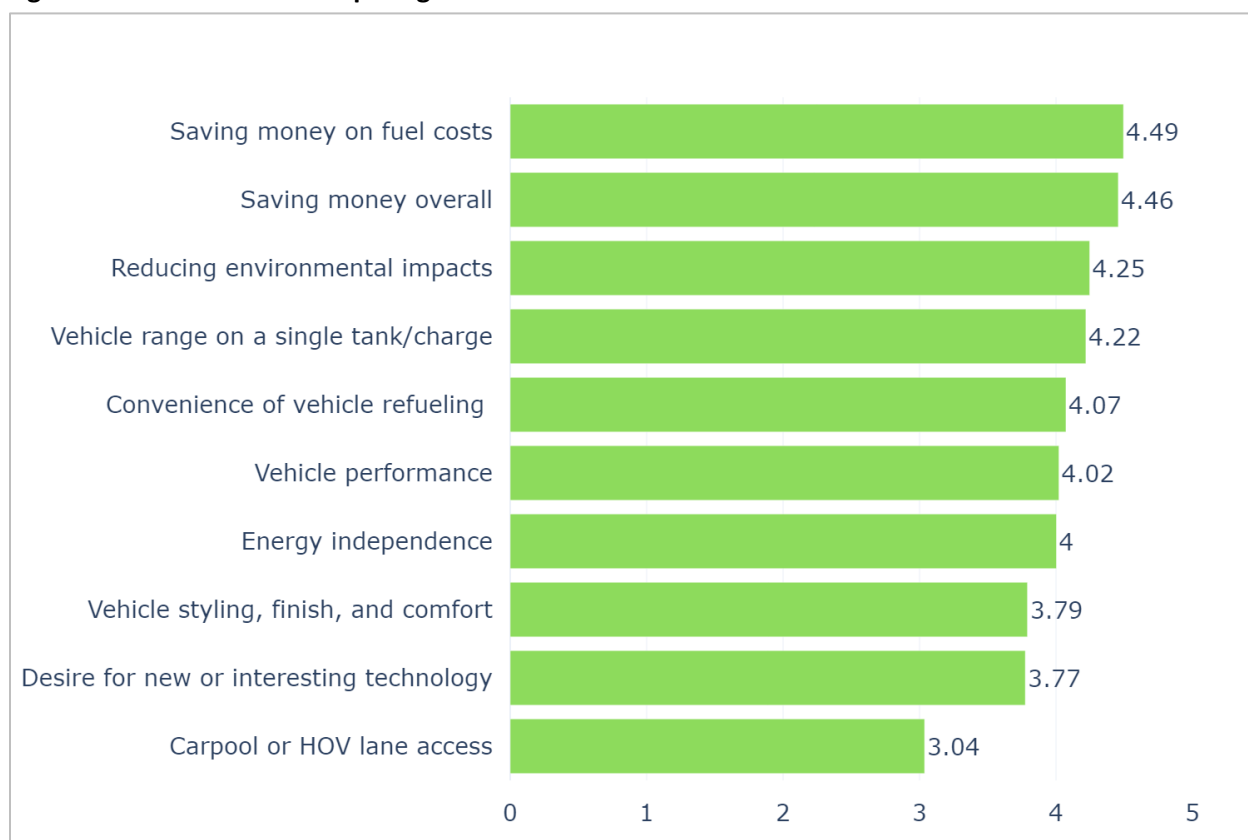
Primary Motivations for Adoption

To understand participants’ motivations for adoption, respondents were asked to rate how important several factors were in their decision to acquire their clean vehicle on a five-point scale. Responses were

coded numerically (1=not at all important and 5=extremely important) so that average scores could be calculated.

As shown in Figure 21, respondents indicated that saving money overall and saving money on fuel costs had the highest importance ratings. Reducing environmental impacts ranked just below saving money in terms of importance. Respondents considered access to HOV lanes to be the least important factor.

Figure 21. Motivation for acquiring a clean vehicle



Respondents who purchased a PHEV or a BEV were asked to rate the importance of availability of charging at several locations – home, work, and other destinations. None of these responses differed significantly by FPL group. The importance of charging at home was the most highly rated, with 76% of respondents rating it as “very” or “extremely” important. These responses differed significantly by technology type. BEV drivers were much more likely to rate the availability of charging at home as “extremely important” than PHEV drivers (Figure 22). Work was the least highly rated location, with only 36% of respondents rating it as “very” or “extremely” important. These responses did not differ significantly by technology type (Figure 23). Finally, “other destinations” was rated “very” or “extremely” important by respondents. BEV drivers were much more likely than PHEV drivers to rate charging at other destinations as “very” or “extremely” important (Figure 24).

Figure 22. “How important to your decision to acquire your plug-in electric vehicle was the availability of charging at home?” (by technology type)

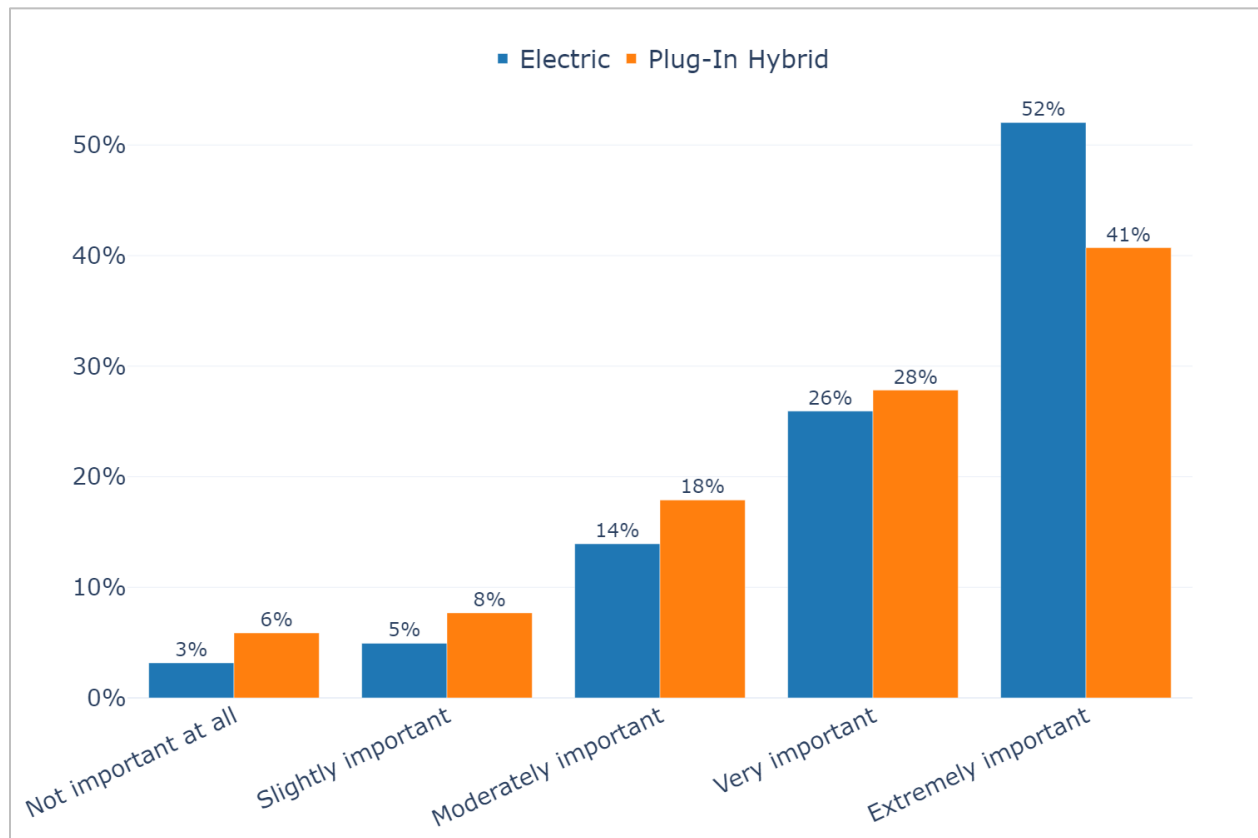


Figure 23. “How important to your decision to acquire your plug-in electric vehicle was the availability of charging at work?”

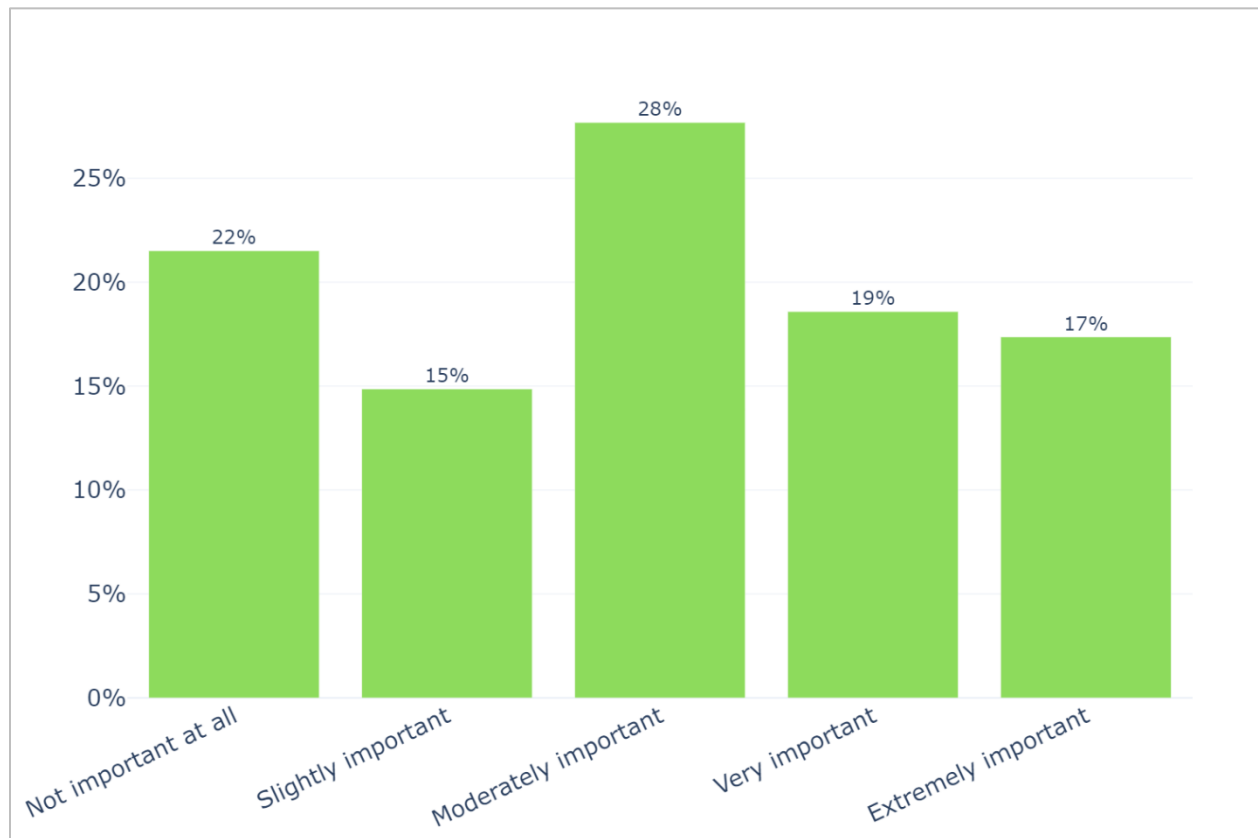
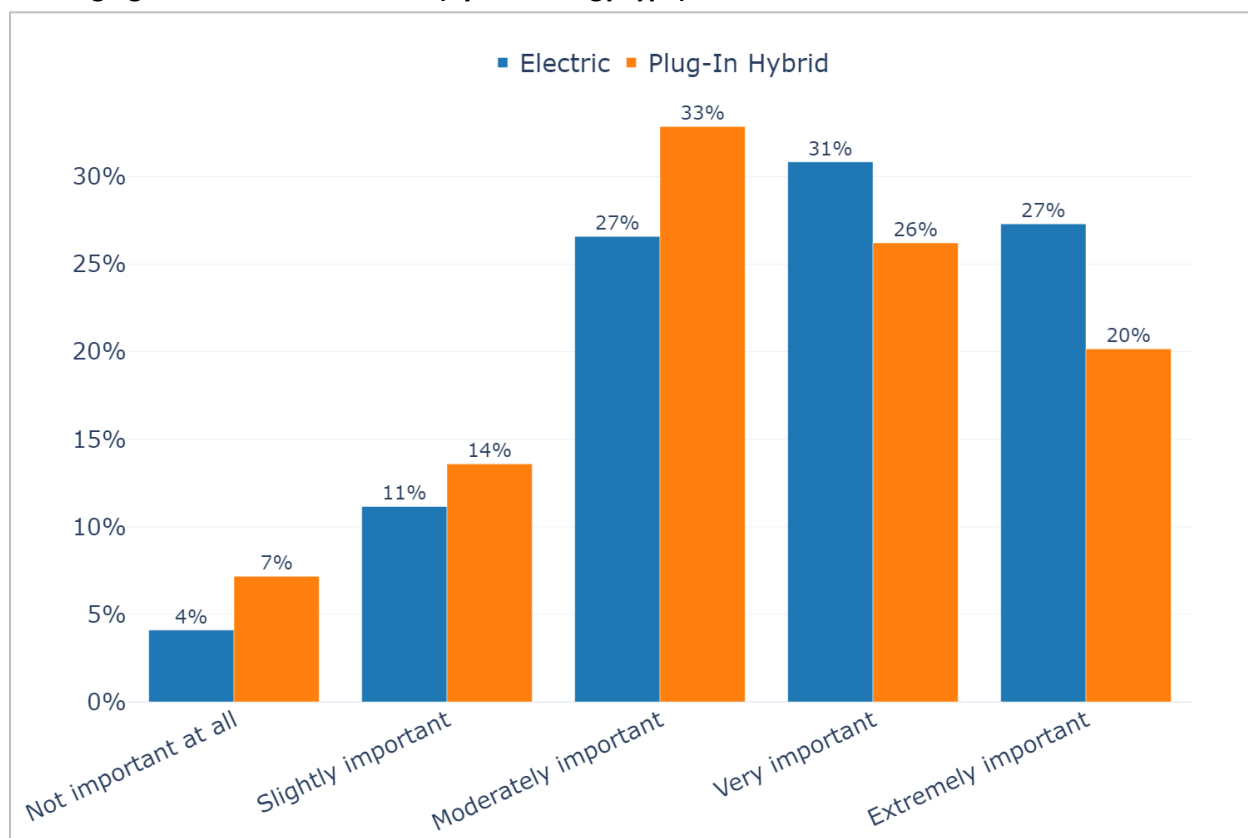


Figure 24. “How important to your decision to acquire your plug-in electric vehicle was the availability of charging at other destinations?” (by technology type)



Concerns for Adoption

To understand program participants’ concerns regarding adopting an electric vehicle, survey respondents were asked to rank the top three concerns they had when shopping for their clean vehicle. Slightly different response options were shown to the survey respondents depending on their vehicle’s technology type. Figures 25 and 26 show the concerns for BEVs and PHEVs, respectively.

The cost of purchase, electric driving range, and battery lifespan were the most frequently selected concerns for both BEV and PHEV drivers.

Figure 25. “Which concerns did you have when you were shopping for your battery electric vehicle (BEV)?”

