

Application of Life Cycle Assessment “LCA” Approach for a Sustainable Building Design under Specific Climate Conditions

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Abstract : In order for building designer to be able to balance environmental concerns with other performance requirements, they need clear and concise information. For certain decisions during the design process, qualitative guidance, such as design checklists or guidelines information may not be sufficient for evaluating the environmental benefits between different building materials, products and designs. In this case, quantitative information, such as that generated through a life cycle assessment, provides the most value. LCA provides a systematic approach to evaluating the environmental impacts of a product or system over its entire life. In the case of buildings life cycle includes the extraction of raw materials, manufacturing, transporting and installing building components or products, operating and maintaining the building. By integrating LCA into building design process, designers can evaluate the life cycle impacts of building design, materials, components and systems and choose the combinations that reduce the building life cycle environmental impact. This article attempts to give an overview of the integration of LCA methodology in the context of building design, and focuses on the use of this methodology for environmental considerations concerning process design and optimization. A multiple case study was conducted in order to assess the benefits of the LCA as a decision making aid tool during the first stages of the building design under specific climate conditions of the North East region of Algeria. It is clear that the LCA methodology can help to assess and reduce the impact of a building design and components on the environment even if the process implementation is rather long and complicated and lacks of global approach including human factors. It is also demonstrated that using LCA as a multi objective optimization of building process will certainly facilitates the improvement in design and decision making for both new design and retrofit projects.

Keywords : life cycle assessment, buildings, sustainability, elementary schools, environmental impacts

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