

BEYOND INCENTIVES

*Lessons from a community outreach campaign
supporting electric vehicle purchase uptake*

May 2023



AUTHORSHIP

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DEDICATION

We dedicate this work to Martha Lozano Nieto of Redeemer Community Partnership. Martha's work with the South LA Community is an exemplar of humanity, compassion, and strength. In the search for working models of community empowerment in environmental justice, we need not look further than Martha.

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As a land grant institution, the UCLA Luskin Center for Innovation acknowledges the Gabrielino and Tongva peoples as the traditional land caretakers of Tovaangar (Los Angeles basin, Southern Channel Islands) and that their displacement has enabled the flourishing of UCLA.

DISCLAIMER

The views expressed herein are those of the authors and not necessarily those of the University of California, Los Angeles as a whole. The authors alone are responsible for the content of this report.

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EXECUTIVE SUMMARY

LOW- AND MODERATE-INCOME households in California face continued obstacles to clean vehicle adoption, hindering an equitable climate transition. While some of these barriers relate to global supply chain conditions, others are potentially surmountable with local, state, and regional policy and advocacy efforts. In this study, we build on our past electric vehicle (EV) equity research by quantifying the different ways in and degrees to which a campaign organized by nonprofit and community-based organizations, partnering with a for-profit marketing firm, developed active interest in the EV purchase process for low- and moderate-income households in the San Joaquin Valley and Southern California areas. The campaign combined the insights of Valley Clean Air Now, Maritz® and the community-based organizations (CBOs) Redeemer Community Partnership and the Latino and Latina Roundtable of the San Gabriel and Pomona Valley. The campaign deployed a baseline survey of EV-interested households, provided information and assistance to overcome obstacles both to survey participants via individual phone calls and the general community via social media, as well as tracked reasons for their (dis)interest and obstacles to purchase over the period from December 2021 through June 2022.

One result of this campaign, as documented by Maritz®, was to classify different household profiles in a method similar to private sector market segmentation or a customer-profiling process. This is a novel development for government incentive programs which can learn from strategies used by consumer product companies in the private sector aiming to reach low-income households. While this pilot may be too limited in scale to draw broader conclusions from the results, the concept of augmenting

traditional community outreach efforts with consumer data analysis presents an opportunity for future innovation.

The Maritz® report documented community engagement results, including the reach of the social media campaign, as well as the characteristics of individuals who participated in the survey, including sociodemographics and vehicle purchase knowledge, purchase preferences, and perspectives.

Alongside this effort, our research team collected and analyzed data on the campaign. This primarily consisted of survey distribution at three points in the campaign: (1) a baseline phone call to gather data on participant demographics, EV preferences and knowledge, and vehicle purchase constraints; (2) a second phone call to focus on participant education and feedback; and (3) a third to characterize vehicle purchase interest. Other data included Facebook campaign dialogue and procedural insights from interviews with CBO staff. We used quantitative and qualitative methods to categorize and analyze survey responses from each of the three phases of data collection.

Highlights of our research include the following:

- ▶ Households who participated were primarily low income (median=\$38,000) and exhibited a high degree of attrition in the campaign. Those who participated throughout all three calls of the campaign were slightly lower income than those who participated in just the initial call.
- ▶ Households with lower incomes reported more constraints with the potential to shape their vehicle purchase process and outcomes, including needing a shorter timeline for vehicle purchase, likely due to replacing rather than adding a vehicle, and having a smaller

budget for purchase overall, thus valuing a low upfront price more than ongoing payment amounts.

- ▶ CBOs reported optimism regarding the effect of Facebook outreach to a subset of households, despite a high degree of misinformation and heated dialogue online.

This analysis illustrates generally understudied barriers to EV purchase, and characterizes education and marketing methods that can potentially be utilized to increase clean vehicle incentive uptake in low-income and disadvantaged communities in California and other regions.

Even with generous funding, existing programs can reach only a limited number of households and will be inadequate to support California's clean vehicle adoption goals and broader equitable transition priorities. Further exploration of the key barriers identified in this study can support the development of complementary programs to directly support EV purchases by residents of vulnerable communities, such as customized options for EV charging, vehicle finance and vehicle insurance.

INTRODUCTION

LOW- AND MODERATE-INCOME households in California face continued obstacles to clean vehicle adoption, hindering a just climate transition. Evidence has demonstrated unequal clean vehicle adoption rates throughout the state (Canepa et al., 2019; Lee et al., 2019). Some obstacles relate to global supply chain conditions that are likely to persist in the near term (Goh, 2022; Jin, 2022; Sun et al., 2022). Others are potentially surmountable, or at least influenceable, via local, state and regional policy and advocacy efforts. Existing financial incentive programs such as the Clean Vehicle Rebate Project, Clean Cars 4 All (CC4A), the Clean Vehicle Assistance Program and the California Clean Fuel Reward (CCFR) can reach only a limited number of households (even with generous funding) and will be inadequate to support California's clean vehicle adoption goals and broader just transition priorities. Therefore, future complementary means of support for vehicle fleet turnover toward zero emissions must include persuasive, non-financial means of inducement.

To establish such pathways to influence zero-emission vehicle uptake for lower-income populations, more evidence on the previously mentioned surmountable barriers must be developed. Existing peer-reviewed and grey literature have evaluated various aspects of the vehicle search and purchase process for low- and moderate-income households in California, including analyses of households' preferences and perspectives on the vehicle search process (Pierce et al., 2019), and factors influencing decision-making and vehicle purchase location (Pierce & Connolly, 2023). Unique obstacles to clean vehicle adoption in vulnerable communities – such as general misconceptions about the vehicles – have been identified, and studies

have highlighted the need for targeted education campaigns, such as the one we analyze in this study, to support vehicle attainment (Hathaway et al., 2021).

