CIE-MAP

Centre for Industrial Energy, Materials and Products

Resource efficiency and lower carbon emissions through waste reduction

Main findings

- The reuse of discarded consumer goods improves resource efficiency, reduces carbon emissions and contributes to a circular economy. Reuse takes place through many different routes and involves many actors. This complexity makes monitoring and increasing reuse challenging.
- Recycling is commonly preferred to reuse by waste managers, reflecting a systemic problem with the collection and handling of discarded goods.
- A life-cycle approach is needed to increase reuse, from changing design to improving reverse logistics operations for discarded items.
- Recovery routes and practices should enable discarded items to remain in good condition. Improved reverse logistics, including more convenient disposal points for unwanted goods, would benefit consumers and enable manufacturers to recover value from discarded items.
- Recovery is generally limited at present to materials that are easily salvageable. Recycling processes need to recover critical raw materials present in small quantities.
- Legislation should address barriers to repair, individual producer responsibility, and appropriate standards in the reuse sector.
- Upcycling is mostly limited at present to small scale, craft based enterprises but has potential to be scaled-up considerably.
- Information for consumers concerning repair, reuse and recycling remains inadequate. There is confusion around collection networks, particularly for small electrical goods, which often end up in residual waste streams.

Restart Project (2016)

Introduction

The global environmental impacts of waste are well documented and include pressure on finite natural resources[1] and increased greenhouse gas emissions that lead to climate change.[2] Efforts by government, industry and consumers to reduce waste by increasing product lifetimes, as proposed in the Waste Prevention Programme,[3] would increase resource productivity, assist in meeting climate targets, and facilitate the development of a circular economy.[4]

Our research has explored resource recovery practices in the UK and concluded that opportunities exist to increase the product longevity as a vital step towards fulfilling these goals. Maximising the value extracted from products during their lifetime and recovering materials at the end of its life-span would help to ensure that resources are used more efficiently and kept in use for longer, in line with the Government's 25 year plan.[5] Such practices also offer new business and employment opportunities.[6]

As materials embody carbon, reducing their consumption could make a valuable contribution to meeting the 5th Carbon Budget.[7] Within the consumer goods sector, action is particularly important for items that contain relatively high levels of embodied carbon, or critical raw materials, such as electrical and electronic equipment.[8,9]

Design for waste reduction

Improved design is important for reducing or preventing negative end-of-life impacts from discarded products. For example, design for ease of disassembly enables product life extension through repair and refurbishment,[10] while specifying the use of recycled or recyclable materials will aid increased recovery of materials when a product is finally discarded.[11] Such approaches can be used to reduce waste arisings and keep products, components and materials in use for longer.

Reuse

There is growing recognition of the need to retain the value in unwanted products by encouraging reuse.[9,12] Interviews with a wide range of stakeholders across the electrical and electronic goods sector, reuse sector and waste management sector revealed that commercial reuse is limited to a relatively small group of products that retain functionality and value beyond the point of discard, while many products lose any reuse potential due to how they are handed in the collection process. Overall, this research[13-15] revealed the following:

- Different models for reuse exist that involve producers, retailers, consumers, local authorities and the third sector, offering a variety of environmental, economic and social benefits.
- Larger scale asset management businesses have achieved profit through reuse, while small scale reuse often involves local, third sector projects.
- Collection systems in which discarded items are returned through the reverse supply chain could address the problem of poor handling which causes damage and reduces the prospect of reuse.
- Recycling is often preferred to reuse by waste managers because it is perceived as easier and cheaper.
- Reuse offers employment opportunities, with prospects for upskilling, training and apprenticeships.

Left: Upcycled Barrel (Teelings Distillery, Dublin)

Top Right: Upcycled glass bottles (Jameson Distillery, Dublin)

Photo Credit: Christine Cole

Repair

Though repair activity has long been in decline, policy interest has grown in the context of the circular economy and at community level through initiatives such as Repair Café.[16]

Researchers collaborated with a London-based environmental charity, the Restart Project, which facilitates repair, to explore their service users' attitudes and experiences of repair.[14,17] Surveys of participants at repair events found that attending such events provides a range of social and economic benefits, empowering individuals to extend the lifetimes of electrical and electronic goods, slowing product replacement cycles and raising awareness of environmental issues. The research drew the following conclusions:

• There is a lack of trust in commercial repairers.

