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End of Life Approaches in the Life Cycle Assessment of Rammed Earth Walls: A Comparative Review

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ABSTRACT

Rammed earth (RE) is discussed within the sustainable construction literature due to its relatively low embodied energy and reliance on regionally sourced materials. End of life scenarios and impacts beyond the system boundary, such as substitution and avoided environmental impacts, receive significantly less attention in life cycle assessment (LCA) research than the production and construction phases of buildings. This study conducts a systematic review of the literature to examine reuse and disposal options for materials emerging from the end of life phase of RE walls from a life cycle assessment perspective. After being classified by transport distance, dismantling method, and stabilizer use, the studies were examined comparatively. Overall, the reviewed studies indicate that end of life performance is primarily shaped by material composition and transport conditions. In stabilized RE walls, recovery is typically confined to crushing and reuse in granular form. On the other hand, unstabilized RE walls enable direct reprocessing by crushing and reshaping, allowing the reintroduction of materials into construction cycles. Longer transportation distances are linked to higher embodied energy, while manual disassembly and local reuse are typically associated with lower emissions. At the same time, system boundary external benefits are rarely incorporated quantitatively into LCA models across the reviewed studies. On this basis, the study organizes end-of-life approaches under shared parameters to support a more consistent evaluation of the circular performance of RE walls.

KEY WORDS:
rammed earth, life cycle assessment, end-of-life, reuse, stabilization