

Providing Avenues to Electric Vehicle Ownership for Ride-Hail Drivers¹

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ABSTRACT

Electric vehicles (EVs) are the future of transportation and will be critical to achieving a significant reduction in greenhouse gas emissions. Despite increasing sales, EV market share hovers around 2% nationwide and EV use continues to be dominated by higher-income early adopters. Ride-hail drivers are a natural market for EVs given the high number of miles they drive and lower cost of ownership of EVs compared to gas-powered vehicles. The higher purchase price of EVs, however, presents a significant barrier given the lower incomes of many ride-hail drivers. In addition, about half of ride-hail drivers' compensation goes to fueling and maintaining their vehicles, which leads to most drivers earning less than minimum wage. Transitioning to EVs presents an opportunity for ride-hail drivers to increase their compensation because of the lower fuel and maintenance costs of EVs. This paper explores how utilities work with transportation network companies (TNCs) to increase awareness of and interest in EVs among ride-hail drivers. We examine how providing EV charging subscription plans can both increase utilization of utility-provided charging and make EVs more attainable. We discuss findings from virtual focus groups, surveys, and an analysis of charger utilization data from Portland General Electric's Electric Avenues. This research highlights both how utilities and TNCs can help make fueling EVs more affordable to ride-hail drivers and on-demand delivery drivers while showcasing an innovative approach to evaluating how utility programs can address transportation equity issues.

Introduction

The transportation sector is responsible for nearly one-third (29%) of greenhouse gas (GHG) emissions in the United States (US), with over half (58%) of transportation-related emissions coming from light-duty vehicles (EPA n.d.). The adoption of electric vehicles (EVs) is a critical component of decreasing transportation-sector emissions and other pollution to meet US GHG reduction goals. As of 2020, EVs accounted for just 2% of all automobile sales (Desilver 2021). To meet ambitious GHG reduction goals, efforts to accelerate EV adoption will need to increase significantly. To date, 15 states and the District of Columbia have Zero Emission Vehicle (ZEV) regulations in place that target 30% ZEV sales by 2030 (Shepardson 2020).

Oregon is one of the states with these ZEV regulations in place. Portland General Electric (PGE), a utility serving the Portland and Salem metropolitan areas, has been leading the charge to help expand EV adoption in Oregon. PGE launched three transportation electrification (TE) pilots in 2018. Two primary goals of the TE pilot programs are to (1) increase customer adoption of EVs and (2) provide its customers with reliable charging in its service territory by installing Level 2 (L2) and Direct Current Fast Chargers (DCFC) at charging plazas known as Electric Avenues. One target group for these pilot activities are ride-hail drivers who drive for transportation network companies (TNCs) (i.e., Uber and Lyft)² and on-demand delivery drivers (i.e., Doordash, Postmates, Instacart, etc.).

¹ This paper has been adapted from a previously published journal article to include new data regarding maintenance and fueling costs. See Hathaway Z, Polis H, Loomis J, Boroski J, Milano A, Ouyang J. A Utility Roadmap for Expanding Customer Adoption of Electric Vehicles. *World Electric Vehicle Journal*. 2021; 12(2):81. <https://doi.org/10.3390/wevj12020081>

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Ride-hail drivers drive considerably more and emit more GHGs than the average driver; they can play an important role in EV adoption and should be considered a key target in these efforts. According to a 2019 study on vehicle miles traveled (VMT), ride-hailing vehicles accounted for between 2% and 13% of VMT within six major metropolitan areas in the US (Balding et al. 2019). A 2019 analysis of ride-hailing data in California found that full-time ride-hail drivers drive about 190 miles per day on average, compared to an average of only 40 miles per day for non-ride-hail drivers. Similarly, a 2019 study found, that full-time TNC vehicles in Austin, Texas were driven an average distance of 29,000 miles per year (Wenzel et al. n.d.), which is considerably higher than miles traveled for personally owned vehicles (13,476 miles per year) (FHWA 2020). As a result, vehicles used for ride-hailing tend to emit more GHGs than other vehicles both because of increased VMT and by “deadheading” (traveling without a passenger in the vehicle) (NESCAUM 2020). One 2020 study estimated that ride-hailing trips can produce 69% more pollutants than the trips they are meant to displace (Anair et al. 2020).

Ride-hail drivers are disproportionately people of color (POCs) and low-to-moderate income earners. According to a 2021 Lyft report, Lyft drivers have a median household income below the national average (\$54,000 compared to \$79,990 in 2021) and nearly half (48%) of Lyft ride-hail drivers identify as POC (Lyft 2021; HUD 2021). EVs provide ride-hail drivers cost savings through lower fuel costs (depending on utility location), and considerably lower maintenance costs (estimated to be about 50% lower than non-EVs) (Harto 2020). Further, TNCs are critical to providing transportation to low-income communities and populations as nearly half (46%) of rides start or end in low-income communities (Lyft 2021).