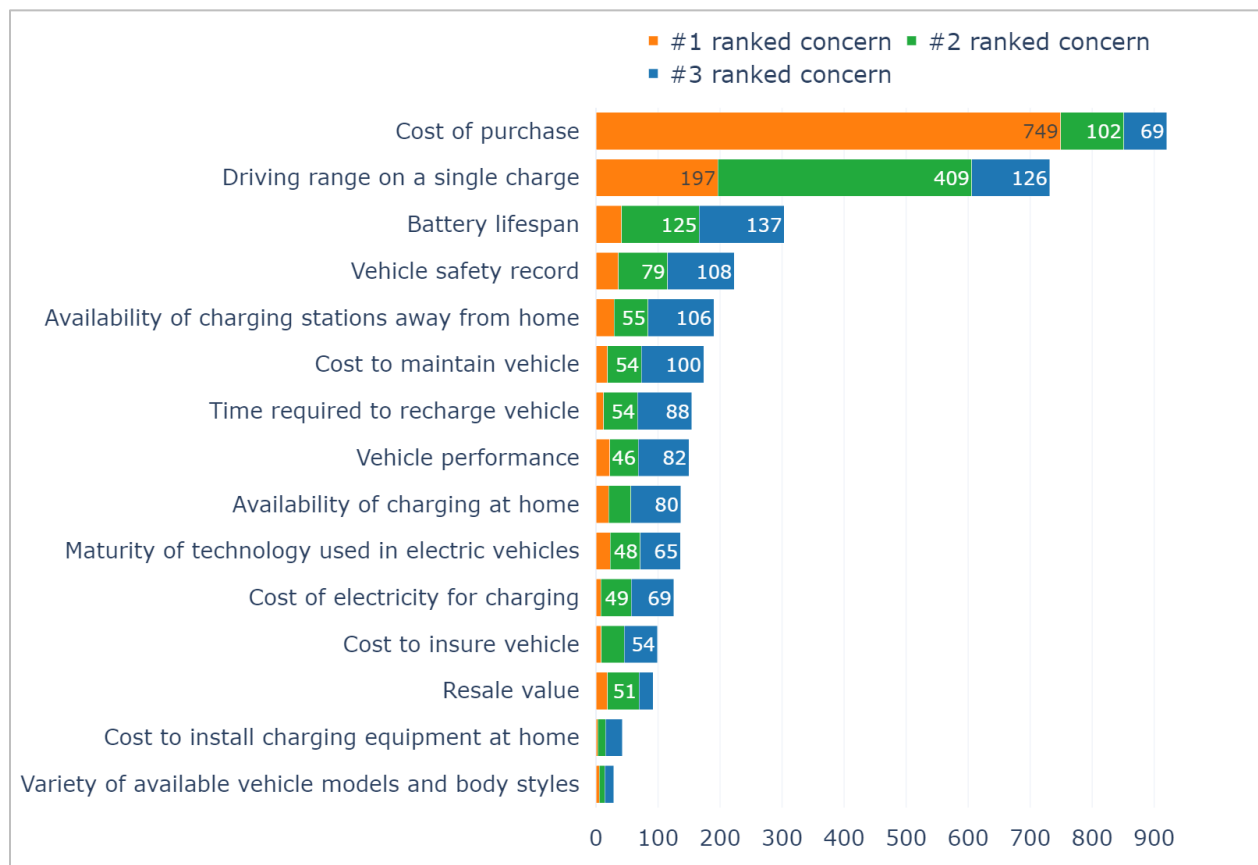
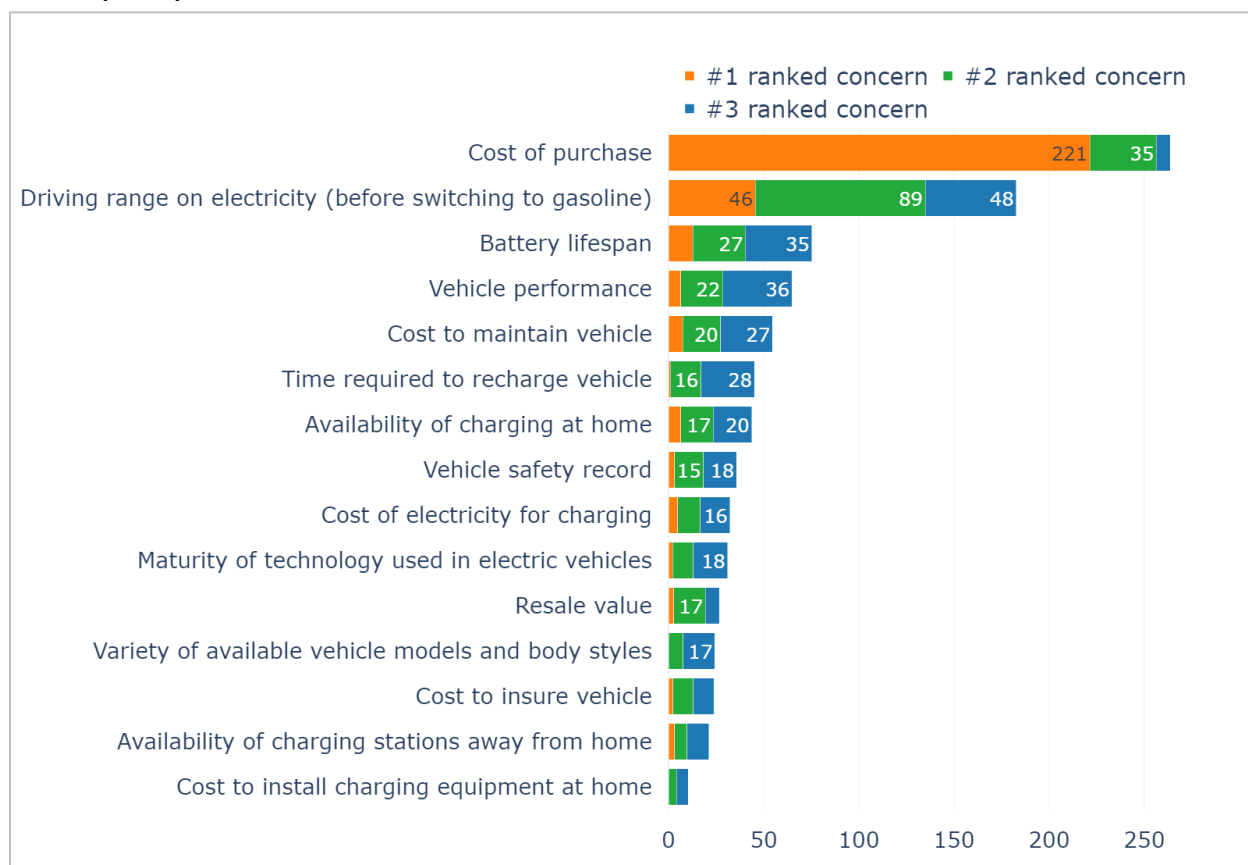


Figure 26. “Which concerns did you have when you were shopping for your plug-in hybrid electric vehicle (PHEV)?”



Clean Vehicle Travel Behavior

Respondents were asked to estimate the total number of miles that they drive their vehicles in a typical week. Respondents whose households are below 225% of the FPL reported driving fewer miles on average than those over 225% (Figure 27). These responses also differed by technology type, with BEV drivers reporting more miles driven per week than PHEV drivers (Figure 28). This is likely reflective of the prevalence of long-range BEVs among Phase 2 participants, since previous studies have found that short-range BEVs are driven fewer miles per year than PHEVs.²

² https://csiflabs.cs.ucdavis.edu/~cnitt/pubs/2020_03.pdf

Figure 27. Estimated total miles driven in a typical week (by FPL status)

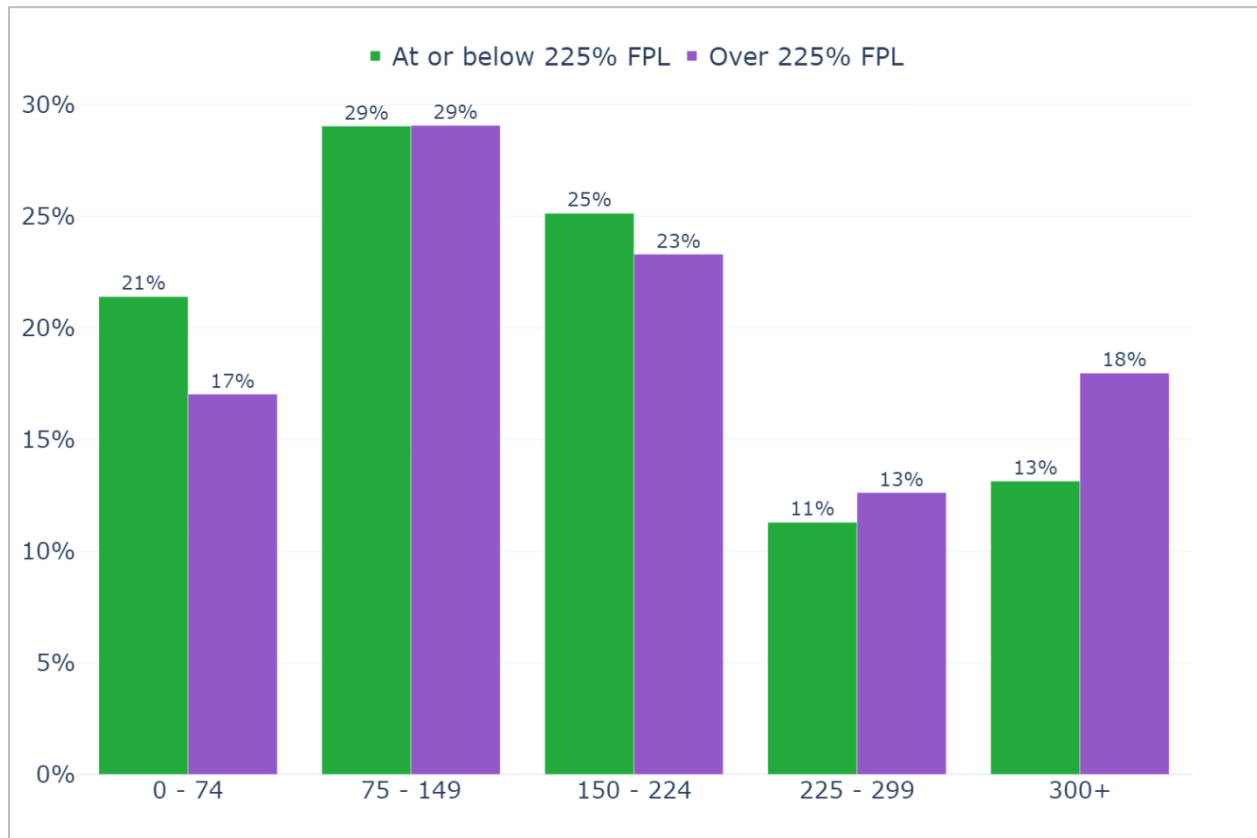
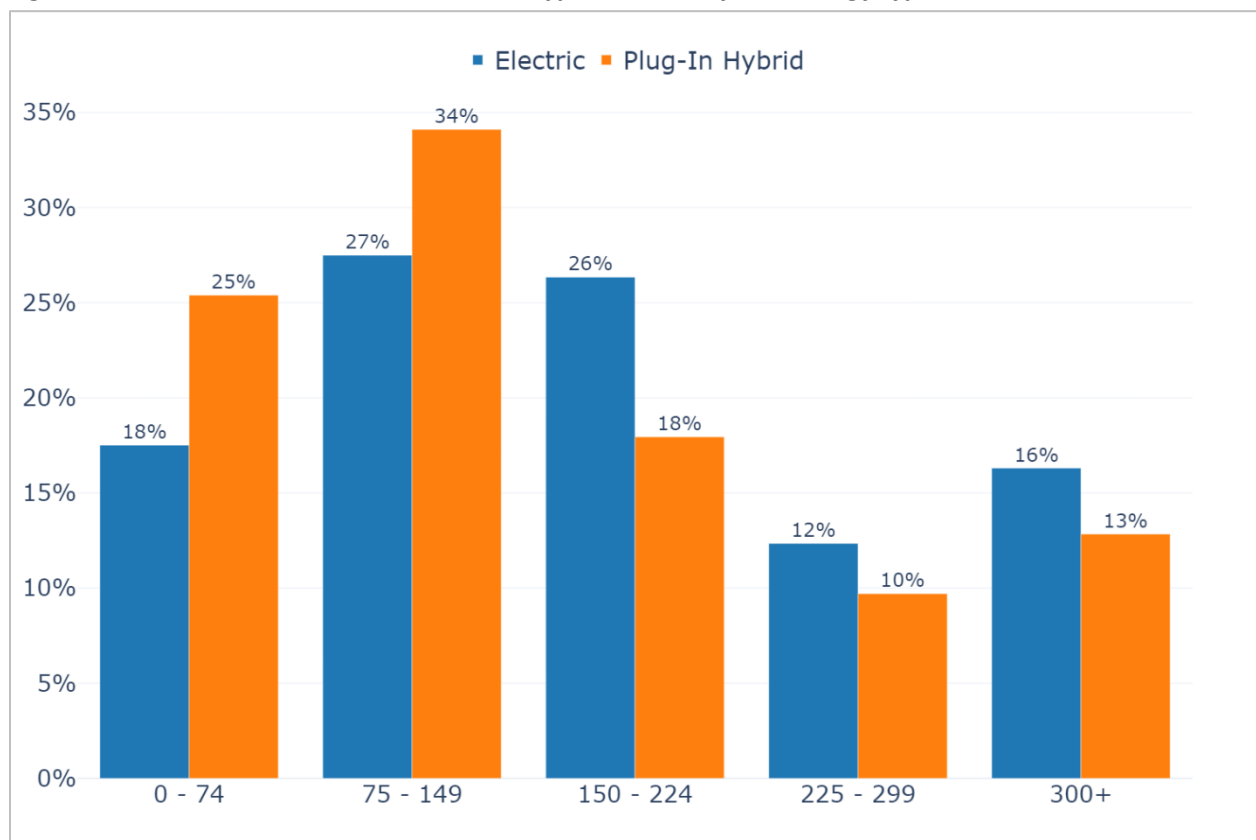


Figure 28. Estimated total miles driven in a typical week (by technology type)



Respondents were asked to describe their previous and current modes of transportation. Overall, 92% of respondents were previously driving a different vehicle to meet their travel needs prior to participating in CVA Program. Previous transportation mode varied by FPL group, with the households at or below 225% of the FPL being less likely to have been driving a different vehicle (Figure 29). Previous transportation mode also varied by technology type, with PHEV drivers being less likely to have been driving a different vehicle (Figure 30).

After adopting a clean vehicle, 95% of respondents are now using their clean vehicle to meet their travel needs. These responses varied by technology type, with PHEV drivers being slightly more likely to use a mode of transportation other than their clean vehicle (Figure 31).

