COLLECTION AND SORTING OF HOUSEHOLD RIGID PLASTIC PACKAGING

A guide for authorities considering adding non-bottle rigid plastic packaging to their kerbside recycling collection service.

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WRAP’s vision is a world without waste, where resources are used sustainably.

We work with businesses, individuals and communities to help them reap the benefits of reducing waste, developing sustainable products and using resources in an efficient way.

Written by: AMEC Environment & Infrastructure UK and Axion Consulting

WRAP and AMEC Environment & Infrastructure UK believe the content of this report to be correct as at the date of writing. However, factors such as prices, levels of recycled content and regulatory requirements are subject to change and users of the report should check with their suppliers to confirm the current situation. In addition, care should be taken in using any of the cost information provided as it is based upon numerous project-specific assumptions (such as scale, location, tender context, etc.). The report does not claim to be exhaustive, nor does it claim to cover all relevant products and specifications available on the market.
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1 INTRODUCTION

This guide sets out key information for local authorities on the options for, and potential benefits of, introducing non-bottle rigid plastic packaging to kerbside recycling schemes. It focuses on the kerbside collected dry recyclables stream and the supply chain that flows from it. The aim is to inform local authorities how the supply chain works and what questions they should ask to inform their procurement and service-change decisions.

An increasing number of local authorities are adding non-bottle rigid plastic packaging, comprising pots, tubs and trays (commonly known as PTT), to existing kerbside recycling schemes. This is in response to demand from residents to recycle more as well as regulatory drivers to increase recycling rates for post-consumer plastic packaging.

The guide has been written for local authorities in England and Scotland and while it is likely to be useful to authorities in the other nations, steps should be taken to ensure that local policies and material outlets are considered. It contains links to further detailed information, including a separate guide for local authorities looking to optimise existing plastic bottle-only collections.

1.1 Target audience

This guide is aimed specifically at local authorities that:

- Currently provide a kerbside collection of plastic bottles and are looking for advice on expanding these collections to include other forms of rigid plastic packaging.
- Are seeking advice on introducing rigid plastic packaging to a kerbside recycling collection.

It is targeted at senior officers and decision makers within local authorities and aims to communicate the key messages in a digestible, concise format that is easily accessible either on-line or as printed copy.

Having considered the information in this guide, local authorities requiring more detailed advice on introducing rigid plastic packaging to their kerbside recycling scheme can contact WRAP’s local authority advisory service.

1.2 Scope of this guide

This guide provides information on the supply chain for post-consumer rigid plastic packaging and highlights key issues for local authorities to consider when assessing potential benefits and options for introducing non-bottle rigid plastic packaging to their kerbside recycling schemes. In providing information on the supply chain and markets, it addresses many frequently asked questions from local authorities as well as the key issues raised by reprocessors accepting household plastic packaging waste. A number of local authorities, waste management contractors and reprocessors have been consulted and their feedback integrated into this guide.
2 TARGETING RIGID PLASTIC PACKAGING: KEY TRENDS AND BENEFITS

Overview

The collection of plastic bottles has increased dramatically over the last decade and is now commonplace in most local authorities. As sorting capacity and end markets develop, the opportunities to extend kerbside collections to include a wider range of rigid plastic packaging will increase. It is important to be aware of these other packaging types to understand which materials have the potential to be added to an authority’s recycling scheme and the benefits of doing so.

2.1 Plastic packaging collection in the UK

UK households produce around 1.7 million tonnes of plastic packaging each year. About a third of this is bottles (550,000 tonnes), a quarter is non-bottle rigid plastics (450,000 tonnes) and the remainder is films and bags (720,000 tonnes).

Figure 2.1 shows how the collection of bottle and non-bottle plastic packaging has increased over time, as reported by RECOUP.

In 2010 kerbside collected plastic bottle tonnages increased by 8.4% to 281,097 tonnes, while non-bottle tonnages increased by 101% to 76,364 tonnes. It is estimated that the 2010 figures equate to an overall bottle recycling rate of 48.5% and rigid packaging rate of 7–9%, which means there is significant scope to increase the capture of all forms of rigid plastic packaging for recycling.
## 2.2 Product and polymer types

The table below contains examples of the packaging types that are commonly found in the household non-bottle rigid plastic packaging waste stream and the polymers from which they are typically made. This is not an exhaustive list, as there are thousands of different products sold in the UK with a huge variety of packaging types. Most rigid non-bottle plastic packaging is made from polypropylene (PP) and polyetheleneerophthalate (PET) with smaller quantities of high-density polyethylene (HDPE), polystyrene (PS) and polyvinyl chloride (PVC). Plastic bottles are mainly PET and HDPE.

<table>
<thead>
<tr>
<th>Packaging type</th>
<th>Typical polymer types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margarine and ice-cream tubs</td>
<td>PP</td>
</tr>
<tr>
<td>Meat trays and microwaveable trays</td>
<td>PP, PET</td>
</tr>
<tr>
<td>Fruit and vegetable punnets and trays</td>
<td>PET, PP, PS</td>
</tr>
<tr>
<td>Household cleaning items</td>
<td>HDPE, PP</td>
</tr>
</tbody>
</table>

### Table 3.1 Examples of common non-bottle rigid plastic packaging waste by polymer type

<table>
<thead>
<tr>
<th>Packaging type</th>
<th>Typical polymer types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yoghurt, cream and other dairy pots</td>
<td>PP, PS</td>
</tr>
<tr>
<td>Pasta sauce pots, sandwich filler tubs</td>
<td>PP, PET</td>
</tr>
<tr>
<td>Fruit pots, plastic baked-bean jars, flexible spread jars</td>
<td>PP</td>
</tr>
<tr>
<td>Bakery goods trays</td>
<td>PET, PS</td>
</tr>
</tbody>
</table>
2.3 Benefits

There are many benefits to extending kerbside recycling collections to include all forms of rigid plastic packaging. These include:

- The addition of non-bottle rigid plastic packaging to kerbside collections is popular with residents. A more comprehensive recycling service leads to higher participation, which means greater yields of materials.
- Recycling rigid plastic packaging delivers a high carbon benefit compared to other commonly targeted materials (around 0.62 tonnes CO2e per tonne plastics). The Carbon Metric system of reporting adopted by the Scottish Government takes a life-cycle rather than a weight-based approach to valuing material by environmental impact. It is intended to aid decision making, refocusing recycling efforts towards materials with a high environmental benefit of recycling over landfill compared to other commonly targeted materials.
- Global demand for plastics has grown and increasing energy costs for extracting and processing virgin materials make recycled plastics more competitive. Commitments to increase recycled content in new products and packaging, such as Phase 2 of the Courtauld Commitment is helping to increase demand for recycled plastics.
- Increasing numbers of sorting facilities now have optical sorting capabilities able to differentiate between polymer types. As a result, many collections and material handling contractors now advise that they accept rigid plastic packaging alongside bottles.
- As landfill tax continues to rise the economic incentive to manage waste resources higher up the waste hierarchy in order to avoid disposal costs increases.

Key messages for local authorities

Consideration of the benefits locally of adding rigid plastic packaging to kerbside collections compared to continuing with a plastic bottle collection should feature in any options appraisal undertaken. The recycling of plastic bottles currently delivers a carbon saving of 1-1.5t CO2e per tonne recycled and typically delivers an additional income of £100/te (comparing a typical UK mixed plastic bottle bale with a mixed rigid plastic packaging bale).

