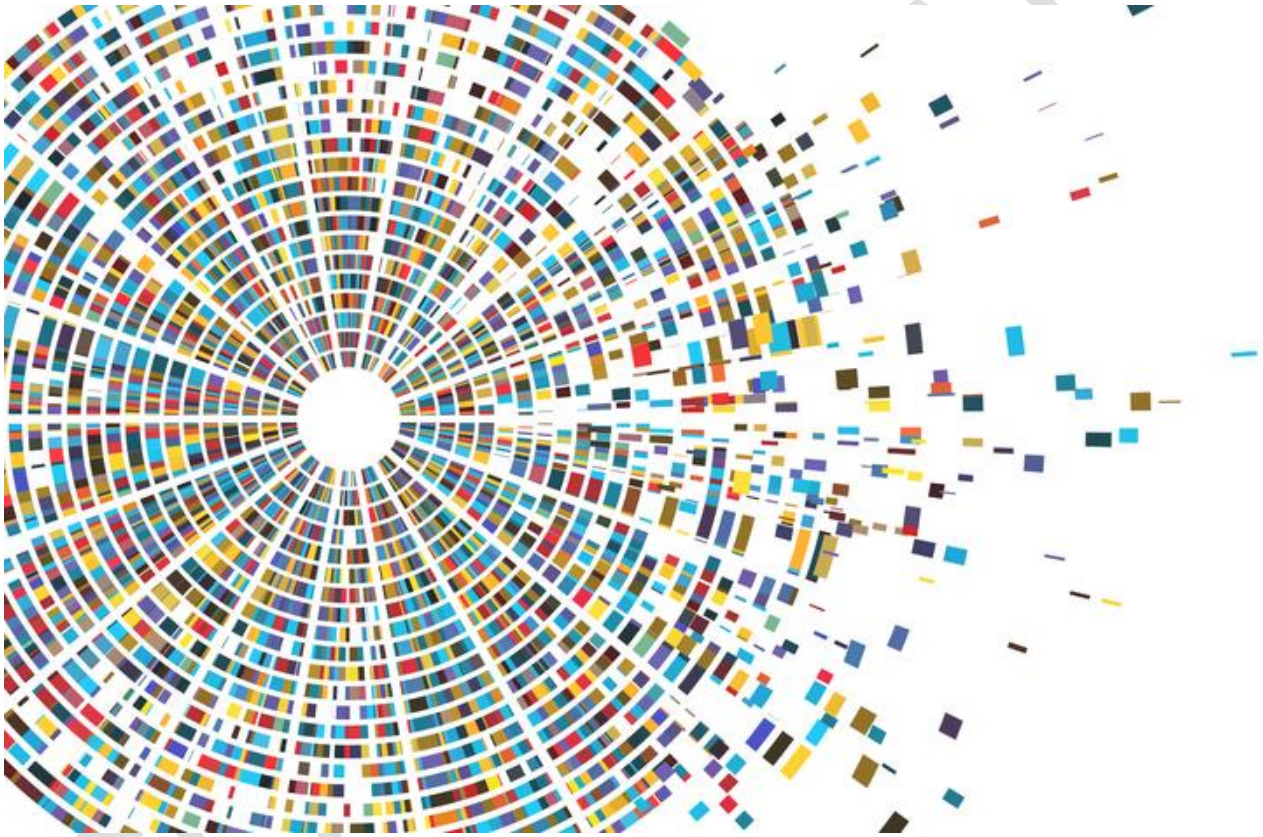
RECOUP

Recycling Small Plastic Items

2020



Report by RECOUP

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RECOUP (Recycling of Used Plastics Limited) is a leading authority on plastic packaging resource management, providing expertise and guidance to a wide range of clients across the plastics supply, use and disposal chain. Set up in 1990, RECOUP is a registered charity, built on a network of members and project activities.

RECOUP works to maximise plastic recycling through stimulating the development of sustainable plastics waste management, including the improvement of plastics collection and sorting activities across the UK, undertaking research and analysis to identify good practices and remove barriers to the adoption of efficient recycling systems.

This report has been written by;

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Introduction

The subject of recycling small plastics items has been one that continues to prompt questions from across the value chain and there is a vested interest about what happens to them and how modifications can be made.

RECOUP's work to date has included projects on small plastic items from the household. These have included various bottles, pots and tubs from the food and non-food sector that are smaller than 40-50mm.

From kerbside collections we know that these small items are compacted, crushed, or broken into even smaller pieces, reducing the chances of these already small items being sorted and detected.