Figure 29. “How did you most often get where you needed to go before you bought the clean vehicle?” (by FPL status)

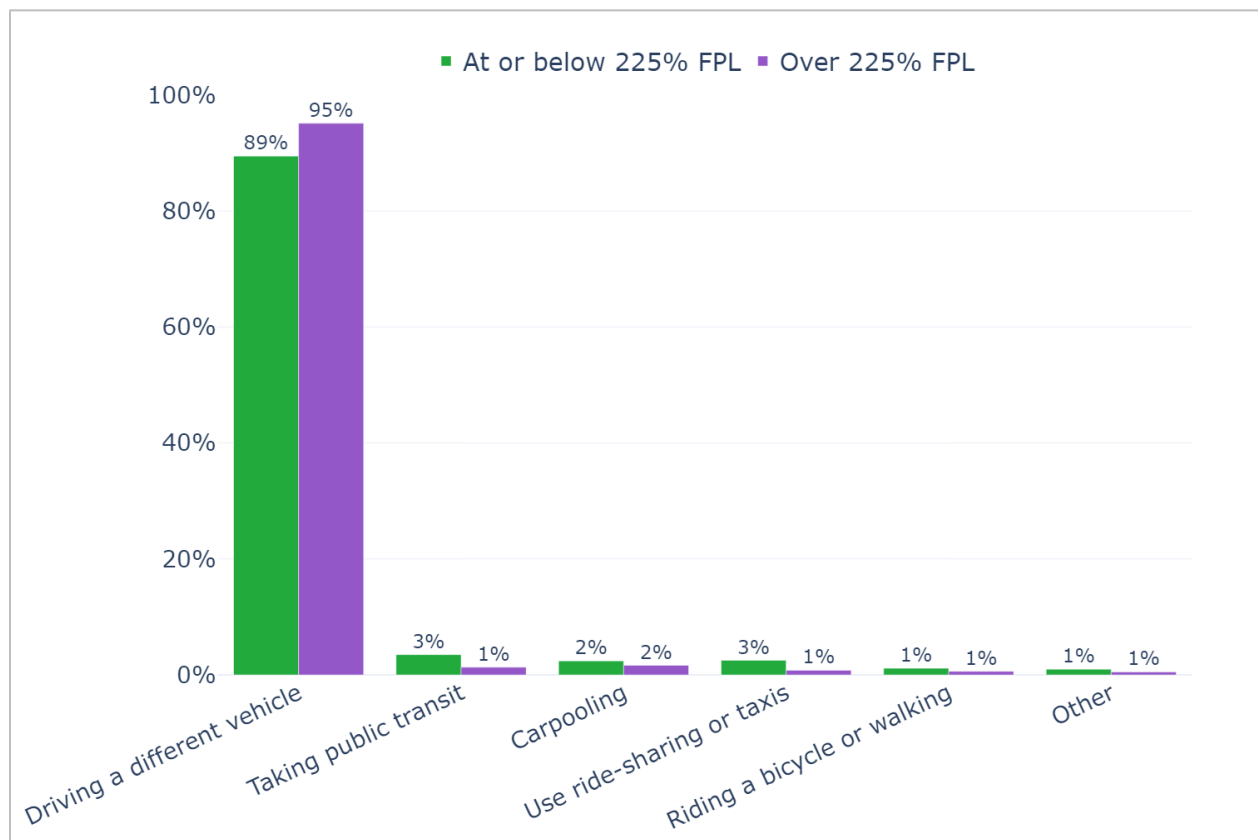


Figure 30. “How did you most often get where you needed to go before you bought the clean vehicle?” (by technology type)

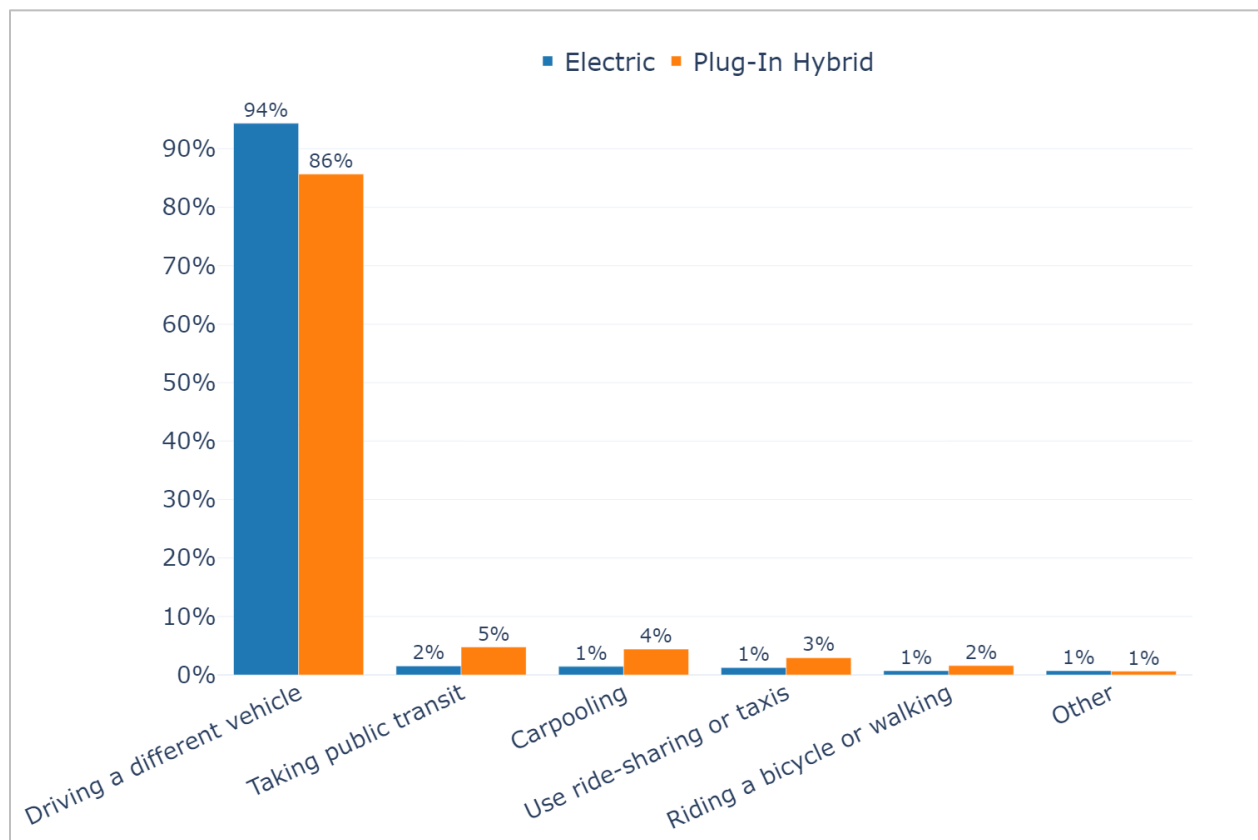
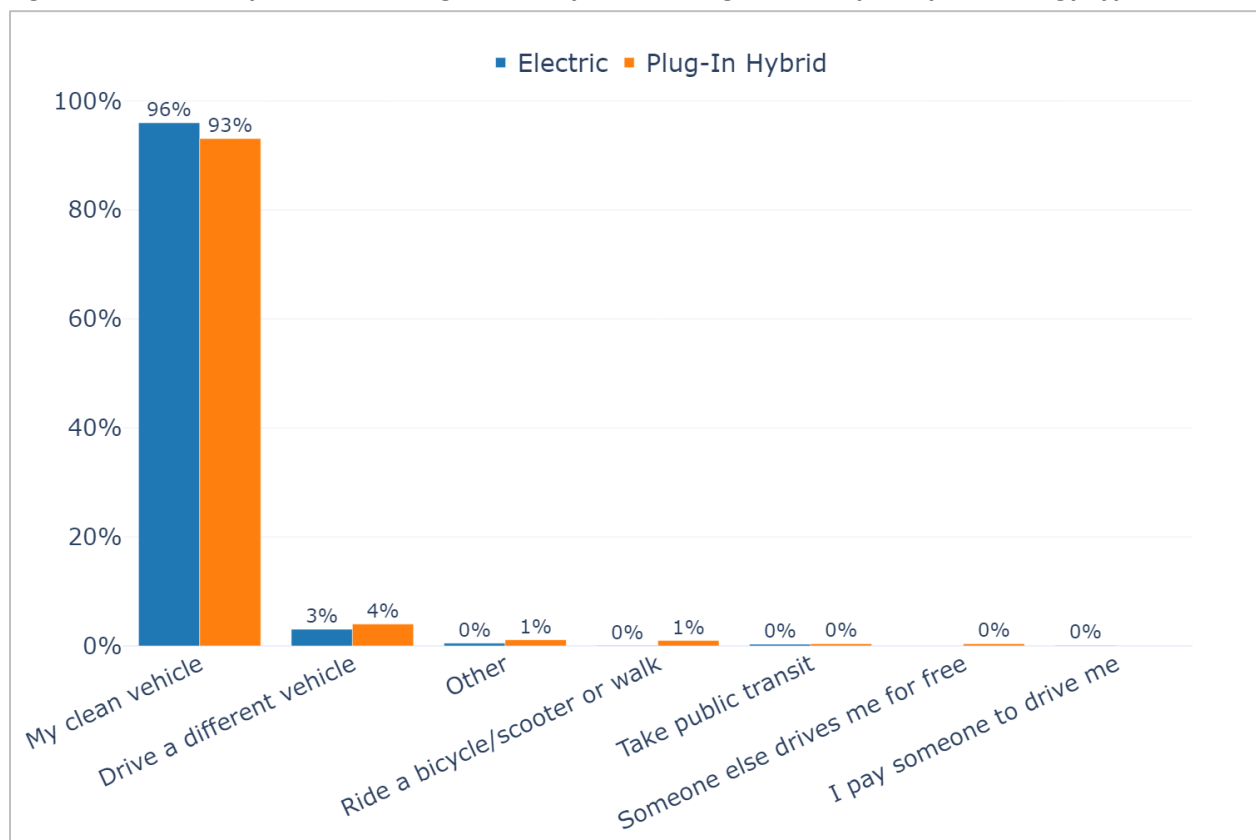


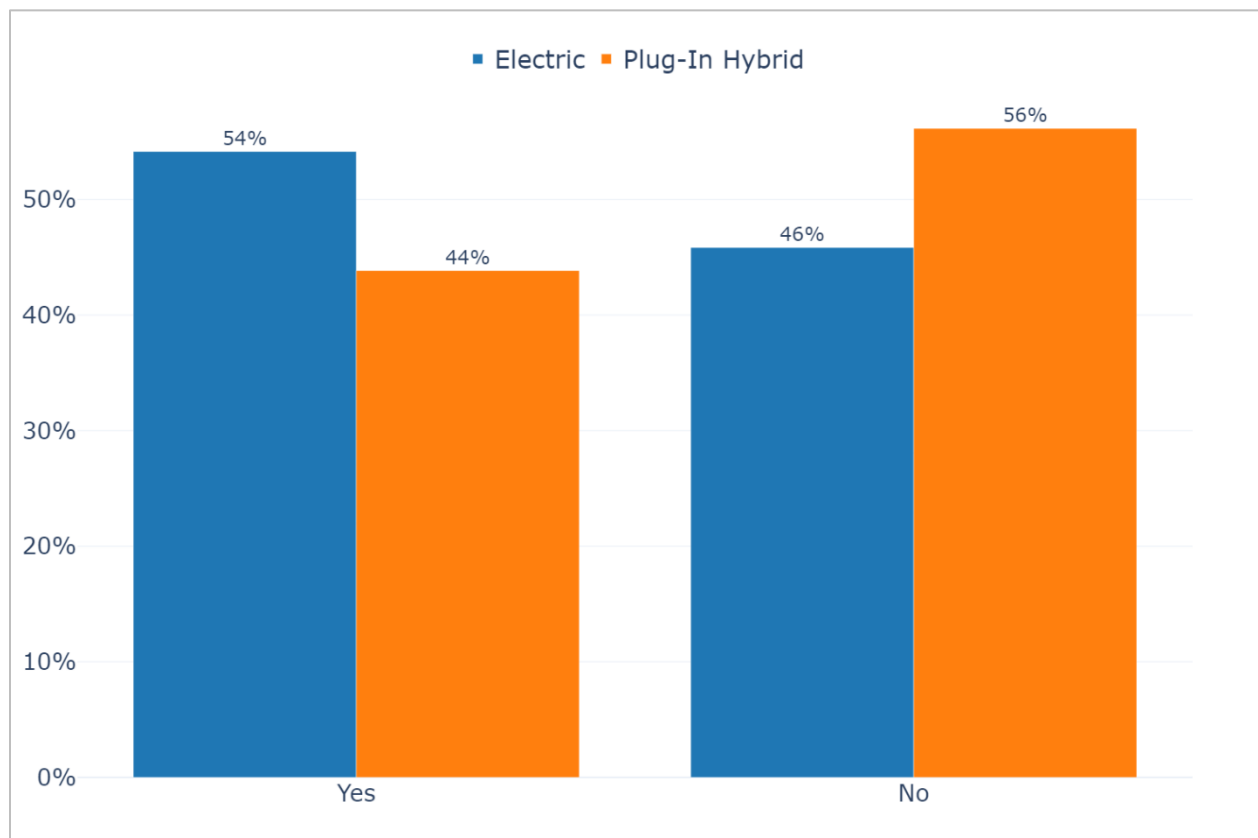
Figure 31. “How do you most often get where you need to go currently?” (by technology type)



Charging Behavior

Respondents who purchased a PHEV or BEV were asked if they had received a Level 2 charging station through GRID Alternatives or were in the process of getting one. These responses varied by technology type; 54% of BEV drivers have received their charger or started the process, versus 44% of PHEV drivers.

Figure 32. “Have you already received a Level 2 charging station through GRID Alternatives, or are you in the process of doing so?” (by technology type)

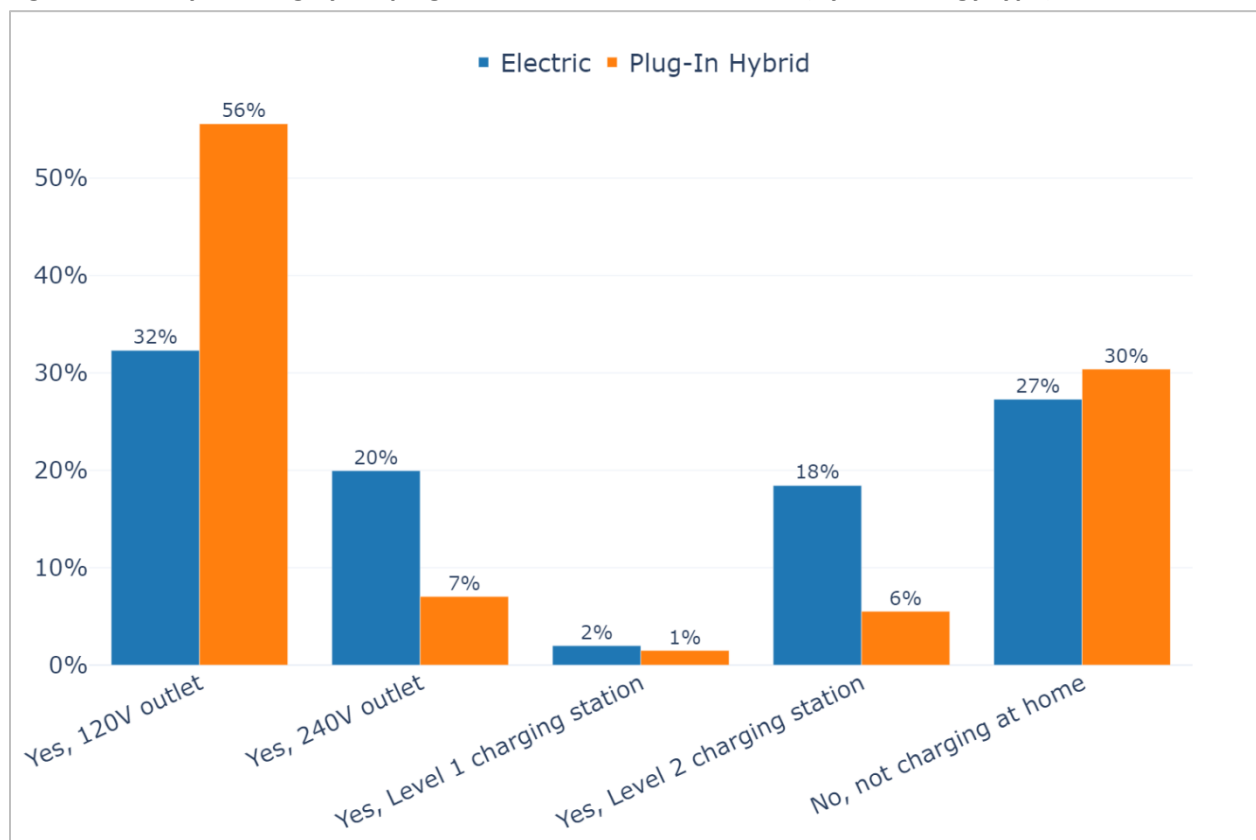


The number of respondents who are using a Level 2 charger or 240V outlet has increased dramatically to 33%, compared with 16% in the 2020 report. These responses do vary significantly by both FPL group and technology type. Figure 33 shows that households with an income at or below 225% of the FPL are more likely to be using a 120V outlet or not charging at home. Figure 34 shows that PHEV drivers are much more likely to be using a 120V compared with BEV drivers – 56% versus 32% respectively.

