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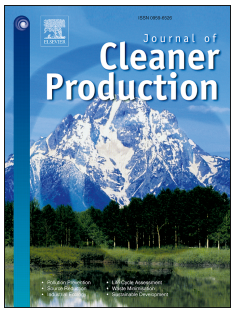

Consequential lifecycle modelling of solid waste management systems – Reviewing choices and exploring their consequences

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Consequential lifecycle modelling of solid waste management systems – Reviewing choices and exploring their consequences

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ABSTRACT

Application of consequential lifecycle assessment modelling has gained increased interest in the area of solid waste management. In such assessments, identification of affected technologies and choices of system boundary setting are of key importance. With the aim of investigating how previous consequential lifecycle assessments of solid waste management systems have tackled these issues, a review was performed of 36 previously published studies. The intention is to contribute to improved understanding of the challenges of performing consequential lifecycle inventory modelling of solid waste management systems, which could facilitate future studies. Results demonstrate a strong relation between the selection of affected energy production technology and overall GHG-emissions. In general, assuming that energy provision from less polluting technologies is affected by studied changes will commonly discredit waste-to-energy technologies and promote material recycling. However, made choices were also in many cases not justified. Materials substituted by waste derived goods are frequently represented by average data. The detected inconsistency in how energy provision and material provision are modelled could result in biased results, and care should be taken to minimize this risk. Four aspects are identified where current practice in system boundary setting choices is diverse and where those choices could have significant influence on overall results; counterfactual waste management, fate of materials avoided through material recycling, cascading effects and rebound effects. This paper argues that there is a need for increased transparency and coherence in identification of affected processes/technologies, as well as for a broader approach in system boundary setting, if studies have the aim of serving as relevant input for decision makers.

Keywords: *lifecycle assessment; solid waste management; consequential modelling; marginal processes*

1. INTRODUCTION

Life cycle assessment (LCA) has been presented as a decision-support tool, applying a holistic perspective in quantifying environmental impacts (EC, 2010). Its usefulness in providing valuable information for decision makers of solid waste management (SWM) systems has previously been demonstrated (EU, 2008). Nevertheless, in their review of a large set of LCAs of SWM-systems, Laurent et al. (2013) identified a certain confusion of concepts and terminology surrounding different types of lifecycle inventory (LCI) modelling frameworks.