

Electric Vehicle Suitability for Public Fleets in Disadvantaged Communities

Summary Report

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California Air Resources Board

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 **Air Resources Board**

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Contents

- I. Background 4
- II. Project Approach 4
- III. Suitability Assessment Process 4
- IV. Baseline Results 5
- V. Modelling Results..... 6
- VI. Continued Engagement 7
- VII. Driving Deployments 8
- VIII. Conclusions 8

I. Background

Since 2010, the California Air Resources Board has provided funding and contracted with the Center for Sustainable Energy (CSE) to administer the Clean Vehicle Rebate Project (CVRP). CVRP provides incentives for California consumers, businesses and public agencies that purchase or lease clean vehicles. In 2015, the Public Fleet Pilot Project was launched to offer increased rebates to public agencies operating clean vehicles in disadvantaged communities.¹ Disadvantaged communities suffer disproportionately from poor air quality and other environmental issues, and the California Air Resources Board has supported a suite of pilot projects to focus mitigation efforts and innovative investments in these communities.

II. Project Approach

In addition to increased vehicle rebates, the Public Fleet Pilot Project provided free plug-in electric vehicle (PEV) suitability assessments to eight public agencies in disadvantaged communities throughout the state. CSE partnered with FleetCarma to deliver the service to five cities, two counties and one water district. Most of these agencies had little or no prior experience with PEVs and desired guidance and data to evaluate potential PEV acquisitions. The complimentary analysis performed by FleetCarma provided evidence-based recommendations to integrate PEVs into specific fleet applications. Suitability assessments were followed up with additional technical support from Public Fleet Pilot Project staff to help participating public fleets leverage assessment results into actual PEV procurement.



III. Suitability Assessment Process

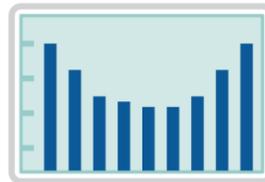
Public Fleet Pilot Project staff regularly conducts outreach to public fleets in disadvantaged communities about the availability of PEV incentives. Through these engagement efforts, eligible agencies were invited to participate in the free PEV suitability assessment. FleetCarma partnered with CSE to present information on the suitability assessment process and gather information from potential participants.

¹ Disadvantaged communities as defined by the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment pursuant to California Senate Bill 535: <http://www.calepa.ca.gov/EnvJustice/GHGInvest/>.

Once the eight agencies were selected, FleetCarma worked with each fleet to finalize a list of vehicles to analyze for potential replacement. Telematics devices were installed to track vehicle usage and provide a baseline for comparison with potential replacement models. The second-by-second utilization and performance data was uploaded to “drive” virtual PEV models that simulated different adoption scenarios. The result was a series of reports on the suitability and business case for PEVs under individualized fleet conditions.



Log baseline vehicle operation to determine how vehicles are currently used.



Input duty cycle data into FleetCarma EV models to evaluate EV suitability and operational costs.



Discover which EV technologies best match fleet vehicle duty cycles and optimize total cost of ownership.

IV. Baseline Results

In total, 85 vehicles were selected for PEV suitability assessments. Detailed baseline information was collected to characterize each individual vehicle. Participating fleets provided input on general fleet management practices such as duty-cycle needs and characteristics, average vehicle life and expected residual value. Data loggers installed in each vehicle tracked detailed utilization and performance information before being returned to FleetCarma for analysis.

The selected vehicles logged nearly 35,000 miles over several weeks of monitoring. Of the 85 vehicles analyzed, 56 were sedans, 20 were pickup trucks, five were vans and four were sport utility

“The information is extremely valuable for us to make informed decisions regarding EVs in our fleet.”

– Doug Bond, Alameda County

vehicles. Vehicle model years ranged from 1997 to 2014, with a project-wide median of 2007. The most common vehicle applications selected for analysis were motor pool (17), building inspection/code enforcement (14) and social services (11). As shown in the following figure, average performance metrics for the baseline vehicles showed a high potential for PEV suitability with low daily driving distances and opportunities for significant fuel and emissions benefits based on the fuel economy and idling time of the vehicles.

Average Baseline Vehicle Statistics

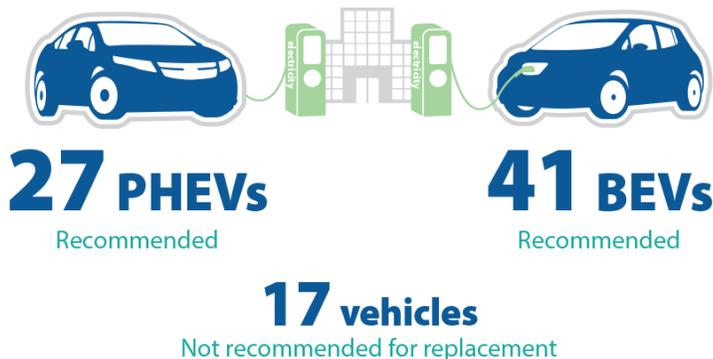


V. Modelling Results

All vehicle models eligible for the Public Fleet Pilot Project rebate were included in the analysis, as well as several larger PEV models to satisfy the needs of fleets with vans and trucks. The analysis focused on four key questions for each vehicle:

