

User Requirements and Software Capabilities for AEC Life Cycle Assessment

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Executive Summary

With sustainability as a key design tenant for an increasing number of projects, Architecture Engineering and Construction (AEC) practitioners want to quantitatively evaluate environmental impacts with a performance based methodology that integrates into their existing workflow. Life Cycle Assessment (LCA) calculates environmental impacts from cradle to grave, and has the potential to be adapted for widespread use in the AEC industry. Its scientific-based tracking of material impacts makes it objective. Currently, a well-defined process for applying LCA to AEC projects is missing. This research applies LCA software tools to the Stanford University Green Dorm to evaluate user requirements and software capabilities.

Application of tools shows that the LCA *process* is complex and suffers from limited *data* and insufficient *tools*. The Athena Environmental Impact Estimator requires the manual-input of building quantities, which is simple for small projects and unmanageable for large projects, especially with complex geometry. Model-based tools, such as LCADesign developed by the Australian Cooperative Research Centre for Construction Innovation, promise to help AEC professionals more easily perform and communicate LCA, but the current processes remain cumbersome and error prone. Future work on these LCA methodologies is needed to make LCA a standard part of AEC processes.