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Where Are Buyers of Used Electric Vehicles in California?

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Issue

In the US, the market share of plug-in electric vehicles (PEVs)—including battery electric and plug-in hybrid electric vehicles—has been rapidly increasing as a variety of new PEVs have been introduced. States such as Washington and California have announced that they will phase out the sale of internal combustion engine vehicles within the next 15 years and are planning for the necessary infrastructure to support PEVs. Knowing where PEV users are located is important to ensure that electric vehicle charging infrastructure is installed in areas where it is needed. Information on PEV location can also inform electricity supply planning to prepare for a future with higher PEV adoption.

Previous studies have looked at the spatial distribution of new PEVs but not of used PEVs. Yet these spatial distributions will

likely differ because the buyers of used PEVs have different characteristics than new PEV buyers. Therefore, planning charging infrastructure and electricity supply based solely on new PEV data may not serve both new and used PEV buyers. Policies developed to support drivers of used PEVs may ultimately attract a broader group of people into the PEV market, as used vehicles are less expensive than new ones.

Researchers at the University of California, Davis used aggregated data at the zip code level to understand where buyers of second-hand PEVs are located, and to explore differences in the location and characteristics of regions with more original owners vs. second owners of PEVs. Data came from anonymized California DMV records and aggregated sales records of new and used PEVs in other states.

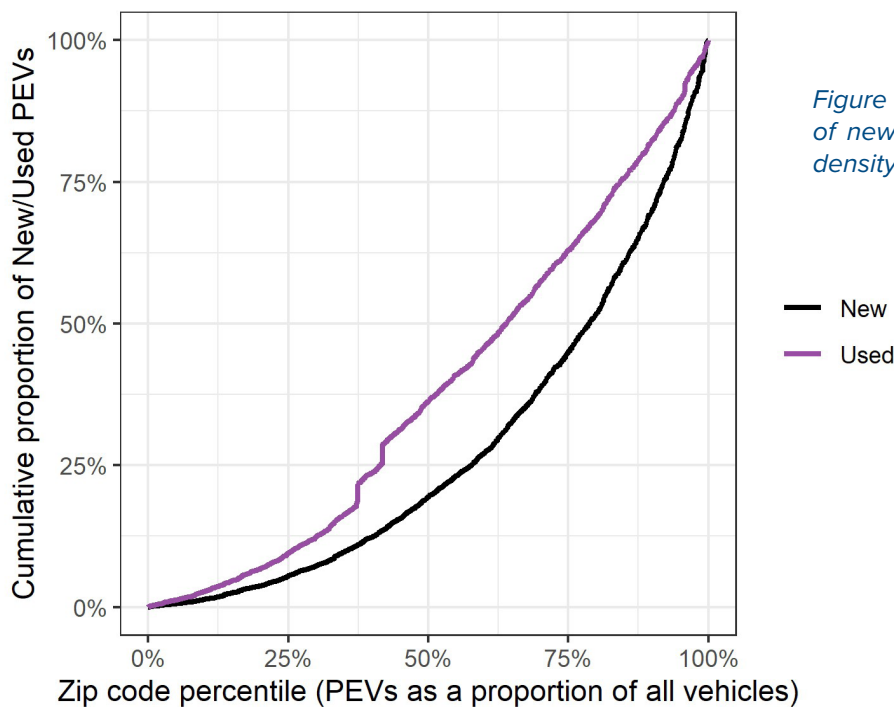


Figure 1. Cumulative distribution of new and used PEVs by PEV density percentile

Key Research Findings

Used PEVs appear to be slightly less spatially concentrated than new ones. Analysis of the distribution of new and used PEVs in California as a proportion of all vehicles shows that both new and used PEVs are densely concentrated in a small number of wealthy urban and suburban zip codes, but used PEVs are somewhat less concentrated than new PEVs (Figure 1). Half of new PEVs are located in only 15% of California zip codes, while half of used PEVs are in 25% of zip codes. This could be because the lower cost of used PEVs makes them accessible to slightly more people.

Used PEVs generally do not seem to be significantly expanding California’s PEV market yet. While used PEVs are slightly less spatially concentrated than new ones, used PEVs are still more likely to appear in areas with high concentrations of new PEVs. This could be due to the “neighborhood effect”—the influence of peers who have adopted PEVs—and the familiarity with the vehicle technology it generates. Another possible factor is home ownership. Residents in areas with low home ownership are less likely to be able to install chargers, and therefore less likely to choose a new or used PEV. However, more research is needed to evaluate the reasons for this phenomenon.

Used PEVs may be contributing more substantially to adoption in certain regions and communities. Analysis of PEV sales nationwide found that while California generally has more new PEV sales than used sales, the opposite is true for many other states. Within California, used PEVs make up a higher proportion of PEVs in some areas than others. Used PEVs make up more than a quarter of all PEVs in nearly every ZIP code in the Sacramento area, for example, suggesting that they may be playing a role in expanding PEV ownership there.

Policy Implications

A disaggregated study of used PEVs is needed in order to fully understand the sociodemographic, location, and use patterns of the owners and their demand for charging infrastructure. However, current results suggest that used PEVs concentrate around areas with already-high numbers of PEVs. Given the potential for lower-cost used PEVs to attract new market segments, new policies can have more impact by focusing on building awareness, incentives, and infrastructure in areas with low numbers of new PEVs but high potential for used market growth.

More Information

This policy brief is drawn from “Where are Used Electric Vehicles and Who are the Buyers?,” a report from the National Center for Sustainable Transportation, authored by Gil Tal, Jae Hyun Lee, Debapriya Chakraborty, and Adam Davis of the University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/where-are-used-electric-vehicles-and-who-are-buyers>.

For more information about the findings presented in this brief, contact Gil Tal at gtal@ucdavis.edu.

The National Center for Sustainable Transportation is a consortium of leading universities committed to advancing an environmentally sustainable transportation system through cutting-edge research, direct policy engagement, and education of our future leaders. Consortium members: University of California, Davis; University of California, Riverside; University of Southern California; California State University, Long Beach; Georgia Institute of Technology; and the University of Vermont.

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