

An overview of Building LCA from the sustainability rating tools perspective

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This study analyses the most representative features of Life Cycle Analysis (LCA) applied to the building sector concerning the environmental impacts of materials and products, through the study of the most shared criteria among four international sustainability rating tools: LEED, BREEAM, DGNB and Green Star. Since 2006, LCA has been internationally standardised with ISO14040 and ISO14044, making it a globally used tool for the environmental assessment of materials, products, building services and whole buildings. The European Commission, through the CEN technical committee (CEN/TC 350), developed the EN15804 and EN15978 standards to stimulate transparent communication about the environmental impacts of buildings and to try to reduce obstacles and limitations in construction industry application. This approach has strengthened knowledge and awareness of environmental impacts, driving designers, producers, stakeholders and policy makers towards more responsible choices and behaviours. Nevertheless, when it comes to buildings, different modalities of usage as well as difficulty in data collection, calculations and projection of service life scenarios, have led to different interpretations of the outcomes, increasing the challenge of accomplishing a comprehensive analysis. Due to this level of complexity, the building sector has not yet been able to exploit the potential of LCA as other sectors, showing a need for simplification and harmonisation. A growing interest and sensitivity is emerging in Europe about this topic since, in 2010, the European Union launched a ten-year strategy called “Europe 2020”, in which targets on energy and climate are included, aiming at: a 20% cut in greenhouse gas emissions (from 1990 levels), a 20% improvement in energy efficiency and achieving 20% of EU energy from renewables.

This paper aims to identify the most representative characteristics of the LCA approach applied to buildings, from the perspective of four major international rating tools, through the analysis of the most common/shared features taken into account. These include: life cycle phases considered, impact categories and environmental indicators adopted, databases sourcing (involving the integration with EPDs) as well as calculation and benchmarking methods applied. Having identified these shared and important criteria, this review sets out draft guidelines for comparing buildings environmental profiles issued from the rating tools application. Such a framework could be embedded in the European national regulations, or simply provide a reference towards the achievement of Europe 2020 objectives.