An options appraisal should draw on information provided by contractors on how the material will be recycled and the commercial arrangements for gate fees and revenues. In assessing the overall economics avoided disposal costs should be taken into account.
3 RECYCLING SUPPLY CHAIN AND MARKETS FOR RIGID PLASTIC PACKAGING

Overview

There is often a misunderstanding of the challenges involved in the downstream separation and reprocessing of plastic packaging material. Becoming informed about these issues will assist local authorities to make effective decisions. This section provides information on:

- UK capability to handle non-bottle rigid plastic packaging;
- the steps involved in sorting and processing rigid plastic packaging; and
- material values and market outlets.

During our research, some larger plastics recovery facility (PRF) operators commented that the bulk of the UK’s plastics recycling supply chain can handle non-bottle rigid plastics made from PET and HDPE, provided they are present in roughly the same proportions as in the bottle stream. There is some capacity to handle PP, but very little capacity to handle PS and PVC. The main issue for larger PRF operators is that introducing non-bottle rigid plastic packaging to bottle-only collections tends to shift the mix of polymer types in the feedstock and increase the proportion of PP and of black plastics of all polymer types.

Black packaging is much more common in the rigid non-bottle stream than in the plastic bottle stream. It is widely used, for example, in food trays. Most sorting facilities cannot recover black plastics because optical sorting machines used cannot detect items with carbon-black, meaning black plastic often ends up in the residual waste stream. WRAP is looking into alternatives to carbon-black colourants that will allow automatic sorting (see section 6.4).

3.1 The key handling steps

The route rigid household plastic packaging takes through the supply chain depends on how it is collected:

- Rigid plastic packaging from multi-stream (kerbside sort) systems typically is baled at a transfer station or depot and sent directly to a PRF or reprocessor without being further separated.
- Materials collected co-mingled, either as single or twin streams, usually pass through a materials recovery facility (MRF) where the co-mingled stream is separated into material types. Figure 3.1 gives an overview of how MRFs typically sort and sell on recyclables.

Supply chain and markets

Collection

Household communications

What to consider

Glossary and acknowledgements
3.1.1 MRF stage: separating and selling on waste plastics

When co-mingled materials enter a MRF, larger bulky items such as plastic films and cardboard are removed manually at the pre-sort stage and are either sold or added to the residual waste for disposal.

Table 3.2 Material yielded at pre-sort stage at MRF

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplied to</th>
<th>(Cost)/Price (£/tonne)*</th>
</tr>
</thead>
</table>
| Large items of plastic film.    | Film recycler. In some cases film plastics may be included in the residual stream for disposal | -100 to 150
|                                 |                                                  | 0 to 30                 |
| Cardboard                       | Paper merchant or mill, or baled for export      | 116 to 124              |
| Large non-recyclables           | Final disposal-landfill or incineration          | -100                    |

* Prices are averaged from figures published by letsrecycle.com in 2011; negative figure represents a cost.

The material then passes through a series of manual and automated sorting processes to remove other higher value recyclable materials.
Table 3.3 Material yielded at primary sort stage at MRF (household waste stream)

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplied to</th>
<th>(Cost)/ Price (£/tonne)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed papers</td>
<td>Paper merchant or mill</td>
<td>100–109</td>
</tr>
<tr>
<td>Glass</td>
<td>Glass plant for remelt applications or recovered for use as an aggregate (price range quoted is for clear glass)</td>
<td>24–31</td>
</tr>
<tr>
<td>Metals</td>
<td>Metal recyclers</td>
<td>130–162</td>
</tr>
<tr>
<td>Residual material</td>
<td>Landfill/mechanical biological treatment/ incineration</td>
<td>-100</td>
</tr>
</tbody>
</table>

* Prices are averaged from figures published by letsrecycle.com in 2011; negative figure represents a cost.

Rigid plastic packaging and plastic bottles will either be separated manually or by an automated optical sorting process which targets the plastic types preferred by reprocessors. The MRF operator may decide to include special optical sorting stages for PET and HDPE containers (the most common and profitable plastics in the household recycling stream), which are easy to sell and generate good returns.

Rigid plastic packaging includes a high proportion of PP and some PS. When significant proportions of these enter the input stream, targeting HDPE and PET as separate streams can lead to high material losses. In this case, MRFs tend to go for maximum yield and hence landfill diversion by using a manual sort for ‘all rigid plastics’ or by turning their optical sorting units (where feasible) to target all the plastic types of interest to downstream PRFs. PRFs generally are interested in PET, HDPE, PP and, usually, PS. On the other hand, PRFs tend to exclude PVC, multi-layer plastics and engineering plastics such as acrylonitrile butadiene styrene (ABS), which is found, for example, in waste electrical and electronic equipment (WEEE) and toys.

How much the baled mixed plastic stream recovered by a MRF is worth to a PRF or reprocessor depends greatly on the proportion of the higher-value polymer types (particularly PET and HDPE) that it contains, while the amount of film and paper contamination that it contains can lower its value by anything from 5% to 35%.

Baled mixed plastic bottles typically brought £177–£247 per tonne in 2011, while bales of all mixed plastics, including bottles and other rigid plastic packaging brought £100–£170 per tonne. Top-end prices are only achieved for such mixed bales if the MRF has not extracted PET or HDPE bottles from the mixed plastic stream for separate sale.

Some MRFs may also include an automated film-removal stage to recover films not pulled out at the pre-sort stage. This may be a mechanical air separation or an optical separation system. Films recovered in this way typically are baled and have negligible value (close to £0 per tonne) because there is only limited capacity in the UK to process this material. However, many MRFs prefer not to handle films because they are difficult to separate and can become a source of contamination in other material streams.

Some larger MRFs include a further sorting process [shown as mixed plastics sort in figure 3.1], again automated or manual, designed to segregate the more valuable plastics by polymer type. These may include the materials listed in Table 3.4.

Key messages for local authorities
The type of kerbside collection employed will determine the requirement for MRF and/or PRF sorting. Being aware of how these sorting processes function, and their requirements with regard to feedstock quality, can help ensure that quality issues are dealt with further upstream.
Table 3.4 Nature and value of plastics yielded at the (optional) plastic sort stage in a MRF

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplied to</th>
<th>Price (£/tonne)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET bales</td>
<td>PET recycler</td>
<td>328–361</td>
</tr>
<tr>
<td>HDPE bales</td>
<td>HDPE recycler</td>
<td>330–358</td>
</tr>
<tr>
<td>PP bales</td>
<td>PP recycler</td>
<td>100–200</td>
</tr>
<tr>
<td>Mixed plastic bottle bales</td>
<td>PRF</td>
<td>177–247</td>
</tr>
<tr>
<td>Mixed rigid plastic bales</td>
<td>PRF</td>
<td>100–170</td>
</tr>
</tbody>
</table>

* Prices are averaged from figures published by letsrecycle.com in 2011

3.1.2 PRF stage: further sorting and baling

PRFs are complex plastic sorting facilities with high capital costs because they need automated separators to produce a range of different polymer types. To be commercially viable they tend to be large with the capacity to handle 80-100,000 tonnes per annum. As well as being standalone facilities, some of the processes carried out a PRF may also occur at the front end of a reprocessing plant, and some PRF operators have invested in downstream reprocessing to make high-grade finished recycled polymers.

PRFs typically employ both manual and optical sorting processes to sort plastics by polymer type. The optical sorters used in PRFs sort only by polymer type, they do not distinguish between bottles and non-bottle rigid packaging of the same polymer type. PRFs generally separate out PET, HDPE, PP and PS, and then separate these further into coloured and clear streams, as clear plastics bring a higher value.

