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

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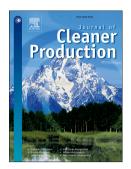
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ACCEPTED MANUSCRIPT

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

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