To better serve the needs of these drivers, PGE is providing outreach to ride-hail drivers to encourage EV adoption, including education about the benefits of driving EVs. In addition to education efforts, PGE is working with a TNC to provide subsidized charging subscriptions at PGE’s Electric Avenue charging sites, plazas of public Level 2 and DCFC charging stations. The TNC fully subsidizes the monthly subscription cost, which provides ride-hail drivers with unlimited charging at PGE’s Electric Avenues. However, drivers were subject to additional fees for charging during PGE’s peak period of 3:00 p.m.–8:00 p.m. These measures are designed to support EV adoption in the ride-hail segment, by increasing access to EVs, allowing ride-hail drivers to benefit from lower maintenance and fuel costs compared to gasoline-fueled vehicles, which will in turn reduce emissions from these high-mileage drivers in PGE’s service territory. This paper discusses the authors’ research methods to evaluate these pilot programs as well as key findings from this research.

Methods

The authors are conducting a five-year evaluation of PGE’s Transportation Electrification Pilots. During the first and second years of the evaluation, the authors compiled data through various sources, including an online ride-hail focus group, ride and drive event intercept surveys and Community charging utilization data to explore usage patterns. In addition, multiple waves of customer surveys have been used to track trends in EV customer adoption and behavior in PGE’s service territory.

Figure 1 provides a timeline of research activities relevant to this paper that have been conducted as part of the five-year evaluation of PGE’s Transportation Electrification Pilots, in addition to upcoming research activities that will continue to inform this research.

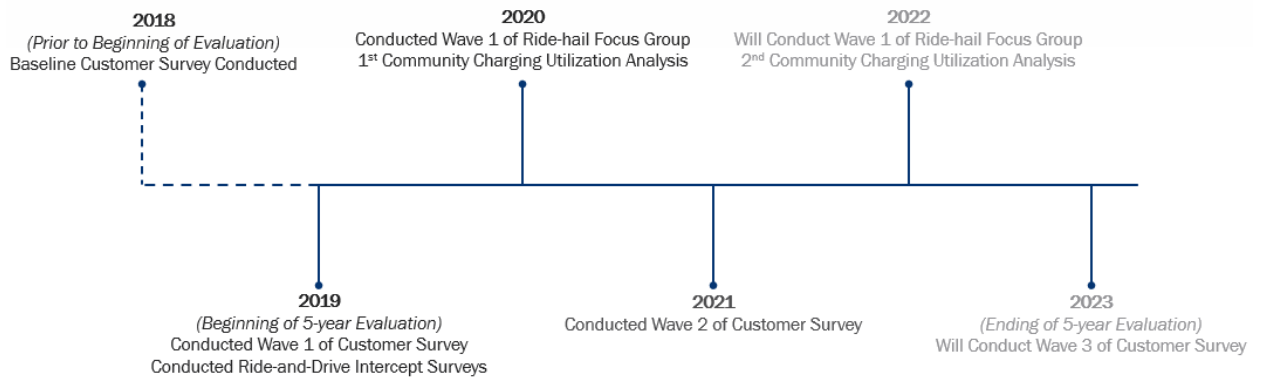


Figure 1. PGE Transportation Electrification Pilot Evaluation Timeline

Ride-Hail Focus Group

In July 2020, the authors hosted an online synchronous focus group with ride-hail drivers who were considering purchasing or leasing an EV for their next vehicle. The purpose of the focus group was to get (1) an in-depth understanding of participants’ experiences as a ride-hail driver, (2) their reasons for considering EVs, and (3) how they would use EVs and EV charging for ride-hail driving. The authors recruited focus group participants from a list of 199 ride-hail drivers who had signed up for a ride-hail EV informational session and ride-and-drive event (as discussed below) sponsored by PGE’s ride-and-drive implementer in November 2019. All 199 drivers were invited via email to fill out a screening survey. The survey confirmed that potential participants were currently or recently a ride-hail driver, did not work for an industry that would pose a conflict of interest, were PGE customers, did not currently own an EV, and were considering an EV for their next vehicle. All other respondents were excluded from being considered for participation in the focus group. The team recruited 10 participants, of which seven attended the online focus group.

