Integrating Life Cycle Assessment (LCA) into Design Process

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Abstract: Comparing what is used today to evaluate different design alternatives using a Life Cycle Cost Analysis (LCCA), with the implementation of sustainability metrics for Life Cycle Assessment (LCA) to compare which of the pavement designs impact the environment less. The scope is to integrate an LCA into the design process for decision-making. The interest for us to provide this LCA for pavement design process is because each year the United States places about $100 billion of roadway construction. This level of activity possibly suggests significant sustainability implications in the construction activities for this work. A means to quantify some of this impact is through life-cycle assessment (LCA). The research project provides an overview of the design process used for comparing alternatives with the conventional LCCA tool. Also the LCA metrics was calculate to provide a comparison decision process. With the LCCA done, we have founded the flexible pavement was more cost effective than the rigid pavement. The flexible pavement and rigid pavement were analyzed for a useful life of 30 years and the analysis was performed for a one-mile length. In the LCA metrics it was found that the energy use for asphalt concrete slab was double than that of the PCC-Slab. Also the amount of waste generated, and CO_2 emissions were calculated for both materials. For the future as more sustainability metrics are developed, LCA can be incorporate into pavement design process and this can help us to make more wisely decision at the time of choose which of the alternatives is better. Now see it in a broader way than before.