29 August 2019
Issue 530
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Source: Messmann, L., Boldoczki, S., Thorenz, A. and Tuma, A. (2019) Potentials of preparation for reuse: A case study at collection points in the German state of Bavaria. *Journal of Cleaner Production*. 1534–1546. DOI:10.1016/J.JCLEPRO.2018.11.264.

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Waste potential: more of our refuse electronics, furniture and leisure goods could be re-used, suggests German study

Between 13% and 16% of waste electric and electronic equipment (WEEE), furniture and leisure goods disposed of at household waste collection centres are in excellent working condition and could be easily be prepared for re-use, finds a new study from Bavaria, Germany. Improvements to waste collection, storage and treatment practices to prevent damage to disposed items could free up a further 13%-29% of these waste streams for re-use. Notably, weatherproof storage for WEEE at collection points could have prevented up to 86% of the damage endured by the studied items.

Re-using products contributes to a circular economy by extending product lifetime. The EU's waste management hierarchy prioritises the re-use of waste above recycling, energy recovery (e.g. through incineration) and landfilling — only waste prevention takes greater precedence. Despite this, only a tiny fraction of waste is re-used. In Germany, for instance, just 0.5% of WEEE is re-used[1], whereas 78.8% is recycled and 11% processed for energy recovery.

This study explored the percentage of waste streams taken to household waste collection points for recycling, or for other forms of waste treatment, that could potentially be re-used. The researchers analysed the condition of WEEE, furniture and 'leisure goods' taken to 61 collection points across the German state of Bavaria. They assessed 5 204 pieces in total: 3 827 WEEE devices, 1 132 pieces of used furniture and 245 leisure goods (such as bicycles, sports equipment and toys).

The researchers had specific reasons for studying these particular waste streams. WEEE is of particular interest owing to its significant environmental impact and the precious materials it contains; used furniture is relevant for second-hand shops; and leisure goods do not belong to any official waste stream, so this study provided an opportunity to learn more about their end-of-life fate.

The researchers developed a method for assessing these waste items, which they suggest could be used elsewhere. The method assesses the quality of the goods on a six-point scale:

- **Q1** and **Q2**-graded products can be easily re-used because they are 'as good as new' or just need cleaning.
- **Q3** and **Q4**-graded items have minor signs of damage, such as scratches or small breakages.
- **Q5** and **Q6**-graded items are unsuitable for re-use because they are heavily damaged.

The cause of damage to the items is then assessed. Importantly, the method determines whether damage took place when the item was in use, or at the waste collection point during disposal, transport, storage or pre-treatment for recycling (e.g. compressing waste or cutting off cables).

Continued on next page.

1. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (*Bundesministerium fur Umwelt, Naturschutz und niuklearer Sicherheit*, BMUB), 2015. *Data on electrical and electronic appliances (Daten zu Elektro- und Elektronikgeraten in Deutschland).*

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The method categorises the waste items into three tiers based on their suitability for re-use and the obstacles to their re-use. Items with no potential for re-use (those graded **Q5** and **Q6**) are not in any tier:

- **Tier I** items are easy to prepare for re-use without any special action.
- **Tier II** items have been lightly damaged during or after disposal, and would be re-usable if this damage had not occurred.
- **Tier III** items have been lightly damaged during use, and would be re-usable if, for example, users were incentivised to conserve their possessions.

Fourteen per cent of WEEE items, 13% of furniture and 16.1% of leisure goods in the Bavarian study were classified as Tier I. Based on their analysis of causes of damage, the researchers present four recommendations for waste managers to enable more Tier II items to become Tier I:

- **R1.** Use value-conserving boxes for transport, instead of bulk cargo containers.
- **R2.** Separate reusable devices at the point of disposal.
- **R3.** Use weatherproof, protective storage containers.
- **R4.** Prohibit pre-treatment.

R3 would have the biggest impact on WEEE, given its vulnerability to the weather. In Bavaria, R3 could potentially move 23 850 tonnes of WEEE from Tier II to Tier I per year. The researchers found that 86% of damage to WEEE during storage at urban collection points was caused by weather.

Storage also has the biggest effect on leisure goods; they are less affected by weather but more protective containers could move 74% of Tier II items into Tier I. Furniture would mostly benefit from R2 and R4 — these measures could move 103 997 tonnes and 94 030 tonnes, respectively, from Tier II to Tier I each year.

The researchers acknowledge that they only assessed the *potential* for re-use. In practice, economic factors may mean some high-quality items have to be recycled — for example, where there is no market for the product, as in the case of old cathode-ray tube televisions.

This project is ongoing, with further results to follow.