Ride-and-Drive Event Intercept Surveys

In 2019, the authors conducted in-person intercept surveys at two PGE-sponsored ride-and-drive events. The first event occurred in April 2019 and targeted the general public at an Electric Avenue grand opening event, while the second event, held in November 2019, was targeted to ride-hail drivers. The purpose of these surveys was to understand reconsideration and intention to purchase or lease an EV in the near future, attendee satisfaction with the event, and attendee exposure to PGE TE outreach and education campaigns or resources. A total of 39 intercept surveys were completed at the two events, 15 at the April event and 24 surveys at the November event. In addition to the two ride-and-drive surveys conducted by the authors, PGE staff conducted a similar survey with 79 attendees who participated in a ride-and-drive as part of a National Drive Electric Week.

Community Charging Utilization Analysis

In 2020, the authors conducted an analysis of PGE’s Electric Avenue charger utilization data. The analysis explored charger utilization patterns at each of the six Electric Avenue sites and the impact of a \$0.19/kWh surcharge during PGE’s peak system hours (3:00 p.m.–8:00 p.m.) on charger use among ride-

hail subscribers compared to monthly subscribers and non-subscribers.³ The authors hypothesized that drivers who signed up for the monthly subscriptions would have higher utilization than those paying per charging session. Further, the authors assumed that the drivers on the TNC subsidized subscription would have higher usage. In addition, TNC subsidized and unsubsidized monthly subscription users would be more price sensitive than non-subscribers and reduce their use during the peak period due to the surcharge. All three user groups are subject to the \$0.19/kWh surcharge during peak hours. The analysis was conducted based on the charging data measured at the chargers at each site from March 2019 to October 2020.

Customer Surveys

In 2018, PGE conducted a baseline survey with the general population of residential customers that indicated whether respondents were considering purchasing a vehicle in the next five years, in addition to exploring customer awareness and perceptions of EVs and EV charging in the PGE territory. The authors adapted the 2018 Baseline survey to create a post-pilot launch survey that was fielded in October 2019 and then again in July 2021. For the 2018 (“Baseline”), 2019 (“Wave 1”), and 2020 (“Wave 2”) surveys, a random sample of PGE residential customers with email addresses were invited to take the web-based survey via email invitation. For the purposes of this paper the authors focus on the Wave 2 survey, which had questions to identify ride-hail and on-demand delivery drivers.

In total, 3,947 Wave 2 surveys were completed by PGE residential customers, of which 82 (2% of the survey sample) indicated they were either a ride-hail driver (n=32), an on-demand delivery driver (n=38), or a both ride-hail and on-demand delivery (n=12). Of the 82 ride-hail and on-demand delivery drivers, 26 (or 31%) reported owning an EV. Note the survey included an oversample of EV owners, which is why there is a large proportion of EV owners among ride-hail and on-demand delivery drivers. Excluding respondents from the EV owner oversample reveals an EV ownership rate of about 2% for ride-hail and on-demand delivery drivers. This is slightly lower than the EV ownership rate among the general population of residential customers (6%) in PGE’s service territory. The authors conducted an analysis comparing ride-hail and on-demand delivery drivers looking at how their responses compared to general population customers in terms of intention to purchase an EV, barriers to purchasing, motivations to purchasing, interest in used vehicles, and demographics.

Results

The following sections present results from the ride-hail focus group, ride and drive intercept surveys, Electric Avenue charge utilization and user group analysis, and general population surveys.

Ride-Hail Focus Group

Ride-hail focus group participants were primarily interested in EVs to reduce their fuel and maintenance costs and help the environment. Participants estimated they could save between \$400 and \$625 in monthly maintenance and fuel costs by switching to an EV and using the Electric Avenue \$25 monthly unlimited charging subscription. A few participants indicated they fill up their gas tank every day or every other day, and two participants mentioned needing to get oil changes about once a month. One said avoiding the \$70 oil changes would result in “significant savings.” Another participant was looking forward to not having to replace brake pads due to the regenerative braking in EVs.

³ Note that ride-hail subscribers included drivers who have free monthly unlimited use of PGE’s Electric Avenue sites, subsidized by a TNC company. Monthly subscribers are general population users who pay \$25 per month for unlimited charging at PGE’s Electric Avenue sites. Finally, non-subscribers are general population users who pay per hour for charging at PGE’s Electric Avenue sites, including L2 charging, which begins at \$3 per hour, and charging at fast charging stations, which begins at \$5 per session.

Upfront cost and difficulty qualifying for low-interest financing are barriers to purchasing EVs for ride-hail drivers, as many drivers do not earn enough to qualify for loans. One focus group participant voluntarily mentioned the difficulty ride-hail drivers encounter qualifying for vehicle loans. When asked of the group, all other participants agreed that qualifying for financing to purchase the EV was a concern for them. According to focus group participants, lenders do not consider ride-hail wages as income until drivers have been driving at least two years. Even after two years, however, ride-hail wages may not be considered “steady” income as most are independent contractors.

