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Implementation of LCA for Pavement Strategy Selection

Quantitative environmental impacts, such as greenhouse gas emissions (GHG), are typically not determined in practice when evaluating pavement design alternative. Life cycle assessment (LCA) is a method that can quantify environmental impacts related to pavement maintenance projects and can account for raw materials extraction, processing, construction, and transportation. A commonly reported output from LCA is global warming potential (GWP), which is a measure of heat absorbed by 1 ton of gas relative to the emissions of 1 ton of CO_2.

LCAs were conducted for conventional and CIR-based repair alternatives for a Capital Preventive Maintenance (CAPM) on State Route 1, San Mateo County, PM 0.0-10.6 (EA 04-0C930). To complete the assessment, the environmental Life Cycle Assessment for Pavements (eLCAP) tool was used. This web-based application was developed by UCPRC and contains a database of life cycle inventory (LCI) data for California-specific materials, processes, activities, and electricity grid. Additional information on the development of eLCAP is described by Lea et al (2022).

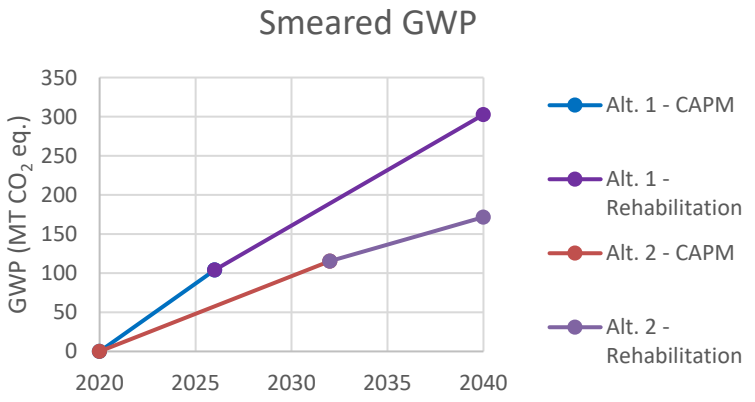

Fig. 3 - Smeared GWP for 20-year analysis period, excluding use

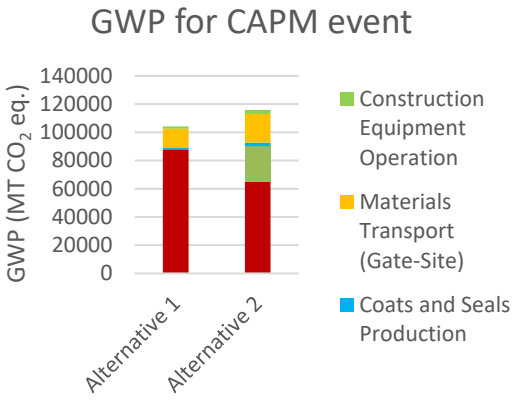

Fig. 1 -GWP of CAPM events for alternatives.

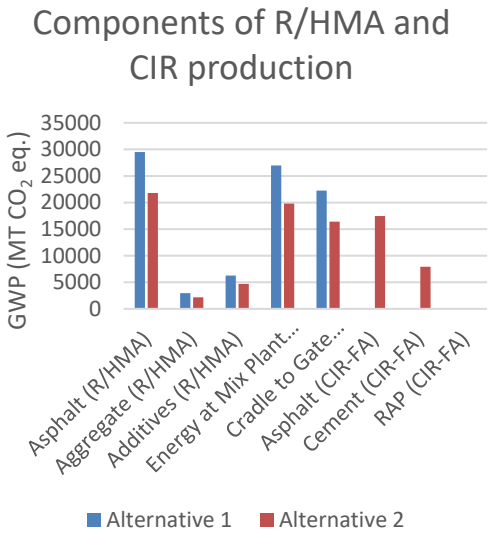

Fig. 2 - Components of HMA/RHMA and CIR production for alternatives.