Moving to full rigid plastic packaging collections should be a relatively straight forward development for PRFs but as this will alter the mix of polymer types requiring sorting, it will require changes to the operations at some PRFs. The proportion of PP and, to a lesser extent, PS in the mix will increase because these polymer types are more common in non-bottle rigid plastic packaging. For HDPE and PET the ratio of bottle to non-bottle rigid packaging can also be expected to change.

Once delivered to a PRF, mixed plastic bales are commonly processed as shown in Figure 3.2.

Key messages for local authorities

The majority of current MRFs, PRFs and plastics reprocessors are sized and configured to accept the mix of plastic types which come from bottle-only collections. Introducing rigid non-bottle plastic packaging to kerbside collection will unbalance the material flows through these facilities. Further capital investment will be needed at many facilities to rebalance these plants to handle mixed non-bottle plastics. Local authorities should discuss any plans to introduce collections of non-bottle plastics with MRF/PRF operators to ensure that appropriate sorting capacity is available to handle these additional materials and to make sure the collection system and MRF input specification are compatible.
Case study 1: Biffa mixed plastic sorting and washing facility

In April 2011, Biffa opened Biffa Polymers, the UK’s first dedicated facility for mixed plastics, in Redcar. Developed with funding support from WRAP, the facility is designed to treat primarily non-bottle rigid plastic packaging (pots, tubs and trays), which it takes from local authority MRFs and other sources. Most of the material accepted by the facility so far is from within the Biffa group, with the rest coming from the spot markets. Thus Biffa is actively sourcing non-bottle rigid plastic packaging to process through the facility. Biffa’s ethos is to accept as wide a range of plastic material as possible and to actively seek out markets for each product stream.

The quality of the material received at the facility varies. If it is heavily contaminated, Biffa Polymers sends it back to the suppliers. To try to prevent this happening, they have worked with suppliers to help educate them on the material quality required by the facility.

Biffa Polymers is finding that many companies are either now incorporating a percentage of recycled material in their products and packaging or making a commitment to do so in the future. Objectives such as these amongst some of the leading brands and retailers are driving increased demand for recycled polymer from PRFs and reprocessors.

For more information on the Biffa mixed plastics reprocessing facility see the Biffa website.
3.1.3 Reprocessing stage

Plastic product values increase more rapidly at the reprocessing stage. Once the mixed plastics have been sorted, they can be flaked and washed. Some reprocessors also have extrusion facilities to change the flaked material into pellets. Plastics reprocessors who choose to incorporate these stages into their process will significantly increase the value of the finished product, enabling them to sell the material on at prices close to those for virgin polymers. The washing and extrusion process is technically challenging and expensive to operate, and a reprocessor who can manage to achieve 70–80% of virgin price for their product is doing well.

Product yield is critical for plastics reprocessors; losses can be as high as 50% from labels and product contents as well as from other non-target material contamination, which at a disposal cost of around £100 per tonne has a significant impact on the economics. Several stakeholders commented that a consistently applied grading system for baled material, starting from clearly defined end market requirements and applied uniformly across the UK, would help MRFs and PRFs drive the importance of adherence to input material specifications and support a consistent approach to auditing.

Continuity of supply is vital for this stage of the supply chain, so long term, stable supply agreements are advantageous.

Table 3.5 lists the polymer streams that PRFs and/or reprocessors can recover from a mixed rigid household plastic packaging waste stream, and shows typical pricing at 2011 prices at the different stages of the material supply chain, as value is added by the recyclers.

<table>
<thead>
<tr>
<th>Material</th>
<th>Supplied to</th>
<th>Price (£/tonne)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baled PET bottles</td>
<td>PET recycler/reprocessor</td>
<td>328–361</td>
</tr>
<tr>
<td>Food-grade PET pellet</td>
<td>Plastic moulder</td>
<td>900–1100</td>
</tr>
<tr>
<td>Food-grade PET flake</td>
<td>Plastic moulder</td>
<td>750–950</td>
</tr>
<tr>
<td>Baled jazz [mixed colour] PET bottles</td>
<td>PET recycler/reprocessor</td>
<td>111–130</td>
</tr>
<tr>
<td>Non-food-grade coloured PET flake</td>
<td>PET recycler/reprocessor</td>
<td>600–800</td>
</tr>
<tr>
<td>HDPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baled natural HDPE bottles</td>
<td>HDPE recycler/reprocessor</td>
<td>330–358</td>
</tr>
<tr>
<td>Jazz [mixed colour] HDPE flake</td>
<td>Plastic moulder</td>
<td>300–500</td>
</tr>
<tr>
<td>Food grade natural HDPE pellet</td>
<td>Plastic moulder</td>
<td>900–1000</td>
</tr>
<tr>
<td>Non-food grade black HDPE pellet</td>
<td>Plastic moulder</td>
<td>750–850</td>
</tr>
<tr>
<td>PP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baled PP containers</td>
<td>PP recycler/reprocessor</td>
<td>100–200</td>
</tr>
<tr>
<td>PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baled PS containers</td>
<td>PS recycler/reprocessor</td>
<td>0–50</td>
</tr>
<tr>
<td>Films</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic films (LDPE and others)</td>
<td>Film recycler/reprocessor</td>
<td>219–255**</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual metals</td>
<td>Metal recycler</td>
<td>155–185</td>
</tr>
</tbody>
</table>

* Prices are averaged from figures published by letsrecycle.com and industry representative opinions in 2011
** Feedback from reprocessors indicates prices closer to zero in 2012.

Sources: Recovered arisings are derived from several sources including WRAP’s Market Situation report [Spring 2010], Stockport Household Plastics Collection and Sorting Trial (WRAP, 2005) and the RECOUP UK Household Plastics Packaging Collection Survey (2011)
**Case study 2: REGAIN Polymers**

REGAIN Polymers is one of the UK’s leading plastic recycling companies. The compounding capacity of its site in Castleford, West Yorkshire is set to increase to 40,000 tonnes per annum by the end of 2012. REGAIN recycles a wide range of rigid plastics, including HDPE bottles and PP pots, tubs and trays collected from the domestic waste stream.

Originally, REGAIN recycled polystyrene products. However, in order to meet the demand from industry, the business now has the ability to deal with a wide range of rigid plastics. The main polymers reprocessed by REGAIN include all grades of rigid polythene, polypropylene and polystyrene.

As well as processing pure streams of post-industrial plastic scrap, REGAIN has wash plants to clean post-consumer plastic wastes. From these varied sources, REGAIN produces highly specified recycled plastic compounds on six extrusion lines and supplies end markets in the automotive, construction, horticulture and packaging sectors.

REGAIN works directly with end users to develop new ways of incorporating recycled material into products. For example, it has worked with Trojan Services to develop troughs for cabling that runs alongside rail tracks. These troughs needed to be UV stable and tough enough to survive the installation process and a 25-year-plus design life. REGAIN worked with Trojan Services to develop a formulation using recycled PP combined with a mineral filler and a state-of-the-art UV system, which is now being used successfully.

**Key messages for local authorities**

Given that individual facilities are configured to be able to handle different ranges of materials (and contamination levels) each local authority should work with their MRF, PRF and downstream reprocessors to understand which particular contaminants cause processing problems, using this information to inform what rigid plastic items they collect at kerbside.

The current advice from the supply chain is that flexible plastic packaging (such as films and bags) should be kept separate from rigid packaging and not included in kerbside collections. Flexible plastics are difficult to separate mechanically and commonly result in lower grade bales; the earlier they can be separated the better. Films are more suitable for a bring bank approach or front of store collection at retailers. WRAP will shortly be producing guidance on the collection of film plastics.

If your MRF cannot separate black plastic packaging, you should consider telling residents that black plastics should not be placed in recycling containers.

