RECOUP

Plastic Packaging

Recyclability By Design

2020 Update

The essential guide for all those involved in the development and design of plastic packaging.

Recyclability By Design
Update 8 : Updated 2020

This work has been published by RECOUP in consultation with experts in the plastic packaging industry and the recycling industry.

The information contained within this document is for general guidance only. Any details given are intended as a general recommendation based on the best of our knowledge at the time of publication. It does not necessarily guarantee compliance with the different recycling schemes. This is by no means a comprehensive list. Users are therefore advised to contact RECOUP to check for specific and up-to-date information.

While every effort has been made to ensure the accuracy of the contents of this publication, RECOUP can accept no responsibility or liability for any errors or omissions. Opinions expressed by external contributors may not reflect RECOUP positions. Recommendations provided herein are offered for the purpose of guidance only and should not be considered legal advice.

The 2020 RBD has been written, researched and compiled by Paul East, RECOUP Packaging Sustainability Manager

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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 packaging 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.

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Introduction

Climate change and sustainable development are recognised as two of the biggest issues facing society today. It is therefore increasingly important for companies to reduce the environmental impacts of products and services through their whole life cycle. Companies failing to address environmental performance in product design and development will find it increasingly difficult to compete in the global market.

As part of these considerations, packaging should be designed to satisfy technical, consumer and customer needs in a way that minimises environmental impact. This means, that amongst other things, packaging should be designed to use the minimum amount of resources for purpose and once it has completed its job, the scope for recovery maximised.

These guidelines focus on the design of plastic packaging to facilitate recycling and represent a small but important aid for the journey to sustainable production and consumption.

Background to Document

The objective of this project has been to produce a definitive general guidance document that has wide international agreement. It will provide plastic packaging designers, in particular, with a better understanding of the environmental implications of their design decisions, thus promoting good environmental practices but without unnecessarily restricting choice. Designers can be reassured that through following these recommendations, their plastic packaging should not cause recycling issues in any European country and be acceptable internationally.

This document is intended to address the issues in a way that will encourage packaging designers and specifiers to follow agreed good practice.

The advice contained in the document has been provided both to help users maintain the value of the post-used material resulting from the mechanical recycling of their packaging and to avoid significant interference with established recycling processes and material streams. The chapter beginning on page 58 “Recycling of Plastic Packaging” summarises the key aspects concerning the recycling of plastics.

Document Scope

This practical document seeks to answer in a pragmatic way many of the immediate questions for designers and specifiers of plastic packaging. The guidelines provided here are broadly applicable and internationally consistent at the time of publication.

This document does not attempt to provide a full strategic overview of all issues in plastic packaging recycling. The authors acknowledge that guidance on designing for recyclability is only one component of a larger sustainability challenge. There are wider issues of relevance, both in considering the overall environmental impact of differentiated packaging systems, and in developing efficient operational solutions to recycling and recovery of used plastic packaging. This is covered in more depth in the chapter “Product Protection First” on page 14.

Introduction

It is noted that continuing work will be required by many parties including designers, manufacturers, waste and resource management professionals and governments to address these developing issues.

It is important to note that since the packaging market is characterised by innovation, there are specific circumstances where the relationship of packaging production and recycling continues to develop.

There will also continue to be developments in the use of labels, glues and other packaging components. In addition good practices will develop and, changes in regulations will continue.

The EFSA (European Food Safety Authority) published in 2008 regulation 282/2008 updated September 2012 – 'recycled plastic materials and articles intended to come into contact with foods'. This extended the regulations to cover any recyclable material, rather than specifically PET bottles. This regulation requires traceability of supply chains for food grade recycling and potential future requirements have led to increase demands in this area even more. As a consequence this may lead to additional recommendations for designers as well as for those involved in the logistics of recycling to ensure that compliance with the current and future regulatory standards is achieved.

Aims

The aim of this document is to encourage designers to consider recycling possibilities, provide guidelines for those wishing to make their packaging (more) recyclable and provide everyone with information to prevent their packaging inadvertently interfering with existing plastic recycling streams.

Pursuit of these aims must be proportionate; the guiding principle for any packaging design should be "fitness for purpose". Thus the goal of improving the recyclability of the packaging cannot compromise product safety, functionality or general consumer acceptance and should positively contribute to an overall reduction in the environmental impact of the total product offering. It is recognised also that recycling packaging may not be the most environmentally or economically sound option in all cases. The intention is not necessarily to try and make every piece of plastic packaging recyclable. Each case must be viewed on merit. However, as the recycling industry grows, collection rates and recycling rates improve, recyclability will more frequently be the most environmentally sound option. Energy recovery or composting are other options to be considered, depending on the nature of packaging and the local solid waste management infrastructure. These recovery routes are complementary and their relative use needs to be optimised to meet local conditions, thereby providing an integrated and sustainable approach to packaging waste management.

Following these guidelines will also help European companies demonstrate compliance with the European recycling standard linked to the Essential Requirements legislation and more generally, will aid demonstration of 'due diligence'.

New EU regulations outline support for a circular economy. The circular economy package encourages new measures which will promote the inclusion of repairability, durability and recyclability in initial design.

Introduction

Is this document relevant to me?

This document is of relevance to anyone specifying, designing or using plastic packaging. The focus is on plastic packaging that ends up in the domestic waste stream but it is also of relevance to commercial & industrial waste streams.

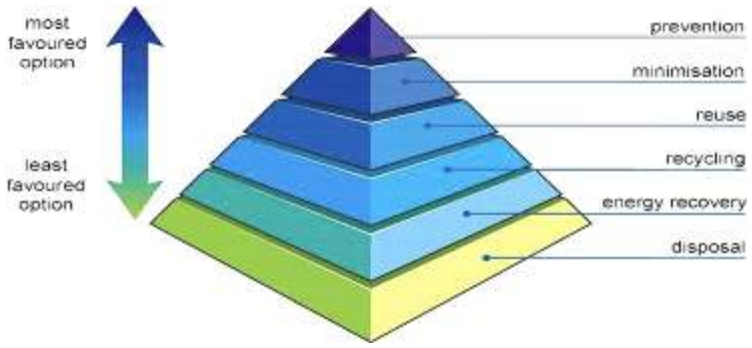
The document gives practical advice and information on environmental considerations to the whole supply chain i.e. designers, packaging technologists, buyers, marketing and retailers but is primarily focused on those responsible for specifying the packaging being used. Any specifier following the guidelines can be reassured that their packaging should not cause recycling issues.

This document consolidates and develops information from RECOUP members in both waste management and the packaging supply chain, together with various sources in Europe and North America to provide a comprehensive guide on plastic packaging design best practice. It is, therefore, particularly relevant to companies selling into markets across Europe and the USA but has more general international relevance.

The Waste Hierarchy

The Waste Hierarchy was part of the revised EU framework directive in 2008. This sets out the methods of dealing with waste, ranked in order of potential environmental impact. This is based on life cycle assessment.

Defra guidance declares that for most materials recycling is better for the environment than energy from waste (EfW) and that EfW is better than landfill.



The Waste Hierarchy has now been incorporated in UK law, via the Waste (England and Wales) Regulations 2011.

Stages	Include
Prevention:	Using less material in design and manufacture. Keeping products for longer; re-use. Using less hazardous materials.
Preparing for re-use:	Checking, cleaning, repairing, refurbishing, whole items or spare parts.
Recycling:	Turning waste into a new substance or product. Includes composting if it meets quality protocols.
Other recovery:	Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste; some backfilling.
Disposal:	Landfill and incineration without energy recovery.

Introduction

The Courtauld Commitment

As a result of this guidance and the impact of the Packaging Waste Regulations, UK industry has focused on improving sustainability by reduction of pack weights. The grocery retail sector, in particular, signed up to the Courtauld Commitment in 2005. Phase 1 of this agreement concentrated on the need to reduce the quantity of food, product and packaging going to waste. Included in the three targets were commitments to remove packaging waste growth, and to deliver reductions in packaging waste. WRAP reported at the close of phase 1 that two of the three targets have been met, while the target to reduce the amount of packaging waste had not been achieved.

Courtauld Phase 2 moved the focus to reduction of carbon impact of packaging, and optimisation of packaging. The target stated was to reduce carbon impact of grocery packaging by 10%, to be achieved by increasing recycling rates and increasing the recycled content for grocery packaging.

The Courtauld Commitment 3 was launched in May 2013. While Courtauld 1 and 2 focused on reduction of packaging and packaging weight, Courtauld 3 was more focused on finding opportunities to reduce the carbon impact of packaging.

Signatories to CC3 commited to working to reducing food waste. Considerations included improving packaging design to both maximise recycled content and also improve recyclability. This involved working closely with the packaging supply chain to apply new packaging technology, for example looking to longer shelf life, to achieve this.

As part of work to help Courtauld signaturies, RECOUP partnered with Morrisions to produce an environmental ready reckoner to help develop recyclability guidance for packaging. RECOUP supplied information, from this publication, and applied to a work sheet. The resultant work was then made part of the design process for supplies.

The next phase of the Courtauld Commitment, Courtauld Commitment 2025, was introduced to cut the waste and greenhouse gas emissions associated with food and drink.
The targets set are;

- A 20% reduction in food and drink waste arising in the UK
- A 20% reduction in greenhouse gas intensity of food and drink consumed in the UK
- A reduction in impact associated with water use in the supply chain

Introduction

Why is Plastics Recycling Important for the Environment?

- Recycling plastics can, in many cases, significantly reduce the consumption of resources and emissions to the environment.

- Plastics recycling can conserve energy and non-renewable resources as recycling replaces the need for primary extraction and manufacture of new plastics.

- Plastics recycling also reduces the reliance on traditional, and less environmental beneficial, landfill waste disposal.

- The environmental impacts and benefits of recycling plastic products vary significantly depending on the type of product and its condition at end of life.

- Relatively large, clear supplies of plastic products can normally be recycled with a positive environmental gain.

- Creating a circular economy would have a number of benefits for plastics which can be a valuable and circular resource.

In cases where plastic products are particularly lightweight and contaminated with other materials, the energy and resources used in a recycling process may be more than those required producing new plastics. In such cases recycling may not be the most environmentally sound option. Where recycling is not environmentally or economically justifiable, energy recovery is preferable as the high calorific value of the plastics can be used to generate energy for district heating and power.

RECOUP and its members are committed to increasing levels of plastics recycling. At the same time we understand that a pragmatic approach to recycling is important. We should be aiming to use available resources as efficiently as possible.

International policy development now places increasing emphasis on the issue of waste in the wider context of product life cycles and resource efficiency. It is clear that current thinking is moving towards an integrated product policy approach. This means that Environmental Best Practices will require consideration of increasingly complex trade-offs between impacts and benefits of particular products on the environment during their life cycle. For example, the overall environmental gains achieved by the use of a lightweight or longer life plastics product can make it the best choice environmentally, even though it may not be environmentally sensible to recycle a particular plastic item at the end of its life.

The use of techniques such as Life Cycle Analysis (LCA) are very important to determine which products and waste management systems are most environmentally sound. There has been considerable detailed analysis of the environmental impacts of recycling many different products containing plastics.

Why is Plastics Recycling Important for Plastics Supply Chain Businesses?

Good recycling and environmental performance, combined with the cost savings offered by plastics recycling, combine to offer a strategic approach to risk minimisation.

Introduction

The economic benefits of recycling are clear; compliance with regulation is mandatory; public image preservation is vital. By ensuring consumer and political demands are met, organisations involved in the plastics waste stream are less likely to come under attack for poor environmental performance, or as polluters. Political backlash to consumer and pressure group complaints will be minimised, with a greater level of dialogue and discussion taking place between sector and political representatives.

Although changes in legislation and policy may appear bewildering, there is an underlying certainty:

- Businesses that understand and act on the fundamental principle of sustainable development will gain competitive advantage.

- Businesses and sectors that fail to recognise the implications of these issues will lose out.

Protecting Your Freedom of Material Choice

Plastic packaging manufacturers understand the demonstrable benefits of plastics as a packaging material. Its lightweight nature is of particular benefit due to transport cost minimisation. In addition, plastic is often the most appropriate material to meet consumer demands of ensured freshness, safety and product visibility.

Companies involved in the packaging supply chain can safeguard their freedom of material choice by engaging with the recycling industry to provide support for the development of effective plastics recycling within the UK. Developing packaging that can easily be recycled by incorporating recyclability into the product development stage, combined with involvement in the development of the recycling industry, will help to protect both the public and political profile of plastic packaging and reduce the risk of material choice restriction via political intervention.

Genuine efforts to minimise environmental impact and maximise environmental benefit through the introduction of efficient plastics recycling programmes both protects and enhances the public image so vital to maintaining competitive advantage.

Why Should I Follow the Guidelines?

Businesses have to deal with continuously more demanding societal expectations in the way that they operate. With the growing awareness of the importance of sustainable development, the environmental impact associated with companies is under ever more scrutiny.

Packaging in general, and plastic packaging in particular, has had a very negative perception with consumers and environmentalists. It has been perceived to be a waste of resources and a significant contributor to the growing levels of waste. In addition it is often also linked to litter issues. Politicians are very aware of this with the result that pressure has been, and continues to be applied on packaging through the introduction of legislation in Europe, the USA, Japan and other countries. In addition, recycling is seen by many as the most important recovery route and, therefore, the one that should take precedence.

