

LIFE CYCLE ASSESSMENT OF SUSTAINABLE PAVEMENT SYSTEMS

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ABSTRACT

This paper presents a comprehensive life cycle assessment approach for pavement design, construction, and maintenance management. The traditional life cycle assessment analysis considers agency costs and user costs associated with pavement service life. However, the impacts of pavement infrastructure on the environment and energy use have been historically ignored. The carbon emissions from transportation account for 28% of all anthropogenic greenhouse gas emissions and 33% of all energy related CO₂ emissions in the U.S. The greenhouse gases are well known contributors to global warming. To create a more “sustainable” world traditional pavement systems must consider and reduce construction related and short term greenhouse gas emissions as well as long term impacts on the environment due to maintenance and heat-island effects.

These life cycle assessment considerations and examples of sustainable pavement materials and construction methods are discussed, which can reduce energy consumption and emissions. These include warm asphalt mixes, pavement recycling, perpetual pavements, non-pavement features, vehicle improvements, and alternative renewable energy sources.

KEY WORDS: Pavement, GHG, life cycle, materials, sustainable, environment.