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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Field Study of Battery-Electric Sweepers

Evaluating the effectiveness, benefits, drawbacks, and special use cases of Battery-Electric (BE) street sweepers as alternatives for traditional fuel technologies.

Equipment

MAY 2025

Project Title:
Battery-Electric Sweeper Evaluation

Task Number: 4137

Start Date: June 2, 2023

Completion Date: May 31, 2026

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WHAT IS THE NEED?

The largest source of the state's greenhouse gas (GHG) and several smog-causing pollutant emissions is California's transportation sector including tailpipe emissions, oil extraction, and oil refining (California Air Resources Board, 2022). In order to reduce GHG emissions and improve air quality, California is moving towards Zero-Emission Vehicles (ZEVs), which do not produce any on-road GHG emissions or criteria pollutants. The California Air Resources Board (CARB) has ZEV targets in place for light-duty vehicles and in 2020 CARB adopted ZEV requirements for heavy trucks (California Air Resources Board, 2020). California Department of Transportation's (Caltrans') Division of Equipment (DOE) will be acquiring eighteen BE street sweepers in the spring of 2023 to help the state meet its climate and air quality goals. With the implementation of this new street sweeper technology, there will be a need to understand specific usage and performance characteristics for the new technology in order to help evaluate the benefits, drawbacks and nuances of the introduction of this new equipment to the Caltrans fleet.

WHAT ARE WE DOING?

This research project will collect and evaluate detailed activity and Controller Area Network Bus (CAN Bus) data from a subset of at least five BE street sweepers and fleet management level activity data from the Geotab fleet management system for all eighteen newly acquired BE street sweepers in the Caltrans fleet. Additionally, survey of Caltrans BE sweeper operators and mechanics will be conducted to help characterize function and performance of the BE sweepers.

Caltrans

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WHAT IS OUR GOAL?

The goal of this research is to assess the in-use characteristics of the newly acquired BE street sweepers to provide insight into their particular usage and performance., Parameters of interest include values such as daily travel time and distance, hours of operation, per charge travel times and distances, recaptured energy through regenerative braking, etc.

WHAT IS THE BENEFIT?

This research will provide necessary information to help assess the effectiveness, benefits, drawbacks, and special use cases of BE street sweepers as alternatives for traditional or competing fuel technologies.

WHAT IS THE PROGRESS TO DATE?

The research team at UC Riverside conducted virtual meetings and in-person meetings at the US Global location with the BE sweeper powertrain manufacturer iLite to discuss Engine Control Unit (ECU) data collection. The team provided iLite with a list of CAN parameters for data collection organized by importance. The research team updated the analysis of the Geotab activity data for three BE sweepers, and retrieved the most recent activity data to date for each BE sweeper, general activity statistics were updated, and hourly activity frequency heat maps were added to the analysis.

REFERENCES

1. California Air Resources Board. (2020, June 25). *California takes bold step to reduce truck pollution.* https://ww2.arb.ca.gov/news/california-takes-bold-step-reduce-truck-pollution
2. California Air Resources Board. (2022, October 26). *California greenhouse gas emissions for 2000 to 2020.* https://ww2.arb.ca.gov/sites/default/files/classic/cc/inventory/2000-2020_ghg_inventory_trends.pdf