Dealing with rigid packaging that is either contaminated with left over product (e.g. food) or other composite packaging elements (such as films) can be difficult. Small quantities of food waste can usually be tolerated as washing commonly occurs at the reprocessing stage. It is considered a lesser issue by handlers and reprocessors than dealing with film.
3.2 The onward supply chain

Usually, plastic types leaving the PRF go to a specialist reprocessor dealing with particular polymers.

3.2.1 PET and HDPE

Currently, plastic moulders are experiencing difficulties in sourcing consistent supplies of clear rPET (recycled PET) and natural rHDPE (recycled HDPE), at both food and non-food grade, because demand from Europe and Asia exceeds supply. As a result, MRF and PRF operators are reluctant to enter into the long-term contracts needed by recyclers and moulders across Europe. Instead, they generally sell on a spot basis, taking advantage of market volatility and selling at peaks. Longer contracts would improve the supply flow to moulders but could also reduce the revenue to MRFs, PRFs and reprocessors.

3.2.2 Polypropylene (PP)

Recycling of post-consumer PP is less well-developed than the processes for PET and HDPE. This is because PP is found mainly in the non-bottle rigid plastic stream, which still represents a relatively low overall tonnage in the UK. However, as the recycling processes required for PP are very similar to those for HDPE, it is relatively straightforward to develop capacity for processing PP. Strong demand exists for PP recyclate for a wide range of applications, including new packaging, construction products and car parts. A food grade recycling process to enable use of rPP (recycled PP) in food packaging applications is under development. If this can be developed and is economically viable then new outlets for rPP will develop in the future.

3.2.3 Polystyrene (PS)

The only commercially viable quantities of PS in household plastic packaging waste are in the non-bottle rigid plastic packaging stream, of which it currently constitutes around 6%, largely in the form of yoghurt pots. PS is therefore not widely recycled from household waste, because non-bottle collection volumes are currently low and because it is commonly lost in MRFs due to its brittleness. The major brand owners and retailers are moving to convert their PS packaging to PP as part of a drive to standardise on PET, HDPE and PP. A number of the large PRFs in the UK currently separate PS for recycling. The baled material is mostly exported to specialist processors outside the UK.

3.2.4 Further information

There are a number of reprocessors in the UK that have the ability to accept mixed rigid plastic waste.

The British Plastic Federation website contains a directory which lists companies operating in the plastic supply chain, including reprocessors.
3.3 Manufacturers’ requirements

The demand for recycled polymer is increasing, however, there are a number of key issues that concern manufacturers using recycled polymer.

3.3.1 Security of supply

While virgin polymer manufacturers are large, secure businesses which can deliver long-term supply commitments, suppliers of recycled polymer trade internationally on a spot-market basis. If international prices move, material supply sources can suddenly shift overseas (for example to the Far East) or radically rise in price. This makes it difficult to maintain a consistent supply for customers. Companies such as Biffa and Viridor are providing more stability in the UK by taking equity ownership of polymer recycling businesses.

3.3.2 Consistency of specification

Waste-derived materials can contain a wide variety of contaminants. Recycling separation processes are designed to remove these problem materials, but if the feedstock falls outside the input specification of the reprocessor for some reason, output quality is likely to decrease. This can create major problems for the final polymer user in terms of compliance with product-safety legislation, physical appearance of the product and mechanical properties (tensile strength, impact strength, flexibility, etc.).

3.3.3 Yield

The economics of any recycling process depend on the yield of useful material that can be achieved from the feed material. It is common for the yield of useful finished polymer from baled whole containers of household rigid plastics to be less than 40%. This means that in order to produce one tonne of high-value finished product, the recycler has to purchase 2.5 tonnes of baled plastic and find low-value or waste outlets for 1.5 tonnes of material which includes labels, contents residues, film and other non-target plastic types. A small change in quality can have a large impact. For example, if the film content of a bale was to increase by 10%, then yield drops to 30%, meaning that the recycler now has to purchase 3.3 tonnes of raw material to get one tonne of good product. This will increase processing costs.

3.3.4 Material security

Most of the pull for recycled plastics comes from manufacturers who want to reduce both material costs and dependence on the small number of global virgin polymer manufacturers. Some market segments now use recycled content almost exclusively, and could not function without supplies of recycled material at prices lower than virgin polymer. For example, the market in polyester strapping (used for securing parcels and large packages) is now largely dependent on coloured PET flake, and it is no longer possible to supply polyester strapping at a competitive price using virgin polymer feed material.

Despite these obvious dependencies, the UK plastic recycling market is still immature, and prices can be volatile. This makes it harder to set up the long-term supply agreements which are needed to underpin investment.
3.4 Exports and imports

When handling queries about plastic recycling, it is important to recognise that both virgin and recycled plastics are global commodities, and that the conditions of the market drive trading. Because most manufactured goods used in the UK are produced overseas, it makes sense for the UK to supply foreign manufacturing bases with the resources they require, subject to regulations (for example the ban on imports of post-consumer film to China).

3.4.1 The current and future role of China

The UK exports a large proportion of its recovered plastics from both municipal and industrial sources to China (see Figure 4.1). Shipping is mainly via Hong Kong. (For more details, see WRAP (2009), The Chinese Markets for Recovered Paper and Plastics – An Update).

Figure 4.1 UK export of recovered plastic

The Chinese market is a key outlet for recycled plastic material, since it is the world’s largest user of virgin and recycled plastic, creating both demand and competition for materials. China was estimated to have manufactured about 58.3 million tonnes of plastic products in 2010.

China also has lower labour costs than the UK. While sorting technologies continue to advance, an essential but expensive element of hand-sorting drives costs up, and Chinese recyclers can offer higher prices for less well-sorted material. It is harder for UK companies to compete in the buoyant market for lower quality mixed bales. If the market persists, it acts as a disincentive to optimise collections and sorting systems capable of delivering higher-quality bales to UK reprocessors.

The Chinese market’s tolerance of lower-quality material may also be starting to change. China aims to introduce a complete and advanced system to recycle 70% of its own major waste products, including plastics, by 2015. This could signal a reduction in demand from the UK. The demand from the export market may not hold up, and the price for baled export material may eventually bring a loss.

As far as the UK’s importance to China as a supplier of waste plastics is concerned, it is estimated that only 4% of China’s total volume of imported plastic waste originates from the UK. There is a perception that UK bales are of lower quality than those from other countries (for example central Europe or the USA). If Chinese demand begins to soften, lower-quality inputs are likely to be the first to suffer disproportionate drops in value and acceptance.
3.4.2 Interactions with continental Europe

Industry sources suggest that rigid household plastic packaging bales received from other European countries are of a better quality, having lower levels of contaminants and commonly including a specification sheet to show reprocessors what they are getting.

3.5 Stakeholder Feedback

Engagement with a number of stakeholders about market opportunities and challenges has revealed two key areas of concern:

- the need to standardise bale characteristics and raise quality (increasing yields) so that UK reprocessors have improved certainty around what they are buying and the value they can add; and

- local authorities have a duty of care to ensure that waste is managed in accordance with legislation, and as such its essential that they obtain transparent information on the ultimate fate of the materials collected. The complexities of the rigid plastic packaging supply chain mean that this level of information is often lost to local authorities.