From the work and research carried out is was evident that in the current status any small plastic items under 40-50mm in diameter were lost typically at the sorting stage as rejects and go onto EFW. This is the case regardless if the MRF takes in glass or not as small items are separated through a sieving process which allows larger items to continue through the system. Although it was agreed that there appear to more MRF's than not sorting glass.

If the MRF takes in glass the small items are separated with the glass. The glass breaker in a MRF is made up of metal discs that rotate and vibrate at high speed agitating the material, sifting and sorting ready for the next stage in the process. The discs in the glass breaker have openings with sizes which vary from 46mm – 52mm, the discs are positioned as diagonals and straights with the diagonal opening being the largest at 50mm and the straight being the smallest opening at 40mm, therefore it is easier to say items between 40-50mm could be lost. As the glass passes through it is smashed and falls between these openings. This is where any small items 50mm or under which include, plastics such as toothbrushes, cosmetics and makeup items, food packaging, medical items; blister packs and pill bottles, bottle tops and lids, small toys and coffee discs. Other items include, cigarette lighters, paper, aliminum, batteries and food waste are are lost with the glass, this material output is known as fines. This process allows larger items such as bottles, pots and tubs, cans, card and paper to continue through the system.

We recognised the challenges and the need to further investigate this part of the process and with the interest and support from our members we formed a working group to share information, ideas and the reallity of what happens now and opportunities for further action. All members were invited to be part of this group.

Exec Summary

RECOUP held an inception meeting on 5th February 2020 at the BPF offices in London. Members of RECOUP were invited to attend for an open session with presentations from RECOUP and members to educate and address the issue of small plastic items under 50mm that are not recovered for recycling.

The meeting detailed current challenges facing producers when it comes to the design and recovery of small items in the waste stream, limitations in current infrastructure to handle such items, and if there are enough drivers in place to consider if there is value to upgrade or change the current system, public behaviours and understanding and discussion around possible solutions to the challenge that manufacturers and brand owners face in relation to small items.

Presentations were given from an equipment provider which gave a detailed insight into current infastructure, how the equipment works and why it operates that way, this sparked much interest. A Waste Mangement company also presented on their scheme Procycle, which allows collection points for difficult to recycle waste streams. This is something to be looked at for further work.

For this work we interviewed five Waste Management companies about their process regarding small items within the MRF's. All five were identical in their process in dealing with small items; this is deemed as standard practice for this material output.

Taking one MRF as an example the amount of fines material collected each month is 247 tonnes. This is the broken glass mixed with other small pieces (as examples above).

Following an open discussion with members it was agreed that it would be beneficial to exploring the process used once this material fraction has reached a glass re-processor.

Connected Opportunities

A number of connected opportunities were agreed for RECOUP to develop further.

1. Visit a glass reprocessor to find out more on what plastic is in the MRF glass and fines fractions and assess how it can be recovered

2. Assess the viability for small plastics under 50mm in diameter to be made with only PET and natural HDPE to enable a valuable material stream to be recovered

3. Investigate impact if EPR is introduced is there a potential process to recover this material, and if so, what is the impact on MRFs and associated costs?

4. Local Authroties to segregate glass at source

5. Working directly with a re-processor to recycle small plastic items

6. Viability of take back schemes, including scale up and tonnage potential

1.Visit to URM, Tilbury Docks, Glass Reprocessor

The RECOUP team visited URM, a glass reprossor in the South of England.

They take in glass from the MRF's; material which has been collected kerbside. Many Local Authorities are moving away from source segregated glass collections and collect mixed dry recycling, including glass, which is all processed through the MRF. The quality of fines taken in from each MRF will vary depending on the capabilities of the facility to produce different grades. URM have leading technology that can process much of this lower grade material received from MRF's.

The facility had significant plastic contamination in their recycling streams received post-MRF sorting, less so from those received directly from sources such as Local Authority bottle banks. The infrastructure they have in place allowed for plastic to be removed separately and therefore had outputs of separated plastic – not just separate from other materials, but also clear plastic was separate from coloured. The unwanted material is removed via suction vents and large sieves. It is fair to say that the quality of this material is not good and having been through the MRF and then glass-sorting process, it had been further degraded and worn down. The composition of the plastic was random – although you could see that there were a lot of bottle tops in it. In terms of the amount of plastic – they said that of the 5kt of glass they receive each week, as much as 20% would be contamination – but the mix of ceramic, metals and other heavy materials, mean that although plastic is significant in terms of numbers, it's not in terms of weight. The end destination of this material is generally EFW and is very much a waste and expense to them.

Whilst on site at URM they provided us with a small sample of the coloured and clear plastics removed from the glass.