Figure 33. “Do you charge your plug-in electric vehicle at home?” (by FPL status)

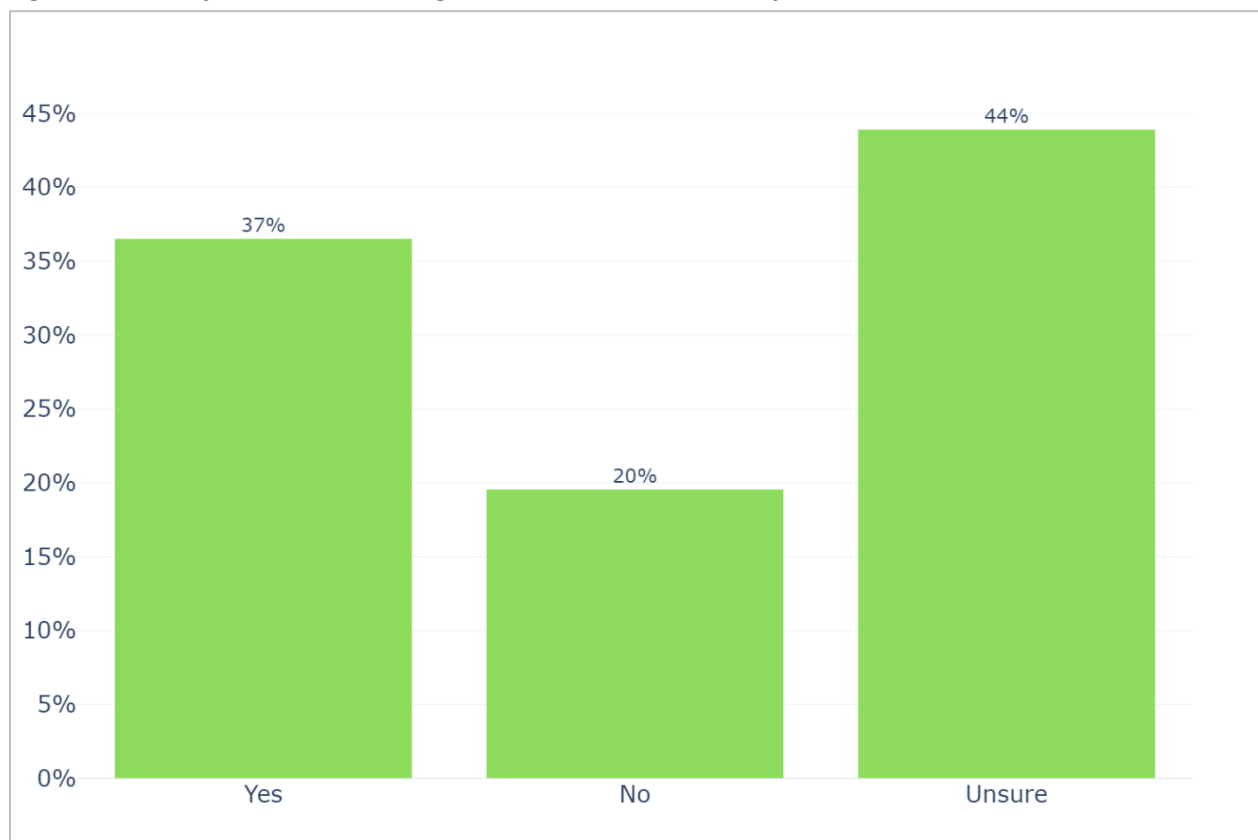


Figure 34. “Do you charge your plug-in electric vehicle at home?” (by technology type)



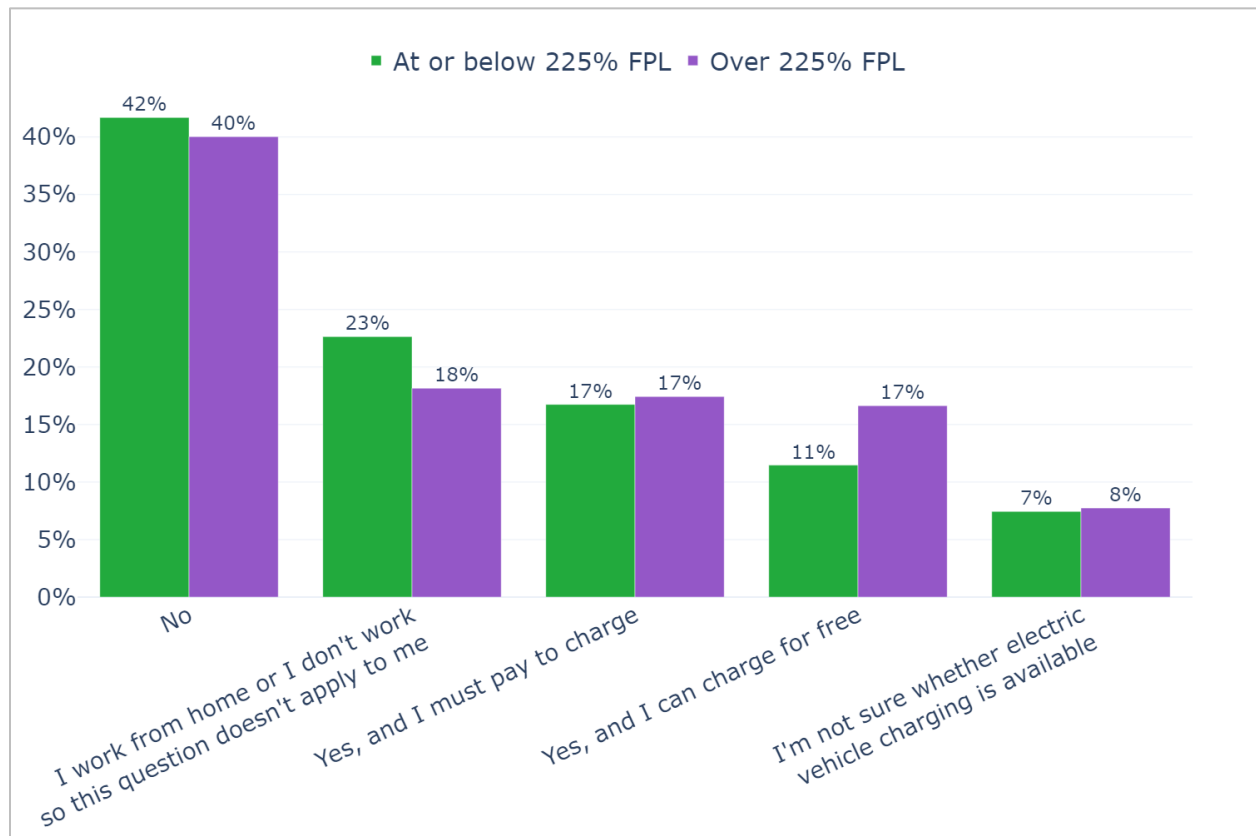
Of those who do not currently charge at home, over one-third (37%) expect to be able to charge at home within the next year (Figure 35). These responses did not differ significantly by FPL group or technology type.

Figure 35. “Will you be able to charge at home within the next year?”



Respondents who purchased a BEV or PHEV were asked about the availability of charging at their workplace. Of those who work outside of the home, 41% reported that they do not have charging available at their workplace. These responses varied by FPL group, with the moderate-income group (over 225% of the FPL) being more likely to have access to free charging at work (Figure 36).

Figure 36. “When you get to work is there somewhere you can charge your plug-in electric vehicle?” (by FPL group)



Ownership Survey

The respondents analyzed in this section of the report received the ownership survey between May and November of 2021. Table 6 summarizes the survey response rate and key dates.

Survey responses were segmented by FPL group (over and under 225% of the FPL), and by technology type (BEV or PHEV). HEVs are excluded from the technology type segmentation due to their small sample size, and FCEV drivers were excluded from all analysis due to their small sample size. These segmentations are shown in the report if the difference between the groups is statistically significant based on a chi-squared test. Otherwise, aggregate percentages are shown. It is important to note that the sample size for the ownership survey is much smaller than for the adoption survey, and therefore the chi-squared test is less sensitive.

Table 6. CVA Program Ownership Survey Summary

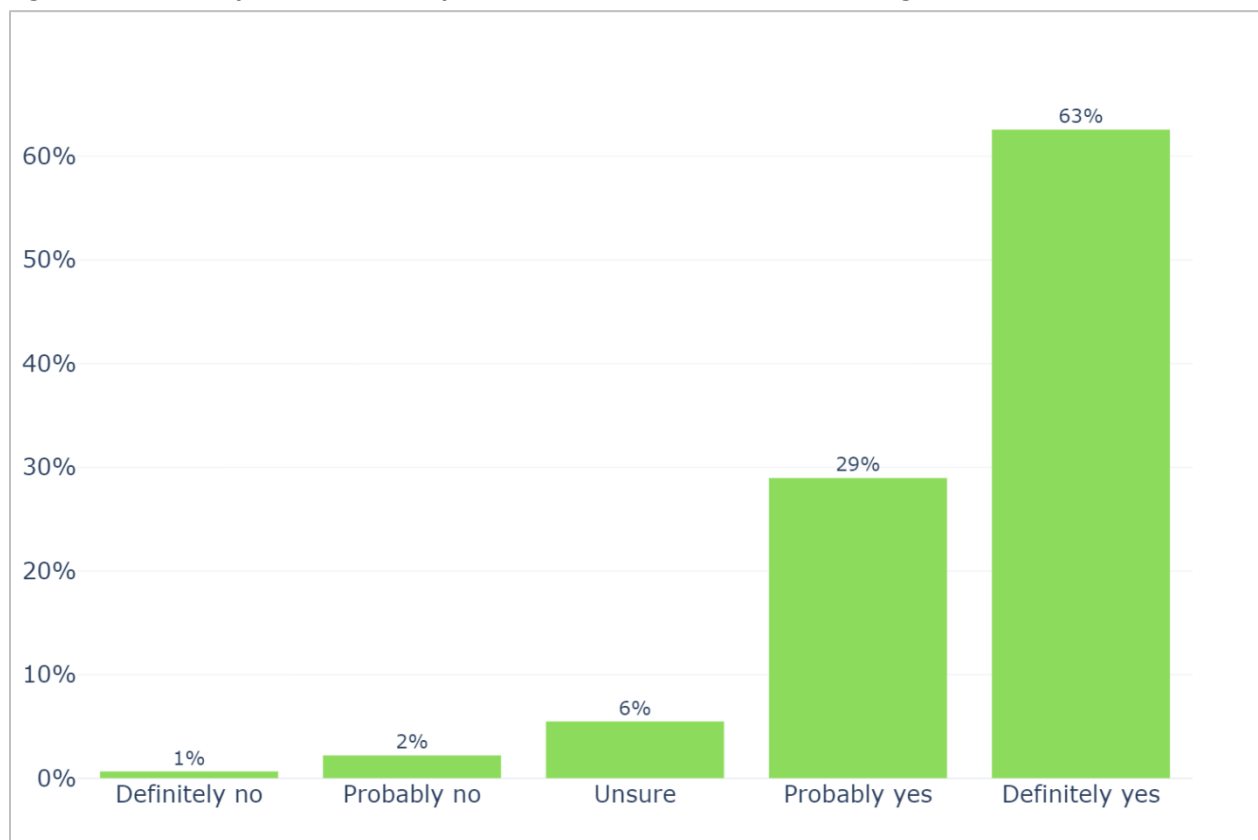
Survey Invite Dates	5/18/2021 – 11/17/2021
Response Dates	5/18/2021 – 11/21/2021
Vehicle Purchase Dates	3/9/2020 – 12/20/2020
Grant Issued Dates	3/17/2020 – 12/24/2020
Program Participant Population	1,022
Survey Responses	297
Response Rate	29%

Overall EV Experience

Of the 297 respondents to the ownership survey, only five respondents no longer had their vehicle. Two respondents reported that their vehicle was damaged or stolen, two sold or traded in their vehicles, and one respondent had their vehicle replaced by a newer model due to a battery recall.

To understand respondents overall experience with their vehicle, we asked whether they would recommend their vehicle to their friend. Over 90% of respondents indicated either “probably yes” or “definitely yes” to this question (Figure 37). These responses were not significantly different by FPL status or by technology type.

Figure 37. “Would you recommend your current vehicle to a friend looking for a new car?”



Program Satisfaction

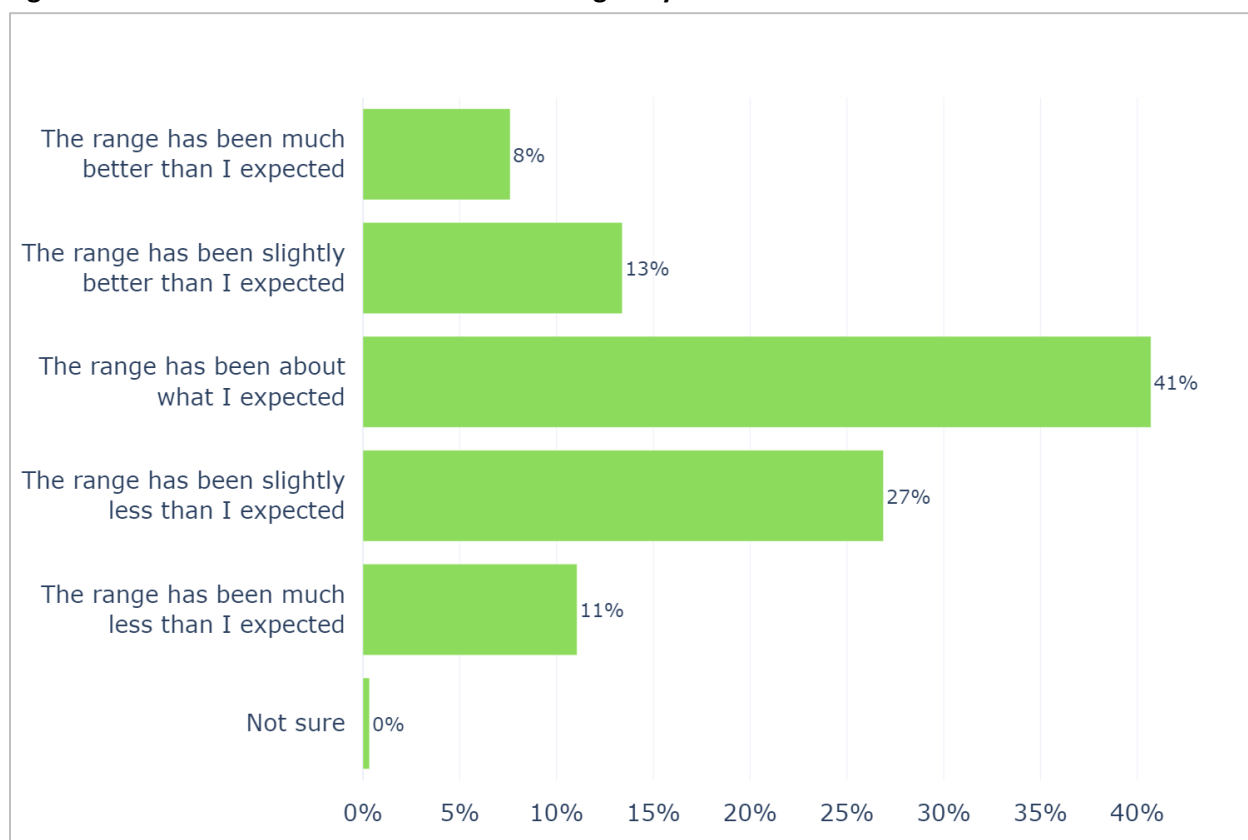
Ownership survey respondents were asked “On a scale of 0-10, how likely are you to recommend the Clean Vehicle Assistance Program to a friend?” This measure of customer satisfaction complements the questions asked in the adoption survey, which asked about more specific categories (e.g. satisfaction with customer service).