Characterizing effective methods to provide relevant education and support for communities to support zero-emission vehicle adoption and reduce obstacles is paramount. To date, existing studies have neither analyzed the extent to which information presented through community engagement channels can overcome barriers to active interest in the attainment of clean vehicles for low- and moderate-income populations, nor reported on the implementation methods and successes and challenges faced by organizations in administering such campaigns. Additionally, while vehicle price is a key barrier for many households, identifying the broader channels through which cost dimensions affect the purchase process as well as community members' decision-making considerations about zero-emission vehicle lease or purchase can illuminate potential ways to increase clean vehicle accessibility.

Therefore, in this study, we build on our past electric vehicle (EV) equity research by quantifying the different ways in and degrees to which a campaign organized by a partnership between nonprofit, for-profit and community-based organizations (CBOs) supported the development of active interest in the EV purchase process for low- and moderate-income households in both the San Joaquin Valley (SJV) and Southern California regions.

The nonprofit organization Valley Clean Air Now (Valley CAN), in conjunction with the San Joaquin

Valley Air Pollution Control District (SJVAPCD) and the California Air Resources Board (CARB), operates multiple longstanding programs for both reducing emissions from older vehicles and providing newer clean vehicles to low-income households in the SJV. These programs include the Tune In & Tune Up smog repair program and the CC4A program. In recent years, Valley CAN has expanded the scope and means of outreach in its household intake process to assess eligibility for bundled programs. This includes simultaneous smog repair and clean vehicle incentive programs, in-person food assistance events initiated during the onset of the COVID-19 pandemic, and an extension to core energy affordability assistance and demand management opportunities. Most recently, Valley CAN explored new ways to deliver bundled cost savings and assistance programs to low-income households (Pierce et al., 2022), building on a unique history of accomplishments in household-centered adaptation and refinement dating back to at least 2012 (Connolly et al., 2020; Pierce & Connolly, 2018, 2019, 2020a).

This report focuses on the impact of an outreach campaign funded by the CCFR program but designed to grow awareness and interest in the EV purchase process more broadly. This campaign had a broader geographic extent than previous emPOWER efforts,¹ with outreach extending across three major areas of the state: the SJV, Los Angeles County, and the Inland Empire. The campaign combined the insights and efforts of Valley CAN, the for-profit marketing firm Maritz®, and the CBOs Redeemer Community Partnership (RCP) and the Latino and Latina Roundtable of the San Gabriel and Pomona Valley (LRT). From December 2021 through June

¹ Since 2019, the emPOWER campaign has been facilitated by Liberty Hill Foundation and Valley CAN to reduce endemic barriers associated with low-income and disadvantaged community (DAC) household enrollment in clean transportation and environmental incentive programs that aim to enhance affordability and just transition outcomes (Pierce & Connolly, 2020b). The emPOWER campaign builds the capacity of community-based organizations to deliver available income-qualified incentive programs to the communities with the greatest need.

2022, these organizations deployed a baseline survey of EV-interested households, provided information and assistance to overcome obstacles both to survey participants as well as the general community via social media, as well as tracked reasons for community (dis)interest and obstacles to purchase. This campaign took place during a period when shortages in clean vehicle inventory in the global market, as well as availability of incentive funds for clean vehicles, were obstacles to near-term purchase especially for low-income households.

Our analysis here expands upon a recently released report summarizing the results of this effort (Southern California Edison, 2022) and aims to answer the following specific research questions:

- ▶ *To what extent can marketing and education help reduce existing barriers and change household perspectives on EVs?*
- ▶ *How do households in these communities prioritize vehicle characteristics and approach the vehicle search process, particularly EV purchase?*
- ▶ *What are existing price and nonprice barriers to EV purchase in low-income and disadvantaged households?*

As mentioned previously, this analysis aims to fill a scholarly knowledge gap by evaluating how access to information can affect interest in EVs for low- and moderate-income populations. Additionally, while price-related barriers to EV purchase are a distinct challenge to EV adoption in low- and moderate-income households (Sheldon & Dua, 2019), other constraining and enabling attributes of interest in the vehicle search and purchase process are less well established and explored here.

DATA AND METHODOLOGY

IN THIS STUDY, OUR RESEARCH TEAM primarily analyzes data from seven months of survey dissemination to 815 original participants by Valley CAN and the two CBOs, RCP and LRT, from December 2021 through June 2022. These participants were recruited primarily through social media and interviewed by phone call. Valley CAN managed the message development as well as the production and placement of social media advertising and other marketing materials. Valley CAN acted in a program administrator capacity, including capturing all survey, social media and case management data, training the CBO phone teams, and coordinating the reporting and billing with Maritz®.

The survey distribution consisted of three phases (all survey questions are listed in the Appendix). The first two phases both included approximately 15 substantive questions each, and the final phase less than 10. The first phase was initiated by customers reacting to social media posts who then called the program phone line. Those customers were then asked a series of questions to gather basic sociodemographic information and determine the participants' baseline knowledge about and interest in EVs, and characterize participants' intent and timeframe for vehicle purchase, as well as factors they would prioritize when searching for a vehicle. The second phase was focused on participant education and feedback, including a discussion of participant needs and progress on the vehicle search, if any. Questions were focused on participant buying and leasing interests, including doubts and concerns about the EV search and purchase process. Only 208 participants reached this second phase. The third and final phase focused on the characterization

of vehicle purchase interest and involved questions on EV models of interest and price range. Questions in this final phase also gauged participant interest in future assistance in the EV search process. Thirty-five participants reached this phase. Some survey questions offered several response options, and others were open-ended to enable more comprehensive participant responses.

We used quantitative and qualitative methods to categorize and analyze survey responses from each of the three phases of data collection. External data on environmental health vulnerability from the Office of Environmental Health Hazard Assessment's CalEnviroScreen (CES) 4.0 tool (Office of Environmental Health Hazard Assessment, 2021) are used to characterize the surveyed households and enhance the analysis.

We also interviewed staff from the two CBOs involved in campaign implementation to gain insights on their experiences and perspectives on the effectiveness of community outreach methods, as well as lessons learned. We summarize main takeaways from these interviews to report on engagement successes and challenges. To supplement the CBO interviews, we review and summarize social media comments from Facebook, the main platform through which CBOs conducted their outreach and interacted with potential participants. However, we do not present a formal discourse analysis of the Facebook comments, due to limitations including challenges in distinguishing between community members and CBO staff comments, as well as a substantial number of offensive comments, many of which are unrelated to the topic at hand.

