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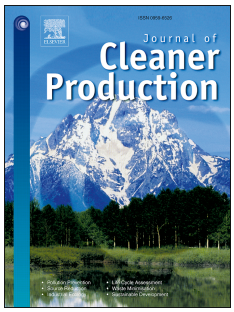

Cradle-to-Gate Sustainable Target Value Design: Integrating Life Cycle Assessment and Construction Management for Buildings

Sarah V. Russell-Smith, Michael D. Lepech

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Sarah V. Russell-Smith and Michael D. Lepech
Department of Civil and Environmental Engineering
Stanford University, Stanford, CA, United States
e–mail: svrs@stanford.edu

Abstract

Building stakeholders cannot easily quantify the environmental impacts of buildings as they accrue during construction. The goal of this work is to demonstrate a method to measure and manage the cradle-to-gate life cycle environmental impacts by linking environmental targets with modern construction management methods, to enable buildings to meet sustainable target values (STV). In this work, a construction activity-based computational framework was developed to enable stakeholders to reliably and efficiently construct cradle-to-gate life cycle models capturing environmental impacts including carbon and energy associated with material extraction, manufacture, transport to site, and construction. These models allow stakeholders to measure and manage impact accrual so as to not exceed STVs; without this framework, construction managers and other building stakeholders do not possess adequate environmental management tools to deliver projects consistently at or below STV. Specifically, the components developed are: (1) time dependent impact accrual budgets during construction and (2) impact measurement during construction. These benchmarks are used to determine whether a specific project is above or below target values, similar to methods for cost and schedule variance analysis. Two case studies were used to test this framework. This integration provides a life