A large majority of respondents (90%) selected 10 out of 10, resulting in an average score of 9.7.

Transportation Habits and Needs

The degree to which the respondent’s expectations of the range of their vehicle matched their actual experience was mixed (Figure 38). Twenty-one percent of respondents have had a positive experience with their vehicle’s range, indicating that the range was better than they had expected it to be. Surprisingly, there was no statistically significant difference between BEV and PHEV respondents for this question.

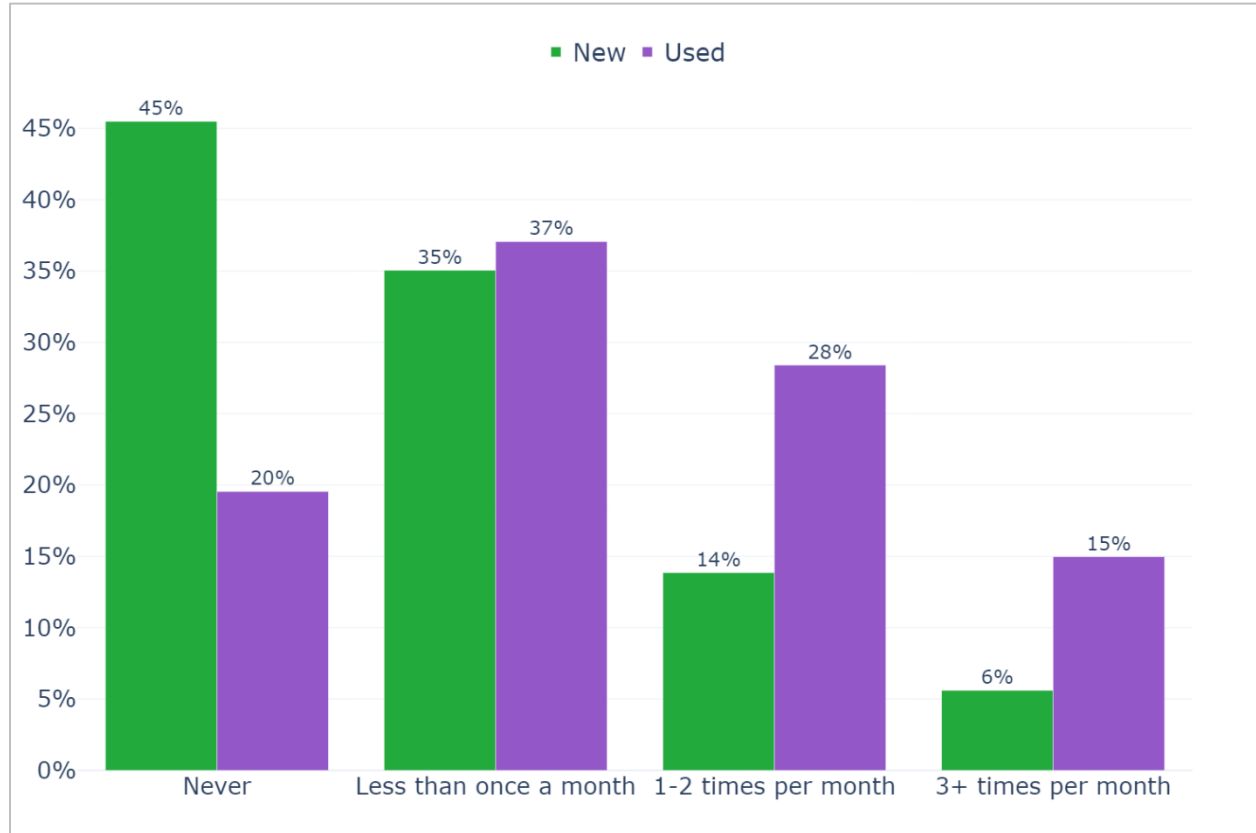
Figure 38. “Which best describes the electric range of your vehicle?”



To improve our understanding of BEV respondents’ satisfaction with the range of their vehicle we asked how often the range of their vehicle was insufficient for a trip that they wanted to take. Overall, 33% answered “never”, indicating that they always had enough range to take their desired trips. This is a large improvement over the 2020 report in which only 13% of respondents selected “never”.

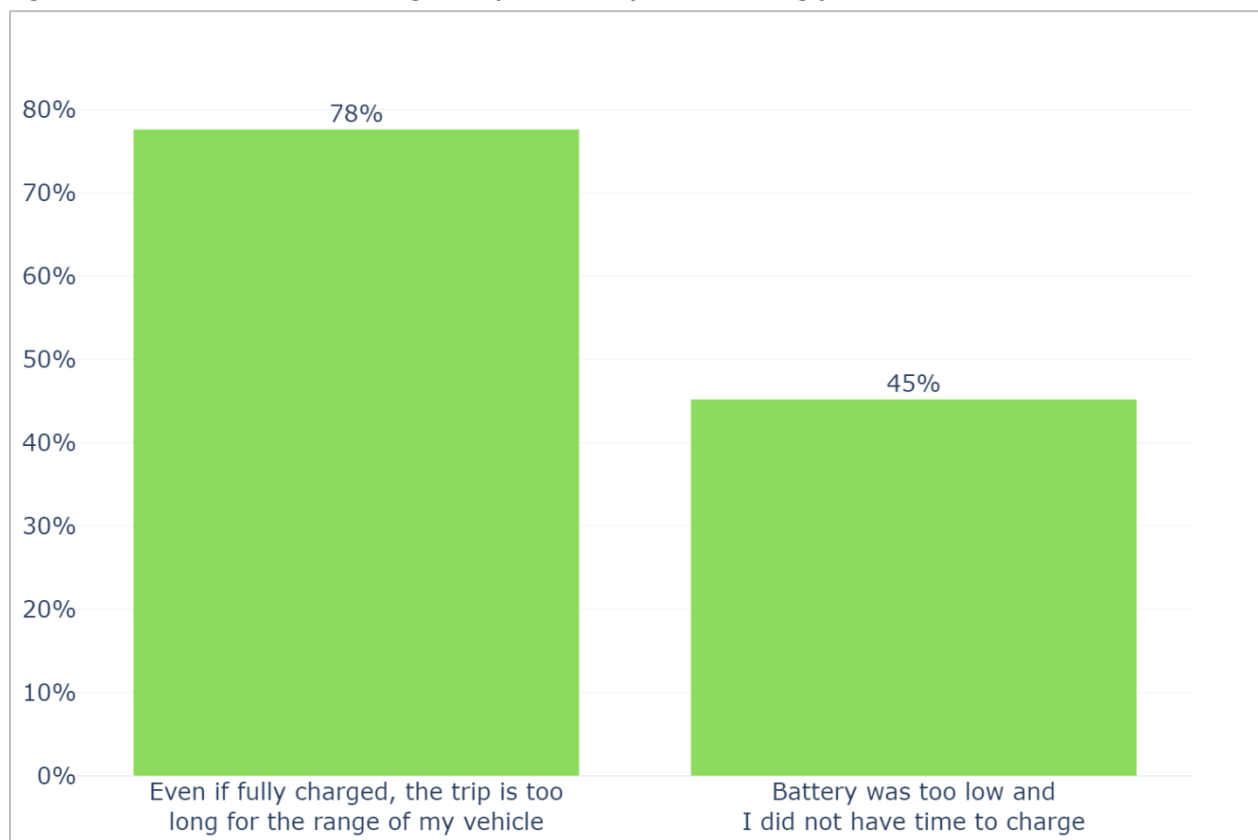
However, range constraints varied drastically between new and used vehicles. Eighty percent of respondents who purchased a used BEV reported that they have insufficient range for a desired trip at least occasionally (Figure 39), a notable decrease from 92% in the 2020 report. In contrast, only 55% of respondents who purchased a new BEV reported that they have ever had insufficient range for a trip.

Figure 39. “How often have you wanted to drive somewhere but did not have enough range with your vehicle?”



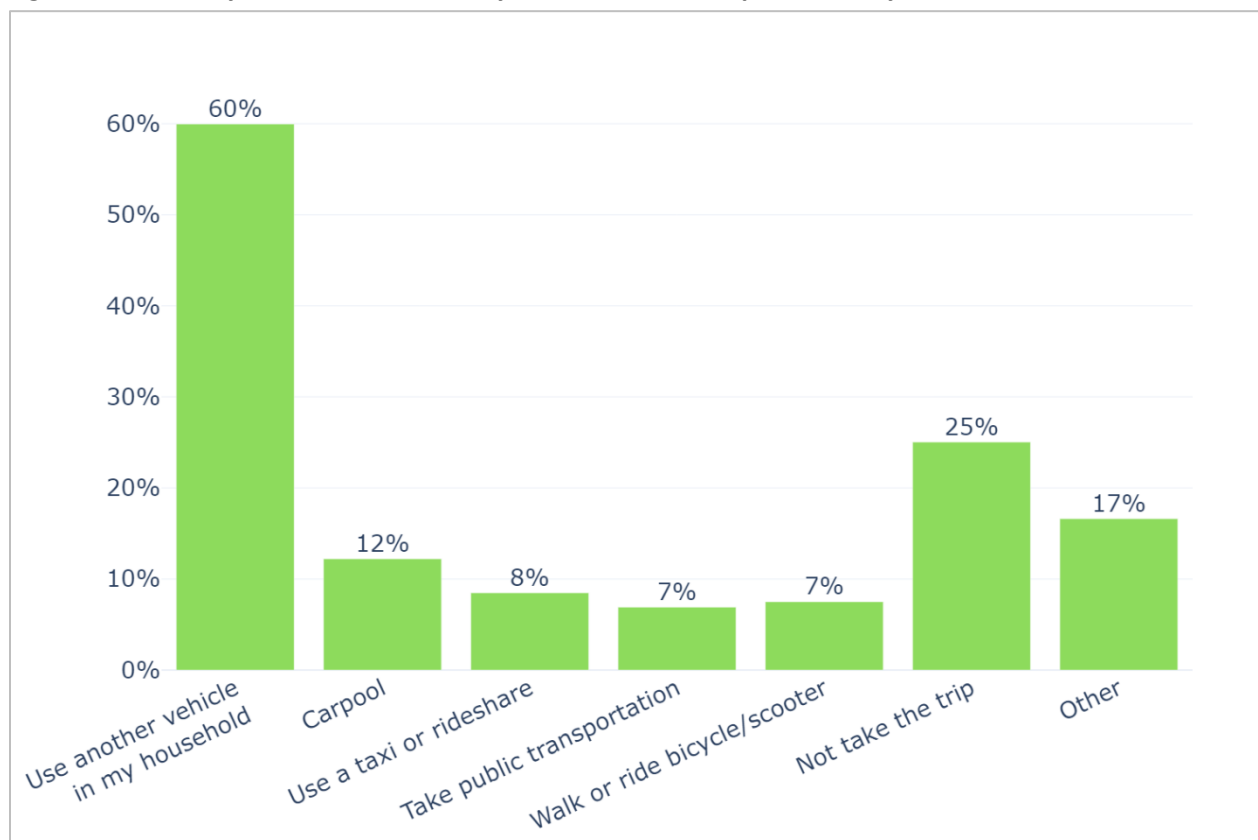
The BEV drivers who found their vehicle’s range to be insufficient on one or more occasions were asked a follow up question about why they have been unable to take a trip in their BEV. Just over three quarters (78%) had wanted to take at least one trip that was too long for the range of their vehicle on a single charge. Interestingly, 45% of these respondents had been unable to take a trip due to a low charge on their battery. This is a higher proportion than in the 2020 report, when only 28% of respondents had been unable to take a trip due to a low charge on their battery. While this survey does not provide further insight into this situation, one possible cause for the increase may be that drivers are using their BEVs for more of their driving needs.

Figure 40. “Which of the following have prevented you from using your vehicle?”



Respondents were also asked how they responded to situations where they could not use their electric vehicle for a trip (Figure 41). Sixty percent indicated that they sometimes used another vehicle in the household and 25% indicated that they did not take the trip. Those who selected “other”, were asked to write in their response. The two most common write-in responses were “rented a vehicle” (10 out of 29) and “used fast chargers along the way” (8 out of 29).

Figure 41. “When you are unable to use your vehicle for a trip, what did you do?”

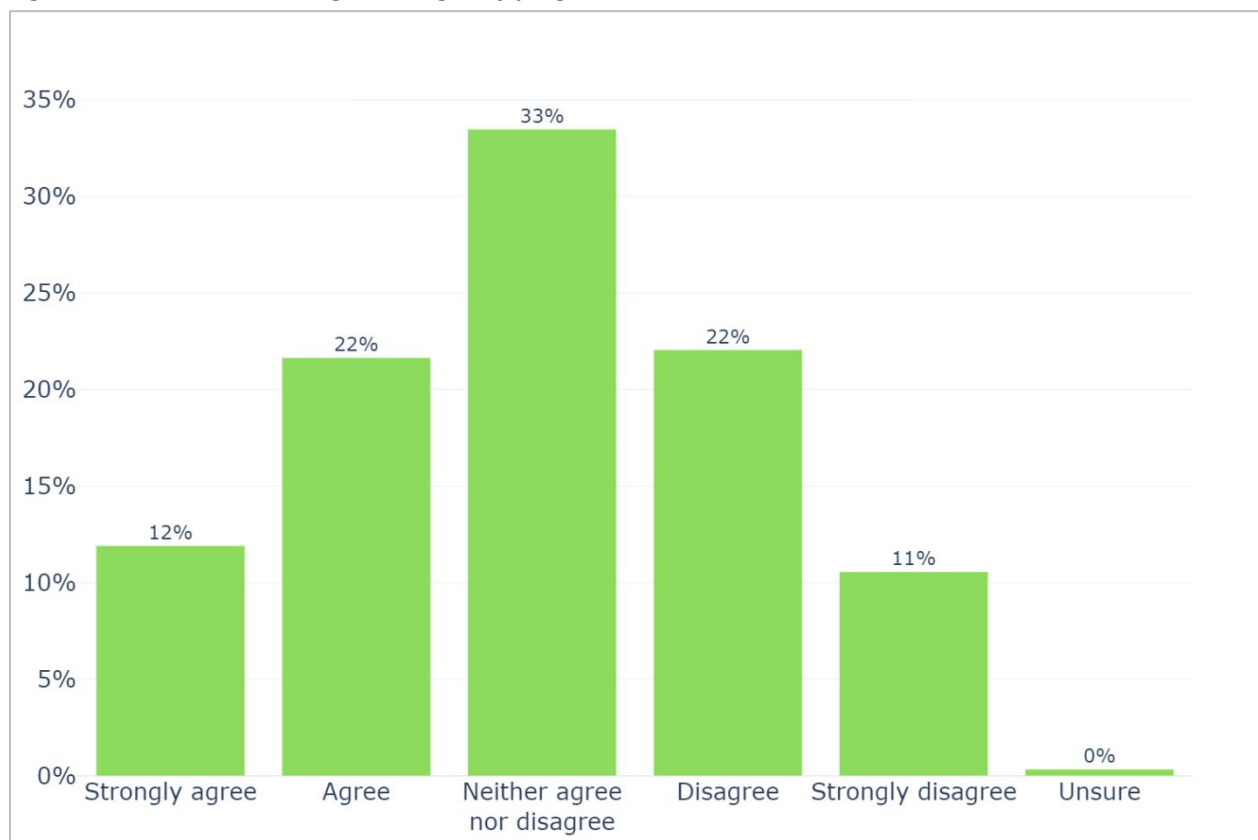


Charging Experience

Respondents were asked how much they agree or disagree with three statements related to the convenience of charging their vehicle (Figures 42-44).