Another key takeaway from the focus group was that ride-hail drivers have a strong preference for unlimited monthly charging subscriptions over the hourly pricing. Focus group participants agreed the hourly charging rates were not practical for the amount of charging they would need and that the \$25 unlimited charge was “reasonable” and “the way to go” for a ride-hail driver. One participant noted they could spend \$25 on gas per day, so \$25 for a month was attractive.

Ride and Drive Event with Ride-hail Drivers

Findings from the two ride-and-drive intercept surveys show that vehicle battery range and charging needs tend to vary between the general public and ride-hail drivers. Survey findings show about three-quarters (12 of 15) of general public respondents reported driving 200 miles or less each week. In contrast, over half (13 of 24) of ride-hail driver respondents reported driving over 400 miles each week for their ride-hail rides, highlighting the need for long-range EVs coupled with easily accessible public charging for ride-hail drivers. Ride-hail drivers were also more likely to report owning more than one vehicle (17 of 24 compared to 8 of 15). Over half (14 of 24) of ride-hail drivers indicated, however, that the vehicle they use for ride-hail rides is also for personal use.

Survey findings also show that the ride-and-drive was effective in boosting purchase intent. About one-third (6 of 15) of the general public and two-thirds (16 of 24) of ride-hail driver survey respondents indicated the ride-and-drive event increased their likelihood of purchasing or leasing an EV “a great deal” (Figure 1). Similarly, at a National Drive Electric Week event, nearly all (99%) of 79 surveyed ride-and-drive participants reported that they were “very likely” to consider an EV for their next vehicle purchase and about two-thirds (66%) reported the ride-and-drive made them “much more likely” to purchase an EV in the future. These findings are consistent with previous studies that have found direct experience with EVs at events such as ride-and-drives can be effective in increasing consideration of EVs (Roberson and Helveston 2020).

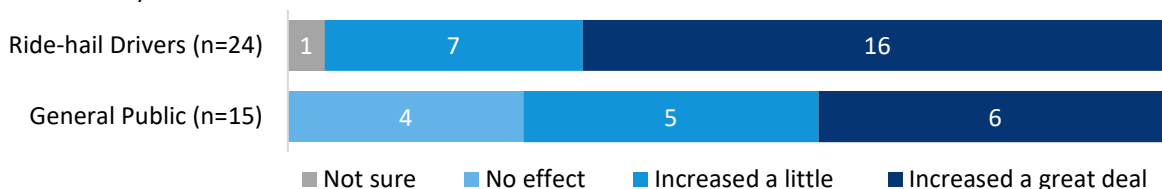


Figure 1. Event Effect on Likelihood of Purchasing EV in Next Five Years, by Survey Wave

After the ride-and-drive, surveyed participants mentioned a variety of concerns they had about purchasing or leasing EVs. Both general public and ride-hail driver survey respondents were primarily concerned about the purchase price of the vehicle (7 of 15 and 14 of 24, respectively) and the vehicle driving range (7 of 15 and 14 of 24, respectively).

Community Charging Impact Analysis

As with the Customer Surveys, the authors categorized PGE Electric Avenue users into three groups: (1) ride-hail subscribers, (2) monthly subscribers, and (3) non-subscribers to conduct a community charging analysis and investigated the differences in usage patterns between these groups. The authors found ride-hail subscribers consume 1.5 times more energy each month than monthly subscribers, and 2.9 times more than non-subscribers. While ride-hail subscribers make up the smallest share of users, they have the highest per-customer-energy consumption in most months. As discussed above, this is expected as vehicles used for ride-hailing tend to have higher VMT than personal vehicles. The largest share of users in each month are non-subscribers, but they consume much less energy per customer compared to the subscriber groups (Figure 2). This finding is consistent with the idea that customers who consume more energy per month have greater motivation to enroll in a subscription program or that customers with a monthly subscription plan are more likely to go to the same charging network to fully utilize the subscription. From March through May 2020, ride-hail subscribers experienced the greatest decrease in energy consumption. This usage decrease correlates with the implementation of COVID-19 restrictions in Oregon, which began on March 12, 2020 and escalated to a statewide stay-at-home order that remained in effect March 23–May 15, 2020 (Office of the Governor 2020a, 2020b, 2020c). Note that usage rebounded after May to pre-March levels. In addition, usage of the Electric Avenues increased generally over the full period of the study due to the expansion of the Electric Avenue network. Over the course of 2019, PG&E installed three sites (12 DC fast charging ports/6 Level 2 ports). From January to April 2020, PG&E added three additional sites for a total of six sites representing 34 ports (22 DC fast charging ports/12 Level 2 ports).