RESULTS AND DISCUSSION

Broader Social Media EV Education Engagement Process, Experiences, and Lessons Learned

RCP and LRT staff, along with Valley CAN staff, helped answer all phone bank calls with community members, monitored and responded to social media posts, and shared notable results, questions and comments with the entire multiorganization team on weekly calls. Valley CAN, RCP and LRT each had their own phone bank system with a unique phone number advertised on Facebook. Valley CAN set up and managed the phone system for all the groups, but each organization answered all the phone calls to their specific number. All call results were tracked using reports in a case management system within Salesforce.

Engagement Successes and Challenges

We first discuss the results of our interviews with CBO and Valley CAN staff involved in campaign implementation, regarding both successes and challenges, particularly to the new Facebook component of outreach.

Both CBOs expressed that the overall campaign was a success and was able to be integrated into each organization's broader social justice efforts with some adaptation. Similarly, both reported that there was substantial interest in engaging on clean vehicle topics by community members and there were significant numbers of participants who heard by word of mouth and engaged without exposure to outreach materials. In fact, RCP reported ultimately not having enough staff time to accommodate the level of active interest in discussions regarding clean vehicle attributes and the purchase process. LRT reported working with students from universities to spread

information regarding the campaign outside originally envisioned channels.

Even though RCP had not employed Facebook before in its program outreach efforts, it went so well that it intends to use the platform in future environmental justice campaigns that it undertakes. A lot of in-depth interaction was undertaken with individuals to dispel misinformation, including on Facebook Live for LRT. Both RCP and LRT generally found more success in moving the segment of individuals who seemed genuinely curious away from misconceptions rather than moving those adamantly opposed toward interest in purchase, especially on Facebook. Also, both organizations found they could better support those who were engaged in a longer-term vehicle search with this campaign, rather than those who immediately needed a replacement vehicle. Additionally, LRT cited having positive one-on-one phone conversations with individuals who were legitimately interested in learning more. Community members were more open-minded via phone, in contrast to Facebook, where people were more decisive of their point of view regardless of the information shared by the CBOs.

One of the shared challenges faced by both CBOs was moving households to the point of vehicle purchase. Reasons for this include that individuals who were in a rush due to their primary vehicle breaking down did not have the time to wait for a new car through the available incentive programs, such as CC4A. Additionally, this outreach platform did not support immediate vehicle purchase, as opposed to other emPOWER-related campaigns that fed directly into applications for CC4A or other formal programs and used complementary program benefits in a one-stop-shop approach to induce households to follow through on their applications. This in turn reflects the timing of

the campaign during a period of global clean vehicle shortages, price markups, and incentive backlogs in California clean vehicle programs. CBO staff also cited that there was a distinct group of individuals who were curious about clean vehicles and the incentive programs, and wanted to learn more, but were not ready to take the leap to purchase or lease a vehicle.

Another shared challenge stemmed from what appeared to be active and concerted efforts to spread disinformation by some participants. This included both typical downsides of social media such as the use of vulgar and confrontational language and the introduction of conspiracy theories but also a volume of individuals engaging with the CBOs who had not previously done so, such that some suspicion arose that there was organized “trolling” against the campaign. LRT felt like it addressed misinformation and conspiracy theories as well as it could, through answering significant numbers of questions in multiple languages and supporting its responses with strong scientific evidence as needed.

Finally, a joint challenge and success unique to LRT was that it initially received feedback from participants that the campaign toolkit seemed disconnected from LRT’s typical work on social justice issues, and consequently the community was confused about LRT’s participation. Using its previously documented adaptive strategy (Pierce & Connolly, 2020a), Valley CAN worked with them early on in the campaign to redevelop a tailored toolkit that integrated better with LRT’s historical messaging, as well as met the particular needs of participants who couldn’t afford vehicles but were still interested in learning more about EVs.

Facebook Comments

The social media campaigns involved general social media posts as well as biweekly Facebook

Live events (Southern California Edison, 2022). Over the course of these efforts, the two CBOs and Valley CAN received several thousands of written comments on Facebook. Between the two CBOs, there were more than 2,000 comments, including responses from the CBO staff. These comments illuminated community knowledge gaps and general misconceptions regarding EVs and barriers to uptake. While the benefits are noted above, one of the CBOs found that interactions with community members were less productive via a social media channel such as Facebook as compared to one-on-one phone conversations, where they felt they were able to have a more detailed dialogue to address individual needs and create rapport with participants to build trust. Comments or questions that were posted repeatedly were noted and then answered on a Facebook Live event to address that issue with the broader community.

While some community members were genuinely engaging and asking questions and sharing knowledge about the content, there was a significant amount of misinformation being spread through Facebook comments, as noted above. It is important to state that these comments are not the sole way to evaluate success of the Facebook engagement. Though it is challenging to decisively state, there is a possibility that community members who are genuinely interested might be less likely to engage in the comments; the CBO staff stated that people on Facebook seemed more opinionated and less open-minded than during one-on-one phone conversations. Several community members appeared to be on the online portal solely to attempt to discredit the CBOs' claims about EVs, with claims along the lines of *"Your 'green' cars are anything but green."*

Based on our limited analysis, some main

discussion themes that emerged from the Facebook comments were as follows:

- ▶ cost of EVs;
- ▶ vehicle charging;
- ▶ batteries, including deterioration and replacement;
- ▶ energy, including the capacity of the grid to handle vehicle charging, and the sources used to power EVs;
- ▶ solar power specifically;
- ▶ pros and cons associated with gasoline-powered vehicles;
- ▶ environmental impact and "green" technology; and
- ▶ the use of tax dollars for rebates.

Some community members asked genuine questions, while others simply added negative comments. Several examples of these quotes and interactions for a few themes listed above are included in the text below.

