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Importance of waste composition for Life Cycle Assessment of waste management solutions - DTU Orbit (09/11/2017)

Importance of waste composition for Life Cycle Assessment of waste management solutions

The composition of waste materials has fundamental influence on environmental emissions associated with waste treatment, recycling and disposal, and may play an important role also for the Life Cycle Assessment (LCA) of waste management solutions. However, very few assessments include effects of the waste composition and waste LCAs often rely on poorly justified data from secondary sources. This study systematically quantifiesy the influence and uncertainty on LCA results associated with selection of waste composition data. Three archetypal waste management scenarios were modelled with the waste LCA model EASETECH based on detailed waste composition data from the literature. The influence from waste composition data on the LCA results was quantified with a step-wise Global Sensitivity Analysis (GSA) approach involving contribution, sensitivity, uncertainty and discernibility analyses. The waste composition data contributed significantly to the LCA results and the uncertainty associated with these results. The importance of 405 individual waste properties was evaluated in comparison with 345 technology parameters. Overall, less than 10 physico-chemical properties dominated the output uncertainty of the LCA results, although these properties had low sensitivity in the model. Moreover, the uncertainties associated with the physico-chemical properties were responsible for output uncertainties that spanned from impacts to benefits. The GSA approach applied in this study constitutes a valuable tool for systematically assessing the importance of waste composition and for consciously collecting and using waste composition data within LCAs of waste management systems.

General information

State: Published

Organisations: Department of Environmental Engineering, Residual Resource Engineering, Department of Applied Mathematics and Computer Science , Image Analysis & Computer Graphics, Atmospheric Environment, Water Technologies

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Pages: 1180-1191

Publication date: 2017

Main Research Area: Technical/natural sciences

Publication information

Journal: Journal of Cleaner Production

Volume: 164

ISSN (Print): 0959-6526

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 5.83 SJR 1.615 SNIP 2.382

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 1.609 SNIP 2.383 CiteScore 5.57

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 1.661 SNIP 2.477 CiteScore 4.6

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 1.644 SNIP 2.581 CiteScore 4.47

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 1.706 SNIP 2.328 CiteScore 4.07

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 1.461 SNIP 1.825 CiteScore 3.19

ISI indexed (2011): ISI indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 1.419 SNIP 1.742

Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.942 SNIP 1.544
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.813 SNIP 1.354
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.942 SNIP 1.489
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.842 SNIP 1.543
Scopus rating (2005): SJR 0.544 SNIP 1.357
Scopus rating (2004): SJR 0.753 SNIP 1.818
Scopus rating (2003): SJR 0.501 SNIP 1.152
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.481 SNIP 1.103
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.419 SNIP 0.85
Scopus rating (2000): SJR 0.694 SNIP 0.888
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.276 SNIP 0.775
Original language: English
Life cycle assessment, Waste compostion, Physico-chemical composition, Fractional compositon, Global sensitivity analysis, Uncertainty analysis
DOIs:
10.1016/j.jclepro.2017.07.013
Source: PublicationPreSubmission
Source-ID: 133673689
Publication: Research - peer-review › Journal article – Annual report year: 2017