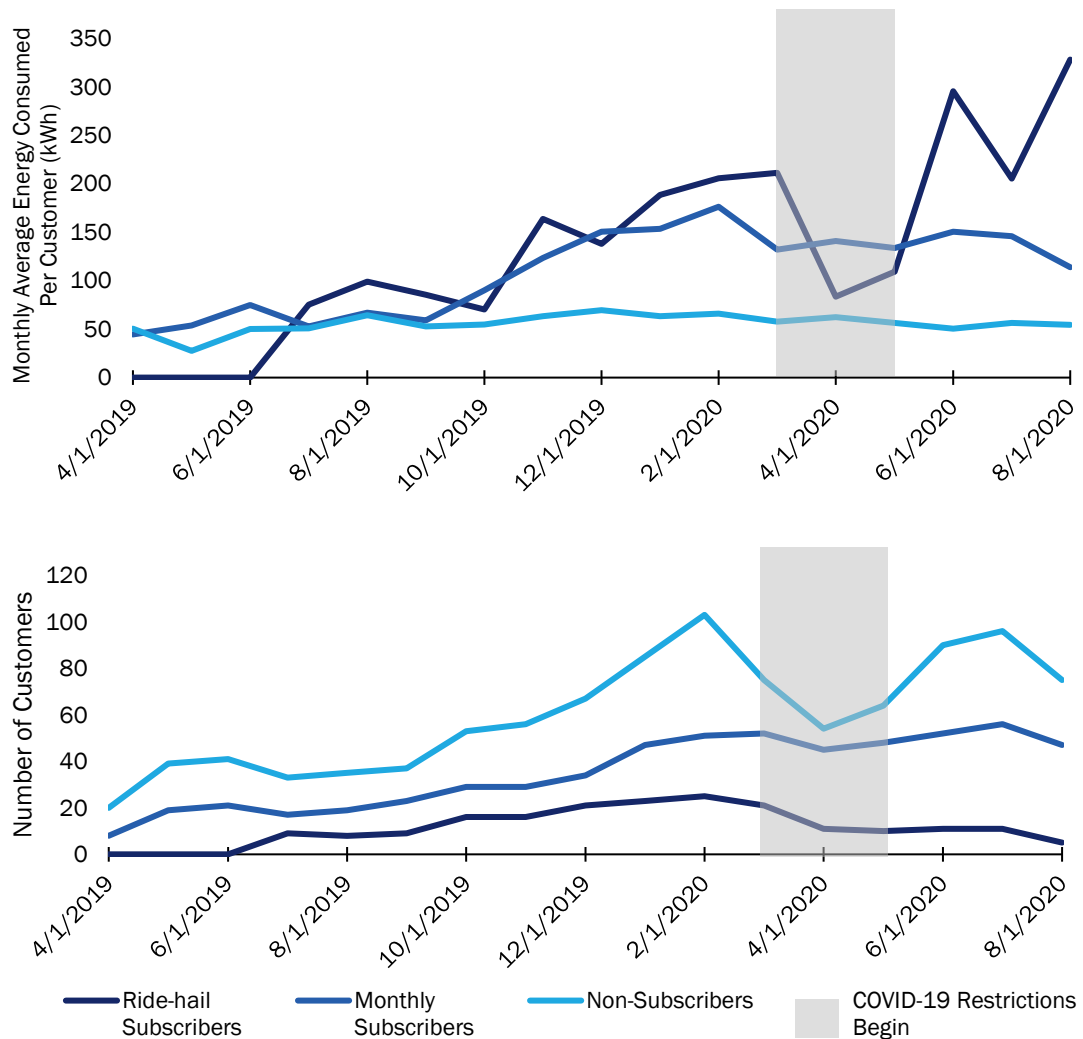


Figure 2. Average Monthly Energy Consumption (top) and Number of Customers per User Group (bottom), by User Group

Our analysis of Electric Avenue utilization data found that the \$0.19/kWh surcharge during PGE’s peak system hours (3:00 p.m.–8:00 p.m.) was highly effective at shifting charging away from system peak load periods, especially for ride-hail and monthly subscribers. We found non-subscriber users conduct about 21% of their charging during the peak pricing period while ride-hail and monthly subscribers conduct 10–13% of their charging during the peak pricing period (Figure 3). This includes the ride-hail drivers which had a free subscription subsidized by the TNC but were required to pay for the additional cost of energy during the peak period. As well as the monthly subscribers that did not include ride-hail drivers. Both groups indicated they were price sensitive to the peak period due to their lower charging rates during this time. The greater share of on-peak charging among non-subscriber users as compared to subscription drivers indicates that the peak period surcharge might be most effective in changing charging behavior if the driver is already on a subscription plan.