Following these guidelines will at a minimum, provide an important contribution to help you ensure that your packaging is compliant with relevant legislation / agreements, that recycling costs are minimised and that societal expectations and your company practices are matched in the area of plastic packaging recycling.

The document however is designed to go beyond being a simple aid to legal compliance; it provides up-to-date guidelines that can be used to support a process of continuous environmental improvement, a key element of both Sustainable Development and Corporate Social Responsibility.

Introduction

Are there Benefits to me if I Follow the Guidelines?

The guidelines allow you to maximise the opportunity for your packs to be mechanically recycled whilst avoiding significant interference with established recycling processes and material streams (requirement of European recycling standard linked to legislation) without unnecessarily restricting choice.

Adopting these guidelines at the start of the design phase will ensure unnecessary difficulties are avoided and hence unwanted project delays and associated on-costs prevented.

A number of countries across Europe seek to reward packaging that conforms to specific design rules and / or penalise those that don't. Compliance with these guidelines will help ensure that you obtain any benefits and avoid potential penalties in this area.

Following these guidelines will help minimise the costs to your company in satisfying its recycling obligations under European legislation and national / state agreements by maximising recycling efficiencies and thus minimising reprocessing costs.

What are you Asking me to Do?

For existing plastic packaging, you are asked to review your current portfolio against these recycling guidelines, highlight any aspects where the design could be improved and then implement changes, as the opportunity arises.

For new packaging, you are asked to integrate these guidelines into the design process at the start, to minimise cost and maximise the opportunity for compliance.

More generally, these guidelines should be integrated into any Environmental Management Systems (e.g. ISO 14001) and new product innovation protocols that you have, and become part of your automatic environmental assessment process for new products.

Will it Cost me Money?

Adoption of good eco-design practice should not result in an on-cost provided that these aspects are considered along with the many other business factors at the start of the design process. Conversely, if environmental considerations are only factored in at the end of the design process, then any changes necessary are likely to be costly in terms of both money and project delays.

Following the guidelines should help you reduce costs by:

- Helping to ensure that your company is compliant with relevant legislation (e.g. the recycling requirements of the essential requirements legislation of the European Packaging and Packaging Waste Directive) / voluntary agreements
- Minimising company recycling costs
- Matching societal expectations and company practices in the area of plastic packaging recycling.

Conversely, the potential consequences to a business of getting these aspects wrong in terms of legal, market share and corporate image issues can be significant.

Where Can I Get More Information?

Where Can I Get More Information?

The current guidelines provide a good point of entry. This document consolidates and develops information from RECOUP members in both waste management and the packaging supply chain, together with various sources in Europe and North America to provide a simple but comprehensive guide on plastics packaging design best practice. Any specifier following the guidelines can be reassured that their packaging should not cause recycling issues. This document will be periodically updated and the most up to date version will be available for download from the RECOUP website; www.recoup.org

The document also provides reference to key industry organisations and web sites dealing with the recyclability and recycling of plastics packaging in both Europe and the USA. You are encouraged to visit the web sites and if necessary, contact the relevant organisation(s) to discuss any specific issues not covered within the current guidelines or obtain further information on a specific area. These organisations can also help put you in touch with your local organisation should this be desired.

If you are unsure who to contact, or require any further guidance in relation to this document or any issues relating to recyclability of plastic packaging, please contact the RECOUP office.

Conclusion

Following these design for recyclability guidelines will be an important contributor towards helping to ensure that companies are compliant with relevant legislation / agreements, company recycling costs are minimised and that societal expectations and company practices in the area of plastic packaging recycling are matched.

In addition, the production of consistently high quality, post-use plastic material will overcome the quality and consistency supply issues experienced in the past. This will make it commercially a more attractive raw material and thus help to further stimulate sustainable secondary markets. Thus the use of post consumer plastic in packaging whenever possible should be encouraged.

Solving the black plastic recycling challenge

RECOUP led a cross-industry forum to address the barriers and issues preventing the recycling of black plastic packaging; representing collaboration from RECOUP members across the plastic packaging supply and recycling chain.

The report produced from the forum outlines the solutions identified. The first and possibly most obvious long-term solution was not to use black; which would follow guidance produced for a few years. There have been clear commitments from Co-operative, Tesco, Quorn and others to reduce the use of black plastic packaging, and through packaging redesign move away from the use of black plastic in favour of a transparent pack or detectable colour.

Work on this also outlined detectable alternatives to other dark coloured plastic; as carbon black pigment can be used in a variety of colours.

To balance this, the report also includes the potentially important role of black and darker plastic as a base colour as we move towards the requirement for greater recycled content

Alternative solutions either available or in development include the detectable black pigment, favoured by Unilever; also alternatives to sort existing black material using innovative alternative technologies from sorting equipment manufacturers including Tomra, Pellenc, BHS Systems and Machinex. The solutions are outlined in the report.

RECOUP believe is that all plastic packaging should adopt the basic principle, as part of the design specifications, that it must not inhibit the sorting or recycling process.

The full report is available to download on the RECOUP website.

Product Protection First
KP Films

Global megatrends such as climate change and resource scarcity are changing the world we live in. Today's consumer is increasingly aware of the need to re-use and recycle to contribute to a more sustainable society. However, placing the onus on recyclability to meet rising targets (55% by 2020 for plastic packaging) and in response to the drive towards a circular economy should not come at the expense of a holistic approach to sustainable packaging design.

"It would be remiss of us to focus purely on recyclability" says Lubna Edwards, Sustainability Director at KP Films. "To address a range of environmental challenges, we must continue to introduce innovation that enhances the primary functions of packaging; to protect, preserve and present the food inside"

According to WRAP, in the UK, over 2 million tonnes of fresh produce is lost or wasted each year in the supply chain alone. The use of modified atmosphere packaging (MAP) and vacuum skin packaging (VSP) ensures that meat reaches the supermarket shelf in an undamaged state, whilst demonstrating a shelf life of up to 28 days. Without innovative, functional and resource-efficient packaging, most packaged food on shelf today would not last more than a few days, resulting in significant food waste.

Today, the number of plastic packs re-entering the recycling chain at the end of their service life is increasing, thanks to growing consumer awareness. Whilst this is positive news, it presents its own challenges. For example, localised infrastructure constraints can impair the separating and converting of the individually recyclable components of multi-component MAP and VSP formats for end-use.

"Sustainability is a global concern and all industries must take a unified approach to tackling the issues it presents" continues Ms. Edwards. "We must now drive the next generation of change by working together to ensure that resource efficient, lightweight packs with reduced carbon footprints can be converted from a waste material into a valuable resource for re-use, regardless of whether their construction is mono or multi-material."

If plastic packaging is recyclable – great! And if it's innovative, resource efficient and sustainable, that's even better. But to demonstrate holistic environmental credentials that become a real catalyst for change it must stay true to its core protective, preservative and display functionality first and foremost.

kp Food & Consumer Products

RECOUP Member

General Guidelines

General Guidelines

Introduction

The guidelines have been compiled to help maximise the opportunity for plastic packaging to be mechanically recycled, without unnecessarily restricting material choice, and to help maximise the value of the post-used material resulting from the mechanical recycling of the packaging.

Up-to-date guidelines can be used to support a process of continuous environmental improvement, a key element of both Sustainable Development and Corporate Social Responsibility.

Careful selection of materials at the design stage will help overcome potential legislative issues, reduce cost and help conserve resources by avoiding obstacles to recovery, improving yields, producing less waste and ensuring a higher value of the recovered material.

The information contained within the guidelines implies no criticism of any material and merely seeks to point out that certain combinations should be avoided to maximise the recyclability of the plastic packaging in question. Plastic materials that cannot be processed with the main material at best reduce reprocessing yields and can, unless care is taken in the design, significantly reduce process efficiency and introduce unacceptable costs. Matrices summarising material compatibilities are provided within each material specific guideline .

Following the recommendations provided in these guidelines should avoid the necessity to evaluate component compatibility. However, if use of non-recommended material combinations is desired, then the user may arrange for more definitive compatibility evaluation tests to be carried out. In addition, specific applications (e.g. food contact) may stipulate more demanding requirements than provided in these general guidelines.

General Principles for Container / Components

In an ideal world, use of mono-materials or mixed materials of the same type are the preferred choice from a recycler's point of view. In this context, type means materials that for all intents and purposes act as if they were a homogeneous material i.e. they are fully compatible, do not downgrade the properties of the recycled plastic and can be sorted and subsequently processed as if it were a single material.

It is recognised that to provide both the technical properties required and to satisfy user needs, sometimes a combination of different types of material is required. Under these circumstances, materials of different densities should be used to facilitate the separation of incompatible materials during mechanical shredding or crushing, or during the subsequent water-based washing process. Combinations of different types of plastic with the same density ranges should be avoided.

General Guidelines

Unpigmented polymer has the highest recycling value and the widest variety of end uses. Therefore, use of unpigmented plastic containers is preferred to pigmented.

For food contact applications, the additional specific requirements of traceability, guarantee of the use of qualified processes and producer responsibility for recyclates would ensure that specifiers use only food approved additives to maintain the potential for the recyclate to be subsequently used in food applications.

Residues

To help ensure packs are emptied to their maximum, packaging designers should carefully consider what good design features can be incorporated to aid the emptying of packs.

For example:

- Design the pack with a wide neck.
- Consider using a pack that can be stood inverted to ease emptying.

Non-stick additives can be used to reduce the cling of contents to the container to ease emptying. Such additives should not, however, affect the ultimate recyclability of the pack.

No firm target figures can be provided as to what constitutes acceptable residue levels as these will be very dependent upon pack size and product viscosity. As a rough guide however, for non-viscous products (i.e. where thickness is similar to water) aim for 50ml-99ml bottle residues <10%, 100ml-499ml bottles < 5% and 500ml+ bottles <2% bottle resides of declared contents when considered empty. For viscous contents it is not practical to set target residue guidelines as the amount of residue depends in part on the properties of the contents.

Composite Materials / Barrier Layers

Where a composite material is necessary to provide the requisite properties (e.g. provide a barrier function) and cannot be designed in such a way that the different types of materials can be separated mechanically or are compatible with the recycling stream, consideration should be given to the use of thin layers.

It should be recognised that lightweight plastic laminates (especially those of thickness <100 microns) which are highly engineered and weight effective packaging materials, in general are not currently recycled. In mainland Europe, at present energy recovery is the optimum treatment route for such materials. In the UK, there are alternatives, such as the system developed by Enval for laminates which include an aluminum layer. The Enval system will segregate any constituent aluminum for recycling. Details of this system are outlined later in this document.

General Guidelines

Colour of Plastic

Colour interferes with the mechanical recycling process in two main ways: Firstly, strongly coloured plastic material has a much lower economic value than non-pigmented plastic. Secondly, heavily coloured (and hence strongly light absorbing) plastic may interfere with automated sorting machinery that uses NIR spectroscopy to identify the nature of the plastic. Such equipment relies on the reflection of NIR radiation and thus there is an issue in identifying plastic items containing carbon black pigment.

The amount of colour to be used should be minimised as much as possible within the constraints set by technical considerations, branding and consumer acceptance. Where use of colour is necessary, designers are encouraged to consider alternative approaches that will further facilitate recyclability. Sometimes using colour may offer overall resource benefits, for example in the reduced use of energy during bottle blowing. Some soft drinks manufacturers use fast reheat plastic resins that necessarily contain carbon black. Sometimes these resins are coloured to mask containers having an otherwise grey appearance.

Avoid direct printing onto natural (not coloured or opacified) plastics.

Readily separable attachments allow reprocessors to remove associated contaminants such as pigments, inks and residual adhesives, hereby raising the quality of the recyclate. This is particularly significant when the primary packaging polymer is colourless or ‘natural’. When the primary packaging polymer is pigmented, e.g. coloured HDPE, the reprocessor specification is less sensitive to low levels of ink contamination and in this case the polymer type of the label, cap and other attachments should be matched to that of the container.

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Closures / Closure Liners / Cap Sleeves / Seals

Closures, liners and cap seals should not interfere with the recyclability of the material to be recycled and ideally be recyclable themselves, preferably in conjunction with the plastic of the main container. Unfortunately, this does not mean PET closures on PET bottles. Ideally, PP closures are used on PET bottles.

Closure systems that contain no liners and leave no residual rings or attachments when removed are optimum. Designers should assume seals may be pushed back into empty containers and choose materials accordingly.

Avoid use of metal caps. They are more difficult and more costly to remove in conventional reclamation systems compared to preferred plastic closure systems. Metal residues cause unacceptably high plastic rejection rates with the metal detectors installed in sortation lines and residues can catalyse polymer oxidation and block injection nozzles. Automatic sortation equipment such as eddy current units or electrostatic separation equipment can remove aluminium closures from recovered polymer. However, not all reprocessors have such equipment and small amounts of aluminium may remain to cause problems. In addition, most reprocessors use a caustic wash and any aluminium residues will be converted to aluminium hydroxide, which will then become a contaminant in the recycled material, that could prevent its suitability as a food grade material (e.g. in the case of PET). Use of threaded / snap-on metal closures should be avoided, as these can be difficult and relatively expensive to remove. Prised off (crown) caps are acceptable provided they are completely detached from the bottle on opening and cannot be pushed back on / into the container.

