DRISI
Caltrans Division of Research,
Innovation and System Information

Research Results

PPRC14 SPE Sus-C: Updated Greenhouse Gas Emission Calculations in PaveM

Develop a program to identify and address pedestrian safety problems in California, with the goal of reducing pedestrian fatalities and injuries.

Pavement

MAY 2019

Project Title:
PPRC14 SPE Sus-C: Updated Greenhouse Gas Emission Calculations in PaveM

Task Number: 2719

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WHAT IS THE NEED?

The California Global Warming Solutions Act (AB 32) calls for significant reductions in greenhouse gas production by 2020. Since a significant portion of greenhouse gas production in this state comes from transportation, Caltrans needs to determine the means required to meet greenhouse gas emission targets and category pollutant regulations.
PaveM (Caltrans' Pavement Management System), enables the Caltrans Pavement Program to develop and successfully implement a proactive approach for prioritizing, preserving, rehabilitating, and maintaining existing highway pavements. PaveM includes a vendor supplied software application and database, which has been configured specifically for Caltrans' unique requirements, that takes the results from the associated annual Automated Pavement Condition Survey (APCS) of the entire network, combined with many other data sources, and predicts future performance, maintenance needs and optimal programs given various constraints. One of the ways that future work can be evaluated within the system is in terms of greenhouse gas production – a world first. However, to effectively manage Caltrans pavements to reduce greenhouse gas production it is necessary to have the most up-to-date greenhouse gas calculations in PaveM. This task will help Caltrans meet its obligations under AB 32.

WHAT WAS OUR GOAL?

This task will develop improved simplified life cycle assessment greenhouse gas calculations and incorporate them into the PaveM software. This will improve the metrics that Caltrans uses to evaluate greenhouse gas reductions across the entire state network, for various alternative programs, and select projects to

minimize greenhouse gas emissions.

WHAT DID WE DO?

This research will update models and analysis options in PaveM based on validation and calibration of life cycle assessment models for pavement effects on vehicle emissions (tasks 2691 and 2718), along with improved performance models for various treatments (task 2703). These improved calculations will be implemented into the PaveM software, and the results will be verified.

WHAT WAS THE OUTCOME?

The existing models within PaveM have been validated, and updated to reflect other changes to the system configuration. Procedures have been established to update the greenhouse gas production from the construction activities associated with various maintenance, rehabilitation, and reconstruction actions (collectively known as treatments within PaveM).

However, the implementation has been delayed for two reasons. Firstly, the performance models (such as those that predict future pavement smoothness) for various treatments have not been finalized, and this process will likely result in the introduction of new treatments (such as specialized treatments for rubberized overlays), and these will require new calculations of greenhouse gas production for the specific representative structure and materials associated with that treatment. Secondly, the improved models for greenhouse gas emissions from vehicles are not yet available, and so the emissions models cannot be updated. In addition, Caltrans have requested that changes not be made to components of the system while other aspects of the system are being validated and improved, and while the system is being used to generate maintenance needs for the next SHOPP funding cycle.

Once improved models are available, the implementation for these should be relatively rapid, since all of the tools and procedures for the calculations are in place, and the framework for validation of the models has already been established.

WHAT IS THE BENEFIT?

Overall, this task will help Caltrans and other entities using pavement to make pavement management decisions that will reduce the production of greenhouse gasses from pavements. This will save the state money while helping to mitigate for climate change.