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Introduction

In striving for 100% carbon-free energy by 2035, ensuring equitable access and benefits across all populations is crucial. The shift toward clean energy and sustainable transport involves numerous challenges, requiring collective efforts from various stakeholders to develop inclusive strategies and policies. This includes community engagement, equitable funding for technology, and expansion of programs to foster an equitable energy transition. Additionally, while cities have initiated incentive programs to promote electric vehicle (EV) adoption, the effectiveness of these programs in ensuring affordable EV ownership for disadvantaged communities is yet to be fully understood. This paper, using Los Angeles as a case study, highlights the importance of evaluating and refining these incentive programs to enhance EV accessibility for marginalized groups.

Methodology

We used three National Renewable Energy Laboratory-developed tools for analysis.



ADOPT: Automotive Deployment Options Projection Tool



EVI-Pro: Electric Vehicle Infrastructure - Projection Tool



EVI-Equity: Electric Vehicle Infrastructure for Equity Model

Business-as-usual (BAU) scenario: A \$7,500 federal and \$2,000–\$7,500 state rebate for new battery EVs (\$1,000–\$6,500 for plug-in hybrid EVs) and a \$4,000 federal and \$1,500–\$2,500 city rebate for used EVs.

Equity scenario: The city rebate increases from \$2,500 to \$4,000 for households with annual incomes up to \$40,000.

Results: EV Stock and Price Prediction in BAU

By 2035, it is anticipated that Los Angeles will host around 1.6 million plug-in EVs.

The majority of EVs will be battery EVs, with about half of all EVs no more than 5 years old.

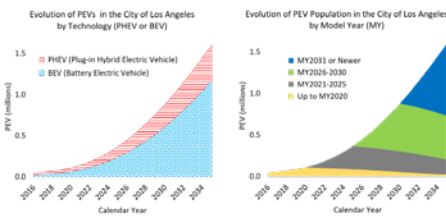


Fig. 1. EV stock in Los Angeles by technology and model year

The cost of EVs is expected to decrease over time. By 2035, the projected buying price for EVs in Los Angeles is anticipated to be \$35,000 for new EVs and around \$23,000 for used EVs.

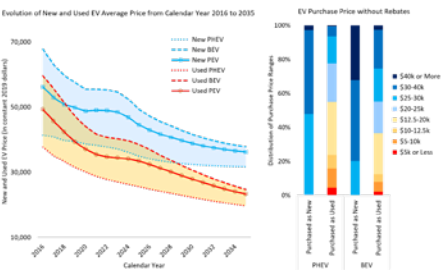


Fig. 2. Projected purchase price for new and used EVs

Results: Access and Affordability for EVs and Charging Infrastructure in BAU

In 2035, more than half of EV buyers are estimated to come from the low-to-middle income population; most people in that population do not have access to home charging.

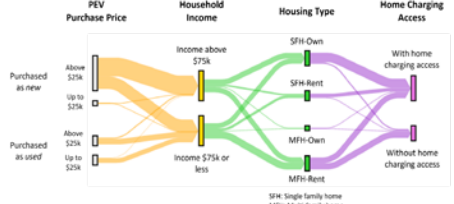


Fig. 3. Breakdown of EV owners in Los Angeles in 2035 by household income, housing type, and access to home charging

Transportation costs are 15% of income without an EV; adopting an EV makes it 12%–26%, varying with new/used, rebates, vehicle type, and home charging.

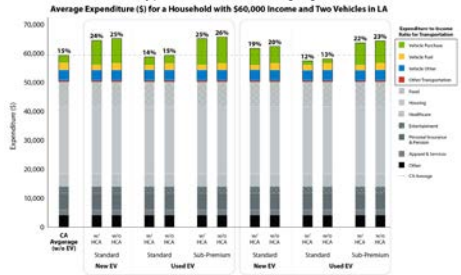


Fig. 4. Household expenditures related to EV and home charging access

Results: Access and Affordability for EVs and Charging Infrastructure in Equity Scenario



Fig. 5. Share of predicted EV owners in Los Angeles in 2035 by household income and EV market

Increasing low-income rebates for used EVs from \$2,500 to \$4,000, aligning with federal levels, could potentially stimulate a 2% increase in used EV adoption among low-income households (roughly 50,000 vehicles by 2035).

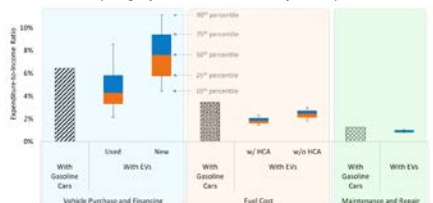


Fig. 6. Expenditure-to-income ratio for households with an income of \$75,000 or less that adopted EVs in Los Angeles by 2035

- For vehicle purchase and financing: On average, used EVs adoption could enable households with annual incomes ≤\$75,000 to save around 3% of total expenditures.
- For operating costs: EVs offer a reduction in fuel expenses across all scenarios, but public charging leads to 1% (about \$300 annually) higher expenditures than home charging.
- For maintenance cost: EVs decrease maintenance and repair costs by 35%.
- Consider providing \$300/year financial support to EV owners who only have access to public charging.