General Guidelines

In certain circumstances, seal residues and minor components of a different type of plastic if present in very minor amounts, may not significantly interfere with the recycling process or the quality of the recycled material.

However, this should not be assumed and further guidance should be sought in these instances.

In applications where tamper-resistance is required, integration into the design feature is preferable. Provided functionality can be maintained, sleeves and safety seals should be designed to completely detach from the container or be easily removed in conventional separation systems. Otherwise they will act as contaminants.

Where a removable sleeve is used on a bottle, instruction to remove the sleeve should be included on the labelling text.

If a full sleeve was to be left on, there is a risk that the bottle may not be correctly recognised by modern automated Near Infrared (NIR) sorting equipment, in which case the bottle could be either mis-read, or at worst possibly rejected and sent to landfill.

Labels / Safety Seals / Adhesives

The type of labels and adhesives used has important implications for ease of container recycling.

Amount of adhesive used and surface coverage should be minimised to maximise yield and ease reprocessing. Water soluble (or dispersible) at 60 to 80°C (140 to 180 °F) and hot melt alkali soluble adhesives are the adhesives of choice as they are the most readily removed during reprocessing. Label adhesives that can't be removed can coat the plastic regrind and embed unwanted contaminants.

The European Plastics Recyclers (EuPR) have produced a list of hot melts acceptable for mechanical recyclers that can be found on their web site. This list is not exhaustive and other adhesives may also be suitable. APR in the USA have also developed testing protocols for adhesive manufacturers to use to evaluate the impact of any adhesive product on conventional PET and HDPE bottle reclamation systems. The European PET Bottle Platform also has developed similar protocols to test acceptability of adhesives in conventional European bottle recycling systems.

For bottles; sleeves and wraparound or collar labels that are only glued to the container at only a few points are optimum.

Foil safety seals that leave remnants of the foil and / or adhesive should be avoided.

Labels should not delaminate in the washing process. Use of paper labels on bottles is not ideal, as some fibres can be carried over into the recycled plastic, causing problems such as surface defects and pinholes during the blow moulding of the recyclate. Paper labels also may pulp in the wash tank. They are acceptable, however, provided they are attached using water soluble adhesives and are not coated in such a way that prevents separation and removal from occurring during reprocessing. For this reason use of decorative / protective finishes (e.g. foil, lacquers, coatings, etc.) should be minimised.

Metallised / foil labels increase contamination and separation costs and should be avoided whenever possible.

General Guidelines

Deposition techniques that provide a very thin layer of metal (only atoms deep) are acceptable however and are the method of choice to provide a metallised effect on labels.

Where in-mould labelling is desirable (e.g. to protect containers frequently coming into contact with oils or water) the same plastic as the container should be used wherever possible.

Reference should be made to the specific material sheets to obtain more detailed information about acceptable options for label materials.

The choice of label should not have the potential to lead to an error in the identification of the material used for the container itself. This is why various published guidelines for bottles often stipulate that the sleeve labels should cover no more than 40% of the bottle surface. Thus, full bottle sleeves, if desired, need to include sufficient clear area so that automatic sortation equipment can properly identify the polymer resin used to make the bottle.

For pots, tubs and trays and other plastic items, a label should not cover more than 60% as presented for sorting.

Pigments / Inks

Inks and pigments selected to colour and print the container and label already have to comply with existing restrictions on the use of heavy metal components and, although beyond the scope of these guidelines, also with relevant health and safety regulations.

In any case, hazardous substances should be avoided in the interests of good manufacturing practice and heavy metal inks not used for printing as they may contaminate the recovered plastic. For these reasons, it is recommended that the regularly updated exclusion list for printing inks and related products, provided by the European Printing Ink Association (EuPIA) is followed.

Inks that would dye the wash solution should be avoided as this may discolour the recovered plastic diminishing or eliminating its value. APR, NAPCOR and The European PET Bottle Platform have testing protocols to assist label manufacturers to assess whether a label ink will bleed in a conventional PET recycling process.

Heavily pigmented containers should be avoided. They can result in a significant increase in the density of the polymer thereby causing separation problems and can also cause problems for automated sorting equipment using NIR sensors.

Other Components

The use of other components of a different material (e.g. handles, pour spouts) is discouraged as they may reduce base resin yield and increase separation costs. When required, compatible materials (preferably unpigmented) should be used.

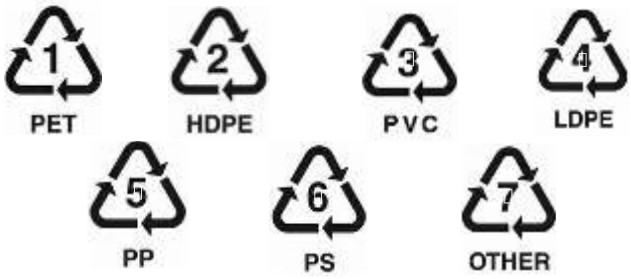
There is a progressive request, primarily from retailers, for RFIDs (Radio Frequency Identification Devices) to be applied to packaging. While these tags offer potential logistics and other benefits, they are in general undesirable from a recyclability point of view at present as the adhesives and metals reduce efficiencies and / or contaminate the recycling stream. Use of RFIDs on plastic packaging is discouraged and therefore should be avoided unless they can be shown to be compatible with the relevant conventional plastics recycling stream and demonstrated not to create any disposal issues based on their material content.

General Guidelines

Material Identification

In Europe, material identification is voluntary, but if it is to be used then Commission Decision 97/129/EC should be followed, although the widely adopted and substantially similar SPI system, developed in the US for plastic, seems also to be acceptable.

When used, the symbol should be shown clearly and ideally moulded into the container / component.



On containers, the marking should be clearly distinct from any other letter or cavity reference number to avoid confusion. For consistency, material identifiers should generally be embossed on the base of a container. Exceptionally, the identifier can be located on an alternative position close to the base (e.g. to avoid the risk of cracking due to bottle design).

Printing the material identifier on a label should be avoided, as this is likely to lead to confusion as it could refer to the label material, the container plastic or the full container.

With the use of automated sorting for household waste, the recycler's need for material identification has become less important.

General Guidelines

Markets for Recycled Plastics

Recycling benefits and economics are maximised when the quality of the recyclate is appropriate and there are strong and diverse market outlets for the secondary material recovered. Today, there are opportunities to manufacture a range of plastic packaging products, including food grade applications such as containers and trays, with a proportion of recycled plastic. In this latter case, traceability is a critical parameter. Designers should consider the possibility of including recycled plastics in their packaging for both environmental and commercial reasons.

Integration of Environmental and Legal Aspects into the Packaging Design Process

The design of packaging is a complex process and is often a key element of product change / new product introduction. If environmental and regulatory assessments are included with the wide range of inputs that have to be taken into account at the start of a project they can become part of the process of maximising the product opportunity. Where environmental considerations are an afterthought issues are invariably more difficult to resolve and can lead to significant on-costs and serious time delays.

It is recommended that companies adopt a new product innovation process that automatically includes an environmental assessment. Ideally, this environmental assessment becomes part of a recognised environmental management system (e.g. ISO 14001). The European CEN standards provide an excellent management approach for carrying out this environmental assessment. Following these standards should ensure that companies automatically cover the key environmental aspects that need to be addressed for packaging. Use of the present document by packaging designers / specifiers should help ensure that the key criteria covered in these standards concerning plastic packaging has been satisfied.

Material Specific Guidelines

General guidelines apply to all plastic materials used for packaging. Specific guidelines have also been produced for plastic packaging. These material specific guidelines complement the general guidelines and should be used in conjunction with them where appropriate. In the unlikely event that the general and specific guidelines appear contradictory, the material specific guidelines should take precedence.

The compatibility matrices contained in the material specific guidelines are divided into three columns, namely:

- **COMPATIBLE** for recycling in most applications
- **MAY BE SUITABLE** for recycling for some applications
- **NOT SUITABLE** for recycling

The meaning of these three columns is as follows:

COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
Generally the material is compatible with or separable from the main material and is acceptable in industrialised recycling processes in large volumes.	Use of material could cause severe recycling issues if used in large volumes. Under certain specific conditions the material may be recyclable, but this would need to be confirmed with the appropriate recycling organisations and/or recyclers.	Material is generally not compatible with or separable from the main material in current industrialised recycling processes and will therefore cause severe recycling issues/ cause rejection of recyclate if present even at low volumes.

It should be noted that under certain circumstances suppliers may require, for a specific application, recycled material that conforms to the most demanding requirements outlined in the material compatibility matrices supplied in this document, as evidenced by the following example:

Example - Polyethylene

For the manufacture of polythene bottles from recycled HDPE, one UK manufacturer highlights the importance from a recyclability perspective of the HDPE material stream including only containers made from HDPE, linerless HDPE caps, labels made from only HDPE and that any inserts or other minor components are also manufactured from only HDPE.

Material Specific Guidelines - PET

Material Specific Guidelines - PET

General

The recommendations given in this section were originally written to cover PET bottles. As explained earlier, these guidelines are driven by the requirements of the mechanical recycling process. Some of the current restrictions (especially for barriers / opacity / colour) may be relaxed as more recycling plants come into commercial operation. These benefits are likely to be realised with PET bottles, as these plants focus first on PET bottles as the source material. For efficient separation and removal in conventional density separation processes, parts of the packaging system that are not compatible with PET should have a density < 1 g / cm3.

Material / Material Combinations

Contaminants which generate acidic compounds during extrusion cause problems when recycling PET, as these catalyse ester depolymerisation reactions, decreasing intrinsic viscosity.

A range of contaminants including PVC, rosin acids from label adhesives and EVA cap liners can act as sources of acids. PVC contamination is a potentially major problem as the similar appearance and overlapping range of densities make the two polymers difficult to separate. PET melts between 250°C and 260°C, and at this temperature PVC begins to decompose producing HCl. The presence of very low levels of PVC (ca50- 200ppm) in recycled PET results in measurable deterioration in chemical and physical properties and can render large amounts of PET useless for most recycling applications. For this reason, the use of PVC components of any kind with PET containers should be scrupulously avoided. These components generally include, but are not limited to closures, closure liners, labels, sleeves and safety seals.

Other types of PET that share the same material identifier may cause problems in separation and conventional recycling. Use of PLA (a biodegradable material) with PET should be avoided as the polymers are incompatible and not readily separable (both have a density > 1g/cm^3). The presence of very low levels of PLA in PET causes haze and a deterioration of physical properties with the recycled PET.

In addition, PLA causes processability problems in the drier as it melts at the drier temperature.

Blends of PET with other resins are undesirable unless they are compatible with PET recycling. Inclusion of nucleating agents, hazing agents, fluorescers, scavengers and other additives for visual and technical effects should be examined on a case by case basis for their impact on the overall plastic recycling stream. Such additives which cause the PET to discolour and/or haze should be avoided unless means are readily and economically available to minimise their effect.

Barriers / Coatings

New PET bottles incorporating additives or barrier materials to further improve barrier performance are continuously being developed and will at some time challenge existing recovery schemes. Non-PET multi-layers or coatings are not always fully compatible with current recovering technologies and may reduce recoverability of PET bottles. Indeed, constituents can be difficult to separate. (It is accepted that newer containers and containers for oxygen sensitive contents may be multi-layer and will, therefore, require additional attention during recovery operations). The European PET Bottle Platform has published guidelines to help the PET production, filling and recovery chain evaluate the impact of such bottles. EVOH barriers in particular have a history of causing significant issues during recycling if residual levels are >= 500ppm. This could include haze and colour issues at low levels and deterioration of mechanical properties at high residual levels.

The European PET Bottle Platform remain against the current use of EVOH as a barrier with PET bottles. This view is also reflected in the USA. Hence EVOH as a potential barrier material with PET is not recommended at this time.

Material Specific Guidelines - PET

Product manufacturers and their suppliers would need to ensure that levels employed are minimised and that data to show that the proposed packaging provides a recyclate that satisfies all technical requirements (especially discolouration and haze) and that recyclers in general can achieve the separation efficiencies required. Alternatively, where performance enhancing barrier layers are used which could interfere with current recycling, for example in PET beer bottles, it is important to ensure that the container is easily distinguished and sorted from conventional PET bottles. For example, in the past, PEN was becoming progressively more used to provide additional barrier properties. When PEN in varying amounts is reprocessed with PET the composition and physical properties of the recovered material varies, potentially restricting the range of applications for which it may be used and hence the value of the recyclate (e.g. PEN tends to brown on re-heating and fluoresces and this has implications for garments made from recycled PET fibres). Its use in packaging is restricted currently to the reuse market. If recycling is desirable when it eventually reaches the end of its useful life, then a separate recycling stream from PET will be necessary to avoid the issues discussed.