2. Assess the viability for small plastics under 50mm to be made only with PET and natural HDPE

One idea which was mentioned was to restrict manufacture of small items to Clear PET and natural HDPE. Further interviews were undertaken to investigate. The conclusion from discussions is that the PET / HDPE material would still be lost through the initial screening process through to the glass stream which would then be treated as a waste contaminant in the glass. It is unlikely that current end markets would be able to separate out such materials for recycling at the present time.

Any remaining material would go through the plant with most going through the mixed plastic stream, if hand sorting you could not remove them for recycling at hand sorting process for larger PET & HDPE. If in the mixed plastic stream, the smaller items may then get separated and recycled at those facilities that take the material for further sorting.

If reducing the size of the screens that remove glass - to enable more small plastic items to be contained within the material stream for separation with mixed plastics - there would be more glass passed through the facility with the significant impact on material quality, damage to plant and risk to staff caused by glass.

3. If EPR introduced, is there a potential process to recover this material, impact on MRFs and associated costs?

With regard to Extended Producer Responsibility, there would not be enough tonnage/value from small plastics to consider changing a MRF layout, the cost of additional plant and equipment would be high and as a result the PRN value for small plastic items would have to be very high to even consider making such changes with plant and bale storage very limited.

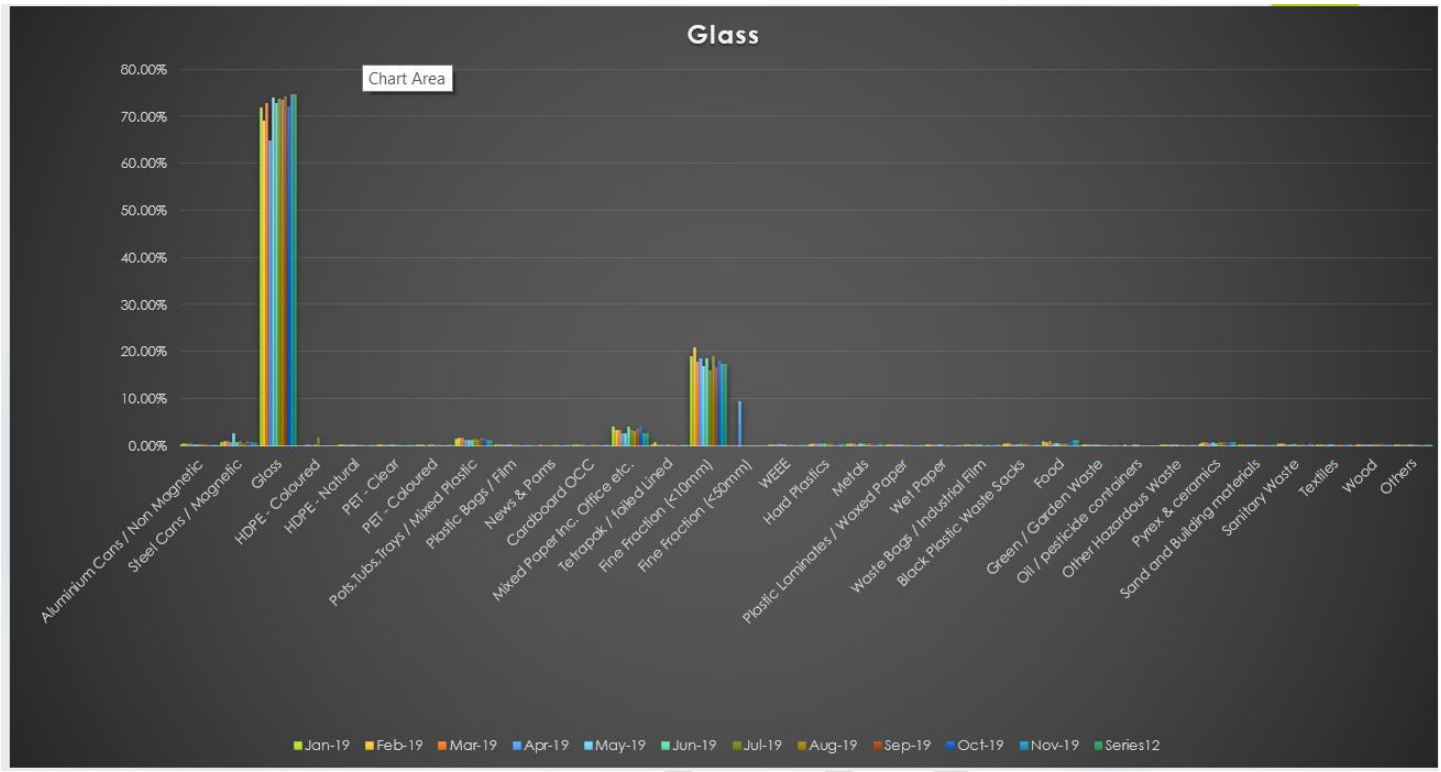
It was suggested that sorting would best be done at mixed plastics sorting facilities where investment is more likely as the volume of such materials would be higher, while we recognise that focusing equipment solutions at the PRF stage could make sense of which there are currently 7 in the UK[1], this would be dependant ensuring the material is not lost at the MRF stage.

