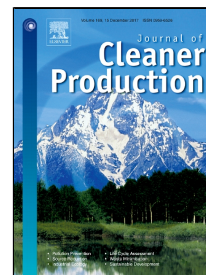


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Evaluation of the environmental and human health impact of road construction activities

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Abstract

This work presents the results of the Life Cycle Assessment (LCA) of two different types of road cross-sections (i.e. embankment and trench sections) with the objective of calculating and analysing the environmental and human health impact related to their construction processes. The geometrical and technical characteristics of the examined sections comply with current Italian standards for minor highways. After analysing a base case scenario, the study evaluated the influence of several transportation conditions on the LCA of both cross-sections, including varying distances between quarries, landfills, mix plants and construction sites, and two European motorization types of road vehicles and earthmoving machines. In all cases, the LCAs included eight impact categories that were evaluated according to the European standard EN 15804. The results support the fact that several impact categories should be included as part of LCA studies if there is an interest for effectively mitigating the deleterious effects related to road construction. Indeed, the analyses show that the use of low impact procedures in the mix plants (e.g. reduction in mixing temperatures, increase of energy recycling), the renewing of the vehicle fleet, and the use of secondary raw materials provide better overall environmental results, not only in terms of greenhouse gas emissions but in all the impact categories considered.

Keywords: Road construction; Pavements; LCA; Impact category; Trench; Embankment, EPD[®]

1. Introduction

The European commission staff-working document 'EU Green Public Procurement Criteria for Road Design, Construction and Maintenance' (European Commission, 2016) deals with several environmental aspects related to road infrastructure construction. Among other features, this document proposes a set of environmental criteria that could be used to assess the complex processes related to road construction works. Given the relevance and complexity of this topic, the Italian Ministry of the Environment is currently transposing the European document and discussing the Minimum Environmental Criteria (MEC) to be included as part of road design and construction public bids. The definition of a MEC for this industrial sector could contribute to the achievement of the goals of the Green Public Procurement (GPP) program, which is the

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