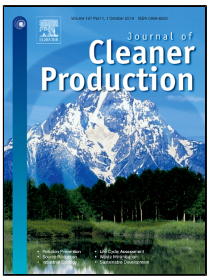
Accepted Manuscript



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PII:	S0959-6526(18)32414-4
DOI:	10.1016/j.jclepro.2018.08.080
Reference:	JCLP 13864
To appear in:	*Journal of Cleaner Production*
Received Date:	14 May 2018
Accepted Date:	08 August 2018

Please cite this article as: Carlo Ingrao, Antonio Messineo, Riccardo Beltramo, Tan Yigitcanlar, Giuseppe Ioppolo, How can life cycle thinking support sustainability of buildings? Investigating life cycle assessment applications for energy efficiency and environmental performance, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.08.080

How can life cycle thinking support sustainability of buildings? Investigating life cycle assessment applications for energy efficiency and environmental performance

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Abstract: In the context of built environment, buildings are amongst the principal generators of environmental externalities. Life Cycle Assessment (LCAs) of energy efficiency and environmental performance of buildings are deemed critical to address sustainable development issues. This paper aims to investigate LCA as a tool to support the design of buildings with two objectives in mind. Firstly, it determines the role of LCA in the evaluation of energy efficiency and environmental performance of buildings. Secondly, it elaborates LCA of these constructions through the lens of international standards. The methodological approach of the study leads to development of a whole building life cycle formula that sums up the contributions from a set of LCAs. By doing so, the paper highlights the necessity of LCA applications in buildings, and the need for minimisation of resource and energy consumption, and environmental impact. The study helps in better understanding the way LCA supports the search for and identification of innovation pathways in buildings. This paper contributes to the efforts in providing theoretical expansions in LCA of buildings and stimulates the creation of technical standards for the residential building construction sector.

Keywords: built environment; buildings; energy efficiency; environmental sustainability; life cycle assessment; sustainable urban development