

Maintenance**NOVEMBER 2024****Project Title:**Evaluation of Electric Vehicle (EV)
Heavy Equipment for Use
in Caltrans' Operations**Task Number:** 4307**Start Date:** June 18, 2024**Completion Date:** May 31, 2026**Task Manager:**Hamid Ikram
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Evaluation of Electric Vehicle (EV) Heavy Equipment for Use in Caltrans' Operations

To evaluate the use of EV heavy equipment in the California Department of Transportation (Caltrans) maintenance operations.

WHAT IS THE NEED?

The heavy equipment currently used in Caltrans maintenance operations such as loaders and excavators are powered by diesel fuel which results in high carbon emissions. There is a need to find alternative to the gas-powered heavy machinery that is reliable and can reduce tailpipe emissions. Electric machines are identified as a suitable substitute for the current technology. Transitioning to electric equipment will eliminate the tailpipe carbon emissions and will reduce the environmental impact of relevant operations. These electric machines are especially suitable for operations in the enclosed spaces and in dense, low-income regions, where the health hazards from fine particulate emissions are an additional concern. This project will help Caltrans understand the latest progress in the development of EV heavy equipment and will identify challenges and opportunities associated with the integration of EV heavy equipment in Caltrans fleet. This project also aligns with the State of California's mission to roll out 100% zero-emission heavy-duty vehicles by 2045.

WHAT ARE WE DOING?

In this research project the contractor, from Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center, UC Davis will perform product search and gather information (on the commercially available EV heavy equipment that meets Caltrans' needs), work with the project panel to select a commercially available EV heavy equipment for evaluation, acquire the selected equipment, develop test plan, and perform field testing and evaluation of the equipment to assess its suitability for Caltrans maintenance operations. The Caltrans maintenance personnel will be



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trained to operate and maintain the equipment. The evaluation of EV heavy equipment in this project will also include collection of feedback from Caltrans maintenance personnel regarding their experience in operating the EV heavy equipment. This project will result in a final report summarizing the results and deliverables, including recommendations for further adoption of EV heavy equipment in Caltrans' fleet.

WHAT IS OUR GOAL?

The goal of this project is to address questions such as the availability of EV heavy equipment, suitability of EV heavy equipment for Caltrans maintenance operations, challenges associated with the integration of EV heavy equipment in Caltrans fleet, training needs for Caltrans staff to operate and maintain the EV heavy equipment, potential benefits of its adoption in Caltrans fleet, and the recommendations on whether or not to adopt the EV heavy equipment in Caltrans fleet.

WHAT IS THE BENEFIT?

The adoption of EV heavy equipment will reduce carbon emissions and thus the environmental impact of Caltrans maintenance operations. The elimination of tailpipe emissions reduces possible health hazards related to activities in confined spaces for Caltrans workers. In addition, the electric machines have fewer moving components compared to their gas-powered counterparts. Therefore, it is expected that they will require less maintenance and have lower downtime and a longer lifespan.

WHAT IS THE PROGRESS TO DATE?

Work on this contract started on June 18, 2024, and the kick-off meeting was held on July 8, 2024.

Contract gathered a list of EV heavy equipment, including their commercial availability, technical specifications, possibilities for data logging and sensor installation, purchase prices, and lease costs.