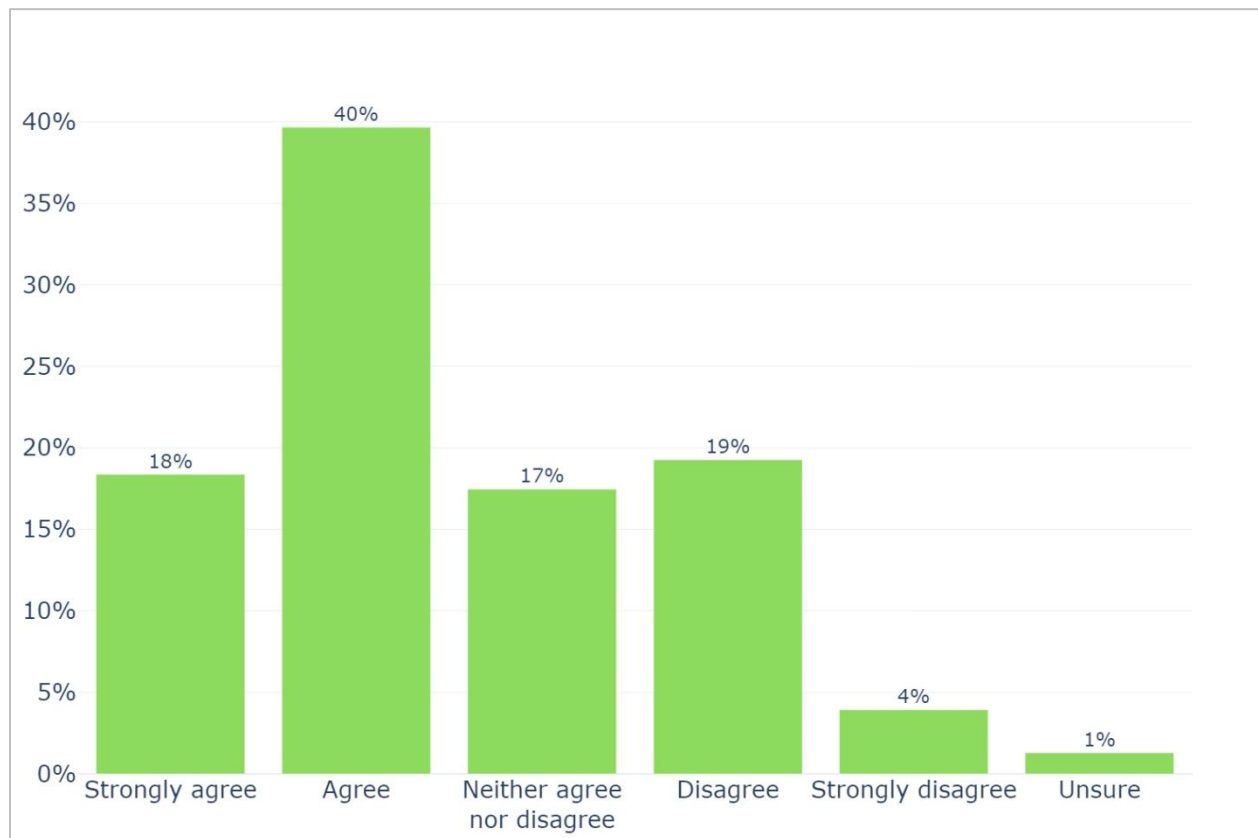
Figure 42 shows respondents' satisfaction with the length of time it takes to charge their vehicle. About one-third (34%) of respondents indicated that it took too long to charge their vehicle – a notable decrease from 45% in the 2020 report. The responses did not differ significantly between BEV and PHEV respondents or for FPL groups.

Figure 42. "It takes too long to charge my plug-in electric vehicle"



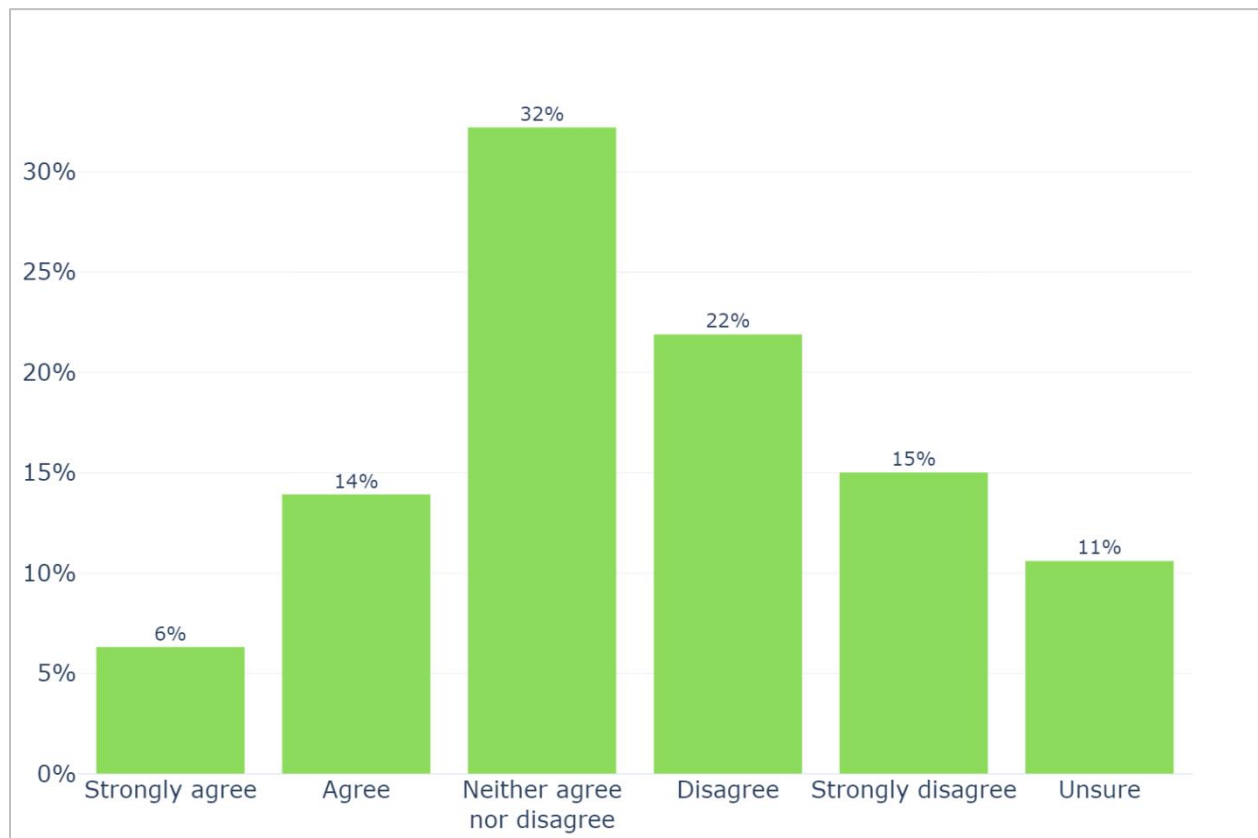
To understand whether charging options were sufficient, we asked respondents their level of confidence in the availability of appropriate charging options when they needed to charge (Figure 43). Respondents' perception of charging availability has improved somewhat since the 2020 report. The proportion of respondents who agree that they can charge their vehicle when they need to increased from 54% to 58%, and the proportion who disagreed decreased from 30% to 23% (Figure 43).

Figure 43. "I am confident that I can charge my plug-in electric vehicle whenever I need to"



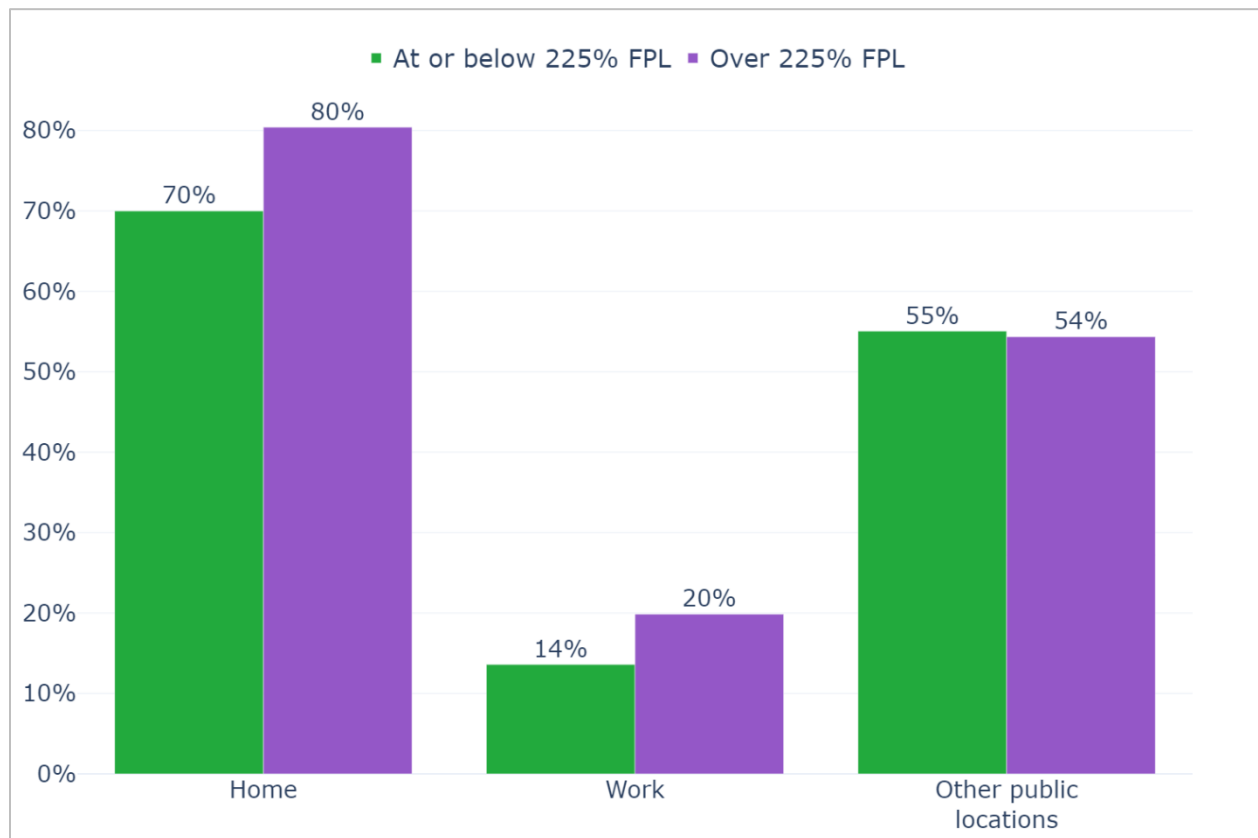
We also gauged respondents' confidence in the reliability of public chargers. Respondents were split on their opinion with 20% agreeing that they were "often not working" and 37% disagreeing (Figure 44).

Figure 44. "Charging stations away from home are often not working"



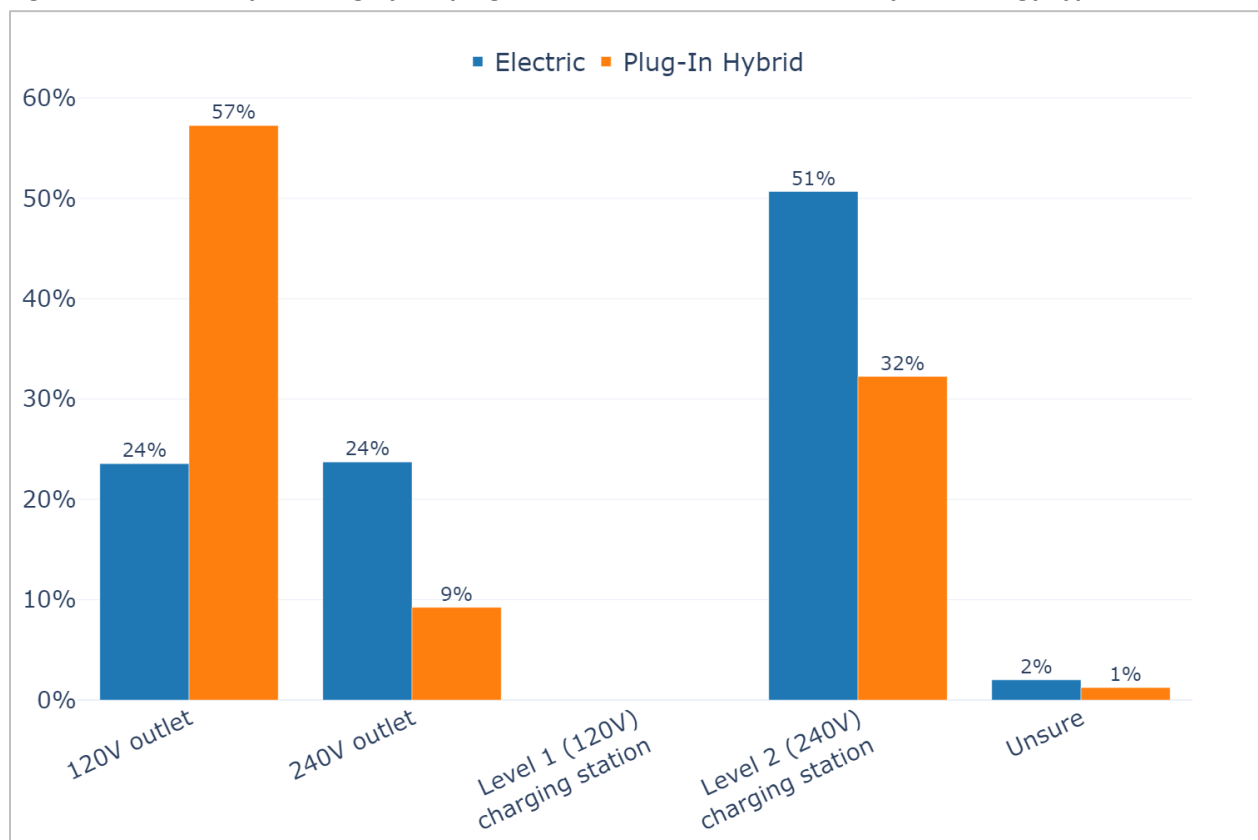
Charging locations did vary by FPL group, with the lower-income group being less likely to charge at home. This aligns with the demographic differences indicating that those at or below 225% of the FPL are less likely to live in detached homes, and it highlights an important charging equity issue.