Clear plasma coatings in general cause no recycling issues, although use of high levels of carbon should be avoided. Other external coatings (e.g. O2 or CO2 barriers) can cause issues. To be acceptable the barrier needs to flake off the PET and be efficiently removed during reprocessing. European PET Bottle Platform protocols have been developed to test suitability.

Colour

Non-coloured, unpigmented PET not only has the highest value and the highest recovery rates but also the widest variety of end markets. At present, tinted (other than light green and blue tints) or opaque PET bottles are not desirable to many PET recyclers because the quality of their end products are colour sensitive.

As a result, strongly coloured PET is rejected by many recyclers and can interfere with the recycling process and therefore its use should be avoided as much as possible.

The use of opacifiers should be avoided as they significantly reduce the value of the PET recyclate. The presence of TiO2 in particular causes breakage during fibre production and thus use of this opacifier in particular should be avoided.

Closures / Closure Lines

EVA liners are only acceptable in combination with plastics. When combined with aluminium they cause contamination and thus should not be used. Conventional silicone seals (density >= 1 g/cm^3) are neither compatible with PET or easily separable and therefore should not be used in combination with PET. Seal manufacturers have recognised this problem and are now designing silicone seals with a density < 1 g/cm^3. These seals should be separable from the PET and avoid potential issue. Potential users are recommended to check that the supplier can provide proof of the compatibility of the seal with conventional PET recycling. It is also worth noting that whilst this development was designed to overcome potential issues within the PET recycling stream, these lower density silicone seals have the potential to end up in the polyolefin stream and adversely affect the quality of this stream.

Closures made from PS or thermoset plastics are undesirable and should be avoided. In general the use of aluminium closures should be avoided, as they are more difficult to separate from bottles compared to the preferred closure systems (PP and HDPE) and add both capital and operating costs to conventional reclamation systems. Foil safety seals that leave foil or remnants or attaching adhesive on the PET bottle should be avoided.

Material Specific Guidelines - PET

Labelling

Polypropylene and polyethylene are the preferred label materials. Foil, lacquered and coated labels become contaminants and are undesirable. While PS sleeves are tolerated by many PET recyclers, to ensure that they can be separated easily in the floatation or wind sifting processes, they should only be used where the PS material is of low-density form (i.e. < 1 g / cm3) such as a foam. Presently all direct printing and decoration contaminates recovered PET in conventional reclamation systems and discolours the conventional base material.

Colour and printing therefore (other than date coding) should be confined to labels.

Other Components

It is preferred that base cups, handles, transportation aids and other attachments are avoided but if used, they should not be welded to the container. If attachments are glued on, they should separate in hot aqueous detergent or caustic solution (60 to 80°C).

Material Guidelines - PET Bottles

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
BODY	Colour	Clear / Light-blue / light tints	dark blue / dark green / brown / strong tints	Opaque / solid colours Carbon Black
	Barrier / Coatings	Clear plasma coating	External coating / PA - 3 layers	EVOH / PA monolayer blends
	Additives		UV stabilisers / AA blockers / Nanocomposites	
CLOSURE	Caps	PP HDPE, LDPE - Europe only		Steel / Aluminium / PS / PVC / Thermosets
	Seals	PE / PP	Silicone (density <1 g/cm$_3$)	PVC / Aluminium / Silicone (density >=1 g/cm$_3$)
DECORATION	Direct Printing	None / Embossed / laser printing (minimal)	Minimal direct printing, e.g. production or expiry date	
	Labels	HDPE / LDPE / PP / OPP less than 60% coverage on face	PET paper over 60% coverage on face	PVC Metalised
	Sleeves (incl. tamper resistance)	PE / PP / OPP / EPS (density <1 g/cm$_3$) Foamed PET / Foamed PET-G	PET	PVC PS (density > 1 g/cm$_3$) / PET-G
	Adhesive	removeable water soluble in 60 - 80oC		not removable in water
	Ink	EuPIA good manufacturing practices (for non food applications)		Inks that bleed and dye wash-solution
OTHER	trigger sprays	PP / HDPE / LDPE		Glass components Metal springs / ball bearings

Material Specific Guidelines - PET

Material Guidelines - PET Trays

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
BODY	Colour	Clear / Light-blue / light tints	dark blue / dark green / brown / strong tints	Opaque / solid colours
				Carbon Black
	Barrier / Coatings	None		PE seal Layer
				EVOH
	Additives	Minimal silicone surface coating (de-nest)	O_2 scavengers / UV stabilisers / AA	
			blockers / Anti-block	
CLOSURE	Lidding film	No residue after removal by consumer;		
		or; as main polymer (PET)		
DECORATION	Direct Printing	None / Embossed /	Minimal direct printing, e.g. production or expiry date	
		laser printing (minimal)		
	Labels	HDPE / LDPE /	PET	PVC
		PP / OPP	paper	Metalised
		less than 60% coverage on face	over 60% coverage on face	
			In Mould label	
	Adhesive	removeable		not removable in water
		water soluble in 60 - 80oC		
	Ink	EuPIA good manufacturing		Inks that bleed and dye wash-
		practices (for non food applications)		solution
OTHER	Inserts		HDPE / LDPE / PP / PET / paper	PVC / PS/ EPS / PU / PA (Nylon)
				PC (Polycarbonate) / PMMA
				(Acrylic)
				Thermoset plastics / Metallic

PET Trays 2020

Develop End Markets For PET Pots, Tubs and Trays

WRAP/RECOUP/Nextek

Collection of household Pots, Tubs and Trays (PTTs) has seen a significant increase since collection tonnages were first reported in 2007. As collection of PTT increases, the quantity of non-bottle PET collected for recycling will increase. To effectively recycle this material, the UK needs to develop end market opportunities for PET.

Recognising this as an opportunity to help towards the UK recycling targets, WRAP instigated and funded a project to confirm that PET from PTTs is technically recyclable and has a range of end markets. The project would provide technical trials, in various applications.

WRAP appointed RECOUP and Nextek to work with project partners, including RECOUP members Veolia, RPC and Dart to run trials to ascertain what the industry feels is the maximum level of non-bottle PET from PTT that can be included in rPET, used for food grade packaging.

Material was sent to Anson Packaging to assess the technical viability of using the flake as rPET in the manufacture of new trays. Dart then trialed the material for mono-thermoforming material. The third packaging trial saw pellet, produced by PET UK, used by RPC for injection moulded containers.

Trials were also carried to assess the suitability of the material for a range of products in other markets, including fibre, geotextiles, pallets and pipes.

Results of the project highlighted that there is still work to be done to remove contamination, such as PVC and polyolefins.

Work also assessed the commercial credentials for the technically successful trials, to include the material and reprocessing costs and values and potential income of the recycled material.

The report was published by WRAP, as one of five plastic-related projects;
http://www.wrap.org.uk/sites/files/wrap/Developing_End_Markets_For_PET_Pots_Tubs_And_Trays.pdf

To improve recycling rates for PET from PTT's, UK local authorities need to be encouraged to collect this material. For this to happen, PTT needs to be seen as a recyclable fraction. To this end, RECOUP intend to continue dialogue with interested parties, with a view to taking the work done on recycling of clear PET trays forward. WRAP, working with industry partners and key stakeholder will also be continuing work to develop end markets and infrastructure for PET from PTT.

Sprite bottles switch from green to clear plastic

Coca-Cola European Partners

In September 2019 drinks manufacturer, Coca-Cola launched the `Clear is the new green' campaign.

This saw the iconic sprite bottle which had been green for 58 years turned clear to make it easier to recycle back in new bottles.

All of CCEP's bottles will move from 25% rPET currently to 50% rPET by June 2020, with the exception of glaceau smartwater, which moved to 100% rPET at the end of 2019. This is part of CCEP's ongoing effort to reduce the amount of virgin PET it uses.

The green bottles were previously recyclable, however, the clear bottles will be easier to recycle through mechanical methods. The green bottles currently go into the coloured PET fraction, with limited end markets and lower value compared to that of clear PET.

The use of rPET converts post-consumer waste into a valuable resource, reduces the use of virgin polymers in new packaging and has lower carbon footprint than virgin PET.

Coca-Cola EUROPEAN PARTNERS

RECOUP Member

Evolve out of Black CPET
Faerch UK

Faerch UK is introducing a solution to the UK challenge of black tray recycling as part of their journey toward creating a circular business with the launch of its new product *Evolve by Faerch*.

Evolve by Faerch is made from an average of 80% recycled PET post-consumer content, uniquely utilising mixed coloured PET as attractive food packaging. As the products are created from a natural mix of recycled PET, their colour will vary; the different palettes of colours enable consumers to recognise they use a recycled and circular product. The *Evolve by Faerch* trays are reliably detected by existing sorting infrastructure in the UK and returned to the mixed jazz stream where they can be recycled into new food safe products again and again.

Retailer interest in *Evolve by Faerch* is strong as public demand for sustainable and circular products increases rapidly. *Evolve by Faerch* complies with the strictest food regulations keeping food safe in the entire temperature range between -40C and + 220C and outperforming alternative packaging materials in particular on food safety, recycled content, and recyclability.

Spencer Johnston, Regional CEO Faerch UK & Ireland, said, "*Evolve* offers the consumers a ready meal tray that is made from recycled post-consumer material and that can be recycled again and again. This represents a significant step forward in packaging and enables consumers to make the switch to a sustainable solution."

Retailers who switch to the new product line can join an innovative recycling programme offered by Faerch: An identical quantity of the volume of Faerch trays a retailer sells through their stores will be sourced as post-consumer waste locally in the UK and recycled into new food grade trays at one of Faerch's production sites.

Faerch are committed to an active role in the plastic debate by driving the industry towards making food packaging truly circular. *Evolve by Faerch* is part of the journey by being fully recyclable and offering market-leading quantities of recycled content. Faerch is powered by 100% sustainable renewable green energy and is the only food tray manufacturer which has invested in ownership of a recycling operation.

Faerch

RECOUP Member

Recycled & Recyclable PET wine bottles

Garçon Wines

Garçon Wines have created an eco, flat wine bottle made of 100% recycled PET, pre-existing material not single-use plastic. Using this sustainable material source is fundamental in creating a demand for plastic that's already in circulation, which in turn gives it a value, funding and fuelling its collection, and helping mitigate against the material ending up as waste in landfill or litter in our environment.

Garçon Wines believes in being plastic-smart, taking into account the entirety of the product's lifespan. We start with a superior product in shape design, material usage, and product components. This is done to slash financial costs and carbon footprint but also to reduce plastic waste and ease recyclability. This is why, since commercially launching product in May 2018 with wine industry standard aluminium screw caps and paper labels, we have substituted both the caps and labels, to be consistent for recycling with the bottle. Now all three components can enter the PET recycling stream safely. This would have not been possible with paper labels and the aluminium screw cap collar which remains on the bottle, even when the cap is removed, negatively impacting the recycling process.

Since summer 2018, our multi award-winning, recycled PET bottles are supplied with PP & PE screw caps and PP labels with an adhesive that allows easy separation from the bottle in the sink-float process. Swiftly implementing these adaptations in the early days, thanks to input from industry experts which we gladly actioned, for the second and all successive production runs, has allowed the bottles in the market to be fully, easily and widely recyclable. 99% of UK councils collect PET bottles for recycling and we believe in making the recycling as simple and hassle-free for the consumer as possible, without expecting them to need to separate individual components. Consumers are also encouraged to recycle the bottles, with significant space on the back label and clear messaging with a weblink which directs them to the Recycle Now website to enter their postcode to check local kerbside recycling.

Garçon Wines

RECOUP Member

Material Specific Guidelines - HDPE

Material Specific Guidelines - HDPE

General

For efficient separation and removal in conventional density separation processes, parts of the packaging system that are not compatible with HDPE should have a density > 1 g / cm3.

Colour

Applications using clear, natural, colourless polyethylene have the highest recycling value, therefore use of unpigmented containers is preferred. Coloured containers, tubes and films are acceptable.

Barriers / Additives

Some applications require the use of additional barrier layers for specific applications. The use of non-PE layers should be minimised (to maximise PE yield and reduce potential contamination and separation costs), but when required they should be compatible with or easily separable from PE in conventional recycling systems. Current HDPE recycling systems can tolerate the use of low levels of EVOH layers. Similarly MXD6 and other nylon-based barrier layers are tolerated, particularly if the layers are readily separated from the HDPE in conventional reclamation systems. In all such cases their content should be minimised to the greatest extent possible to maximise HDPE yield and reduce potential contamination and separation costs. PVdC barriers should be avoided.

The use of additives / fillers such as calcium carbonate, talc, etc. in concentrations that alter the density such that they cause the HDPE plastic to sink in water or alter the properties of the regrind are undesirable and should be avoided. For this reason, the HDPE density should be kept at <= 0.995 g/cm3.

Other Components

Use of PVC components should be avoided as they can cause discolouration and malodour.

HDPE Bottles - Material / Material Combinations

Unpigmented, homopolymer HDPE bottles generally do not use a multi-layer construction at present. It is possible that future bottle designs, however, might require the use of layers for specific product applications and then the barrier advice given should be followed.

