DRISI
Caltrans Division of Research, Innovation and System Information

Research Notes

Quantifying the Effects of Vehicle Electrification Program on Traffic Loads

This research explores the potential impacts of vehicle electrification on pavement.

Modal

MAY 2020

Project Title:
ZEV Center of Excellence

Task Number: 3333

Start Date: January 1, 2020

Completion Date: December 31, 2020

Task Manager:
Stan Chow
Transportation Engineer
stan.chow@dot.ca.gov

WHAT IS THE NEED?

Electric vehicles (EVs) tends to have a higher weight than a normal vehicle. The increasing vehicle weight is a concern for the maintenance and design of pavement and road infrastructure. This project will assess the impacts of vehicle electrification on the average axle loads for a range of vehicle classes. The study will then estimate the potential impacts to average traffic loads based on traffic composition and targets for increasing vehicle electrification out to 2050. This research will use a combination of life-cycle assessment (LCA) and life-cycle cost (LCC) methods to estimate environmental impacts and costs.

WHAT ARE WE DOING?

Conducting a comprehensive review of peer-reviewed, grey literature, and available data examining mass of electric vehicles and forecasts of electric vehicle battery performance improvements. Estimating axle loads for different EV categories and forecast potential changes in axle loads based on changing models and improving battery systems. Then developing and refining a methodology for estimating pavement damages based on vehicle weight and estimate axle load damages.

WHAT IS OUR GOAL?

Results from this analysis can also be combined with life cycle modeling of EVs to better understand the environmental consequences of their deployment and use. A white paper will detail the research findings and discuss a range of policy implications.

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WHAT IS THE BENEFIT?

This study will explore the impacts of vehicle electrification policies on traffic loads in California. The proposed white paper will provide estimates of how increased vehicle electrification could impact axle weights, average traffic loads, and pavement damages. The research will support the state's EV policies and continued investments in roadway construction and maintenance.

WHAT IS THE PROGRESS TO DATE?

During the past quarter, the research team performed data collection and literature review. They conducted initial literature review and developed and refined weight estimates of battery electric vehicle system components. They also evaluated potential data sources, including weight in motion data, to evaluate existing axel load spectra and damage impacts.