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Review

Life cycle energy analysis of buildings: An overview

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Abstract

Buildings demand energy in their life cycle right from its construction to demolition. Studies on the total energy use during the life cycle are desirable to identify phases of largest energy use and to develop strategies for its reduction. In the present paper, a critical review of the life cycle energy analyses of buildings resulting from 73 cases across 13 countries is presented. The study includes both residential and office buildings. Results show that operating (80%–90%) and embodied (10%–20%) phases of energy use are significant contributors to building's life cycle energy demand. Life cycle energy (primary) requirement of conventional residential buildings falls in the range of 150–400 kWh/m² per year and that of office buildings in the range of 250–550 kWh/m² per year. Building's life cycle energy demand can be reduced by reducing its operating energy significantly through use of passive and active technologies even if it leads to a slight increase in embodied energy. However, an excessive use of passive and active features in a building may be counterproductive. It is

excessive use of passive and active features in a building may be counterproductive. It is observed that low energy buildings perform better than self-sufficient (zero operating energy) buildings in the life cycle context. Since, most of the case studies available in open literature pertain to developed and/or cold countries; hence, energy indicative figures for developing and/or non-cold countries need to be evaluated and compared with the results presented in this paper.



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Keywords

Life cycle energy; Embodied energy; Operating energy; Life cycle assessment; Building

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