

WR1211 - Recyclates: Quality, Markets, Content and Barriers. Summary Analysis of Research to Date

Recycling and the use of recycled material for new products are important in creating a resource efficient economy. This report is a summary analysis of research into:

- The quality of materials from different collection schemes insofar as the evidence suggests they may have an influence on the end-use of the materials collected.
- Methods for determining the recycled content of materials in final products.
- Technological barriers to the use of recycled content for the manufacturing of products and packaging.
- Markets for recyclates.

We developed a set of key research questions around these issues in respect of five commonly recycled materials:

- Glass
- Metals
- Paper
- Card
- Plastics.

We reviewed 230 UK and International studies, articles and reports. Most of this research is focussed on materials recovered from the municipal solid waste (MSW) stream with fewer articles dealing with recyclates from automobile, electrical equipment and commercial packaging waste streams.

In relation to each of our research questions, for each material, we came to the following key conclusions:

Glass

- *What are the links between collection method and quality of recyclates?*

Because of a trend toward collecting more glass as a mix of colours and equal price support through the packaging waste recovery note (PRN) system, there is a slight downward trend in the proportion of used glass purchased by the UK glass container industry. Instead, recovered glass is directed to export markets, glass fibre and aggregate use. This latter use offers negligible carbon benefits.

- *How do we measure recycled content?*

There is a common measurement standard for the recycled content of glass packaging, which has been adopted by UK industry.

- *What are the technological barriers to increased use of recyclate?*

There are no technological barriers to increased use of recycled glass. However, the use of cullet in container manufacture is constrained by colour contamination, in particular in furnaces that manufacture clear (flint) glass.

- *What is the recyclate market potential in the UK, EU and elsewhere?*

Markets are mature, stable and primarily UK based. Because the amount of 'green' glass being recovered in the UK is greater than the amount of 'flint' and 'clear' glass required by

the container glass industry, there is potential to increase the amount of container glass manufactured from 'green' glass. This will to some extent be dependent on consumer acceptability.

- *What are the economic barriers to the increased use of recyclate?*

Prices are stable with demand from UK and European container manufacturers, glass fibre (insulation) manufacturers and aggregate suppliers. The key economic barrier is the cost of collection which is driven by transportation costs where there is a low density of collection points.

- *What are the policy/regulatory barriers to increased use of recyclate?*

Current policy may be responsible for encouraging more glass to aggregate uses than is necessary for an optimum market share based only on environmental outcomes.

Metals

- *What are the links between collection method and quality of recyclates?*

Steel is easily separated at material recovery facilities (MRFs) by magnets, and therefore its quality is unaffected by the method of collection. The situation is different for aluminium where co-mingling with other materials can affect the operation of furnace equipment, which may shut down until contaminants are burned off. This can have the effect of limiting the applications to which the recovered aluminium can be used, as furnace operators may either re-sort prior to processing or reject recovered aluminium from MRFs.

- *How do we measure recycled content?*

There is no drive to develop a common measurement standard for recycled steel or aluminium content in packaging. For steel, packaging waste represents a very small proportion of overall scrap and recycling back into containers is not undertaken. Closed-loop recycling of used aluminium beverage cans does occur, although no efforts to measure recycled content were identified. However this may change as other material packaging manufacturers advertise their own recycled content.

- *What are the technological barriers to increased use of recyclate?*

For steel a theoretical technological barrier is contamination of tin from steel cans. However, the very small proportion of steel cans as a share of steel scrap means that this is not generally an issue in practice. There are no technological barriers to the use of recycled aluminium.

- *What is the recyclate market potential in the UK, EU and elsewhere?*

Increasing amounts of steel and aluminium are collected for recycling. However, more metal packaging - particularly aluminium - can and should be collected, particularly as there are significant CO₂ benefits from recycling aluminium. Demand for scrap metals is strong and closely linked to economic trends.

- *What are the economic barriers to increased use of recyclate?*

The markets for recovered metals are relatively mature and operate effectively, even during periods of price volatility. The key economic barrier is the cost of collection from widely dispersed locations e.g. aluminium beverage cans, which have been identified as a priority material for increased collection.

- *What are the policy/regulatory barriers to increased use of recyclate?*

There were none identified

Paper and card

- *What are the links between collection method and quality of recyclates?*

Where paper is collected separately from other materials it is usually of a better quality than when mixed with other materials. This reflects the absorbent characteristics of paper with respect to both moisture and other dry materials, particularly glass.

- *How do we measure recycled content?*

Agreed measurement standards exist for both newsprint and other grades of paper.

- *What are the technological barriers to increased use of recyclate?*

Pulping and de-inking technologies enable collected fibres to be re-processed, particularly for newsprint, tissue paper and packaging board. There has recently been research which received significant media coverage¹ that suggests that when recycled packaging is used in food packaging and there is direct food contact, there may be some risk of migration of hazardous substances to the food, with potential human health risks. This issue may require further research.

- *What is the recyclate market potential in the UK, EU and elsewhere?*

The international market for secondary paper and card continues to operate successfully and underpins the economic viability of recovering paper of all grades. It is, however, dependent on growth in demand from re-processors based in Asia.

- *What are the economic barriers to increased use of recyclate?*

A key determinant of demand is the substitute price of virgin pulp. A correlation between virgin pulp prices and recovered fibre prices has been shown. When virgin pulp is cheaper it will generally be preferred, depending on the paper grade to be produced but we have not seen research that identifies how frequently such switching occurs.

- *What are the policy/regulatory barriers to increased use of recyclate?*

The research indicates that supply side measures dominate. There is limited evidence of demand-side measures, particularly public procurement specifications. The success or otherwise of these initiatives is under-researched.

Plastics

- *What are the links between collection method and quality of recyclates?*

Collection tonnages are increasing; however, there are issues of contamination by glass and other materials in co-mingled collections from domestic sources, and with coatings and chemical substances in respect of automobile and electrical equipment waste streams. These then negatively impact downstream re-processing operations.

- *How do we measure recycled content?*

Draft measurement standards for plastic packaging have been agreed at an industry level in the UK.

¹<http://www.independent.co.uk/life-style/food-and-drink/news/health-concerns-over-recycled-packaging-2235468.html>

- *What are the technological barriers to increased use of recyclate?*

Technological barriers relate to the complexity of polymer types (and their sorting) and the issue of contamination, particularly by hazardous substances. Mixed plastics are particularly problematic and their ultimate end use is likely to generate on-going research.

- *What is the recyclate market potential in the UK, EU and elsewhere?*

There is increasing demand from brand manufacturers and retailers for recycled PET and HDPE packaging in the UK. However, domestic market demand for other polymers (mixed plastics including polypropylene) is limited, although there is a ready export market.

- *What are the economic barriers to increased use of recyclate?*

The high costs of sorting, as well as high collection costs, are the principal economic barrier. However, since recycled plastic can substitute for virgin polymers which are priced according to the prevailing cost of oil, there is a significant financial incentive to increase the use of recycled plastics.

- *What are the policy/regulatory barriers to increased use of recyclate?*

There are a number of policy/regulatory barriers identified in the research. For the most part, these reflect the balance between recycling objectives and other public policy goals such as consumer health and safety: for example, the European Food Safety Authority (EFSA) requirements relating to food grade recycled plastics and the RoHS and WEEE Directives in relation to recovered plastic waste that contains brominated additives.