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

Research Notes

Sustainability: Pavement Life Cycle Assessment (LCA)

Updating database and implementing new models for LCA.

Pavement

MAY 2025

Project Title:
Partnered Pavement Research Center (PPRC) 23: Sustainability

Task Number: 4207

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) and the University of California Pavement Research Center (UCPRC) have partnered for over a decade to collect data on pavement materials, construction methods, and energy sources. These efforts support eLCAP, Caltrans' web-based pavement life cycle assessment (LCA) tool. Regular updates to its databases and models are essential to ensure LCAs remain accurate, relevant, and useful for decision-making in project design, pavement management, and policy evaluation, especially as California advances climate policies such as Assembly Bill AB32, greenhouse gas (GHG) emission targets, and pollutant regulations.

WHAT ARE WE DOING?

This task order supports Caltrans in expanding and improving its pavement LCA capabilities through the following activities:

- Updating existing inventories and developing new material inventories in OpenLCA, a software tool for life cycle assessment and sustainability analysis, for materials not covered by the Federal LCA Commons or industry environmental product declarations (EPDs).
- Implementing use stage models, EPD considerations, and updated inventories in eLCAP, along with improvements to the tool's features and functionality.
- Preparing a critical review package for the updated inventories, models, and supporting documentation to ensure accuracy and transparency.
- Continuing support for Caltrans' EPD program through participation in committee meetings and alignment of LCA practices with EPD initiatives.

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system.

WHAT IS OUR GOAL?

The goal of this task order is to expand, update, and improve Caltrans' pavement LCA capabilities by updating inventories, implementing new models, enhancing the eLCAP tool, and ensuring results undergo external critical review. These efforts strengthen Caltrans' ability to conduct LCAs that support environmentally responsible, energy-efficient, and resource-conscious transportation decisions in alignment with California's climate action and sustainability goals.

WHAT IS THE BENEFIT?

By enhancing Caltrans' ability to conduct accurate, up-to-date pavement LCAs, this task order supports more informed decisions about project design, maintenance, and material choices. These decisions help minimize environmental impacts, improve energy and resource efficiency, and guide sustainable infrastructure development, all in alignment with California's climate policies and emission reduction goals.

WHAT IS THE PROGRESS TO DATE?

The research team has made the following progress:

- Updated material inventories and models in OpenLCA, developed a 2023 California electricity model, and integrated updated EMFAC and Off-Road construction equipment data into eLCAP.
- Improved eLCAP functionality by fixing bugs, enhancing features, and conducting efficiency analyses to support wider tool adoption; continued planning for a new eLCAP version.
- Completed third-party critical review of updated material models, finalized the critical review report (4.66), and closed out the previous contract report on California binder inventories.
- Maintained support for Caltrans' EPD program through ongoing participation in EPD committee meetings and alignment of LCA practices with EPD initiatives.