Regarding vehicle cost, some community members also expressed concerns about the affordability of EVs, with one specifically stating *"EV's are for deep pockets only not for average like us."* This reflects a common misconception of EVs being a "luxury" purchase, which is a persistent challenge with increasing EV uptake in low-income communities (Pierce & Connolly, 2020b), particularly with supply chain challenges raising the prices of EVs even further.

In terms of vehicle charging, community members expressed concern about the siting of charging stations, stating *"Charging stations will only be built near wealthy communities,"* and others asking *"When will the multifamily charging installations roll out for EVs?"* The CBOs were able to engage in conversations with some of these individuals to share their perspectives. One interaction with staff from RCP went as

follows, where a community member shared their successful vehicle charging experience with others engaging on the platform:

Community member: “I live in LA and I am able to charge at work, at public lots while running errands, at the pharmacy, at the grocery store, at my doctor’s office, on the street at meters in some parts of LA, at my bank, near restaurants while I’m eating, at the mall, and more. I think it’s easy to feel intimidated by lack of charging at your home but availability of charging is expanding exponentially and I get a lot of charging done in spots my car would have been parked anyway.”

RCP staff: “Hi [community member name], Thank you for your comment. While charging an EV at one’s apartment may not be an option for everyone, the number of public chargers is growing by the day. Many charge their EVs at work.”

Additionally, the ability of the power grid to handle vehicle charging was a highly debated topic in the Facebook comments, with one community member stating, “We can’t even make it through a summer without rolling blackouts, please explain how [expletive] that is going to work when everyone gets home and plugs their car in?” — a concern echoed by several others on the platform. This is an understandable concern with the challenges faced throughout the state in the past several years and highlights the need for more education and clarification around the future of the power grid.

The CBOs also had several community members reach out with concerns about these programs being a scam, which the CBO staff were able to successfully dispel. One interaction that began on Facebook but continued by phone is partially quoted below, during which a community

member was initially concerned about the security of the website link provided by RCP:

Community member: “Something seems fishy about this.... I was intrigued by the ad, and the prospect of getting over \$14k in assistance in buying an EV, but this really seems like a scam. Please show me that it's not.”

RCP staff: “We are not a scam.... You can check our websites and see we are legit.... We are trying to educate our community and inform them to what they can qualify for. You can see the protest that we have had for real just a week ago against an oil drill site. We have a tutoring program for kids in our community. Redeemer Community Partnership is working with Liberty Hill Foundation and Valley Clean Air Now, and some other organizations like Latina/Latino Roundtable to inform our communities that's why you see different ads.

In fact, emPOWER can also help you to apply for programs that help you pay your bills, exchange your old fridge, and so much more. <https://www.libertyhill.org/how-we-work/partnerships/> <https://www.redeemercp.org/>”

Community member: “Thank you for taking the time to speak with me today over the phone. Clearly this is not a scam....”

More broadly, community members with positive EV experiences were happy to share their perspectives and help educate others. One current EV owner stated, “The average EV battery costs around 6 K, not 14, and the savings in gas are incredible. Also, we only have one planet and we have to reduce emissions. #ProudEVCarOwner.”

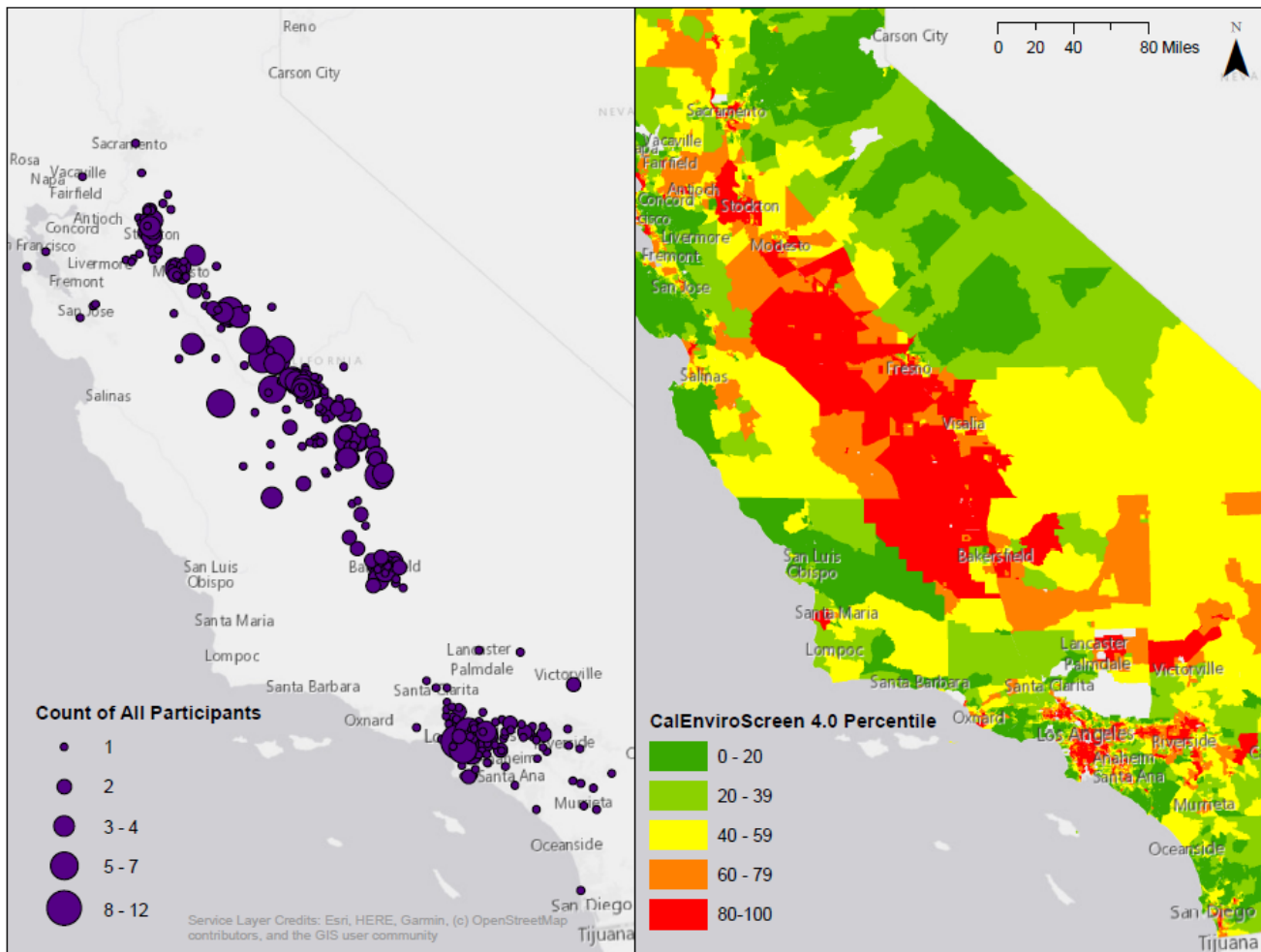
Although Facebook can be a challenging platform to engage on, the CBOs had several successful interactions, including those that