Commercial drivers must be in place to make any modifications or adjustments to current equipment and procedures.

4. Local Authority collections

It was suggested by some that Local Authorities should segregate glass at source, which would mean that plastics do not contaminate the glass fraction, however the issue remains with the loss of fines in the MRF process. We have not identified a suitable solution for ensuring an alternative approach to resolve the MRF fines issue.

[1] Referenced from the RECOUP Infrastructure report



This graph shows the volume of glass vs the fine fraction that is collected at a typical UK MRF.

5. Impact Solutions – Impact Recycling

Impact Recycling was formed to bring a new dimension to plastic recycling. Their plastic experts have applied their industry knowledge to help improve the circular economy by developing a density separation technology to recycle mixed polyolefins. They accept post-consumer plastics which are commonly described as mixed rigid plastics.

Following on from RECOUP's visit to the glass facility we contacted Impact recycling to ask them to analyse the two small sample bags of mixed materials to determine if they could incorporate this into their mix. Although the bags contained mainly plastics there were other contaminants such as, toothbrush heads, seashells, and lighters.

On visual inspection, Impact confirmed that it looks like useful feedstock and asked for us to send them to their facility for further testing. They confirmed that both samples contain a high level of non-polyolefins which would be of little interest to recyclers.

Impact confirmed they could give a more detailed composition of materials if they could be supplied with at least a tonne of material – this would need to be agreed with the glass reprocessor as part of a research project. Impact can then tell us what is lost at each stage of the process, yield, and loss, sink fraction recovered, and other feedback such as the nature of the contaminants and (possibly) also the process cost per tonne.

Samples of the mixed broken plastics taken from the glass re-processor

6. Viability of take back schemes, including scale up and tonnage potential

There are some schemes in place where such items can be taken to collection points. Some brands are offering reward schemes for customers who return their used makeup packaging to stores, and retailers are offering takeback and refill schemes on beauty products. However, there is little information available on what these outlets are doing with the collected material from takeback schemes and there is a lack of evidence to suggest that they are being reused or recycled. More information is needed from retailers and the organisations that run these schemes on the process of what happens once the material is collected, and this would be welcomed by the plastics industry.
The box below lists 3 current return to store schemes for cosmetics.

RETAILER	SCHEME
MAC	Back to Mac programme – this allows the customer to return 6 primary packaging containers in return for a free lipstick
Body shop	Return Recycle Repeat scheme – this encourages customers to return any 5 empty bottles, tubs tubes or pots to recycled in return for £5
John Lewis	Started a new scheme which ran for 9 months and allows customers to return empty beauty products instead of throwing them in the bin!

Further Work

Following on from the members meeting, site visit and material analysis, the RECOUP team have discussed the opportunities and possibilities to continue and further develop the area of work.

More investigation into retailers and products is needed and there is pressure for smaller items to be recycled or made in a way that they can be recovered and not lost to waste. This can include household consumer items, on-the-go items including hotel chains, travel, pharmaceutical and small toys, and gadgets.

Key target areas: collections/pharmaceuticals/airports/hotels/leisure centres/toys

If these items can be collected via another means, i.e. bring point or store collection, and transported direct to the recycler this would mean they are still in their whole form and would give them maximum opportunity to be further recycled. This could be linked to the collection system provided by the waste management company as previously mentioned which allows difficult to recycle items from the home to be collected, taking a targeted material by sector would allow the material to be further analysed. For this exercise we would target stores that stock cosmetics and pharmaceutical items, as example blister packs:
Medica blister-packs containing pills are often found in the fines collected from MRF's. These are made from PVC with a foil opening and are usually small and compact. Such items have two negatives at a sorting plant; 1. The polymer, PVC is not collected or sorted and 2. The size being 50mm and under

The next step is to arrange a second working group discussion to reviews findings and agree tasks to end of the year, look at on-the-go challenges which links with our on-the-go group and collate feedback from our members.

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