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Clean Cities: Used Plug-in Electric Vehicles (PEVs) in low-income households

Olumide Winjobi[1], Jarod Kelly[1]

[1]*Argonne National Laboratory, 9700 South Cass Avenue, Lemont, IL*

owinjobi@anl.gov, jckelly@anl.gov.

Executive Summary

Reliable access to amenities and better-paying jobs can be an avenue to improve the social equity for low-income households. Compareed to used internal combustion engine vehicles (ICEVs), used plug-in electric vehicles (PEVs) have lower operating costs and lower initial purchase price retention (meaning that retained value of PEVs are lower than ICEVs and sell for relatively less as a used vehicle). These PEV may thus serve as a low-cost and low maintenance mode of transport for these low-income households. Zero tail-pipe emissions of PEVs also makes them an attractive option in mitigating emissions related to the transportation sector. Despite these potential benefits, some barriers such as the access of these households to charging infrastructure through public charging and awareness on the potential cost benefits of the electric drivetrain may need to be addressed to encourage the participation of low-income households in electric mobility.

Abstract

Lack of vehicle ownership in an household can either be voluntary due to reasons such as concern for the environment, e.t.c or involuntary due to the cost associated with a vehicle ownership, which has been reported to be a significant household expenditure second only to housing.[1] A breakdown of involuntary zero-vehicle households in the United States is dominated by low-income households with household income lower than 50% of the poverty level. Households that are at-or-below the poverty line have an 18% rate of being without a vehicle compared to only ~3% of households with income greater than 200% of the poverty level.[2] Limited mobility of these low-income households due to lack of reliable means of transportation impacts their access to critical services and amenities.[3] Such households without access to a reliable vehicle have also been reported to be less likely to be employed, which further limits their ability to obtain better-paying job opportunities.[4]

Currently, plug-in electric vehicles (PEVs) are reported to have lower residual values relative to internal combustion engine vehicles (ICEVs), i.e. having lower retention of their initial purchase price.[5] Therefore, used PEVs can potentially serve as a low-cost and low-maintenance means for vehicle ownership in these zero-vehicle low-income households, consequently improving the access of these households to amenities, services, and opportunities to better-paying jobs. With zero tailpipe emissions, used PEVs can also help mitigate pollution as some of these low-income households are sometimes located in high pollution areas such as along congested highways, as observed in the San Joaquin Valley in California.[6]

This study reviews the primary barriers to the adoption of PEVs with an emphasis on the adoption of used PEVs in low-income households with a view to creating a discussion platform to address some of the standing

notions about PEVs (both new and used) such as: *Are PEVs just for the wealthy? How does the cost to operate and maintain PEVs compare with ICEVs?*

Addressing some or all the barriers reviewed in this study may, therefore, help increase the participation of low-income households in electric mobility.

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Presenter Biography

Olumide Winjobi is a postdoctoral researcher with the Energy Systems Division at Argonne National Laboratory. He received his B.Sc. in chemical engineering from the University of Lagos and his MS and Ph.D. in chemical engineering from Michigan Technological University. His research interests are in energy, mobility, and sustainability.