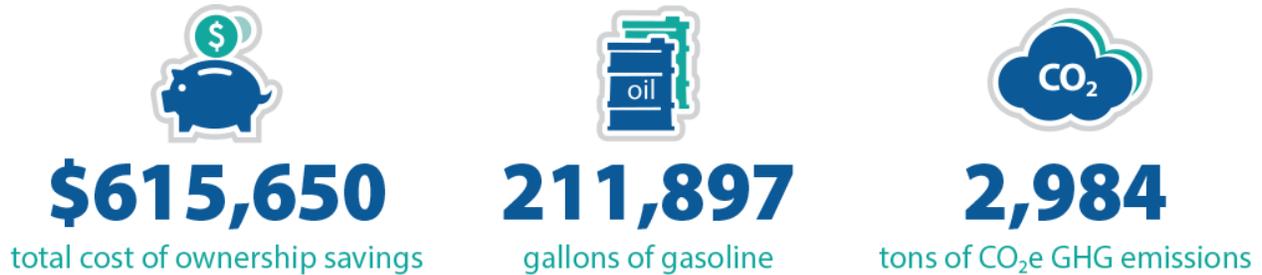
1. Is there a PEV model that would be “range capable,” with sufficient driving range to complete each trip?
2. Is there a PEV model that would be “charge capable,” with enough time to fully charge the vehicle between duty cycles?
3. Is there a financial benefit for the fleet to replace the existing vehicle with a suitable PEV?
4. What are the environmental benefits of replacing the existing vehicle with a suitable PEV?

Based on these factors, 68 of 85 vehicles (80%) analyzed were recommended for replacement with a PEV. Of the 68 vehicles recommended for replacement, estimated savings over the life of the vehicle ranged from \$23 to \$4,747, with an average of \$1,309. Sedans were the most often recommended for replacement (52/56), while pickups were least often recommended for replacement (10/20). If each



fleet replaced all the recommended vehicles with the best-fit PEV, the fleets would save an average of approximately \$75,000, or nearly 25% of estimated total cost of ownership over the life of the vehicles. Recommended replacements also would prevent an average of 67% of each fleet’s modeled vehicle emissions.

Total Project Savings Potential with PEV Replacement Recommendations



VI. Continued Engagement

After delivering the PEV suitability assessment results, Public Fleet Pilot Project staff continued to engage with each participating agency to explore their PEV options. This follow-up support included providing best practices, guidebooks and personalized information on topics such as electric vehicle charging infrastructure, incentives and funding opportunities, and peer-to-peer connections to agencies with existing PEV procurement contracts or experience with PEVs on the road.

A post-project questionnaire was distributed to participants to gauge the utility of the PEV suitability assessment process, the value of potential additional services and the level of continuing barriers to PEV deployment. Seven of the eight participating fleets provided feedback on the questionnaire. Responses verified several key barriers and facilitators previously noted by staff throughout the Public Fleet Pilot Project engagement efforts.

Vehicle purchase price and charging infrastructure were the most significant challenges to PEV adoption according to questionnaire respondents. The cost and complexity of electric vehicle charging infrastructure remains a difficult barrier. It is especially hard for small agencies with limited staffing to research options and carry out potentially expensive and complex electric vehicle charging installations. Simple, turnkey solutions are very desirable for most public agencies. Financial support for both charging equipment and vehicle acquisition remains a necessary facilitator for most fleets as the PEV market matures. The fleet market also is in need of more affordable, commercialized vehicles in the heavy light-duty and medium-duty sectors. Pickup trucks and vans make up a sizeable portion of fleet vehicles.

Questionnaire respondents marked procurement support, best practices and peer-to-peer information as the most valuable potential services. This kind of assistance is in high demand for fleet PEV deployments to agencies with limited or no experience with the technology. Several participants expressed interest in deploying their first PEVs in centralized motor pools. For many public agencies, motor pools are an attractive starting point because vehicles can be directly managed by fleet staff to ensure they are assigned to appropriate trips and kept sufficiently charged. However, PEVs in this application often remain underutilized if not carefully managed, thus reducing the return on investment. To move PEVs beyond motor pool into vocational applications where they can enjoy consistently high utilization, public fleets often need additional assurances that the vehicle's capabilities will meet the duty cycle's needs.

VII. Driving Deployments

The post-project questionnaire and subsequent communication with participating agencies suggests that the suitability assessment process was successful in facilitating actual PEV deployment. All post-project questionnaire respondents answered that they were “very satisfied” with the experience and six of the seven responded that they were “more likely to acquire electric vehicles” after completing the suitability assessment. These six agencies also said they were “very likely” to acquire PEVs within the next year. The information on potential cost savings was most valued by participants.

 **100%** of participants were “**very satisfied**” with the process.

 **86%** of participants said they were **more likely to acquire EVs** after the assessment.

 **86%** of participants said they were very likely to acquire EVs **within one year**.

Within four months of completing the assessment, most of the fleet participants had begun the process of acquiring electric vehicles, with a total of 50 PEVs in the procurement pipeline. This is especially significant because several of the participating agencies had no prior experience acquiring or operating PEVs in their fleets and several are located in areas with relatively low levels of PEV market penetration.

VIII. Conclusions

Public agencies, especially local governments in disadvantaged communities, may require extra assurances to invest in new and unfamiliar technologies. They may be operating within tight fiscal constraints, have procurement policies to minimize capital costs and lack vehicle duplication or flexibility to deal with potential failures. For these agencies, financial and technical assistance is essential to facilitate PEV adoption.

Outside technical assistance that independently validates new technologies for fleets on a vehicle-by-vehicle basis empowers local governments to begin deploying PEVs. Fleet managers backed up by expert advisors are more effective at convincing executives and officials to support PEV procurement. Technical support helps local governments leverage limited funds to maintain or expand levels of service while also implementing robust climate action plans and air quality goals.

“This assessment was a great opportunity to evaluate our future needs for electric vehicles and related equipment to change our carbon footprint.”

— Roseann Galvan, City of Selma



As a mission-driven nonprofit organization, CSE works with energy policymakers, regulators, public agencies and businesses as an expert implementation partner and trusted information resource. Together, we are the catalysts for sustainable energy market development and transformation.

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