Figure 45. “In which locations do you charge your plug-in electric vehicle?” by FPL group



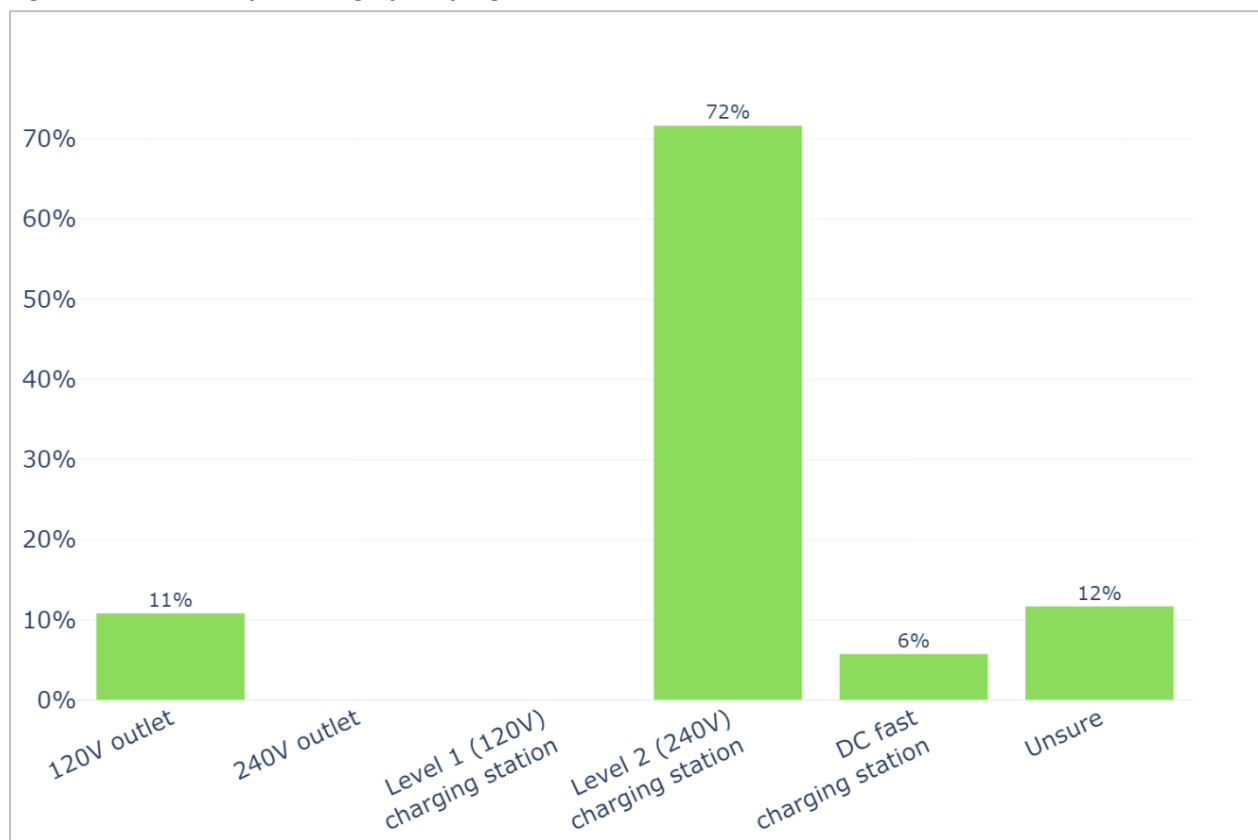
Respondents' method of charging at home varies dramatically by technology type (Figure 46). Over half (57%) of PHEV drivers indicated that they charge their vehicle with an 120V outlet versus only 24% of BEV drivers.

Figure 46. “How do you charge your plug-in electric vehicle at home?” (by technology type)



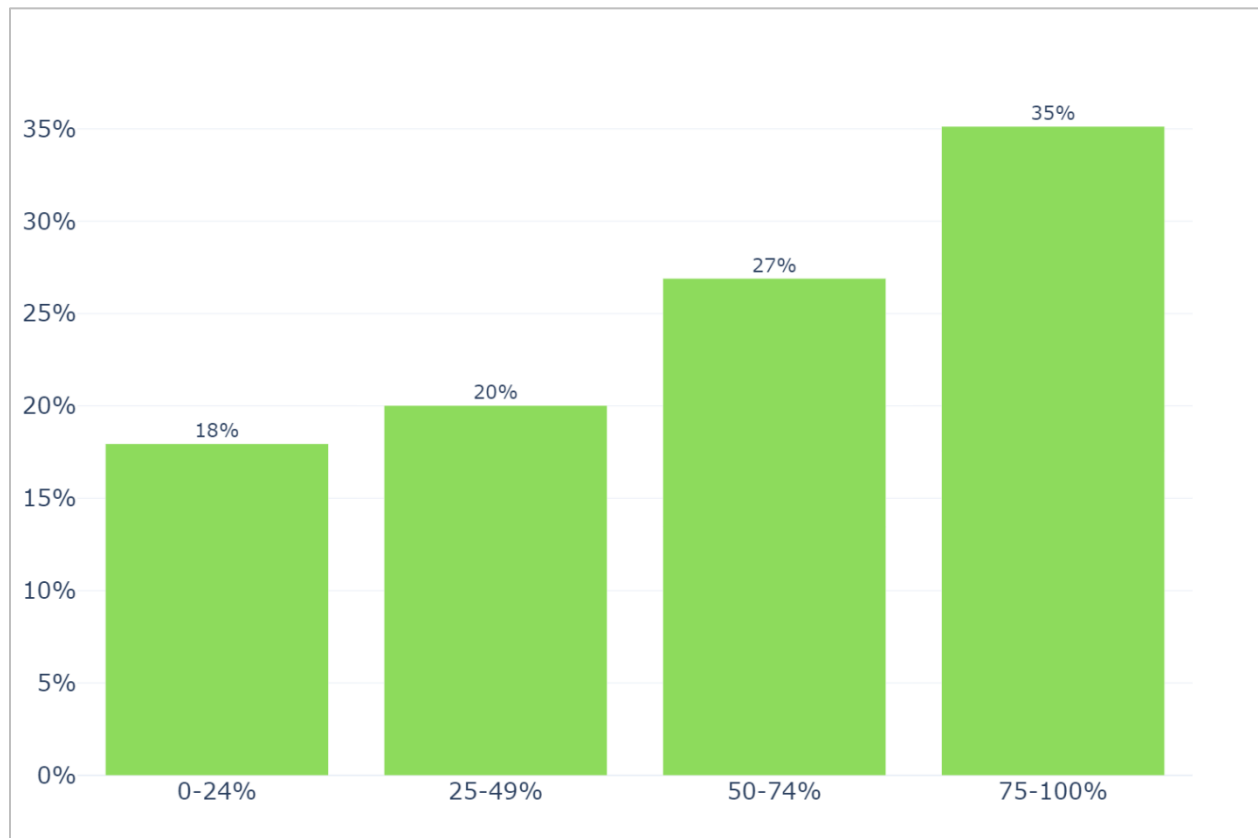
Among respondents with workplace charging, approximately 78% indicated that the charging is free. Respondents that take advantage of workplace charging were asked about their workplace charging station (Figure 47). Approximately 72% of these respondents indicated that at their workplace they use a level 2 charger (240V), 11% use a 120V outlet and 6% use a DC fast charger.

Figure 47. “How do you charge your plug-in electric vehicle at work?”



Program participants who purchased a PHEV were asked to estimate what percent of the time they have driven using electricity rather than gasoline. While this is a difficult metric for respondents to estimate accurately, it is worth noting that the number of respondents who report driving on electricity more than 50% has declined since the 2020 report, from 73% to 62%.

Figure 48. "In the last three months, what percent of the time have you driven using electricity from your battery (as opposed to gasoline)?"



Respondents were asked whether they were aware of special plug-in EV electricity rates provided by their utility and whether they were enrolled in such rates. About two-thirds (64%) of respondents are aware of plug-in EV electricity rates (Figure 49), and just over one-third (36%) are enrolled (Figure 50). Neither awareness or enrollment varied significantly by FPL group or technology type.

Figure 49. Percent of respondents who are aware of special plug-in electric vehicle electricity rates provided by their utility company

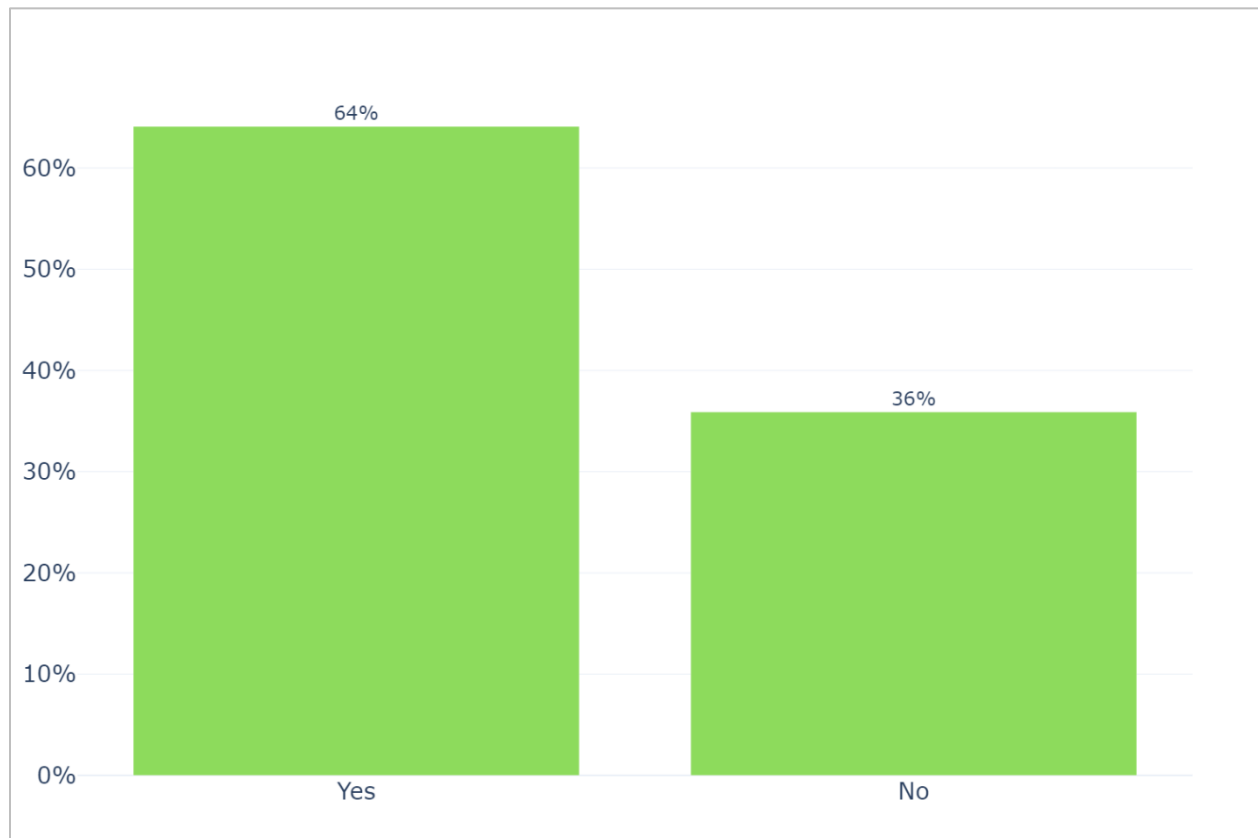
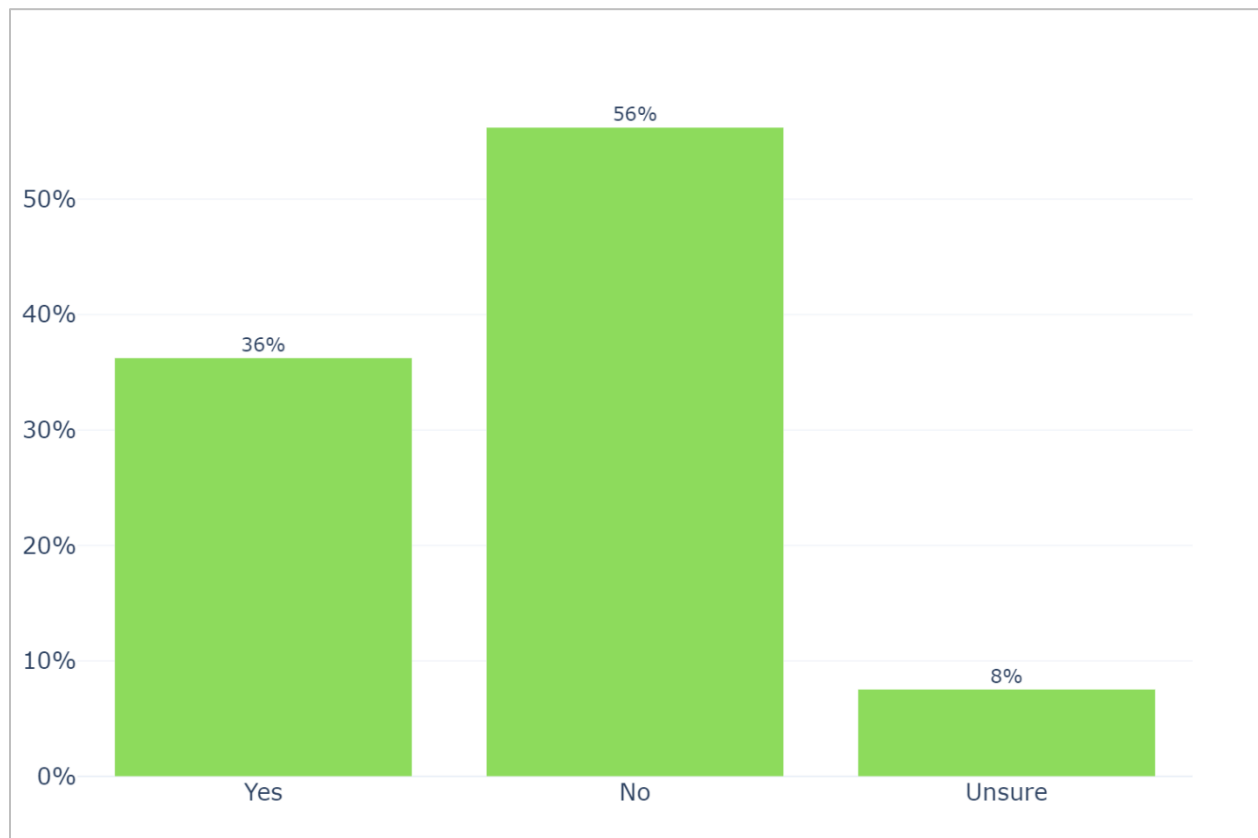


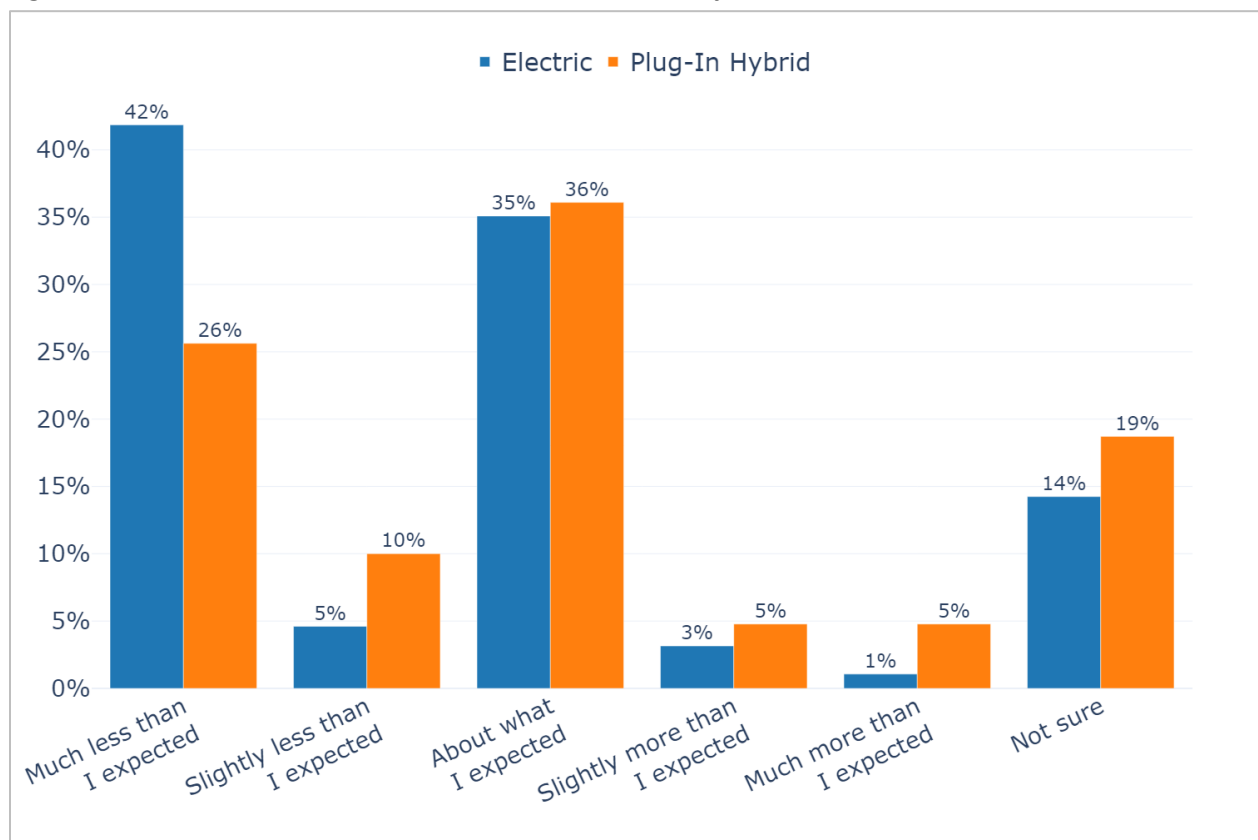
Figure 50. “Is your household currently enrolled in a plug-in electric vehicle electricity rate?”