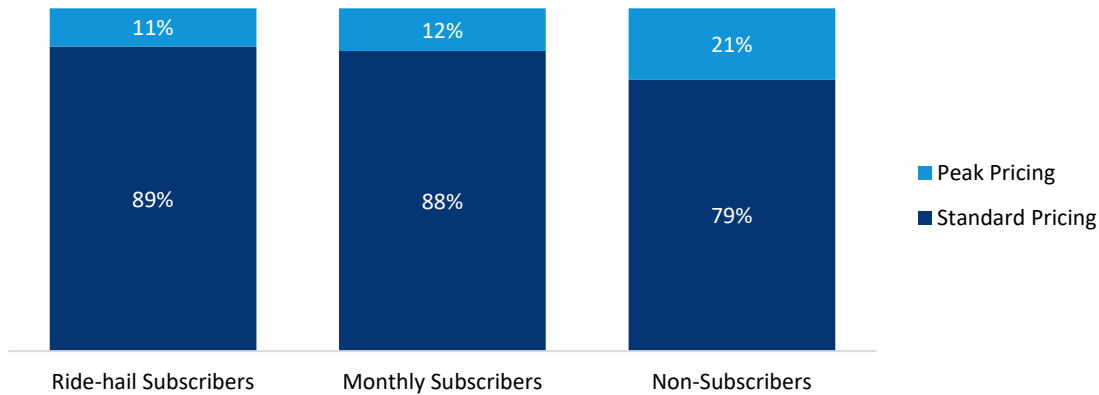


Figure 3. Peak Pricing Energy Consumption by Electric Avenue User Group

Customer Surveys

Due to the increase in on-demand delivery drivers because of the COVID-19 pandemic, the authors decided to include questions to identify on-demand delivery drivers in addition to the ride-hail drivers in the Wave 2 survey. Results from the Wave 2 survey show demographic trends for ride-hail and on-demand delivery drivers to be consistent with other research discussed above (see Lyft 2021; HUD 2021), although ride-hail survey respondents were reported being similar in race and ethnicity to the general population. Ride-hail and on-demand delivery drivers were significantly less likely to report being a college graduate, with 54% of ride-hail/on-demand drivers compared to 78% of the general population. Only 26% of ride-hail/on-demand drivers report an annual household (HH) income of over \$100,000 which is significantly lower than PGE customers identified as likely purchasing a vehicle in the next five years where nearly half (46%) earn an annual HH income of over \$100,000. Further, 26% of ride-hail/on-demand drivers report an annual HH income of less than \$50,000 which far exceeds the general population of only 9% earning below \$50,000. In addition to HH income and education, ride-hail/on-demand drivers have much lower rates of owning their own home. However, when we look closer at EV-owning ride-hail/on-demand delivery drivers there are similarities to the type of home and access to home charging with EV owners in the general population.

Ride-hail/on-demand drivers reported much lower rates of home ownership at 59% compared to 85% of the general population (Figure 5). Note, however, that EV-owning ride-hail/on-demand delivery drivers and EV owners in the general population were equally likely to report living in single family homes (93% vs. 88%, respectively) and having L2 charging available at home (67% vs. 66%, respectively). This suggests that single family homes and access to L2 charging is an important consideration to EV ownership. It is also not surprising that EV-owning ride-hail/on-demand delivery drivers share this similarity, considering their need to access reliable charging at both public and home locations to maintain the high number of miles they drive each day.