The principal polymer contaminant of recovered HDPE is PP from bottle caps and bottles. HDPE and PP are opaque and less dense than water and consequently difficult for reprocessors to separate. Even in the small number of reprocessing plants able to separate PE from PP, this is not common as it is costly to carry out. PP has a higher melting point (160-170°C) than HDPE (ca130°C), and so does not disperse readily in the HDPE recyclate mix. PP contamination can limit the recovered HDPE specification to lower value applications. In general, a level of PP contamination up to 5% can be tolerated in the total mix and levels of PP cross contamination in finished product are frequently at around 5%. Higher levels e.g. 10% in the total mix can be tolerated for certain lower specification applications. When designing packaging, it is recommended that PP levels are restricted to a maximum of 5% to avoid potential end use issues. This is in line with US recommendations. Higher levels may be possible but this would require the difficult task of investigating the likely effects on the total mix during recycling. HDPE is very susceptible to contamination from the contents e.g. pesticides, motor oil, etc.) which can result in colour and odour problems. Whilst recyclate derived from milk bottles can result in malodour issues, this should be avoidable using a hot washing stage during reprocessing. HDPE containers used for mineral oil based products (e.g. motor oil) are not generally mechanically recyclable as they can cause residual malodour issues but more importantly, the oil migrates into the plastic and is not removed during normal reprocessing operations.

Material Specific Guidelines - HDPE

Colour

In general homopolymer bottles are unpigmented whilst copolymer HDPE bottles (detergent bottles) are pigmented. Indeed, some plastic recyclers use pigmentation as the basis for distinguishing and separating copolymer from homopolymer containers. For this reason a communication program to alert recyclers to the potential confusion should accompany any use of unpigmented copolymer bottles. In multi-layer HDPE bottle designs, the use of inner layers of the same colour as the outer layer is preferred to maximise recyclability but inner and outer layers of different colour can be tolerated.

Closures

The use of closures that are the same colour as the bottle is desirable (although not essential). Foil safety seals that leave foil or remnants or attaching adhesive on the HDPE bottle should be avoided.

Labelling

In applications using unpigmented, homopolymer HDPE, all direct printing other than date coding, used either for product labelling or decoration, presently contaminates the recycled unpigmented HDPE in conventional reclamation systems. Use of PVC labels should be avoided as during the density separation the foil is so thin that it is carried over with the PE and does not sink as would be expected from its intrinsic density.

Other attachments

The use of any other attachments is discouraged, as they reduce base resin yield and increase separation costs. If attachments are added to a bottle, they should be made from either materials that are easily separable from HDPE in conventional separation systems or are compatible e.g. PP, LDPE or preferably, unpigmented, homopolymer HDPE. Use of PP or LDPE attachments, if necessary, should be limited to less than 5 percent of the total bottle weight wherever possible as higher percentages can contaminate the HDPE for many recycling applications. If pour spouts are added to a bottle they should allow for complete removal of product contents and be designed to leave virtually no product residue when the bottle is empty. If adhesives are used to affix attachments, they should be water-soluble or dispersible at temperatures between 60°C and 80°C in order to be removed in conventional washing and separation systems. The use of attachments that contain metallic and other non-plastic components is discouraged and should be avoided.

Material Specific Guidelines - HDPE

Material Guidelines - HDPE

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
BODY	Colour	Natural	Light-blue / Green / light tints	Carbon Black
			Opaque / Heavy colours	
	Barrier / Coatings	None	EVOH / PA (incl. MXD6)	PVDC
	Additives			talc / CaCO3 / other fillers that increase the density of HDPE above 0.995 g/cm3
CLOSURE	Caps	HDPE / LDPE / PP		Steel / Aluminium / PS / PVC / Therrmosets
	Liner	HDPE / LDPE / PE+EVA / PP		PS / PVC / EVA with aluminium
	Seals	PE / PP / OPP	Aluminium	PVC / Silicone
DECORATION	Direct Printing	Minimal or moderate direct printing, e.g. production or expiry date	Excessive direct printing	
		laser printing (minimal)		
	Labels	HDPE / MDPE / LDPE / LLDPE	Paper	PVC / Aluminum / Metallised
		PP / OPP / PS (US only)	over 60% coverage on face	PET / PS (except US)
		less than 60% coverage on face	In Mould label	
	Sleeves (incl. tamper resistance)	PE / PP		PVC / PS
	Adhesive	water soluble in ambient conditions	water soluble up to 80oC	not removable in water
	Ink	EuPIA good manufacturing		Inks that bleed and dye
		practices (for non food applications)		wash- solution
OTHER	trigger sprays	PP / HDPE / LDPE		Glass components
				Metal springs / ball bearings

Material Specific Guidelines - PP

Material Specific Guidelines - PP

General

For efficient separation and removal in conventional density separation processes, parts of the packaging system that are not compatible with PP should have a density > 1 g/cm^3.

Colour

The use of unpigmented PP is preferred to pigmented as the recyclate from unpigmented bottles will have a greater value due to the larger number of potential applications.

Clarified PP is acceptable when bottles are shown to be compatible with end uses for recyclate.

Material Combinations

The principal polymer contaminant of recovered PP is HDPE from bottles, closures and attachments.

PP and HDPE are opaque and less dense than water and consequently difficult for reprocessors to separate. Since HDPE has a lower melting point (ca 130°C) than PP (160-170°C) the overall PP mix will be more tolerant to HDPE contamination than the converse.

Nonetheless, when designing packaging, it is recommended that PE levels are restricted to a maximum of 5% to avoid potential end use issues. This is in line with US recommendations. Higher levels may be possible but this would require the difficult task of investigating the likely effects on the total mix during recycling.

Barriers

Current PP recycling systems can tolerate the use of EVOH layers. Similarly MXD6 and other nylon-based barrier layers are tolerated, particularly if the layers are readily separated from the PP in conventional reclamation systems. In all such cases their content should be minimised to the greatest extent possible to maximise PP yield and reduce potential contamination and separation costs. PVDC barriers should be avoided.

Closures / Closure Liners

The use of closures that are unpigmented or the same colour as the bottle are desirable (although not essential). Foil safety seals that leave foil or remnants of the attaching adhesive on the PP bottle should be avoided.

Labelling

In applications using unpigmented PP, all direct printing other than date coding, either for product labelling or decoration, presently contaminates the recycled unpigmented PP in conventional reclamation systems.

Other Components

Use of PVC components should be avoided as they can cause discolouration and malodour.

Material Specific Guidelines - PP

Material Guidelines - PP

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
BODY	Colour	Clear / natural, or lightly tinted	Opaque / Heavy colours	Carbon Black
	Barrier / Coatings	None	EVOH / PA (incl. MXD6)	PVDC
	Additives		Clarifier	
CLOSURE	Caps	HDPE / LDPE /PP	HDPE / LDPE	PS / Thermoset plastics / Aluminium / Steel / PVC
	Lidding film	No residue after removal by consumer; or; as main polymer (PP)		
DECORATION	Direct Printing	Minimal or moderate direct printing, e.g. production or expiry date	Excessive direct printing	
		laser printing (minimal)		
	Labels	HDPE / MDPE / LDPE / LLDPE	paper	PVC / Metallised
		PP / OPP / PS (US only)	over 60% coverage on face	PET / PS (except US)
		less than 60% coverage on face	In Mould label	
	Sleeves (incl. tamper resistance)	PP / PE		PET / PVC
	Adhesive	water soluble in ambient conditions	water soluble up to 80oC	not removable in water
	Ink	EuPIA good manufacturing practices (for non food applications)		Inks that bleed and dye wash-solution
OTHER	Inserts	PP	HDPE / LDPE	PVC / PS/ EPS / PU / PA (Nylon)
				PET (Heavy)
			paper	PC (Polycarbonate) / PMMA
			PET (light)	(Acrylic)
				Thermoset plastics / Metallic
	trigger sprays	PP / HDPE / LDPE		Glass components
				Metal springs / ball bearings

PP 2017

RPET & PP Snap packs to replace styrene

Faerch UK

Snap packs have fast become a consumer favourite, offering the flexibility of single-serve portions to guarantee product freshness and portion control.

This product launch is the first part Faerch's ongoing product innovation programme, with further ranges launching very shortly and is part of Faerch's commitment to the UK Plastics Pact.

Snap packs are technically demanding to manufacture, as they must combine the strength to preserve the product's integrity with sufficient flexibility to allow a 'snap' action separating each pot safely and successfully. To date only styrene material was thought capable of offering this differentiating property at scale. Faerch's new, patented 'S perf' solution now overcomes this limitation by offering snap packs made from polypropylene (PP) and rPET, depending on the application and product type.

It meets an increasing demand from manufacturers and retailers allowing them to switch from styrene to other materials.

Mark Tollman, Group Strategic Sales Director at Faerch says "The Faerch S perforated design has been developed in partnership with a leading UK retailer to give consumers an alternative to styrene, which can be recycled".

No barriers to plastic recyclability

Berry Global

Barrier plastic recyclability is just part of their good news story says Katherine Fleet, Sustainability Manager at Berry Global.

Packaging provides a reflection on how we live. It responds to market trends and consumer demands. In the food sector, for example, our busy lifestyles are contributing to the continuing popularity of on-the-go eating, while at home, time-pressed consumers are increasingly seeking the convenience of pre-prepared foods – either complete meals or ready-to-use ingredients to speed up the cooking process.

Barrier plastics offer excellent opportunities for the development of a variety of convenience pack solutions. Barrier technologies can be allied to different plastic manufacturing techniques – blow moulding, injection moulding and thermoforming – so that packaging manufacturers and designers can tailor a solution to precise product and brand requirements. Therefore, whether the focus is on the need for reclosability, intricate eye-catching designs, or a large family-size pack, plastic has the flexibility – in both materials and processes – to meet any or all of these requirements.

At Berry, for example, customer requirements have ranged from a thermoformed pack to resemble a traditional French cooking pot to large-size containers with indented handles for easy handling in the busy food service sector.

However, there is still a common misconception that barrier plastic packaging is not recyclable and for this reason some designers tend to focus only on monolayer packs in the development stages.

The fact is that barrier plastics are recyclable and can form part of a mixed plastics recycling stream. The current use of barrier material, such as EVOH, is minimal and for this reason does not act as a major contaminant in a bale of PP or mixed plastic to be recycled. Current PP recycling systems, for example, can tolerate the use of EVOH, particularly if the layers are readily separated from the PP in conventional reclamation systems. This helps to maximise the PP yield.

And there is high demand for this material – from re-use in non-food packaging, such as paint containers, to second life applications including fencing and benches. So it is vital that manufacturers and retailers continue to promote the recycling message and that more local authorities make facilities available to recycle plastics.

At the same time, a sustainable pack design needs to take into account more than just the recyclability of the pack. It is important to consider the entire lifecycle, covering factors such as the manufacture and transportation of the pack, and its ability to provide product protection and reduce food waste.

No barriers to plastic recyclability
Berry Global

Food waste, in particular, is currently generating a lot of coverage. The SAVE FOOD initiative, a joint campaign organised by the Food and Agriculture Organisation of the United Nations and Messe Düsseldorf GmbH to highlight and fight global food loss and waste, says that each year, worldwide, a third of all food is thrown away or lost, while at the same time around 842 million people are suffering from hunger. Excessive food waste also has a negative impact on the environment, a point underlined in the UK by WRAP's 'Love Food, Hate Waste' campaign.

The advent of barrier plastic technologies is one way in which we can reconcile the demand for convenience and the need to preserve food and minimise waste. They enable many different products to enjoy extended shelf lives – up to 24 months and in some cases even beyond this – while maintaining their freshness, quality and taste.

Barrier portion packs offer another solution to minimising food waste by ensuring the right amount of product for individual servings.

The light weight of plastic packs also makes an important environmental contribution in terms of energy savings during transportation. Barrier packs offer a further energy-saving advantage since products can be hot filled, pasteurised or sterilised in the pack (like other more traditional materials) to enable them to be stored at ambient temperatures without the need for chilling. In addition, these products do not need preservatives to deliver long shelf life, enhancing their quality.

For pack designers, barrier plastics' versatility gives them the flexibility to create a pack that meets both brand objectives – in terms of on-shelf image and appeal, and practicality and functionality – while being tailored to the precise characteristics of individual products. And the packs' recyclability is just one element in a strong environmental profile that can make an important contribution to a company's sustainable image.

Material Specific Guidelines - PS

Material Specific Guidelines - PS

General

Applications using clear, colourless polystyrene have the highest recycling value. Therefore use of unpigmented containers is preferred. Coloured transparent containers are acceptable however, but their recyclability and the value of the recyclate are reduced.

In principle aluminium lids are acceptable on PS, especially peel-off ones.

Tubs that have a clear or colourless body and where the information is presented on the lid are particularly suitable for recycling.

Direct printing is acceptable provided attention is paid to ink types to avoid interference with quality of regranulate.

Excessive paper content can cause issues during recycling and thus use of paper labels is less desirable. If used, they should be lightweight and cover only a minor area of the container.

