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ECO-EFFICIENCY INDICATORS AND THE IMPORTANCE OF SERVICE LIFE FOR STRUCTURAL FRAMES SELECTION

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ABSTRACT

Research initiatives for next generation of sustainable buildings assessments state that buildings sustainability should always be assessed with help of indicators. Their selection should be based on clear understanding about the issues of concern and the relevance of the building sector to these issues. In this context it is noteworthy that life cycle-based studies consistently show structural frames and envelopes as major contributors to the building's environmental loads. Therefore, LCA associated to other aspects like cost and functional requirements should be used by the building designers to support decision making. The balance between these criteria is their task to achieve the optimum building performance.

Using a case study approach this paper aims to validate a core set of eco-efficiency indicators that integrates functional, environmental and economic performance requirements, from a life cycle perspective, to assist in selecting structural frames in the Brazilian context.

To predict service life and estimate LCC for building column design proposals the software Life-365 was used, while to refine the functional unit cradle-to-gate LCAs were performed for one cubic meter of different concrete compressive strength mixtures designed for the Brazilian study region.

The results highlighted the design service life as an adequate functional unit from the environmental and economic points of view, once it makes the benefits from adopting a structural frame of higher concrete strength evident, as well as the importance of considering the time dimension through LCA and LCCA in the buildings sustainability analysis. Moreover, designing by the Brazilian concrete structures design standard, ABNT NBR 6118:2003 does not ensure compliance with the Brazilian performance standard, ABNT NBR 15575:2008. Brainstorming during LCCA helps finding alternatives to the current proposals to overcome it, simulating a maintenance program with a repair schedule and concrete protection strategies for increasing service life of reinforced structures.

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