The beginning of the end-of-life

Recycling is a process which is surely above criticism. But, as **Kate Fletcher** explains, the environmental benefits of textile recycling are hotly disputed

WHY do we love recycling so much? In the textile and clothing industries recycling continues to be a major issue for companies and the focus of attention at environmental conferences. And yet the environmental benefits of recycling are hotly disputed, and its psychological benefits – of assuaging our guilty consciences – likely diminish over time. Yet our enthusiasm for recycling, and the related use of recyclable materials, remains largely untempered. So it seems that whatever it is about recycling that has captured popular imagination needs to be capitalised upon so that waste issues in general (rather than just recycling in particular) infiltrate the public and industry psyche. This article touches upon some of the key waste issues associated with textiles.

Textiles currently make up 4% of household waste in the EU. Around 25% of this is reused, the remainder being dumped in landfill. Textile wastes in landfill contribute to the overall environmental impact of these sites, which can include methane emissions (particularly associated with decomposing wool) and pollution of groundwater through toxic leachate. Waste management strategies prevent (or delay) landfill impacts and have become particularly important as disposal costs have increased. Other legislation has also begun to influence how waste is managed. Since 1996, German textile producers have had to make provision for the return of used textile goods and to develop and produce textiles with a recycled content which minimise environmental impact end-of-life. Such legislation, which forces the collection of post-consumer textiles, is likely to be implemented across Europe in the next five years. The implications of this 'take-back' legislation are likely to be profound for textiles. Products will have to be developed with consideration for end-of-life, such as the recyclable nature of materials, and with a structure designed to be conducive to easy and economic disassembly. Some of these aspects have already been considered in the carpet sector, with the recently completed RECAM (REcycling of CArpet Materials) study. The recommendations were for collection and (chemical and mechanical) closed-loop recycling of 0.8 million tonnes of carpet waste in Western Europe each year.

Currently, textiles are commonly reclaimed in two ways: via resale in charity shops (normally clothes); and recycling facilities where old textiles are collected, pulled apart and reworked into yarns and fabrics. The majority of textile waste has the potential for a useful second life. This includes reuse of the product; reuse of fabric as engineering and industrial wiping cloths; recycling fibres into new fabrics; recycling of fibres for furniture filling or insulation material.

Reuse

The process of reusing textile products causes the least impact of the range of waste management options, as there is little or no processing involved. However these products (normally clothes) may be transported long distances, with transport-related emissions. Most textile reuse is organised through charity shops or flea markets which sell on second hand clothes.

Recycling

Recycling, like reuse, prevents pollution associated with virgin fibre production and processing. However the process has energy requirements, although these are thought to be far less than those associated with virgin material processing. Most textile fibres can be recycled. As few technical barriers to recycling exist, obstacles such as raw material collection and particularly the lack of markets for recycled fibre, are the most significant limits to recyclability. Markets for recycled textiles are influenced by colour, fibre type, quality and the purity of the feedstock itself. Industry prefers white textiles which allow easy re-dyeing; natural fibres which are easier to 'pull' and more versatile; quality (long staple) fibres which can be processed on faster machines; and unblended fibre which requires less processing than fibre mixes and which are less problematic in processing stages.

There are two ways of recycling textile materials: mechanical, in which fibres are 'pulled' apart and reworked into a yarn; and chemical (suitable for synthetic fibres like polyester, polyamide and polypropylene), in which fibres are re-polymerised into a chemical feedstock and then spun in the normal way. Fibres with a mixed synthetic/natural content can also be treated chemically to extract one component (normally the synthetic) from the mix, so that the natural material can be reused. There is little information on the environmental impacts of chemical recycling, either in terms of resource consumption or outputs from the process. The only synthetic fibre to be recycled in any significant way appears to be polyester.

Recycling not only results in energy savings, it also reduces consumption of virgin materials. As it is common for textiles to be sorted by colour prior to recycling it also reduces effluent emitted from the dyeing and finishing of new materials. Recycling does, however, incur transportation costs. Indeed the environmental costs associated with transporting material to be recycled can sometimes mean that the recycling process has a higher impact than other waste management options.

Incineration

Incineration of textile waste with energy recovery diverts material from landfill and reduces associated impacts. It does, however, cause other impacts, not least those to do with carbon dioxide emissions which are linked to global warming and the production of air pollutants such as dioxins. Incinerators are often used as generators of energy, with polyester on average producing 25% more energy than cotton.

Biodegradation

Waste materials that are biodegradable are broken down into simpler molecules by the digestive action of micro-organisms that are capable of using them as food. The EC Landfill Directive requires that by 2016 the landfilling of biodegradable waste will be cut to 35% of 1995 levels, with separate collections for composting likely to provide part of the solution. While synthetic textile materials are slow to break down, other textile materials (naturals and cellulosics) do biodegrade, although there is little information available on ultimate biodegradability of these materials.

Conclusions

As is the case with seemingly all considerations in ecodesign, issues associated with waste are hugely involved and involve few simple answers. Trawling through the minefield of information on waste requires sophisticated analysis and consequent decision-making. So perhaps the best source of inspiration is to look to live design projects working through these issues. One of the best examples in textiles is that of the Climatex Lifecycle range of furnishing fabrics developed by a joint initiative between American architect William McDonough and DesignTex (http://www.dtex.com/products/prd_wm01.htm). The fabrics are made from wool and ramie and use of carefully selected dyes and finishes which contain no carcinogens, persistent toxic chemicals or heavy metals. The result is a product that is completely compostable. Meaning that one possible future of ecodesign could be to waste away. e/d

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