Material Guidelines - PS

		COMPATIBLE for recycling for most applications	MAY BE SUITABLE for recycling for some applications	NOT SUITABLE for recycling
CONTAINER				Multi-layer material
				(unless based on PS with
				polymers of the same type in
				limited quantities)
	Colour	Clear / natural, or lightly tinted	Heavy colours	Opaque / solid colours
				Carbon Black
LID	Lidding film	No residue after removal by consumer	Lightweight Aluminium foil	Heavyweight Aluminium foil
		Lightweight ;	PE	PET / Heavy paper
		Metallised OPET	PP	PET / PS
		Metallised OPP		
		PBT / PS		
		PET / light paper		
		PS		
		PS with PE insert		
		PS with EVA insert		
		OPS		
DECORATION	Direct Printing	Minimal or moderate direct printing, e.g. production or expiry date	Excessive direct printing	
		laser printing (minimal)		
	Labels	PE / PP / OPP / PS	Paper	PET
		PS / OPS		PVC
		less than 60% coverage on face	over 60% coverage on face	Metalised
			In Mould label	
	Adhesive	water soluble in ambient conditions	water soluble up to 80oC	not removable in water
	Ink	EuPIA good manufacturing		Inks that bleed and dye
		practices (for non food applications)		wash- solution

Sustainable Packaging for Food-To-Go
Klockner Pentaplast (kp)

kp Infinity™ is a high-quality material made from a single form of plastic. This means it is easily recycled and can be used to create a variety of new products: from packaging to furniture, flooring and textiles – which gives our food-to-go packaging a second life and more.

To fully understand how recyclable kp Infinity™ is, we collaborated with several key partners across Europe leading comprehensive trials, as well as conducting our own trials in a series of key tests. Ensuring the basics our research began with an extensive trial, set up by Borealis, with recycling specialists Veolia and MTM. This first test required the recycling of 20 tonnes of EPP cups to check that it could be easily sorted and recycled using the technology and processes available in UK and European facilities.

Testing the full cycle after these successful trials, MTM took a further eight tonnes – in the form of pressed clamshell boxes commonly used for takeaway food – to determine whether recycled kp Infinity™ could be processed into pellets that meet regulation standards for being recycled and reprocessed into new products.

During the trial, a mix of 20% kp Infinity™ and 80% standard post-consumer polypropylene (PP) was processed into plastic flakes. Despite the EPP component, higher than that usually processed by MTM, there were no impacts to the efficiency and the end product was of the same quality as a standard batch. The trial determined that kp Infinity™ was highly recyclable. We also conducted a test with UK waste management specialists Biffa. Using a one-tonne sheet of kp Infinity™ as input material, Biffa also confirmed that kp Infinity™ is fully recyclable within its infrastructure.

The final phase of the test was to blow-mould the resulting polymer resin into non-food grade bottles, such as those traditionally used for household bleach.

Preventing contamination at plastics recycling facilities (PRF), sink–float technology is commonly used to separate out the PP waste stream (70%) from the mixed waste stream (30%). Foamed or expanded PP has a density lower than one and floats in water. Other plastics, such as EPS and expanded polyethylene terephthalate (EPET), also have a density lower than one, meaning there is the potential for contamination of the profitable PP stream. It is for this reason that they are difficult to recycle within the current system. kp Infinity™, however, being a monomaterial, will have the benefit of adding more high-quality PP into the reprocessing stream.

kp klöckner pentaplast

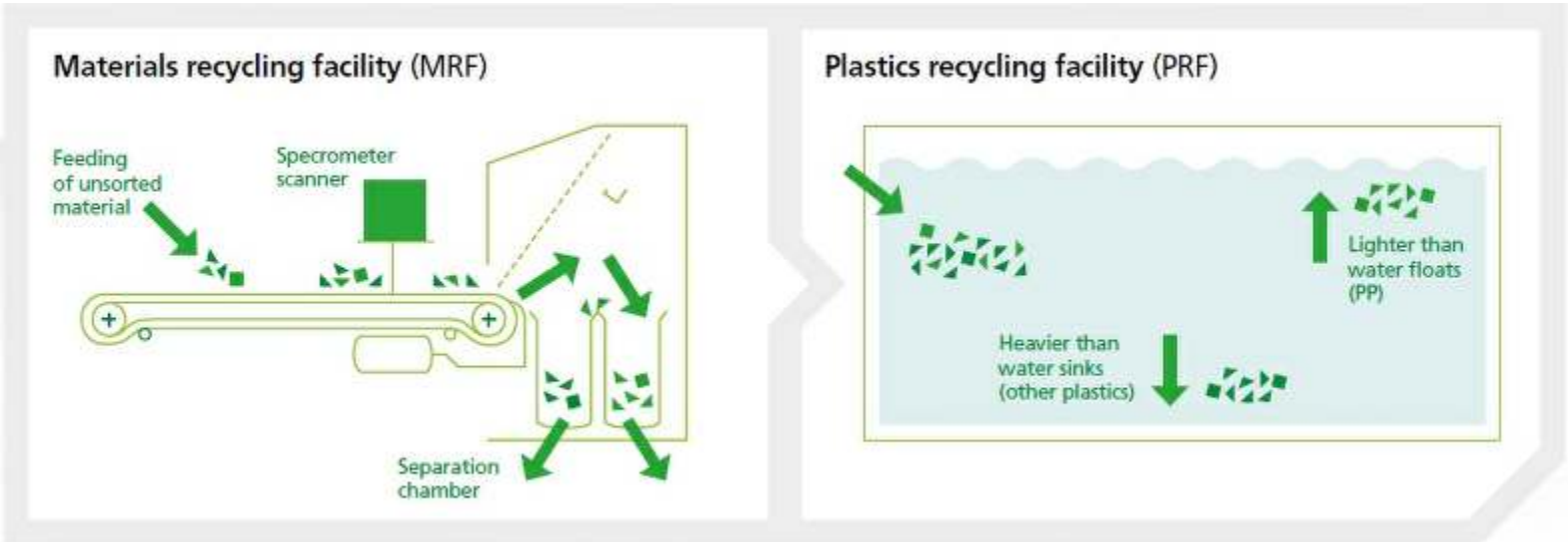
RECOUP Member

Sustainable Packaging for Food-To-Go
Klockner Pentaplast (kp)

The partner trials all concluded that kp InfinityTM performs as expected in all existing recycler processes and is therefore fully recyclable

Conclusive approval was achieved in working closely with RECOUP, who kp regard as the UK's leading authority on plastics waste and resource management. Samples were supplied for trial at a local materials recovery facility (MRF) to see if they would be separated easily into the correct recycling stream. A MRF collects all different types of materials and sorts them into defined streams. The results were decisive and successful, with kp Infinity™ easily being diverted to the correct stream.

For further validation, samples were sent to TOMRA in Germany to determine whether kp Infinity™ could be scanned by near infrared (NIR) AUTOSORT technology, which is designed to detect the exact chemical and material makeup of objects. All samples were fully recognised and sorted by AUTOSORT.



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RECOUP Member

Guidelines - Other Plastic Packaging

The term ‘mixed plastics’ has been used to cover all non-bottle plastic packaging sourced from the domestic waste stream. This includes rigid and flexible plastic items of various polymer types and colours that are typically found in the household waste bin. It excluded plastic bottles and non-packaging items. It is now widely believed that the term is too general, and even misleading.

With an increasing range of materials being recovered in domestic waste recycling systems, other plastic packaging items form some of the most visible remaining components of the domestic waste bin.

In addition, for those countries in Europe that collect all packaging waste within their respective recovery schemes (e.g. Germany, Italy and Spain), the same fee scale is used for all plastics. Hence the manufacturers who have to pay the fees for plastic packaging expect a progressively higher percentage of the material to be recycled. There is, therefore, a growing need to develop sustainable waste management options for non-bottle plastic packaging in Europe and there are signs that plastic packaging collection streams in the USA are expanding beyond rigid bottles / jars to cover all plastic packaging.

Where a range of plastic packaging is collected for recycling, the flexible packaging is first separated from the rigid plastic packaging and then the bottles are extracted from the rigid mixed plastic components.

The rigid mixed plastic component (pots, tubs and trays form the bulk of this packaging type) is generally then separated into a polyolefin stream (PE+PP or PE & PP separately) and a PET stream using near NIR detectors.

While there are markets for all major individual polymer types once separated, there is an under developed market at the present time for a mixed plastics stream. The mixed polyolefin stream is often used to make, for example, insulation and furniture while the PET material is used in applications that can utilise lower quality compounded PET flake.

Guidelines - Other Plastic Packaging

General

The basic design principles for other plastic packaging are no different to those given in the general guidelines section and in the specific polymer sections. However, the processes used for the recycling of other plastic packaging containers are not identical to those used for plastics bottle and hence exactly the same rules may not apply. This is likely to become particularly apparent when more experience is gained with the recycling of various mixed plastics.

Rigid Mixed Packaging Material / Material Combinations

As with rigid bottles, use of mono-materials or mixed materials of the same type are the materials of choice from a recycler's point of view for mixed plastics. Mixed plastics however very often require the use a variety of plastic materials to provide both the technical properties required and to satisfy user needs. In the absence of any other specific guidance, designers should follow the recommendations provided in the corresponding polymer table when designing a plastic rigid container. Alternatively, components that were known to be readily separable could be used.

Colour

Wherever possible use of dark rigid mixed plastics packaging (e.g. black, dark grey, and any heavily pigmented colour) should be avoided. Black plastic remains invisible to NIR detectors and thus will be rejected. In addition any black / dark material entering the plastic recycling stream will further reduce the value of the recyclate.

Contamination

Plastic containers are generally lightweight. Product contamination can therefore represent a significant proportion by weight of the collected material (e.g. the weight of product residues in yoghurt pots can be as much or more than the weight of the container itself).

Contamination lowers the efficiency of the recycling process as polymer weights are much less than weights of material collected and the residues themselves (often oily food) can interfere with the washing process. It is therefore important that containers are designed in such a way as to ensure levels of contamination are minimised as much as possible. This not only provides a benefit to recyclers, but also to the consumer. To further facilitate recycling, consumers / end-users should remove any plastic film, paper, cardboard and foil present and as much food residue as possible before putting the container out for collection.

PET/PE Trays

Rigid PET packaging represents a significant fraction by weight of the domestic plastic waste stream. One particular difficulty is the widespread use of PET/PE multi-layers (e.g. in the processed meat sector). As already indicated, use of mono-materials or mixed materials of the same type are the materials of choice from a recycler's point of view. Hence the current efforts by some producers to switch from PET/PE blends to monolayer PET for trays should further facilitate recycling. However, it should be restated here that it is appreciated that use of multi layers in this way may have a greater environmental benefit, in extending shelf life, than consideration of recyclability.

Guidelines - Other Plastic Packaging

As with other PET packaging formats, it is vitally important that contamination by PVC is avoided. PVC trays and blisters represent an important potential contaminant of the PET tray and blister stream and every effort needs to be made to try and ensure that such contamination is avoided either through design and / or at the recycling stage.

PE - Tubs / Dishes

Tubs and dishes are often made of injection grade HDPE, exhibiting higher melt flow rates than blow moulding grade HDPE. Mixing the two types of HDPE together decreases the value of the mixture. Do not mix HDPE bottles with HDPE tubs or dishes.

In principle aluminium lids are acceptable on PE, especially peel-off ones. Adhesive should stay with the aluminium lid.

Tubs that have a clear or colourless body and where the information is presented on the lid are particularly suitable for recycling.

Direct printing is acceptable provided attention is paid to ink types to avoid interference with the quality of regranulate.

Excessive paper content can cause issues during recycling and thus use of paper labels is less desirable. If used, they should be lightweight and cover only a minor area of the container. Paper labels are liable to pulp in a hot caustic washing step.

PE - Tubes

Cap and tube should be manufactured from the same type of plastic and ideally from the same polymer (in this case HDPE). An elevated percentage of PP lowers the quality of the recycled plastic.

Direct printing is acceptable for marking tubes provided the printing is in compliance with the EuPIA Exclusion list. Paper labels also can be used, provided they are easily removed in water and leave no adhesive residue that is difficult to remove.

PP - Tubs / Dishes / Trays

In principle aluminium lids are acceptable, especially peel-off ones. Adhesive should stay with the aluminium lid.

Tubs that have a clear or colourless body and where the information is presented on the lid are particularly suitable for recycling.

Direct printing is acceptable provided attention is paid to ink types to avoid interference with quality of regranulate.

Excessive paper content can cause issues during recycling and thus use of paper labels is less desirable. If used, they should be lightweight and cover only a minor area of the container. Paper labels are liable to pulp in a hot caustic washing step.

Guidelines - Other Plastic Packaging

PP - Tubes

Cap and tube should be manufactured from the same type of material and ideally from the same polymer (in this case both from PP).

Direct printing is acceptable for marking tubes provided the printing is in compliance with the EuPIA Exclusion list. Paper labels also can be used, provided they are easily removed in water and leave no adhesive residue that is difficult to remove.

Film - Material / Material Combinations

As with rigid bottles and mixed plastics, homogeneous films can be recycled optimally. Use of mono-materials or mixed materials of the same type are the materials of choice from a recycler's point of view and combinations with a different type of plastic of similar density should be avoided wherever possible.

