

Taxonomy of uncertainty in environmental life cycle assessment of infrastructure projects

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Abstract

Environmental life cycle assessment (LCA) is increasingly being used to evaluate infrastructure products and to inform their funding, design and construction. As such, recognition of study limitations and consideration of uncertainty are needed; however, most infrastructure LCAs still report deterministic values. Compared to other LCA subfields, infrastructure LCA has developed relatively recently and lags in adopting uncertainty analysis.

This paper presents four broad categories of infrastructure LCA uncertainty. These contain eleven drivers focusing on differences between infrastructure and manufactured products. Identified categories and drivers are: application of ISO 14040/14044 standards (functional unit, reference flow, boundaries of analysis); spatiotemporal realities underlying physical construction (geography, local context, manufacturing time); nature of the construction industry (repetition of production, scale, and division of responsibilities); and characteristics of infrastructure projects (agglomeration of other products, and recurring embodied energy).