Life cycle assessment of construction and demolition waste management - DTU Orbit (08/11/2017)

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Life cycle assessment (LCA) modelling of construction and demolition waste (C&DW) management was carried out. The functional unit was management of 1 Mg mineral, source separated C&DW, which is either utilised in road construction as a substitute for natural aggregates, or landfilled. The assessed environmental impacts included both non-toxic and toxic impact categories. The scenarios comprised all stages of the end-of-life management of C&DW, until final disposal of all residues. Leaching of inorganic contaminants was included, as was the production of natural aggregates, which was avoided because of the use of C&DW. Typical uncertainties related to contaminant leaching were addressed. For most impact categories, utilisation of C&DW in road construction was preferable to landfilling; however, for most categories, utilisation resulted in net environmental burdens. Transportation represented the most important contribution for most nontoxic impacts, accounting for 60-95 per cent of these impacts. Capital goods contributed with negligible impacts. Leaching played a critical role for the toxic categories, where landfilling had lower impacts than utilisation because of the lower levels of leachate per ton of C&DW reaching the groundwater over a 100-year perspective. Leaching of oxyanions (As, V and Sb) was critical with respect to leaching. Typical experimental uncertainties in leaching data did not have a pivotal influence on the results; however, accounting for Cr immobilisation in soils as part of the impact assessment was critical for modelling the leaching impacts. Compared with the overall life cycle of building and construction materials, leaching emissions were shown to be potentially significant for toxicity impacts, compared with contributions from production of the same materials, showing that end-of-life impacts and leaching should not be disregarded when assessing environmental impacts from construction products and materials. CO2 uptake in the C&DW corresponding to 15 per cent carbonation could out-balance global warming impacts from transportation; however, carbonation would also likely result in increased toxicity impacts due to higher leaching of oxyanions. (C) 2015 Elsevier Ltd. All rights reserved.

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