One way to help achieve these goals is by developing longer-term supply agreements between supply-chain partners. Case study 3 shows how one authority has managed this.
Case study 3: A long-term supply agreement

In 2009 Milton Keynes Council (MKC) expanded its weekly kerbside recycling scheme to include rigid plastic food packaging. The council’s materials recovery facility (MRF) already had four near-infrared optical sorting units (dating back to 2001) to sort clear and coloured HDPE and PET bottles. Since 2009, MKC has collected rigid plastic food packaging and plastic bottles from the kerbside, co-mingled in pink sacks along with paper, card, cans, aluminium foil, aerosols, cartons and textiles. Glass is collected separately and flexible plastic packaging is excluded.

Community Waste Recycling Ltd (CWR) signed a 15-year contract with MKC in 2009 to manage the MRF. The contract includes a profit-share arrangement with CWR, so it is mutually beneficial if the material collected is of good quality and not contaminated. The Milton Keynes MRF has a long-standing aim to produce high-quality materials and has controls in place to measure and control contamination.

CWR has signed an initial two-year agreement with ECO Plastics to supply rigid plastics (pots, tubs and trays) and bottles. The combined plastic packaging is on average around 600 tonnes per month. Before the agreement with ECO Plastics, CWR sold the material it produced to various recyclers via a combination of contract and spot sales. The new agreement provides a secure outlet for the plastic material produced by CWR. It also allows CWR to continue to invest in their recycling infrastructure and assure local communities that its plastics will be returned to the market as new products.

CWR and ECO Plastics worked together for 18 months to reach a contractual agreement; they ran a series of trials using different blends of plastic packaging. This helped them agree a single quality specification which suited both parties. Following the trials, changes were made to CWR’s sorting process which allowed it to optimise the use of its existing four-unit near-infrared sorting array. The equipment, previously set to select a single polymer, was adjusted to select any non-plastic content across all four stages. This tripled CWR’s opportunity to remove contaminants.

A contamination limit of 12% is set in the contract, and to get the best price for the material the bales should comprise 75% bottle plastics. ECO Plastics will still take the bales even if the specification differs from the agreed quality parameters. The agreement contains a flexible pricing structure to allow a lower price to be paid for reduced bottle content.

The diagram below shows the key activities undertaken by each party in the supply chain with regard to establishing and implementing the long-term supply agreement:

MKC encouraged the bidders for their MRF contract to propose new materials that could be accepted for recycling at the MRF if they were to win the contract.

CWR, who won the contract, researched the possibility of accepting rigid mixed plastics with ECO Plastics. They undertook trials to help develop an agreed quality specification.

ECO Plastics agreed to take CWR bottles and rigid plastic material to an agreed specification and established markets for the material.
4 COLLECTION

Overview
This section discusses collection system design features, specifically information on containment and vehicle options, and provides sample weight and volume figures to help determine container and vehicle requirements. It is relevant to both multi-stream (kerbside sort) and co-mingled collection schemes.

4.1 High-performing recycling schemes

Local authorities face the challenge of operating high-performing sustainable recycling schemes in a cost-effective manner. It is therefore important to understand the impact of adding non-bottle rigid plastic packaging to an existing scheme. Non-bottle rigid plastic packaging has low bulk density – it is high in volume and low in weight – so the total volume of recyclable materials collected at the kerbside will increase. This will have an impact on how collection vehicles fill up, potentially leading to additional tips. It may also have an impact on the container capacity provided to residents.

Previous sections have covered the benefits and supply-chain challenges of recycling non-bottle rigid plastic packaging. Local authorities are finding that their residents are requesting that this material be included in kerbside collections, or seeing evidence of demand through the significant quantities of it finding its way into existing bottle-only schemes.

Where the latter is happening a first step should always be to discuss with your material handlers/contractors and reprocessors what impact this is having. This will help to inform whether a change of policy where handlers/contractors formally accept this material is appropriate.

Key messages for local authorities
Local authorities considering the practicalities of expanding kerbside recycling services to include non-bottle rigid plastic packaging should consider the following:

- How much rigid plastic packaging are residents likely to present?
- Is there sufficient capacity for residents to store this extra material in existing recycling containers?
- Are our existing vehicles best suited for the collection?
  - Do they have capacity for the additional material?
  - Do they allow compaction? What impact would this have upon the quality of the material and its sortability?
- Do existing collection policies (for example, approaches to dealing with spilt waste) and communication routes support the roll-out or addition of a non-bottle rigid plastic packaging collection?
4.2 Yield of rigid plastic packaging

The yield of rigid plastic packaging in a kerbside collection depends on:

- the waste-stream composition;
- the storage capacity available through the recycling collection (i.e. the frequency of the collection and the space available in the existing container for additional materials);
- the storage capacity available through the residual waste collection (i.e. the frequency of the collection and the size of the container); and
- the ease of use of the service, how effectively changes are communicated to residents and what materials are provided to support behaviour change.

RECOUP’s 2011 survey data shows that where non-bottle rigid plastic packaging is collected with plastic bottles at the kerbside in the UK, the average total yield of bottles and other rigid containers is 20.1kg per household per year (kg/hh/year). Of this, non-bottle rigid plastic packaging accounts for 8.5kg/hh/year (42%), the remainder being plastic bottles. By way of comparison, a waste collection contractor undertaking collections of around 5,000 tonnes of plastic bottles and rigid plastic packaging in 2010/11 estimated the proportion of rigid plastic packaging to fall within the range of 30–52% of the total weight collected.

The RECOUP survey figures are averages; high-performing authorities have achieved much higher average total yields of bottles and other rigid packaging. For example, extrapolation of WasteDataFlow reports for January to March 2011 demonstrates that Staffordshire Moorlands District Council achieved a total average yield of 41.1kg/hh/year from kerbside sources. When applying the RECOUP average breakdown this equates to an average kerbside yield of 17.4kg/hh/year of non-bottle rigid plastic packaging.

4.3 Assessing collection capacity

4.3.1 Containers

Recycling capacity directly affects capture rates and must therefore be carefully considered. Sufficient recycling capacity for target materials must be made available to maximise the potential for rigid plastic packaging captures.

The average uncompacted bulk density of non-bottle rigid plastic packaging (no film) is assumed to be approximately 22 kg/m³. This assumption is based on the sample uncompacted bulk densities for rigid household plastic packaging (no film) and plastic bottles in WRAP’s Materials Bulk Densities report. This figure may vary, depending on the collection system, with lower bulk densities seen in box collections and slightly higher bulk densities seen in wheeled bin collections (likely to be due to compaction by other denser materials such as card, metal and glass in the bin). The formula below shows how to calculate the volume impact of uncompacted non-bottle household rigid packaging.

For the RECOUP average yield of non-bottle rigid plastic packaging of 8.5 kg/hh/year collected, the required container volume is 7.4 litres per household per week. For Staffordshire Moorlands’ calculated yield of non-bottle rigid plastic packaging of 17.4 kg/hh/year the required container volume is 16.7 litres per household per week.

If the volume of rigid plastics is likely to exceed that available in existing recycling containers, councils should consider:

- providing additional containers to those residents who require increased capacity; and
- assessing how communication campaigns can be used to give residents good practice tips for presenting the material, for example ‘rinse and squash’.