Running Costs

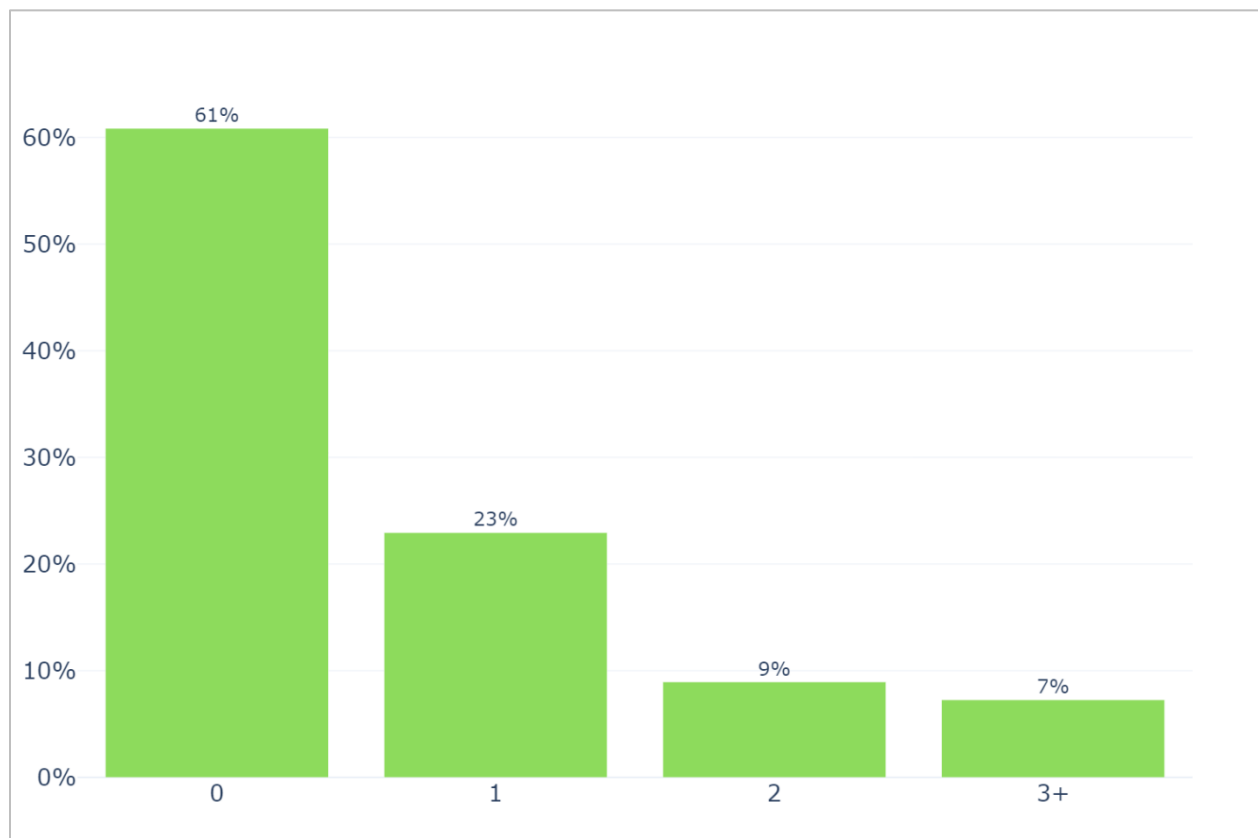
Respondents were asked how the maintenance costs of their vehicle compared with what they were expecting. BEV drivers were more likely than PHEV drivers to be surprised by how little they were spending on maintenance. Nearly half (47%) of BEV drivers indicated that maintenance costs were less than expected and only 4% indicated that maintenance costs were more than expected (Figure 51).

Figure 51. “Which best describes the maintenance cost of your vehicle?”



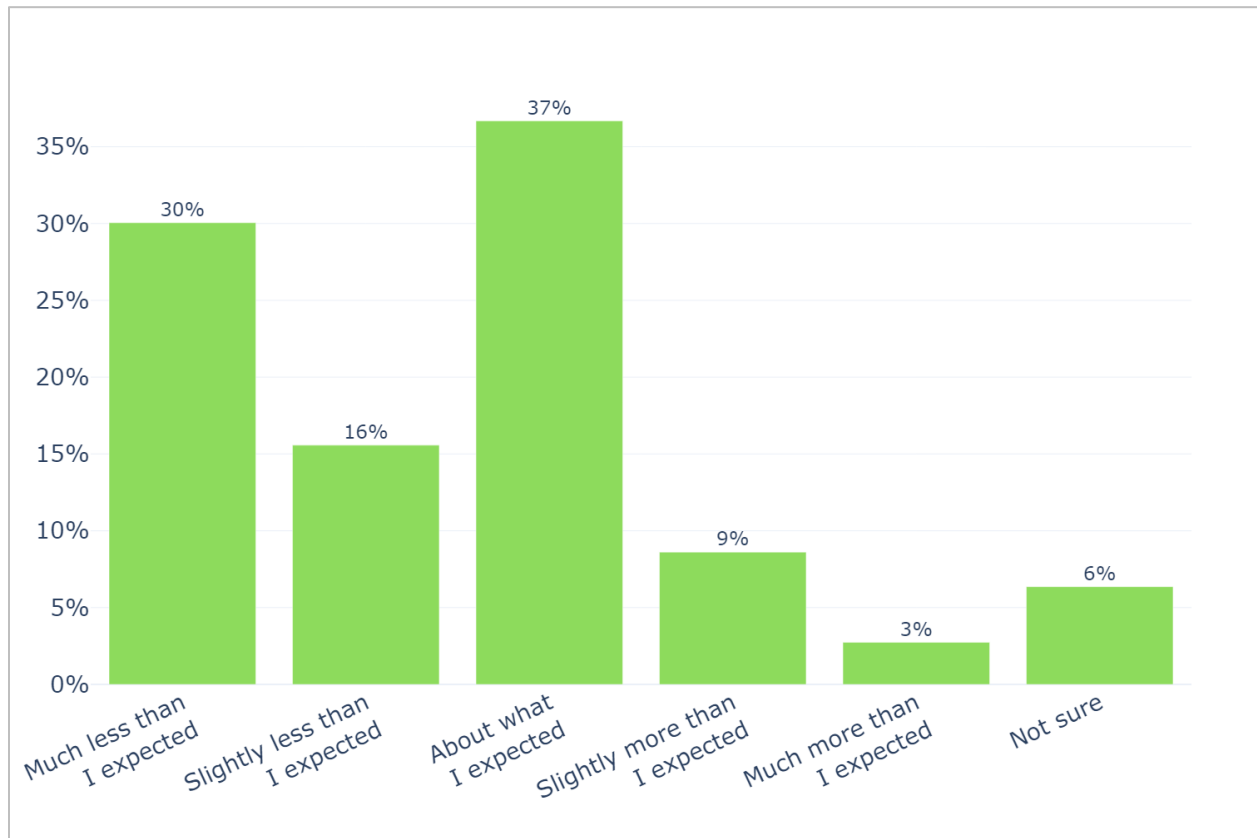
Respondents were also asked how many times they have had to take their vehicle to the mechanic since purchasing it. Most respondents (61%) have never had to take their car to the mechanic, and only 16% of owners have taken their vehicle to the mechanic more than once.

Figure 52. “How many times have you needed to take your vehicle to the mechanic since you purchased it?”



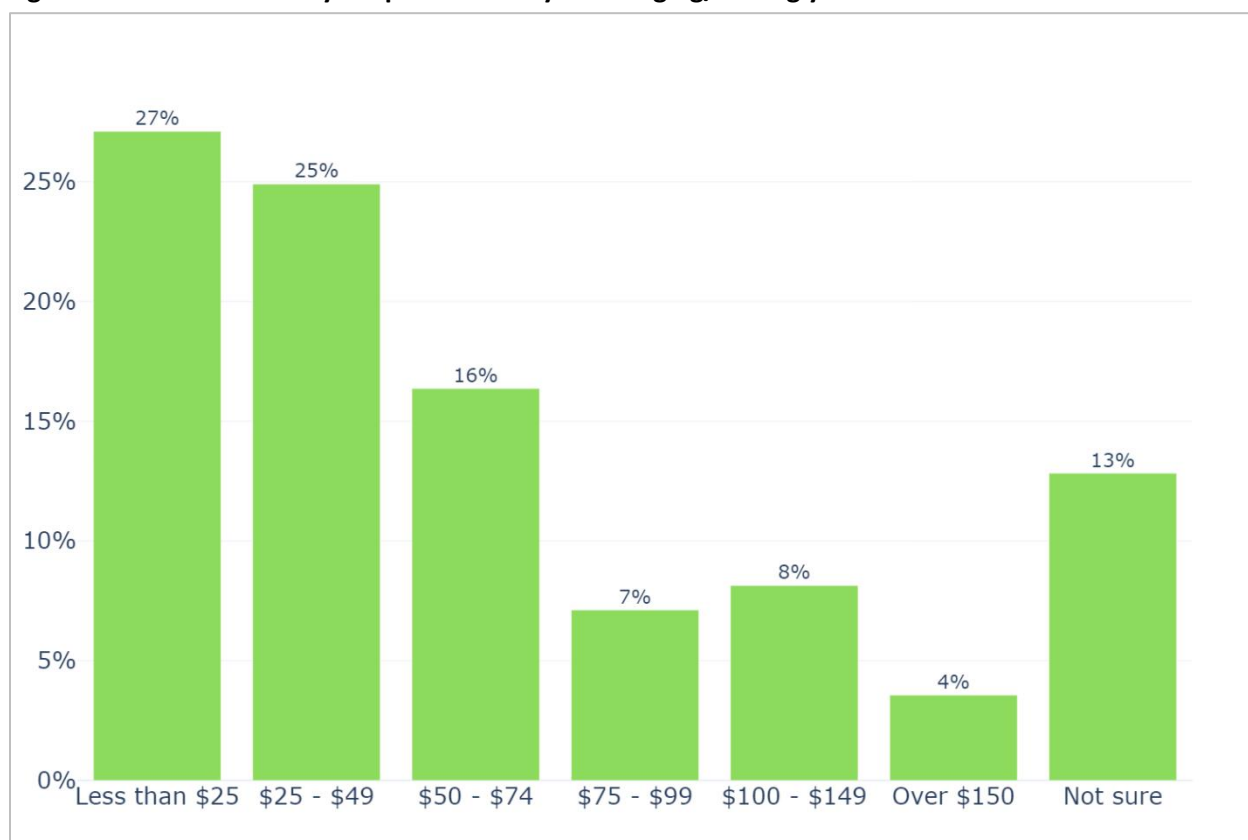
We also asked respondents about their expectations of fuel costs relative to the actual fuel costs of their vehicle. Similar to the 2020 report, nearly half (46%) of respondents indicated that fuel costs are less than they had expected; only 12% indicated that they are more than expected (Figure 53). These results indicate that there continues to be an opportunity for additional education and outreach around operating costs of EVs.

Figure 53. Fuel cost perceptions



Respondents were also asked to estimate their average monthly fuel costs (Figure 54). Surprisingly, the results were not significantly different for BEV and PHEV drivers.

Figure 54. “How much do you spend monthly on charging/fueling your vehicle?”



VI. Discussion

Program Participants

The vehicles being purchased and leased with CVA Program grants have shifted significantly. Phase 2 vehicles are much more likely to be new rather than used, and they are also more likely to be BEVs. The share of new vehicles rose from 17% in Phase 1 to 76% in Phase 2, and the share of BEVs rose from 44% to 77%. The top two most frequently rebated vehicles over the lifetime of the program are now the Tesla Model 3 and the Tesla Model Y. In contrast, the most popular vehicle in the 2020 report was the Nissan LEAF, and at that time there were no Teslas in the top 10 most frequently rebated models. This change is likely due to Tesla being added to the CVA Program Dealership Network in the summer of 2019.

Participants' incomes have increased from Phase 1 to Phase 2. The proportion of rebate recipients whose household income was above 225% of the FPL increased from 30% to 48%.

Adoption Survey

In this report we segment participants by two FPL groups – over and under 225% of the FPL. We find that participants in the lower-income group (at or below 225% of the FPL) are more likely to be female and are younger. They are less likely to own their home and less likely to live in a detached home, indicating that they face higher barriers to installing EV chargers at home.

The CVA Program continued to be very impactful, with 86% of respondents saying that they would not have purchased their clean vehicle without the grant and 65% of respondents who received a loan from BSB saying that they would not have purchased their clean vehicle without that loan.

Saving money on fuel and saving money overall continues to be the top two highest-rated motivations for purchasing a clean vehicle, followed by reducing environmental impacts. The cost of the vehicle continued to be the most frequently cited concern for both BEV and PHEV drivers.

Weekly mileage varied by FPL group, with moderate-income participants driving more miles per week on average than those in the lower-income group. Interestingly, BEVs were driven more miles per week than PHEVs, despite some evidence that short-range BEVs are driven less than PHEVs.³

Charging mode varied by both FPL group and technology type. The lower-income group was more likely to report using a 120V outlet to charge at home rather than a Level 2 (240V) charger; PHEV drivers were also more likely to use a 120V outlet.

Ownership Survey

Overall, the survey results suggest that program participants are satisfied with the vehicle they purchased with over 90% of respondents indicating that they would “probably” or “definitely” recommend their vehicle to a friend. As in the 2020 report, many respondents indicated that both maintenance and fueling costs were less than they had expected.

One important finding is that the lower-income group is less likely to charge at home – consistent with the finding that participants in this group are less likely to live in single family homes.

Vehicle range continues to be a limitation for some respondents, but the number of BEV drivers who reported any range limitations (i.e. being unable to take a trip due to the vehicle’s range) has declined from 87% to 67%. For BEV drivers who purchased new vehicles, only 55% had ever experienced range limitations.

³ https://csiflabs.cs.ucdavis.edu/~cjnitta/pubs/2020_03.pdf

Drivers' opinions about the speed of charging their vehicle have improved since the 2020 report. Only 24% of respondents agree with the statement "it takes too long to charge my vehicle," compared with 45% in the 2020 report. Perceptions about public charger availability have also improved: only 23% are not confident that they can charge whenever they need to, versus 30% in the 2020 report. Perceptions about public charger reliability remained relatively stable. The percent of respondents who agreed that "charging stations away from home are often not working" only fell from 23% to 20%.

The findings from both the adoption and ownership surveys show that a large majority of CVA Program participants had a positive experience with the program and are happy with their vehicle. However, they do highlight remaining barriers to EV adoption, especially cost and charging access for lower-income households.