continued offline via phone as mentioned previously. Some participants expressed gratitude via Facebook, with one stating, “*Thank you! Been looking for an EV and guidance on tax credits.*” These Facebook comments, as well as the experiences of the CBOs in disseminating information about EV technology and incentives, highlights the importance of community-tailored outreach, including the value of personal conversations with interested participants. It is evident from the comments that widespread, dynamic conversations on the value of EVs and the implications for energy use and the power grid are very much needed.

Analysis of Survey Phases: Participant Perspectives and Preferences

We next analyze and discuss the implications of results from seven months of sequential surveying of participants in the campaign by Valley CAN and the two CBOs. Figure 1 shows the distribution of all individuals who participated in the first phase of the survey throughout the SJV and Southern California alongside the CES percentiles for each census tract, which represent higher environmental health vulnerability with increasing percentiles. As the map demonstrates, this campaign successfully reached some of the most vulnerable neighborhoods throughout the state.

FIGURE 1: Counts of all campaign participants (by residential census tract) who completed the Phase 1 survey (left) and CalEnviroScreen 4.0 percentile (right).



Participant characteristics

First, we provide an overview of participant characteristics and a by-phase analysis of trends. Table 1 reports the characteristics of participants advancing through each phase of the process. The first column presents an overview of all participants, regardless of phase. Each following column characterizes participants who made it to a specific phase (i.e., participants who made it to Phase 2 are not included in the Phase 1 column).

There were more than 800 initial survey responses, with a median household income of all participants of \$38,000 (average household income = \$46,900), which is about half of the median household income in California. The low household income status aligns with the environmental health vulnerability of neighborhoods which participants reside in, as represented by CES percentile and disadvantaged community (DAC) status. These metrics demonstrate that campaign participants are generally disadvantaged, with an average CES percentile of 76.2 (communities are assigned Senate Bill 535 DAC status if they have a CES percentile of 75% or higher or meet other specific criteria [Office of Environmental Health Hazard Assessment, 2021]).

At the same time, as also shown in our and others' previous work, vehicle ownership levels and vehicle miles traveled among low-income households were slightly lower than the general population, but not demonstrably so (Blumenberg & Thomas, 2014; Pierce & Connolly, 2023). In other words, households participating generally relied on vehicles to a large degree for their travel needs and this is true among the broader low-income population in California.

Interestingly, while there was a high degree of attrition overall, households that advanced to Phase 3 of the campaign appear slightly more disadvantaged at both the household and

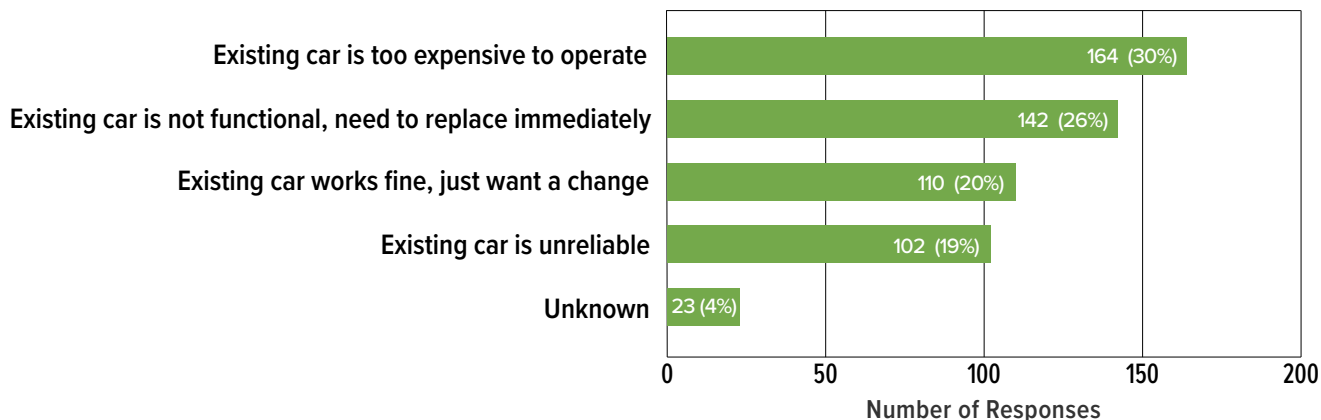
community level than the original participant pool and in Phase 1. This indicates that the campaign supported lower-resourced households as well as it did other participants and demonstrates a potentially higher commitment to learning about potential incentives among the lowest-income households and those who needed to replace a vehicle.

On the other hand, while the Phase 1 population was primarily renters (64%), the majority of participants making it through to Phase 3 own their homes (54% owners, 46% renters). This may reflect the barrier of accessing a charging station in a rental property, which has been largely cited as a challenge of operating an EV (DeShazo, Krumholz, et al., 2017; DeShazo, Wong, et al., 2017). Communities of color and lower-income communities have less access to charging facilities (Hsu & Fingerman, 2021; Roy & Law, 2022). Individuals renting their homes may be less interested in engaging in conversations about EV purchase when considering challenges in charging any future EV they may rent or purchase.