<table>
<thead>
<tr>
<th>Required volume (litres)</th>
<th>Predicted yield of non-bottle rigid plastic packaging (kg/hh/collection)</th>
<th>Average uncompacted bulk density of non-bottle rigid plastic packaging (c.22kg/m³)</th>
<th>1,000 (to convert from m³ to litres) = ÷ ×</th>
</tr>
</thead>
</table>

For the RECOUP average yield of non-bottle rigid plastic packaging of 8.5 kg/hh/year collected, the required container volume is 7.4 litres per household per week. For Staffordshire Moorlands’ calculated yield of non-bottle rigid plastic packaging of 17.4 kg/hh/year the required container volume is 16.7 litres per household per week.
In addition to the traditional single body refuse collection vehicles (RCVs) that are commonly used across the waste industry, a new generation of vehicles intended to optimise the efficiency of twin-stream and multi-stream recycling collections have recently been developed. These vehicles utilise compaction equipment and/or additional storage space for low density materials (typically cans and plastics), thus maximising the volume available on the vehicle for more material. Examples deployed at the time of writing include:

- May Gurney’s resource recovery vehicle and Romaquip’s kerb-sort vehicle, both of which aim to allow optimal space for each recycling stream, using either additional storage space or on-board compaction of plastics and cans;
- The Terberg kerbsider with material volume reducer (MVR), which works by compacting low-density materials when the trough empties the material into the main body of the vehicle; and
- The Topselect kerbsider, which has internal compaction in two of its three compartments (the middle compartment moves to compact material in the front and rear of the vehicle).

Figure 4.1 May Gurney’s resource recovery vehicle
Figure 4.2 Topselect’s kerbsider with internal compaction.
Figure 4.3 Schematic of Terberg’s kerbsider with MVR
Figure 4.4 Romaquip’s kerb-sort vehicle

Ideally the MVR installation position is in the frontmost compartment, allowing improved relative volume in all other compartments.
4.3.2 Vehicles Cont.

The formula below shows how to calculate the required total vehicle compartment volume for all rigid household plastic packaging.

\[
\text{Required volume (litres)} = \frac{\text{Predicted yield of rigid plastic packaging (kg/household/collection)}}{\text{Number of households on collection round}} \times \text{Average compacted bulk density of rigid plastic (see below)}
\]

The table below is an extract from WRAP’s Materials Bulk Densities report. It shows the average compacted bulk density of rigid household plastic packaging (no film) measured on a small sample of vehicle types. We have assumed that the average compacted bulk density of non-bottle rigid plastic packaging will be similar to these figures. You can use these bulk densities in the formula above to calculate the approximate volume that your vehicles will require for rigid household plastic packaging.

<table>
<thead>
<tr>
<th></th>
<th>Average compacted bulk density of rigid household plastic packaging (no film)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear-end loader (soft pack)</td>
<td>79</td>
</tr>
<tr>
<td>Rear-end loader (split back)</td>
<td>106</td>
</tr>
<tr>
<td>Kerbsider (with MVR compaction)</td>
<td>29</td>
</tr>
<tr>
<td>7.5 – 15T caged stillage (no compaction)</td>
<td>25</td>
</tr>
</tbody>
</table>

Staffordshire Moorlands Council uses split-bodied vehicles to collect paper and co-mingled recycling fortnightly. Collection rounds service on average 1,000 properties per day. Based on a calculated yield of non-bottle rigid plastic packaging of 17.4kg/hh/year, the required volume on one vehicle is 6.3 m³.

4.4 System choice and costs

It is important that you take into account the full cost of the service, and compare options on a like-for-like basis. WRAP has published a study assessing the comparative costs of different collection systems applied to plastics.

Local authorities that collect plastic bottles are likely also to be collecting a proportion of non-bottle rigid plastic packaging already. Making a formal policy of accepting this material may not have a significant volume or resource-based cost impact on the collection service.

The case study on the next page presents the key stages through which an authority’s kerbside services have evolved, culminating in the recent addition of rigid plastic packaging to all kerbside recycling collections.
Case study 4: Adding non-bottle rigid plastic packaging and simplifying collections as part of a journey towards a high-performing recycling service

The London Borough of Richmond upon Thames is a relatively small authority in south-west London. Serving approximately 65,000 low-rise properties and 15,000 flats, the borough extended existing kerbside recycling services between autumn 2010 and spring 2011 to incorporate the collection of non-bottle rigid plastic packaging and food and beverage cartons. This coincided with the procurement of new materials processing contracts. The new collection arrangements have been rolled out across all frontline collections (kerbside, flats, bring sites and commercial recycling).

<table>
<thead>
<tr>
<th>Material</th>
<th>Frequency</th>
<th>Receptacle</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refuse</td>
<td>Weekly</td>
<td>Household provided (sacks/bins)</td>
<td>Collected on standard RCV</td>
</tr>
<tr>
<td>Food</td>
<td>Weekly</td>
<td>Kerbside box (and internal caddy)</td>
<td>Collected on dual-compartment (pod) RCVs alongside paper and card</td>
</tr>
<tr>
<td>Dry recycling</td>
<td>Weekly</td>
<td>Two-box/bins system (for containers and fibres)</td>
<td>Fibres collected separately in split-body (pod) RCV alongside food. Mixed containers (plastic bottles, pots, tubs and trays; cans/tins and aerosols; foil and unbroken glass bottles and jars) are collected in separate single body RCVs</td>
</tr>
<tr>
<td>Garden waste</td>
<td>Fortnightly</td>
<td>240-litre wheeled bin and pre-paid sacks</td>
<td>Chargeable service</td>
</tr>
</tbody>
</table>

Pre-procurement of new materials-processing contract: Richmond upon Thames added food waste, card and plastic bottles to existing weekly refuse and weekly multi-stream recycling collections in 2007. Collected material commodities were bulked with some sorted at an in-house mini materials recovery facility (MRF) and sold on.

The main dry recycling contaminants (and focus of resident requests for additional materials to be included) were non-bottle rigid plastic packaging and cartons.

Procurement phase: The authority went out to the market for a four-year materials-processing contract. The procurement was designed to deliver:

- an affordable solution that moved recycling of as many target materials as possible up the waste hierarchy (preferring solutions including non-bottle rigid plastic packaging and cartons);
- provided surety of the market (enabling the authority to make the pledge to residents that all materials collected will be recycled); and
- use of local material markets where possible.

Bidders were asked to submit tenders for a number of different material lots.
Case study 4: Continued

Contract arrangement: The authority entered into two separate contracts for containers and fibres, both of which finish at the same time as the outsourced collections contract in 2014.

Although the income stream received for the mixed plastic containers is relatively low, the new arrangements were affordable, with savings made through operational changes offsetting the income effects of collecting and marketing each material separately.

Rollout: Before the expanded service was rolled out, the fill level of the existing 55l container box was recorded across part of the borough as part of a wider food-waste participation-monitoring exercise. This identified fill levels of around 50%, and informed an estimate of how many additional boxes might be requested (they were to be provided at no charge) and the option for residents to purchase nets for boxes.

Revised container arrangements enabled the rigid household plastic packaging recycling service to be available to all flats (previously only 55% had had plastic bottle collections) by reducing containerisation and simplifying the service for residents.

Plastic bottle recycling was available at six bring sites prior to the changes; this increased to 84 sites with rigid household plastic packaging containers.

Outcomes:

- Reduced contamination rates and complaints. Residents are now able to recycle a wider range of materials, with a consistent range of materials collected from all housing types and offered to commercial customers.
- Materials price certainty for two years, when there is a review point; the intention is to enter into a further two-year fixed-price arrangement.
- Mixed paper and card tonnages increased by 3.5% (34 tonnes per month). Mixed containers increased by 5.5% (32 tonnes per month) based on comparison of the average monthly collected tonnages six months before and after the changes.
- Cost savings of around £250,000 per year through simplifying the fleet and removing the need to operate specialist vehicles. A capital grant was provided for additional containers at flats and an additional standard RCV by the London Waste and Recycling Board (£265,000).
- Collection tonnages appear still to be rising gradually. Up to 40% of households receiving the kerbside service were not aware of the service changes via the initial communications, however tonnages are gradually increasing as knowledge of the scheme is growing.
5 HOUSEHOLD COMMUNICATIONS

Overview

Effective communications are key to the successful introduction and use of any kerbside recycling scheme. Residents need to have clear instructions how to use their service and know what materials they can and can’t recycle.