Packaging film very often requires the use of a variety of plastic materials, to provide both the technical properties required and to satisfy user needs. Recognising this need, and in the absence of any other specific guidance, designers should follow the recommendations provided for the corresponding polymer material. In the case of films, however, this is less important as some film recyclate is used in applications that have a more tolerant specification e.g. furniture, bin liners, etc. In these cases plastic film users can feel less restricted to use material combinations in the MAY BE categories than with rigid containers. Combinations in the NOT SUITABLE category should still be avoided.

Labels

Labels manufactured from materials that float in water while the film sinks (e.g. PET) or vice versa and attached with water-soluble adhesive are acceptable. Paper labels also can be used, provided they too are easily removed in water and leave no adhesive residue that is difficult to remove and do not reduce to pulp in the washing process.

Flexible packaging recycling present and future

Axion Consulting

The recycling of flexible packaging, such as bread bags, crisp packets and pet food pouches is very much in its infancy in the UK. The recycling industry has a number of concerns over this type of material, and the packaging industry is unclear on what their packaging should be made of in order for it to be recycled.

Flexible packaging is a highly engineered product, designed to meet specific performance criteria to provide environmental savings in terms of logistics and preserving food. As a result, flexible packaging consists of a mixture of polymers. Some flexible packages are made from a single polymer whereas others can be made from several polymers laminated or extruded together. Recycling is only one aspect of packaging sustainability so the overall function of the packaging should not be compromised to enable recycling if there is a negative impact on the entire life cycle assessment.

Currently in the UK, post-industrial flexible PE, PP and PE/PP packaging is recycled as well as PE films from commercial and industrial sources. There is some limited capacity for post-consumer PE film sorting and recycling, however the industry is still in its infancy.

With no substantial infrastructure for recycling flexible packaging already in place, it is challenging to advise packaging producers on what materials they should and should not use. However, the main challenges associated with flexible packaging recycling are:

- The type and quantity of different polymers within the waste stream is poorly understood
- Flexible packaging is perceived to be difficult to sort using conventional technology
- Polymer derived from film is believed to have limited end markets

Flexible packaging recycling present and future

Axion Consulting

Several projects are active across the Globe to provide evidence to show that these problems can be overcome and to improve the understanding of flexible packaging recycling. Axion has been actively involved in several of these. Studies carried out on the UK waste stream suggest that a significant proportion of flexible packaging is mono-material and is primarily polyolefin. The split between PE and PP is also estimated to be almost equal, and it is therefore imperative that a recycling solution is established for both PE and PP from post-consumer films. This way the material yield for recyclers will be enhanced and it is more likely that recycling of flexible packaging will be commercially viable.

By placing packaging on the market which has been shown to be recyclable at pilot scale, it should provide the waste management sector with the confidence to invest in flexible packaging recycling. Producing mono-material PE or PP structures, or as a minimum all polyolefin structures should be the target for converters from a potential recyclability standpoint. Many property enhancing components such as metallisation, EVOH barriers and coatings have been shown to have little negative effect on the quality of recyclate during laboratory trials. They cause no problems at the level at which they are in the waste stream, and therefore could still be used to provide functionality to packaging.

The recycling of flexible packaging ultimately rests on the packaging sector's willingness and ability to place "recyclable" packaging on the market, and for the waste management and recycling sector to invest in the infrastructure to process the material into high quality recyclate. Further supply chain engagement and joint development is required to address the recycling of post-consumer flexibles on a meaningful scale.

AXION

Film Recycling

There is more and more interest surrounding plastic films and its options for recycling which goes in hand with the growing increase of flexible packaging and film used across industries. It is estimated that there is 395k of household film placed on the market with an increasing demand from industries and consumers to make this material mechanically recyclable. Household collection of plastic films are in decline due to current infrastructure and little financial benefit, alternative options for collections are required.

This year has seen an increase in front of store collection schemes at major retailers for flexible materials. This material is sent for industrial recycling with other post-industrial films. These schemes are not always a success and issues such as the decline in carrier bag use and high levels of contamination have contributed to the collected material not reaching the film recyclers. There has also been much attention around refillable pouches/doy packs. These pouches remove the need for rigid packaging, but attention should be paid to the choice of materials used and if there is currently any feasible recycling route for such items at the present time.

The packaging industry along with recyclers continue to collaborate and inform with CEFLEX/and other groups developing initiatives and sharing best practice. With flexible packaging being difficult to recycle and investment required into the infrastructure it is imperative that the industry are placing flexible packaging onto the market that can be recycled.

Currently there is limited specific guidance for film producers, as packaging film very often requires the use of a variety of plastic materials, providing technical properties and satisfy user needs. However, some film recyclate is used in applications that have a more tolerant specifications e.g. furniture, bin liners, etc. In these cases, plastic film users can feel less restricted to us material combinations in the MAY BE categories on the tables, than with rigid containers. Combinations in the NOT SUITABLE category should still be avoided.

The design of plastic flexible film controls to a large extent the degree to which a packaging can be recycled. The structures and materials which are incompatible with mechanical recycling cause a number of disruptions in a recycling line. This may vary from clogging and damaging recycling equipment to heavy input material losses and downgrading of the recyclate (i.e. discoloration, loss in performance and chemical properties, impact on the visual aspect).

The incompatibility of certain structures or innovations of flexible packaging with recycling will hamper the transition towards circular plastics and eventually the circular economy. Without quality recycled material that can be used in loops, circularity of plastics cannot be achieved.

Improving packaging design and matching its functionality with recyclability would improve the recyclate quality and offer to the market a standardized raw material comparable, application per application, with virgin resins.

The following tables are from RecyClass film guidelines. More details available at: https://recyclass.eu/recyclass/design-for-recycling-guidelines/

Film Recycling

	PE Transparent Flexible Film		
	COMPATIBLE for recycling for most applications	**MAY BE SUITABLE** for recycling for some applications	**NOT SUITABLE** for recycling
POLYMER	PE-LD; PE-LLD; PE-HD	multilayer PP/PE	any other polymer
COLOURS	unpigmented; trasparent	colours	dark colours
BARRIER	barrier in the polymer matrix	<5% EVOH (in polyolefinic combnation film); metalized layers; 'Ecolam High Plus'; 'VO+ LLDPE'	>5% EVOH (in polyolefinic combination film); barrier layer PVC, PVDC; any other barrier layer foaming agents used as expandant checmical agents;
ADDITIVES			additives concentration ≥ 0.97 g/cm3
LABELS	PE label	PP label; paper label	metalized labels; any other
ADHESIVES	water soluble (less than 60°C)		
INKS	no inks	non toxic (follow EUPIA Guidelines)	inks that bleed; toxic or hazardous inks
DIRECT PRINTING	laser marked; small production or expiry date	printing covering < 50%	printing covering ≥ 50%

	PE Coloured Flexible Film		
	COMPATIBLE for recycling for most applications	**MAY BE SUITABLE** for recycling for some applications	**NOT SUITABLE** for recycling
POLYMER	PE-LD; PE-LLD; PE-HD	multilayer PP/PE	any other polymer
COLOURS	light colours; translucent	dark colours	
BARRIER	barrier in the polymer matrix	<5% EVOH (in polyolefinic combnation film); metalized layers; 'Ecolam High Plus'; 'VO+ LLDPE'	>5% EVOH (in polyolefinic combination film); barrier layer PVC, PVDC; any other barrier layer foaming agents used as expandant checmical agents;
ADDITIVES			additives concentration ≥ 0.97 g/cm3
LABELS	PE label	PP label; paper label	metalized labels; any other
ADHESIVES	water soluble (less than 60°C)		
INKS	no inks	non toxic (follow EUPIA Guidelines)	inks that bleed; toxic or hazardous inks
DIRECT PRINTING	laser marked; small production or expiry date	printing covering < 50%	printing covering ≥ 50%

Film Recycling

	PP Transparent Natural Flexible Film		
	COMPATIBLE for recycling for most applications	**MAY BE SUITABLE** for recycling for some applications	**NOT SUITABLE** for recycling
POLYMER	PP	multilayer PP/PE	any other polymer
COLOURS	unpigmented; trasparent	light colours; translucent colours; white	dark colours
BARRIER	barrier in the polymer matrix	barrier layer EVOH (in polyolefinic combination film); metalized layers	barrier layer PVC; PA, PVDC; any other barrier layer foaming agents used as expandant chemical agents; aluminium
ADDITIVES			additives concentration ≥ 0.97 g/cm3
LABELS	PE label	PP label; paper label	metalized labels; any other
ADHESIVES	water soluble (less than 60°C)		
INKS	no inks	non toxic (follow EUPIA Guidelines)	inks that bleed; toxic or hazardous inks
DIRECT PRINTING	laser marked; small production or expiry date	printing covering < 50%	printing covering ≥ 50%

	PP Coloured Flexible Film		
	COMPATIBLE for recycling for most applications	**MAY BE SUITABLE** for recycling for some applications	**NOT SUITABLE** for recycling
POLYMER	PP	multilayer PP/PE	any other polymer
COLOURS	light colours; translucent colours	dark colours	
BARRIER	barrier in the polymer matrix	barrier layer EVOH (in polyolefinic combination film); metalized layers	barrier layer PVC; PA, PVDC; any other barrier layer foaming agents used as expandant chemical agents; aluminium
ADDITIVES			additives concentration ≥ 0.97 g/cm3
LABELS	PE label	PP label; paper label	metalized labels; any other
ADHESIVES	water soluble (less than 60°C)		
INKS	no inks	non toxic (follow EUPIA Guidelines)	inks that bleed; toxic or hazardous inks
DIRECT PRINTING	laser marked; small production or expiry date	printing covering < 50%	printing covering ≥ 50%

What is the problem with Oxo Degradables?

Why are the European Plastic Recycling Trade Associations opposed to Oxo material?

The debate surrounding the use of Oxo degradable additive materials in plastic packaging products such as carrier bags has been ongoing for many years. More recently one of the original proposals in the draft Government legislation introducing a charge for single use polythene bags – known as 'the carrier bag tax' – included the option for an exemption from the charge for bags manufactured with an Oxo degradable additive included in the raw material blend. This proposal resulted in a fierce debate between the supporters of Oxo degradable material, primarily the Oxo Degradable Manufacturers Association, and those opposed to the use of Oxo materials in plastic packaging including the British Plastics Federation, INCPEN, Foodservice Packaging Association, RECOUP together with European Plastic Packaging Trade Associations including Plastic Recyclers Europe and EuPR.

When the charge for single use plastic bags was introduced in July 2015 no exemption was included in the Regulations. However, the debate surrounding the use of Oxo degradable additives in plastic packaging continues. One sector of the plastic manufacturing industry which is the most vociferous in its opposition to the use of Oxo degradable materials is UK plastic films recycling businesses. Why is this, after all there do not appear to be any immediate business conflicts between the suppliers of a plastic additive which can be included in the raw material blend for polythene extruders, and the recyclers of waste polythene film? The answer to this question is simple – the risk of Oxo degradable contaminated plastic entering and thus contaminating the waste stream. If this were to happen plastic recyclers fear for the integrity of their products, especially with their end use customers some of whom have already expressed concern stating that merely 'the risk' that a finished product could contain an oxo degradable additive would be too great, thus the raw material specifications for the manufacture of these products, including building and construction polythene films and membranes, would revert to using 100% virgin/prime polythene raw materials.

In order to successfully compete with the demand for waste polythene film for the export market, UK plastic film recyclers have to be both efficient and provide guaranteed high quality recyclate to their customers for manufacture into a new product, both of these key business requirements could be compromised if the plastic waste stream becomes contaminated with Oxo degradable materials.

The plastics recycling sector provides many thousands of jobs in UK manufacturing and is ideally placed to support any initiatives to expand the Circular Economy. To do this investment will be needed to increase recycling capacity with high output machines. The final requirement to encourage growth will be markets for the additional tonnages of plastic recyclate produced, with existing customers of UK plastic recyclers already expressing concern at the potential risk of product contamination with Oxo degradable residues, it is difficult to see any benefits an increased use of these materials in plastic packaging could have? However, the negative consequences in the form of a potential reduction in demand for recycled plastic and a consequent contraction of the UK plastic film recycling sector are obvious.

Berry | bpi group

RECOUP Member

Alternatives to PVDC for meat packaging

Krehalon

PVDC: Why the fresh meat packaging industry can survive without it.

PVDC (Polyvinylidene Chloride) has been used as a barrier in fresh meat packaging for decades, but increasing environmental concerns are urging packaging producers and retailers around the world to revisit its use and develop viable alternatives.

But why is PVDC bad for the environment?

There are several reasons why PVDC barrier structures are considered harmful to the environment:

1. PVDC packaging is not currently recyclable. This is true both for mechanical and chemical recycling systems.
2. Obstacles for mechanical recycling of PVDC:
    a) PVDC is considered a contaminant to well-established recycling streams (such as PE) because it degrades at low temperatures, rendering large portions of the mainstream polymer unusable.
    b) Even relatively small quantities of PVDC are reported to have detrimental impact on the quality of the recyclate.
    c) PVDC causes corrosion and damage to the reprocessing equipment due to its chlorine content. Frequent replacement of such equipment is therefore necessary.
3. Currently the only after-use options for PVDC are either landfill or incineration – neither considered environmentally friendly due to the release of toxic chemicals.
4. When incinerated, PVDC generates considerable quantity of dioxins - a well-known potent human carcinogen. The hydrogen chloride gas evolving from PVDC's incineration also discourages its use in the industry.

