Project Title: Quantifying New and Used Plug-in Electric Vehicle Market Dynamics in Disadvantaged Communities

Area of Interest: 13: Transportation and Energy Analysis

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Project Objectives: Electrifying the vehicle fleet is a cornerstone of most plans to curb the greenhouse gas emissions causing climate change, but plug-in electric vehicles (PEVs) are still not accessible for most car buyers in the U.S. Policy interventions will be needed to make PEVs more accessible to disadvantaged communities (DACs), but little is known about the needs and preferences of these communities as well as the market dynamics governing the used vehicle market—where most people in DACs buy vehicles. This research will generate new knowledge about vehicle ownership in DACs as well as the market dynamics governing the new and used markets to guide future policy decisions aimed at making PEVs more accessible to more diverse communities.

Project Description: This research involves two research thrusts: 1) an analysis of a large dataset of new and used vehicle listings capturing nearly every vehicle sold at dealerships in North America between 2015 and 2023, and 2) interviews and choice-based conjoint surveys of car buyers and dealerships in DACs in two case study locations. The research thrusts will be conducted in parallel, with initial exploratory tasks for each thrust being conducted in the first budget period and later confirmatory tasks for each thrust being conducted in the second budget period. The analyses will generate new data and insights about vehicle ownership and preferences of vehicle owners in DACs will help identify barriers to and solutions for increasing PEV adoption in these communities. The research will also benefit other modeling efforts regarding the dynamics of vehicle fleet turnover by unpacking when, where, and at what prices new and used vehicles are brought to dealerships at an unprecedented resolution. The research will generate new estimated depreciation rates of most recent vehicles over the past seven years can also improve the accuracy of multiple existing projects, such as the "Total Cost of Ownership" modeling at multiple national labs. New data will be collected on state-level PEV incentives for every state at an annual basis between 2015-2023 and merged into the vehicle listings data base. Spatial analyses of PEV supply over time will quantify the availability (both in terms of location and affordability) of PEVs in DACs. Finally, all results will be integrated into NREL's EVI-Equity tool to reveal important equity implications of all analyses. Results from all analyses will reveal new local knowledge about the needs and preferences of car owners in DACs as well as the role of the used market as a potential conduit for increasing PEV adoption in DACs. Survey and interview results will be specific to the two case study locations, though some outcomes may be more generalizable. For example, the integration of PEV supply mapping into the EVI-Equity tool will allow users to compare similar dynamics in cities across the U.S.

Major Participants: Dr. John Paul Helveston (GWU), Dr. Dong-Yeon Lee (National Renewable Energy Laboratory, NREL), Eric Wood (NREL), and Jeff Gonder (NREL)