TABLE 1: Overview of participant characteristics

	All participants	Phase 1	Phase 2	Phase 3
Total number of responses	815	572	208	35
Average household income	\$46,930	\$47,247	\$46,390	\$44,961
Median household income	\$38,000	\$37,000	\$39,141	\$44,000
Average household size	3	3	3	3
Average weekly vehicle miles traveled	181	177	188	192
Housing ownership status				
Own	39%	36%	46%	54%
Rent	61%	64%	54%	46%
DAC status				
Yes	57%	55%	59%	69%
No	35%	35%	38%	31%
Unknown	8%	10%	3%	0
Average CES 4.0 percentile of participant tracts	76.2	76.5	75.2	77.3
Preferred language				
English	70%	72%	65%	71%
Spanish	30%	28%	35%	29%
Household vehicle ownership				
0	12%	14%	8%	3%
1	30%	34%	22%	17%
2	25%	27%	22%	23%
3	9%	9%	10%	3%
4 and more	5%	5%	6%	3%
Unknown	19%	11%	33%	51%
Educational background				
College & above	19%	18%	22%	23%
Associate/Technical	28%	30%	25%	20%
High school	31%	31%	32%	29%
Less than high school	13%	10%	17%	26%
Unknown	9%	11%	5%	3%
Age				
18-25	6%	6%	6%	9%
26-35	25%	26%	21%	23%
36-49	38%	38%	39%	43%
50+	23%	20%	31%	23%
Unknown	8%	10%	3%	3%

FIGURE 2: Vehicle replacement reasons, all participants



Vehicle purchase constraints and preferences

Approximately two-thirds of all participants (66%) sought to replace an existing vehicle, with one-third preferring to add a vehicle. As is intuitive, participants continuing to the later phases of the survey indicated an increasingly strong preference for replacing a vehicle. In terms of reasons for vehicle replacement, as seen in Figure 2, operational costs being too high was ranked as the top reason for vehicle replacement by respondents across all phases. This aligns with existing evidence of maintenance challenges for low- and moderate-income populations (Pierce et al., 2019).

Additionally, the vast majority of respondents indicated a need to acquire a vehicle immediately (55%), or in less than six months (33%), with the remaining participants reporting a less stringent timeline or not responding to the question. A more urgent need to purchase a vehicle was also reported among lower-income households. This has several implications, considering higher-income households with less urgency may be able to negotiate for favorable terms for total cost of ownership and affordable monthly payments, whereas lower-income car buyers with an urgent need to replace their car are limited to whatever deal they can make work at that time. When households are forced

to make quick purchase decisions favoring cheaper vehicles, they often wind up with higher expenses later, typically because they purchase an older car with a lot of miles, for which the gas and maintenance are equal to what the monthly payment would have been for a cleaner, more reliable car. Moreover, they are much less likely to wind up purchasing an EV, both because of the educational process in learning about options, as well as the short supply of affordable clean vehicles in the present market.

Moreover, as Table 2 shows, lower-income households prioritize upfront price and the associated financing terms when buying a vehicle. The mean and median household incomes for participants prioritizing those two considerations demonstrate that such households prioritize financial wellness considerations, as opposed to other factors such as fuel efficiency, safety, quality, and vehicle warranty.

Additionally, the vast majority of participants report being comfortable purchasing a vehicle through a formal means such as a dealership or online (>80%) rather than through informal means such as social media or a local auto shop, which is an important consideration for clean vehicles in particular, as detailed in our previous research (Pierce and Connolly, 2023).

TABLE 2: The most important factor when purchasing a vehicle

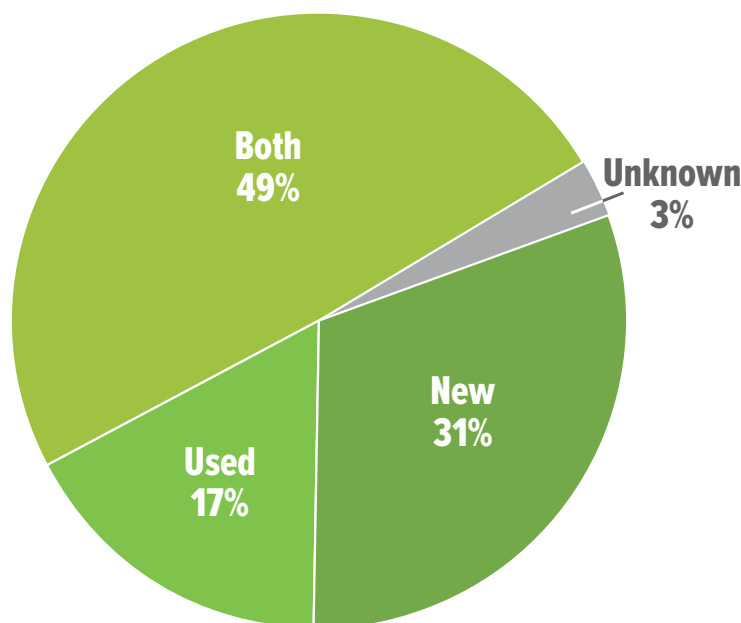
Vehicle factor selected	Number of responses	Mean household income of participants	Median household income of participants
Fuel Efficiency	310	\$53,241	\$45,000
Price	242	\$40,063	\$32,500
Safety	83	\$46,227	\$34,000
Quality	82	\$46,655	\$35,000
Finance	26	\$32,950	\$36,500
Warranty	19	\$42,240	\$36,000

As seen in Figure 3, almost half of participants expressed interest in both new and used vehicles; of the remaining participants, there was a slightly greater preference for new vehicles compared to used.

We also calculated the vehicle budget² to household income ratio for all participants, to determine what proportion of total income people were planning to spend on their next vehicle purchase. The median value of this ratio is 37% for all participants. Unsurprisingly, the

stated budget for those intending to purchase a new vehicle was much greater (nearly double) those intending to purchase a used vehicle. The average self-reported expenditure to purchase a vehicle across all participants who answered this question was almost \$14,000, or over 35% of the median annual income of households surveyed. However, even when combined with the most generous EV incentives, this willingness to pay will not enable households to purchase a new EV currently on the market.