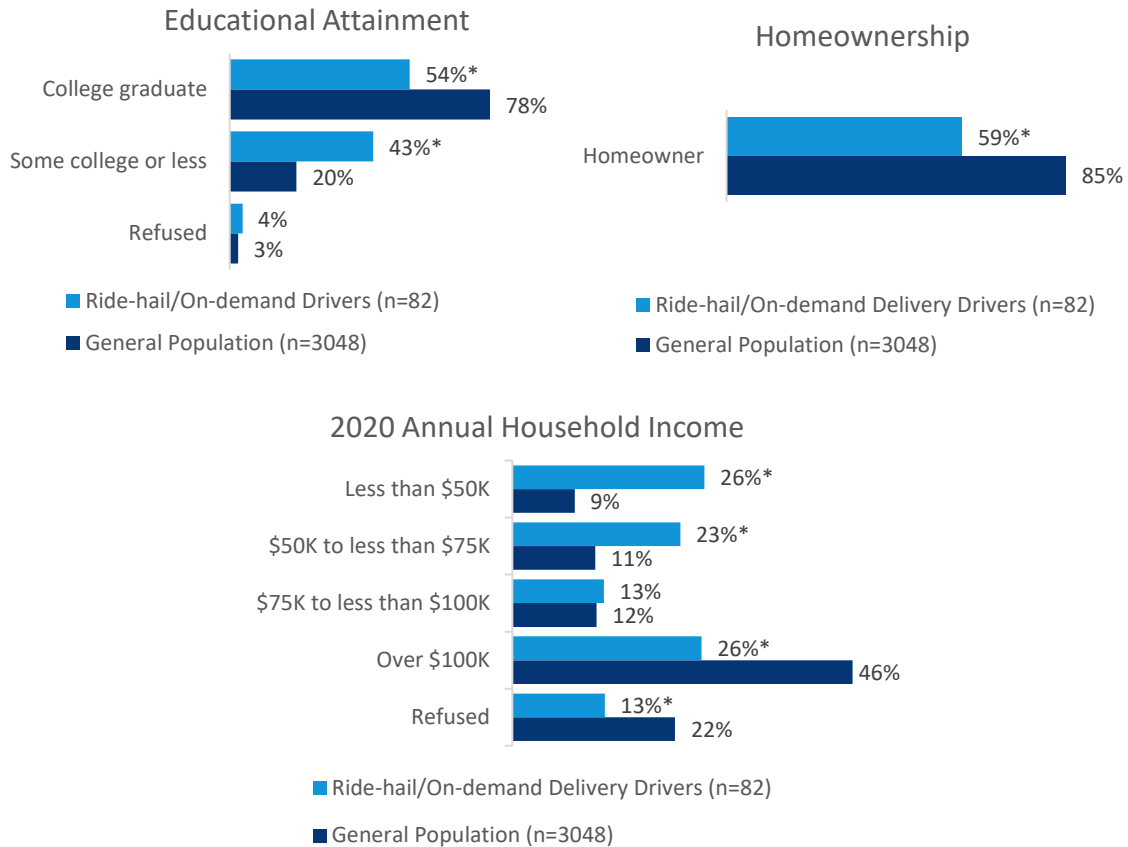


Figure 5. Demographic Characteristics of Wave 2 Survey Ride-hail and General Population Respondents

Note: * Indicates statistically significant difference between ride-hail/on-demand delivery drivers and general population (z-test for proportions, $p < .05$).

Ride-hail and on-demand delivery drivers are significantly more likely to report that lower fuel costs are a “major reason” they would consider purchasing an EV in the future (Figure 6). Further, ride-hail and on-demand delivery drivers are significantly less likely to report that protecting the environment and vehicle performance and handling are major reasons to purchase an EV.

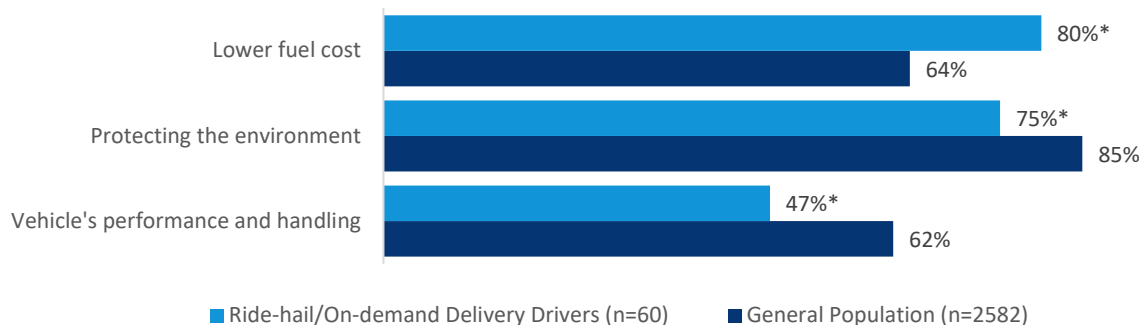


Figure 6. Reasons for Purchasing or Leasing an EV, by Customer Type (% Reporting a “Major Reason”; Multiple Responses Allowed) Note: * Indicates statistically significant difference between ride-hail/on-demand delivery drivers and general population (z-test for proportions, $p < .05$).

Ride-hail and on-demand delivery drivers are statistically more likely to report that the cost of home charging, concerns with reliability of electrical grid, and ability to charge at work are “major concerns” to purchasing or leasing an EV in the next five years (Figure 7).⁴ Note that in terms of preferred location to have charging available, general population and ride-hail/on-demand delivery drivers were equally likely to report preferring home charging (72% vs. 74%, respectively).