WRAP has produced much guidance on communicating service changes to residents. This section does not seek to replicate this advice, rather it signposts you to key information and guidance including a suite of new communication materials designed specifically to promote the collection of rigid plastic packaging for recycling.

5.1 Communicating service changes

How to communicate the types of packaging that can be recycled is the most important issue relevant to the recycling of rigid plastic packaging. Local authorities that have recently introduced rigid plastic packaging have adopted differing approaches to handling communication of the change. This guide does not suggest which communications strategy should be adopted, but seeks to raise awareness of the advantages and drawbacks before any decision is made.

Some local authorities and handlers/reprocessors believe that accepting all rigid plastic packaging forms gives the simplest message to residents and that the recycling industry is best placed to find ways of separating the material and developing downstream markets. A benefit claimed for this strategy is that such schemes are likely to capture a greater quantity of the material for which valuable markets exist. On the other hand, a percentage of that material set out by residents for recycling will not actually be recycled, providing a misleading message and potentially reducing confidence in the service.

Communication material for a collection scheme including rigid plastic packaging must provide residents with correct information, but should also be quick and easy to read. It is considered good practice to provide lists of common packaging items, the scheme will and will not accept, each accompanied with a photo or photos.
5.2 Communication guidance and materials

In 2009, WRAP published a practical guide to improving recycling through effective communications with residents. It builds on WRAP’s experience of running national and local recycling and waste-prevention campaigns and on good practice from local authorities throughout the UK. It provides a broad introduction to the issues associated with developing a communications strategy for a recycling service and a methodical approach to campaign planning, supported by local authority case studies and links to more specialist information sources and Recycle Now iconography.

In January 2012, WRAP commenced the development of a suite of consumer communication materials for the collection of household rigid plastic packaging.

With the aid of feedback from the consumer testing, WRAP produced final communication materials in the various national formats and brands – Recycle Now (for England), dual-language format for Wales, Recycle for Scotland and Rethink Waste (for Northern Ireland) – see section 5.1 for examples.

Find out more about how we designed the materials and how we arrived at the final designs on the Recycle Now Partners Website.

The materials for England and Northern Ireland can be found at the Recycle Now partners website and Scottish partners can request artwork by emailing partnerbranding@zerowastescotland.org.uk or telephoning 0808 100 2040. Welsh authorities can request artwork from mail@wasteawarenesswales.org.uk or by telephoning 02920 468613. If you would like to know more about how to use these communication materials, you can get in contact via LAartwork@wrap.org.uk.

Key messages for local authorities

Communications will be required to inform residents of the roll out of a new service with on going communications needed to continue to encourage participation and proper use of the service.

Residents will require clear instructions of what they can and cannot place in their recycling container(s), as there are many plastic items that cannot be accepted. These include all types of films and other non-packaging household items such as toys, washing-up bowls, brushes.

Asking residents to rinse out items of packaging, especially those which have contained food, is good practice as it reduces the risk of smells and contamination of other materials.

Consider using the WRAP/Zero Waste Scotland communications materials. Materials can be adapted to reflect your service and will save you time and money.
6 WHAT TO CONSIDER BEFORE MAKING A DECISION

Overview

This guide has demonstrated the complex interactions that take place in the household plastic packaging recycling supply chain. Before making a final decision on whether to incorporate non-bottle rigid plastic packaging in your local authority collection scheme, ensure you have given due consideration to the points in this section.

6.1 Risk

You should consider your authority’s position on recyclate market risk:

- Are you aware of how existing non-target materials in your plastic bottle collection are handled? Are they exported? Would formally targeting non-bottle rigid plastic packaging alter that? Consider the potential benefits of continuing with a bottle-only scheme in cases where you are able to obtain a high level of assurance that this material will be reprocessed in the UK and often in closed loop applications. In 2011, high-quality bottle streams commanded a higher unit price in the market and delivered a greater unit carbon benefit than rigid household plastic packaging streams.

- What are the longer-term risks on a global scale? While some overseas markets, such as China, currently accept lower-quality materials than UK reprocessors, the international market could soon change. Depending on how the European recycling supply chain responds, collection contractors and materials recovery facility (MRF) operators could become less willing to accept large amounts of lower-grade polymer. The knock-on risk to local authorities is that contractors may no longer accept non-bottle plastic packaging in their feed material. It is therefore critical that local authorities conduct adequate engagement with collection, sorting and reprocessing companies to understand future risks and make plans to mitigate or alleviate them.

6.2 Outlet market assurance

For local authorities market outlet assurance is key to delivering the desired outcomes of greater participation in kerbside collections and greater landfill diversion. Despite the relative immaturity of the UK plastic recycling supply chain, there are organisations actively looking for recycled polymer derived from rigid plastic packaging, and manufacturers making commitments to use such material in new packaging and products.

- It is essential that local authorities engage with the supply chain, (for example through WRAP, local contractors or trade associations and events) in advance of making decisions, in order to identify these emerging combinations of partners that are able to positively separate and recycle this material.

Local authorities can help to strengthen their downstream supply chain by requiring the following:

- Comprehensive and firm material specifications, to ensure quality for material going into a MRF, for material supplied from MRF operators to plastics recovery facilities (PRFs) and from PRFs to plastic reprocessors.

- Longer-term supply agreements from MRF operators to PRFs/reprocessors or from PRFs to reprocessors, ideally lasting several years. This will encourage the major investment required throughout the supply chain and give local authorities outlet security. Pricing for these agreements can be linked to virgin material price indices. The ideal outcome would be a long-term pricing structure that removes uncertainty associated with price volatility. MRF operators in the UK typically sell their recyclable materials on a spot basis, often to export markets. This can maximise short-term revenue for local authorities (where revenue sharing agreements exist) and waste collectors but does not provide the security and stability required to develop UK supply-chain infrastructure for the long term.

- Regular (for example, quarterly) and transparent information returns on volumes, prices and destinations for their recyclable materials. These information returns should cover material flows down the supply chain beyond the MRF, including to the PRF that separates the plastics by polymer type, the plastics reprocessors who clean up each plastic type and the end users who make products from the plastics. Local authorities should recognise that this information will cover material from all...
6.3 Deliverability

You should consider the following issues relating to the practical implementation of a potential scheme:

- Has the emerging recycling infrastructure (for example MRFs) in your region evolved to handle non-bottle rigid plastic packaging and have supply agreements with reproprocessors for this material been negotiated? Take the time to speak to the reproprocessors the MRF supplies and understand their views; contact details for reproprocessors can be obtained through the British Plastics Federation website. WRAP’s advice is that if the infrastructure does not currently exist to positively separate and recycle this material then it is better to wait until you are happy the material can and will be recycled via routes that meet your authority’s sustainability criteria.

- Has your in-house team or collection contractor considered the additional volume impact on residents’ recycling containers? Make sure you have sufficient stocks of additional containers to meet householder requests in advance of making any service change.

- Has your in-house or collection contractor considered the additional storage space that may be required at the bulking station/depot prior to transferring the materials to a MRF/materials handler.

- How do you intend to communicate the change to residents and crews, including the key issue of how to convey the product packaging types you will and will not accept (in line with researched agreements with material handlers)?

If, after researching what the downstream supply chain can deliver, you find that collection or reproprocessing capacity and contract constraints mean that non-bottle rigid plastic packaging cannot be positively recycled, then it may be better to operate a bottle only scheme in the short to medium term.

