



Assessing the life cycle environmental impacts of bulky waste management in Brussels E. Towa, <u>V. Zeller</u>, W. M.J. Achten

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This research is conducted in the frame of the BRUCETRA project funded by the Brussels' capital region – Innoviris (2015-PRFB-3a)

Brussels' context

- Current management of bulky waste in Brussels
 - mixed, i.e. non-recyclable, recyclable and potentially reusable materials
 - Incineration with energy recovery most important treatment
- Bulky waste is one of the priority flows within the



Context

programme for economy

Methoc



Treatment of bulky waste in Brussels (2014)



Preparation for reuse Recycling Incineration



Bulky waste collection in Brussels

- Two main actors
 - Public actor
 - Social economy organizations (SEOs)
- Three collection types
 - Mixed collection on demand
 - Separate collection of items with a reuse potential
 - Bringing systems: to container parks or SEO centres

Tons, 2014	Public actors	SEOs	Total
Classical collection	19,845	179	20,024
Citizen deposit at CAS or SEOs centres	13,145	357	13,502
Separate collection	0	1,238	1,238
Total	32,990	1,774	34,76 4



Bulky waste definition

- Bulky <u>items</u> that are donated or resold are not considered as waste
- Bulky waste = waste that does not fit into containers & bags <u>Categories included:</u>
- Furniture and other items such as bikes, strollers, prams, ironing boards, toys, kitchen items (plates, cups, vases), sport items, sanitary items, etc.)

Categories excluded:

• WEEE, textiles, mattresses

Material composition







Environmental performance of bulky waste management

Waste hierarchy sufficient?

• \rightarrow Life cycle assessment to verify

- i) CE potential of bulky waste management in Brussels?
- ii) Life cycle-based environmental impacts of different bulky waste management system?



MFA & scenario development

Material flow analyses

- Collection of waste statistics from different entities
- Decomposition
- Sankey that shows the management chain



tizen denosit to CAS

. CE potential

- Potential for reuse
- Potential for recycling
- Potential for separate collection



Evaluation of scenarios with LCA

- Data on transport requirements
- Data on waste treatment processes
- Data on substitution rate (reuse & recycling)
- → Impact assessment

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CE scenarios- Scenario 1



Scenario 1:

• Improved sorting at the civic amenity sites to increase items for reuse and recycling

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CE scenarios- Scenario 2



Scenario 2: Potential of separate collection

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Context	Method	Results	Conclusions

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Evaluation of scenarios with life cycle assessment System boundary: Bin to grave' boundary Approach for co-products:



- Substitution potential for reuse: <u>full substitution</u>, partial substitution (quality/LT) or no substitution
- Substitution potential for recycable materials: substitution rates (for example: metals 1:1, plastic 1:0.9) (Rigamonti 2009)

Results

Conclusions

Impact assessment



DALYs (disability adjusted life years), represents the years that are lost or that a person is disabled due to a disease or accident.

PDF: Potentially disappeared fraction of species • m2 • year: local relative species loss in terrestrial, freshwater and marine ecosystems, respectively, integrated over space and time

The unit for resource scarcity is **dollars (\$)**, which represents the extra costs involved for future mineral and fossil resource extraction

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Huijbregts et al. 2017: ReCiPe2016: a harmonised life cycle impact assessment method at midpoint and endpoint level_xt Method Results Conclusions

Impact assessment at process level



Impact assessment of scenarios



Conclusions

Method

Discussion of key parameters- sensitivity



Reuse potential:

- Sensitivity analysis in the article
- Market potential of reuse?
- Substitution rate for reused products?
 - Substitution or not?
 - Partial substitution?

Limits of the study:

- A thorough assessment of reuse potential needs a product based approach
- Proxy data for the composition of mixed bulky waste
- Proxy data for the preparation of reuse
- Some LC stages not (yet) included

Conclusions & outlook

- CE potential is currently underexploited
- CE scenarios show a high potential for environmental savings, especially in terms of resource use
- For a significant improvement, a change in the collection system is required
- → more information about the quality of bulky waste stream as well as consumer demand & behaviour is needed

Thank you for your attention

CONTACT INFORMATION



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