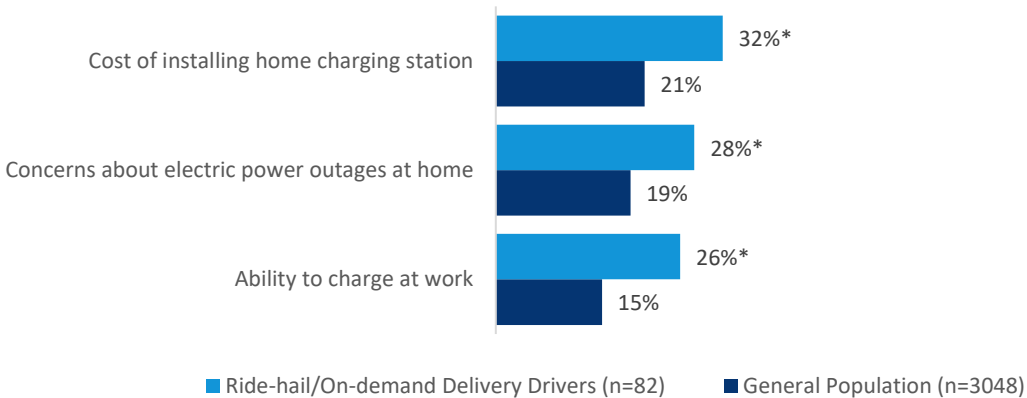


Figure 7. Barriers to Purchasing or Leasing an EV, by Customer Type (% Reporting a “Major Concern”; Multiple Responses Allowed)

Note: * Indicates statistically significant difference between ride-hail/on-demand delivery drivers and general population (z-test for proportions, $p < .05$).

Conclusions

Ride-hail and on-demand delivery drivers are an important segment to focus vehicle electrification efforts on as they can deliver significant emission reductions due to their high VMT. However, adoption in this segment will require efforts to overcome barriers to vehicle affordability and increased access to reliable charging infrastructure at affordable rates.

The research described above highlights the unique barriers ride-hail drivers experience to purchasing an EV. Survey data shows that ride-hail drivers are more likely to have lower incomes, which makes vehicle price a key concern for this market segment. Further, because ride-hail drivers are often considered independent contractors with variable incomes, they face challenges qualifying for vehicle loans. Increasing access in this segment will require strategies that provide greater access to these vehicles at lower-cost, and potentially non-traditional ownership models. For example, as the used EV market expands, there will be more affordable options for ride-hail drivers. Access to TNC EV rental programs is another potential way to address concerns with vehicle affordability, allowing drivers to benefit from decreased operating costs associated with EVs. Utilities can also help reduce the total cost of owning a vehicle through access to reliable and affordable charging that can help offset monthly operational costs.

Ride-hail drivers also have distinct charging needs compared to the average drivers. The authors found that ride-hail drivers report driving over 400 miles each week for ride-hail rides, considerably more than the average driver. Not only do ride-hail drivers require long-range EVs to meet their driving needs, but they also need access to reliable public charging, especially in low-income communities where a large proportion of ride-hail rides begin and end. Providing access to charging for ride-hail drivers can support

⁴ Note that the question listed “access to workplace charging” was listed as a barrier, among others, that respondents rated. The authors recognize that “access to workplace charging” may be inferred to as “access to public charging” due to the nature of their work.

utility goals in achieving higher utilization of utility-owned public charging. Our analysis of charging data from PGE's Electric Avenues uncovered that ride-hail drivers use significantly more energy each month compared to other Electric Avenue users. In addition, analysis shows that utilities can leverage pricing models to reduce demand during critical peak periods, as ride-hail and other subscription customers were observed to reduce usage of Electric Avenue chargers during peak periods.

This research provides insights into how utilities can better serve ride-hail drivers and plan for how ride-hail driver charging behaviors may impact utility distribution systems. As highlighted in this paper, utilities have a unique ability to act as an infrastructure provider, ensuring an equitable distribution of charging stations in communities that provide the ride-hail and on-demand delivery driver segment greater access to affordable and reliable fuel. This is a likely growing segment as economies continue to open and on-demand delivery services increase in popularity. This paper also highlights that financial assistance targeted to high-usage ride-hail drivers may reduce the barriers to purchasing EVs and those utilities can work with TNCs to offer subscription-based charging, which provides drivers with access to reliable charging infrastructure and stable fuel costs to encourage EV adoption. Utilities should consider ways to build partnerships with TNCs and ride-hail drivers by offering easy to understand subscription models that provide low-cost fuel to this growing vehicle segment. Further, this research shows how pricing models can be effective in mitigating demand during critical peak periods with subscription-based users. When deploying community charging infrastructure, utilities should consider incorporating price surcharges to reduce usage during peak periods.

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