6.4 Practical challenges

Certain types of plastic packaging remain difficult to separate and recycle, either because of the material used (commonly a composite of different polymers and metals), its colour (which can make the object difficult to identify by optical sorters) or its form (its dimensions and bulk density).

The key messages for local authorities (in approximate order of priority) are as follows:

- The single most important piece of advice is to keep flexible material separate from rigid. Flexible packaging (for example films and single use carrier bags) is difficult to separate out mechanically and commonly results in lower-grade bales being produced; the earlier it can be separated the better. This continues to be an area of focus for the industry, for example through WRAP’s work with retailers on packaging design and labelling, and through wider review of the UK recycling market for films. Films can be recycled, for example into damp course membranes, but many are degradable, limiting their suitability for use in long-life products. Other applications are emerging, such as the conversion of films to diesel, but the challenge of separating these when presented along with other flexible items such as paper in the household recycling stream remains. At present the best option remains to encourage the recycling of flexible plastic packaging through dedicated bring banks and retail front of store collection points.

- Black rigid packaging, for example food trays, continues to be a challenge to identify and positively sort in MRFs and PRFs as the carbon black colourants prevent the plastic from being detected by the optical sorting equipment. Check whether your downstream handlers and reproprocessors can handle black plastic packaging, as not all can. If they can’t you should consider telling your residents that black plastic packaging should not be placed in recycling containers. Retailers like black food trays because they enhance the appearance of the contents. WRAP has supported trials of alternative black colourants that would allow optical sorting and is working with retailers and the British Retail Consortium (BRC) to implement a solution, however these alternatives have not yet been adopted commercially.
Washing out and rinsing items, although relatively minor, is still an issue. Dealing with rigid packaging that is contaminated with either retained product (for example food) or other packaging elements (such as films) can be difficult. Small quantities of these materials can be tolerated as washing is commonly adopted in the downstream recycling supply chain. Asking residents to rinse containers remains good practice in order to reduce the risk of smells and vermin linked to waste storage at home.

Other common contaminants affecting the quality of rigid plastic packaging collections and the ability of MRFs to separate them include expanded polystyrene (PS), glass and cartons.

Given that individual facilities are configured to be able to handle different ranges of materials and contamination levels, it is important that each local authority or consortium works with MRFs, PRFs and downstream reprocessors to understand the causes of processing problems, and to use this information to help inform residents on what they can and can’t put out for recycling.

### 6.5 Downstream good practice

Local authorities can help to satisfy the demand from their residents for collection (and UK-based recycling) of the full range of rigid household plastic packaging by encouraging the supply chain using materials from their collections to adopt the following measures:

- Ensure that MRFs which separate their collected recyclables sign long-term fixed supply contracts with the downstream PRFs/reprocessors.
- Ensure that MRFs encourage the PRFs to enter into long term contracts and agree tight product specifications with their end customers.
- Require MRF operators to agree and demonstrate their compliance to quality standards and/or grades for the percentage of non-target material in the mixed plastic or single-polymer bales that they produce. This should include not only the percentage of target material in the bale and the bale size and binding system, but also maximum levels for particular contaminants in the material (for example organic waste, waste electrical and electronic equipment (WEEE), metals, wood or hazardous material). It is appreciated that individual local authorities may not have the appropriate level of commercial or technical understanding to inform what these specifications should be, but maintaining pressure on the supply chain and remaining engaged with WRAP on this issue will help drive long-term investment in UK markets.

### 6.6 Collection policy changes required

A number of collection policies may need to be revisited in advance of making the change to include rigid plastic packaging, including:

- How are crews expected to deal with windblown material and spilt waste? If necessary make provision for the supply of lids or nets where operating a box-based scheme.
- How will contamination be monitored, reported and addressed through a clear set of policies agreed with your material handlers/contractors; and more generally?
- Can you implement positive purchasing policies which encourage recycled content for products procured by the authority that contain the types of plastic found in your waste stream?
6.7 Tendering considerations

In preparation for retendering collection and downstream material-handling contracts the considerations we have outlined earlier in this section should help to define some of the key questions you will ask of potential contractors and requirements you may wish to impose on them. It is also advisable to consider:

- **Requiring MRF operators to state in their tenders the minimum recovery of useful polymers from the co-mingled stream they will achieve and how they will measure and demonstrate ongoing achievement of this recovery target.**
- **Requesting information about downstream material recycling rates (for example at PRFs and subsequent reprocessors) and evidence to support this.**
- **Requesting that collection charges are quoted separately from MRF gate fees so that there is transparency between the costs of these distinct activities.**
- **Asking whether MRFs are members of the Environmental Services Association’s Recycling Registration Scheme (RRS) which sets minimum reporting standards where output material is exported. At the same time approach WRAP or Zero Waste Scotland to determine whether any industry codes of practice or baled material specifications and/or grades should apply.**
- **Making a link between the contractor’s provision of material-destination reports and the performance management framework and payment mechanism underpinning the contract. This will serve to reinforce the importance of this information to local authorities in support of being able to calculate accurate recycling rates, validate Carbon Metric figures in Scotland and respond to public and media enquiries.**
GLOSSARY

As post-consumer plastic packaging makes its way along the recycling chain, a range of terminology is used by the different stakeholders handling it. The various terms used in this guide are defined in the table below.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible household plastic packaging</td>
<td>Mixed plastic films from household collections (including single use carrier bags). This material is typically excluded from rigid plastic packaging collections. It includes a wide range of polymer types used in the packaging of consumer products. Further separation of plastic films is required for many higher grade recycling applications as they are made from a range of polymer types.</td>
</tr>
<tr>
<td>Household plastic packaging</td>
<td>Includes plastic bottles and mixed plastic packaging (non-bottle rigid plastic packaging and flexible plastic packaging).</td>
</tr>
<tr>
<td>Household rigid plastic packaging</td>
<td>Covers both mixed plastic bottles and non-bottle rigid plastic packaging.</td>
</tr>
<tr>
<td>Mixed plastic bottles</td>
<td>Bottles are made from a range of polymers including HDPE and PET. Bottles usually are traded in compressed bales weighing 300-500kg. It excludes all non-bottle rigid plastics and flexible plastics.</td>
</tr>
<tr>
<td>Mixed plastic packaging</td>
<td>Covers all non-bottle plastic packaging sourced from the household waste stream and includes rigid and flexible plastic packaging of various polymer types and colours. It excludes plastic bottles and non-packaging items.</td>
</tr>
<tr>
<td>Non-bottle rigid plastic packaging</td>
<td>Typically plastic pots, tubs and trays. This definition specifically excludes plastic bottles, construction plastics, foamed plastics, flexible plastic films and bulky household plastic items such as washing-up bowls and toys.</td>
</tr>
<tr>
<td>Plastic bottles</td>
<td>Plastic bottles from households.</td>
</tr>
<tr>
<td>Plastics recovery facility (PRF)</td>
<td>A facility set up specifically to sort plastics by polymer type and/or colour. However, some of the processes commonly featuring in a PRF may also occur at the front end of a reprocessing plant. Some PRF operators have invested in downstream reprocessing capacity in order to produce high grade recycled polymers.</td>
</tr>
<tr>
<td>Plastics reprocessor</td>
<td>Converts the sorted plastic packaging polymers into a raw material that can be used to manufacture new plastic products. This can include washing and extrusion (melting) of the polymers to produce flakes or pellets.</td>
</tr>
</tbody>
</table>
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- RPC
- SITA
- Staffordshire Moorlands Council
- Veolia
- Wandsworth Council
For further information about support available to local authorities visit
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