FIGURE 3: New or used vehicle preferences, all participants



² Vehicle budgets equal to \$0 were removed from this analysis.

TABLE 3A: Baseline EV knowledge and income, all participants

EV knowledge	Number of responses	Mean household income of participants	Median household income of participants
Some knowledge	411	\$50,021	\$40,000
No knowledge	250	\$35,509	\$32,086
Very knowledgeable	102	\$60,058	\$50,050
No answer	32	\$37,906	\$34,500
Expert	20	\$73,638	\$56,000

TABLE 3B: Baseline EV knowledge by phase

EV knowledge	No response	Expert	No knowledge	Some knowledge	Very knowledgeable
Phase 1	5%	2%	30%	51%	12%
Phase 2	1%	3%	29%	51%	15%
Phase 3	0%	0%	46%	43%	11%
Grand Total	4%	2%	31%	50%	13%

Electric vehicle perspectives and active interest

Participants were additionally surveyed regarding their knowledge of and interest in EVs.

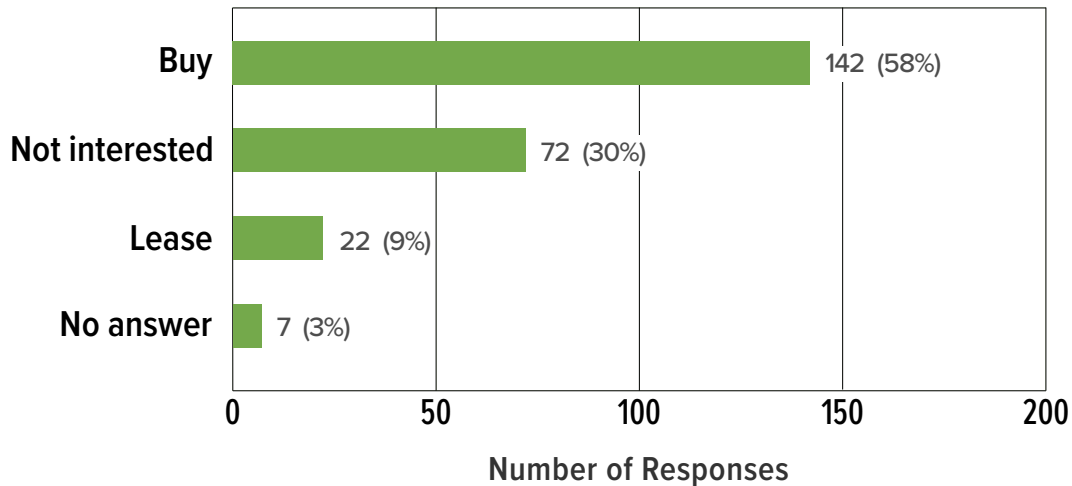
Tables 3a-b demonstrate participants' self-reported level of baseline knowledge on EVs at the start of the survey process. In general, higher-income households self-identify as much more knowledgeable about EVs than lower-income households, even within this relatively low-income sample of households (Lee et al., 2019). On the other hand, almost half of participants who continued through to the third and final phase of the process reported having no knowledge about EVs, highlighting the need for this type of campaign and education, as well as the capacity of Valley CAN to support participants and avoid attrition even when participating individuals do not have any background knowledge on the technology, which could present a significant barrier. Additionally, with respect to which EV-specific

factor participants (with interest in purchasing an EV) would prioritize in their vehicle purchase, distinct income-related trends persist. While those who selected price as the EV factor to prioritize reported the lowest average household incomes (approximately \$38,000), the highest average income was reported for participants who selected range as their primary EV factor of interest (approximately \$61,000).

As shown in Figure 4, the majority of participants who made it to Phase 2 were interested in vehicle purchase (58%), with 30% of participants indicating they are not interested at all, and 9% expressing interest in leasing a vehicle.

Once participants made it to the second phase, there were very limited concerns reported regarding incentive programs as well as the prospect of attaining an EV. Sixty-six percent of participants that progressed to Phase 2 reported having no concerns regarding the incentive programs. Forty-eight percent of respondents reported having no questions, doubts, or

FIGURE 4: Interest in buying or leasing EVs



concerns about EVs in general, though 42% did not respond to the question. This may be a direct result of the efforts of the segment of the campaign involving the provision of education on clean vehicles and the associated incentive programs through one-on-one phone calls, as described in Sections 2 and 3.1. The use of phone banks enabled Valley CAN and CBO staff to have in depth conversations with individuals who took the initiative to call the phone bank; these participants are likely to be genuinely interested in either learning more about clean vehicles and existing incentive programs or actively purchasing an EV in the near future. These one-on-one, tailored conversations are conducive to ensuring each participant's lingering questions are answered and concerns and misconceptions about clean vehicles or the incentive programs are addressed.

Echoing the findings reported from the CBO outreach process, in responding to an open-ended question asking survey participants if there are any “reasons or factors that might stop you from buying, leasing, or owning an EV,” participants expressed the most concern with not being able to afford EVs, as well as supply chain issues. Additionally, limitations expressed in

response to the question “Has this made getting an EV easier?” in Phase 2 of the campaign yielded some individuals responding with “yes” and stating that participation helped them become better informed about EVs and related incentives. However, many participants who dropped out before Phase 3 still answered this question with “no” and referenced challenges with not being able to get incentives and thus afford EVs.

CONCLUSION

IN THIS STUDY, WE BUILD on our past EV equity research by quantifying the different ways in and degrees to which a campaign organized by nonprofit and community-based organizations partnering with a for-profit marketing firm supported the development of active interest in the EV purchase process for low- and moderate-income households in the SJV and Southern California areas. Our findings illustrate cost and non-cost barriers to EV purchase and highlight education and marketing methods that can potentially be utilized to increase clean vehicle incentive uptake in low-income and disadvantaged communities in California and other regions. The issue of low-income drivers needing to replace their existing vehicle more quickly to avoid economic consequences such as job loss, thus favoring upfront price rather than ongoing cost, is particularly problematic for a just transition and potentially self-reinforcing suboptimal economic outcomes on several fronts.