• Owners' lack of knowledge, confidence and skills are barriers to repair.

• People have a fear of repair being expensive and possibility of "making things worse".

• Small electrical and electronic items were often not recycled, unlike packaging and larger household goods.

A recent initiative, the Open Repair Alliance, has been formed to improve access to data on barriers to repair across several countries to inform policymakers and manufacturers.[18-20]

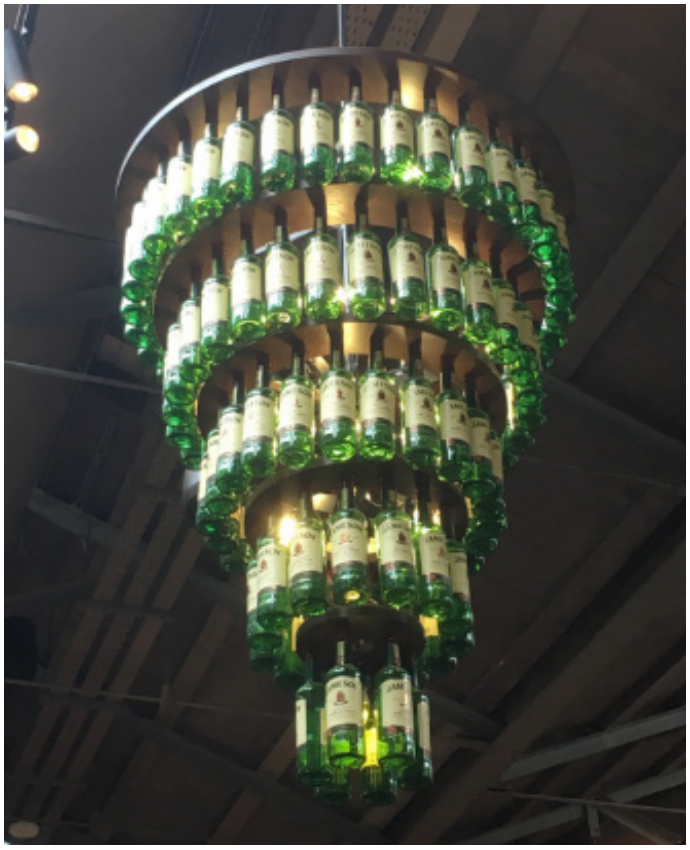
Upcycling

A significant, though less common, means of retaining the value of products and components is upcycling, the creation or modification of a product made from used components and materials which is of equal or higher quality or value than its compositional elements.[21] Research with upcycling stakeholders has shown that:

• Upcycling is mostly limited at present to small scale, craft based enterprises such as award-winning NTU alumni Sarah Turner,[22] but has potential to be considerably scaled up.[23]

• Barriers to upcycling include lack of engagement from manufacturers, inadequate marketing resources and the cost to consumers of unique products compared to those that are mass-produced.

• Upcycled products have an educational role and are often used as statement pieces to provoke conversations about sustainability.



Recycling

Improving the processes through which waste materials are collected and sorted for recycling and increasing return rates are particular challenges.[24] China's changing attitude towards the importation of low quality recyclates from Britain requires a rethink on the way we use resources in order to reduce our exposure to lower demand for waste materials.[13]

Single use plastic items such as shopping bags and drink cups have attracted particular concern in recent years. Research into a Swedish business model for recovering plastic bags using a deposit and return system provides an example of the potential for change, and could be applied to a range of products.[25]

Improving the waste infrastructure

Moving to a circular economy will involve changes in how consumers use and discard items, which has implications for the physical infrastructure. As waste management is liable to be polluting and visually unattractive, gaining support from the local community helps to minimise the risk of delay in the planning and development process. Research has found a need for wider access to information that interprets complex issues and provides assessments for the local community, and for enhanced public consultation when planning developments.[26]

Conclusion

A reduction in materials consumption through increased product longevity would lead to less waste, lower carbon emissions, improved resource efficiency and potential social benefits in the form of new business and employment opportunities. This could be achieved through various policy measures to encourage longer lasting products[27] and more effective waste collection.[15] More generally, a change in attitudes is needed such that unwanted items are regarded as potential resources, in line with the principles of a circular economy.

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CIE-MAP

Working closely with government and industry, CIE-MAP conducts research to identify all the opportunities along the product supply chain that ultimately deliver a reduction in industrial energy use.

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