Existing incentive programs can be a valuable tool for increasing clean vehicle uptake in low- and moderate-income communities, but considering the limited funding available, complementary means of support for clean mobility uptake involving persuasive, nonfinancial means of inducement will be vital in advancing the state's just transition goals. Further exploration of the key barriers identified through the surveys and interactive social media engagement in this study can support the development of complementary programs to directly support EV purchase by residents of vulnerable communities, such as customized options for EV charging, vehicle finance and vehicle insurance. The direction of funding toward more expansive community-led vehicle purchase support campaigns is one pathway to achieving an equitable energy future, and further research to continue to characterize evidence-based methods to increase clean mobility awareness and EV uptake will be vital.

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APPENDIX

Phase 1 Questions

1. Full Name
2. Preferred Language
 - a. English
 - b. Spanish
3. Phone
4. Email
5. Residential Address
6. Do you rent or own where you live?
7. What is your total household size?
8. What is your gross annual household income?
9. Are you replacing an existing car, or adding a car?
 - a. Replacing
 - b. Adding
 - c. Neither
10. If replacing, why do you feel you need to replace your car?
 - a. Existing car not functional, need to replace immediately
 - b. Existing car is too expensive to operate
 - c. Existing car is unreliable
 - d. Existing car works fine, just want a change
11. How many miles do you drive a week?
12. What is your expected time frame for buying a vehicle?
 - a. ASAP
 - b. 1-3 months
 - c. 3-6 months
 - d. 6-9 months
 - e. 1 year
13. What is your vehicle purchase budget?
14. Are you thinking about buying a new or used vehicle?
 - a. New
 - b. Used
15. What is the most important factor to you when buying a vehicle?
 - a. Price
 - b. Warranty
 - c. Finance
 - d. Quality
 - e. Safety
 - f. Fuel Efficiency
 - g. Other (fill in)

- 16. What's the most important reason that you'd choose a (new/used) car?**
- a. Price
 - b. Warranty
 - c. Finance
 - d. Quality
 - e. Safety
 - f. Fuel Efficiency
 - g. Other (fill in)
- 17. How much do you know about electric vehicles?**
- a. No Knowledge
 - b. Some Knowledge
 - c. Very Knowledgeable
 - d. Expert
- 18. If you have considered buying a plug-in electric vehicle, what is the most important factor to you for considering an electric vehicle?**
- a. Price
 - b. Charging Station/Parking Availability
 - c. Environmental Impact
 - d. Range
 - e. Charging time
 - f. Cost Savings /Fuel Economy
- 19. If you have not considered buying a plug-in electric vehicle, what would help to change your mind and make you consider an electric vehicle?**
(open-ended)
- 20. What is your educational background?**
- a. Less than a High School diploma
 - b. High School or equivalent
 - c. Technical or occupational certificate
 - d. Associate Degree
 - e. Bachelor's degree
 - f. Master's Degree
 - g. Other (fill in)
- 21. What is your age?**
- a. 18-25
 - b. 26-35
 - c. 36-50
 - d. 50+

(Continues next page)

Phase 2 Questions

1. Are you still interested in buying or leasing an electric vehicle?
 - a. Not interested
 - b. Buy
 - c. Lease
2. We have identified the following incentive programs that you qualify for (information provided to participant). Do you have any questions about how the incentive programs work or what you need to do to receive the program rebates?
3. Do you have any fears or concerns about any aspects of the incentive programs?
 - a. No
 - b. Yes, worried I may not receive the money
 - c. Yes, worried it may take too long to receive a vehicle
 - d. Other (fill in)
4. Do you have any questions, doubts or concerns about buying, leasing or owning an EV?
 - a. No
 - b. Yes, concerns about credit/purchasing through dealer
 - c. Yes, concerns about paying off loan
 - d. Yes, concerns about vehicle mileage range
 - e. Yes, concerns about where to charge
 - f. Other (fill in)
5. Are you making this purchase or lease decision with someone else? If you are making this purchase or lease decision with someone else, do they have concerns (same options as listed above)?
 - a. No, I am the primary decision-maker
 - b. My partner or spouse
 - c. Older family member
 - d. Other children/adults in the household
6. Do you have any questions about purchasing, leasing or owning an EV that I can help you with?
7. Are there any reasons or factors that might stop you from buying, leasing or owning an EV?
8. Have you had an opportunity to search available electric vehicles in your area online or at a dealership?
9. Are you comfortable searching and purchasing a vehicle through a dealer/online or would you typically prefer to purchase through an informal means (e.g., social media, local auto shop, friends/family)? Why? (open-ended)
 - a. I am comfortable purchasing through a dealer or online
 - b. I prefer to purchase a vehicle through another means
10. Would it be helpful if we sent you a list of available electric vehicles and pricing in your area?
11. Can we schedule a follow-up call?
12. In general, has this made the process of buying or leasing an EV easier for you?

13. Has this influenced your decision to buy or lease an EV vehicle?
14. What type of vehicle (make/model) are you most interested in? Why?

Phase 3 Questions

1. Before we begin, I wanted to check with you if you know what model of EV you are looking for?
 - a. Chevy Bolt
 - b. Nissan Leaf
 - c. Mini SE
 - d. Mazda X-30
 - e. Hyundai Kona
 - f. Tesla
 - g. Other (fill in)
2. Are these cars within your price range if you use the incentives?
 - a. Yes
 - b. No
 - c. Other (fill in)
3. Do you think you would be interested in test driving or ultimately purchasing any of these vehicles?
 - a. Yes
 - b. No
 - c. Other (fill in)
4. If yes, what kind of assistance can I provide you with?
5. Would you like me to email me a copy of these vehicles to you?
 - a. Yes
 - b. No
6. Would you also like us to look up and provide you information about used vehicles in your area?
 - a. Yes
 - b. No
7. We wanted to check with you again - do you have any other questions about the incentives or about EVs?

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