Why has PVDC been the preferred barrier for fresh meat to date?

PVDC provides excellent barrier to both oxygen and water vapour. Most alternative barrier polymers offer just one or the other.

Fresh meat is packed in wet and humid environments. It is therefore paramount for meat packaging to maintain its barrier properties when exposed to high-moisture environments.

Since PVDC's permeability properties are unaffected by relative humidity, it can deliver consistent protection for dry and high-moisture environments allowing shelf life of fresh meats of up to 100 days.

RECOUP Member

KREHALON
Preserving Quality Together

Alternatives to PVDC for meat packaging

Krehalon

Do alternatives to PVDC exist at present?

EVOH (Ethylene vinyl alcohol) is a non-chlorine barrier alternative for fresh meat packaging and is readily available today. However, EVOH has been thought to be sensitive to high moisture packing conditions, especially at a relative humidity of above 80%. This common perception has limited the wider use of the material so far.

Recent innovations in extrusion technologies, however, provided opportunities for the increased use of EVOH through engineering EVOH-based multilayer barrier structures that offer shelf life maintenance for fresh meats unaffected by high humidity.

A recent study compared such highly engineered EVOH-barrier shrink bags with traditional PVDC-based bags and indicated that both packaging solutions achieved similar meat quality levels under controlled storage.

EVOH is also considered recyclable – it can be tolerated by mechanical recycling streams within certain percentages and can be handled by chemical recycling.

Further support?

Krehalon have been the leading producer of EVOH-barrier shrink bags for over 40 years. We have a wide array of application knowledge and experience in the development of high barrier non-chlorine grades for fresh meat and cheese applications.

We are happy to offer evidence-based advice and expertise should you have further questions on the topic.

RECOUP Member

KREHALON
Preserving Quality Together

Recycling of Plastic Packaging

Plastic Packaging Recycling Overview

The development of collection, sorting and reprocessing technology and its techniques is constantly changing. The following information will provide an informative picture of current practices and technologies for the recycling of plastic packaging.

Following the success and interest in recycling plastic bottles other forms of plastic packaging recycling have been developed and introduced into collection streams. These are primarily other 'rigid' plastic packaging such as pots, tubs and trays (PTTs) used for both food and non-food applications, both from households and from commercial and industrial sectors.

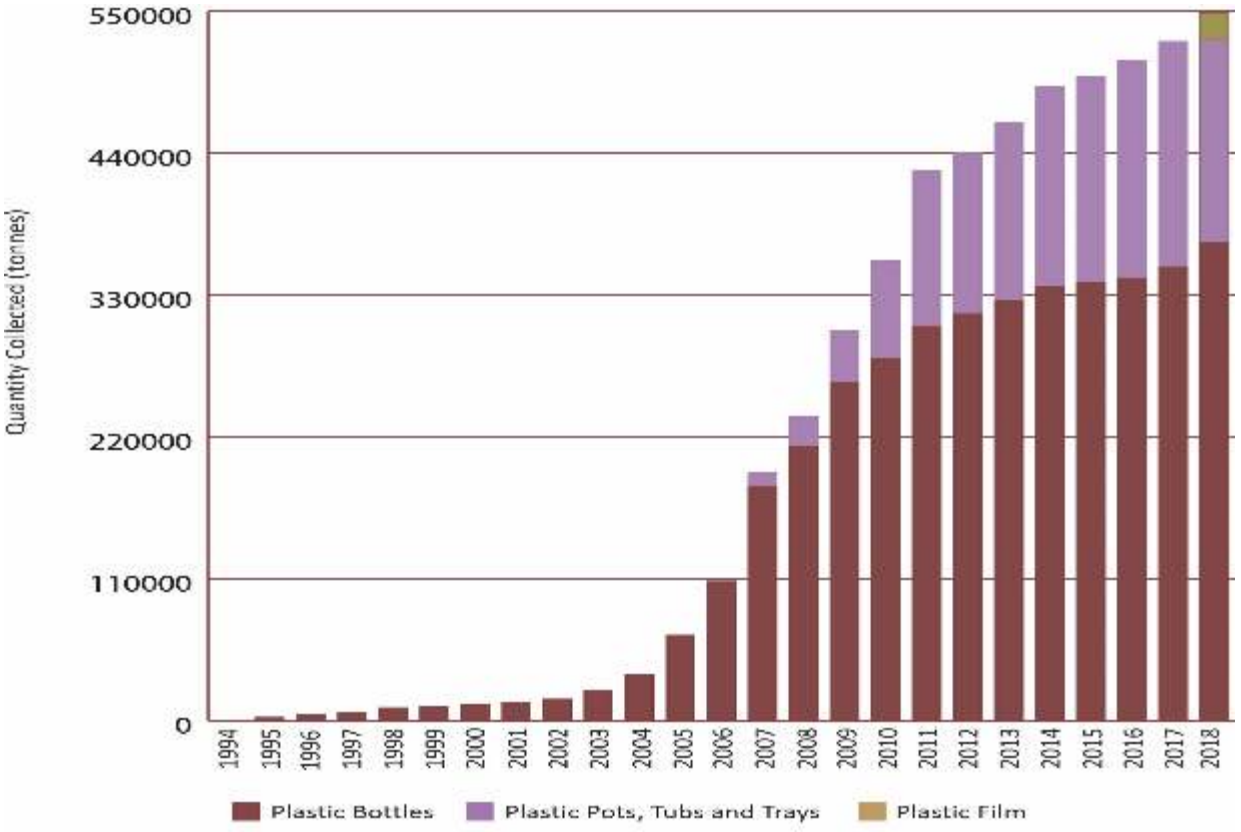
Separate waste collection streams have existed for some time for commercial & industrial waste as recycling of such materials is traditionally more commercially favourable (e.g. cleaner materials, bulk collection). In terms of domestic plastic waste recycling, which is the focus of the current document, the technology and processes for recycling have been designed for rigid plastic packaging, focusing on plastic bottles and PTTs.

Six main types of plastic are found in the domestic waste stream: PET, HDPE, PVC, LDPE, PP and PS. All bottles of a given type of polymer are usually compatible and so may be mechanically recycled together. Technical incompatibilities between a number of these different polymers, however, prevent them being directly mixed and mechanically recycled as high specification products. However, they can be readily separated, provided the simple guidelines given in this document are followed.

Packaging design should facilitate the separation of non-compatible polymers and avoid the risk of them being left unseparated by visual or mechanical recognition systems.

A typical plastics mechanical recycling process involves several distinct steps, these are indicated in the following sections.

Recycling of Plastic Packaging



Household Plastic Collection Data (RECOUP Household Plastic Collection Survey 2019)

Collection

There is a wide variety of collection methods used to receive recyclable materials from households. Most of these methods identify particular material types and products that should be deposited. These products are typically newspaper and magazines, cardboard, glass, steel and aluminium cans and plastics packaging.

The two household recyclables collection methods used by Local Authorities are kerbside and bring schemes. Originally most household plastic packaging recycling collections were achieved by asking the public to place their materials into containers placed in public locations such as supermarket sites and car parks. These are termed bring sites.

Since 2003, there has been a significant growth in the use of kerbside collection systems which provide a recyclables collection service on the householders' doorstep, and the landscape of household plastic packaging collection rates began to change. This is illustrated by the graph above. The householder is provided with a bin, box or bag which is then collected every week or fortnight.

Kerbside collection schemes are now the predominant method for the collection of plastic packaging in the UK, with bring schemes used alongside kerbside schemes to form part of the recyclables collection infrastructure which Local Authorities offer. There are a number of variations in kerbside schemes in terms of collection container, service frequency, and communications, and depending on the specific requirements for each Local Authority.

Recycling of Plastic Packaging

Sorting and Separation

Once the recyclable materials have been collected the various material types need to be segregated at the materials recovery facility (MRF), and then bulked or baled ready for delivery to material reprocessors. The plastic packaging is separated either using automated NIR (near infrared) optical equipment for higher volumes and throughputs, manually by picking operatives, or a combination of the two.

Sorting Techniques

Automated optical scanners are used to separate materials by polymer type, using NIR (near infrared) sensors, which are installed above the conveyor and ejecting the targeted material using compressed air jets at the end of the conveyor. This technology is frequently used to separate plastic containers into different fractions, as the market requires clean streams of specific resins and colour types. Typical automatic sort rates are up to 40,000 bottles/hour or 11 bottles per second. Although not without its limitations, auto-sorting greatly improves the quality and efficiency of the separation process.

Many countries still rely on the manual sorting of whole plastic bottles by visual inspection. However, automatic bottle sorting is becoming more widespread both within Europe and the USA, where the larger MRFs have throughputs sufficient to offset the capital cost of the equipment. Manual bottle sorting is based primarily on the physical characteristics of the bottle (e.g. shape, colour and product recognition) and experience. Although this method can lead to inaccurate identification and separation due to human error or distorted containers.

In addition, complications arise when bottles of the same design are made using different polymer types. Although most plastic bottles carry a Material Identification Code, this coding system has limited value to sorting personnel. Manual sort rates are typically 1200+ bottles/hour. Thus sorters have less than three seconds to pick up, identify and sort the bottle. This precludes looking for the code on every bottle.

Sorting Techniques - Plastic Bottles

Dependant on the scale of operation and throughputs being handled the plastics fraction will be sorted either manually or using automated NIR equipment. In the case of plastic bottles these can be all segregated into a single bottle stream, baled and sold as mixed polymer bottles. Alternatively, the bottles can be segregated by polymer and colour to achieve higher sales values. Typical bottle fractions are clear HDPE, coloured HDPE - sometimes referred to as Jazz HDPE, clear PET, and coloured PET. Once the bottles have been segregated they are baled and are then ready to be delivered to plastics reprocessor.

Sorting Techniques - Pots, Tubs and Trays

The sorting of PTTs has increased significantly over the past few years with more and more councils opting to collect these materials at the kerbside. Similar to plastic bottles these materials are segregated using optical equipment into specific polymer streams and colours. Typically at large scale MRFs these materials are baled as a ‘mixed plastic’ grade where they are then further segregated into individual polymer grades at a PRF or plastic recovery facility. At smaller scale MRFs PTTs are sometimes separated manually by negative picking where, after the plastic bottles have been removed, all remaining plastic materials are baled together as a mixed grade. The picking operatives clean the PTTs material by removing any remaining waste or contaminates before it is baled, however this material is usually low quality, low value. Due to the small size and varying polymer types which are difficult to distinguish, automated equipment is usually favoured as manually picking PTTs is a very inefficient process.

Recycling of Plastic Packaging

Label Removing and Washing

Once the plastic packaging has been segregated into individual polymers and colours, the material is then shredded into 5-10 mm flake to begin the label removing and washing stage. The intense friction and cutting action in the presence of circulating water provides the first washing stage, removing most labels and residual contents. Hot water, alkali solution and detergents are then frequently used during further washing stages to remove more difficult to separate contaminants such as residual labels and adhesives.

Separation by Flotation

Density based sorting, such as sink/float tanks, hydro-cyclones and air classification separate contaminants on the basis of density. Use of float tanks is very common (e.g. PET recycling) as they are much simpler and cheaper. The ability to separate materials is much more limited however and restricted to two types, namely those that sink and those that float in water. Thus any mix of plastic types that sink together / float together in water are not capable of being separated. The key density difference is now not so much that between the polymers themselves than the density difference between the individual polymer and water. The density ranges of plastics commonly used for packaging are given in Appendix - Polymer Densities. This table provides intrinsic plastic densities and also indicates how the polymer behaves in a float tank.

Drying Stage

After the wash and flotation processes excess water is removed by, for example, a centrifuge spin drier system. Heat from this is then used to dry the plastic flake. The dried plastic flakes are then transferred to plastic sacks, bulk bags or silos and are either then sold to convertors or further reprocessed into pellets.

Plastic Sales and End Products

The values for plastics will fluctuate over time and are dependent on a number of conditions, with a particular focus always on quality levels, and are based on baled material delivered to a plastic reprocessor. The collection and recycling of plastics entering the UK household waste and recycling systems remains primarily focused on plastic bottles, with markets and values for pots, tubs and trays developing.

Once the plastic packaging has been dried into a flake or pellet format by the reprocessor the material can be converted into new products. These include food grade plastics such as bottle to bottle and fresh food trays, non-food packaging such as paint pots, and other applications such as building site screens, garden furniture, stationary, and using yarn to produce clothing such as t-shirts, fleeces and jeans.

Recyclability Code

Borealis

Polyolefins (PE and PP) are an ideal material for designing flexible and rigid packaging that can be recycled and these Design for Recyclability (DfR) Codes should be adopted to optimise their recyclability.

While there are many aspects of plastic packaging design that make packaging “recycling-ready”, we have identified three key overarching codes of conduct when designing for the function (such as preservation, safety and wastage) of the packaging:

- Use as few different polymer types, components and materials as possible in the design of the overall packaging. This applies to all packaging components such as the body, closures (caps, liners seals), lidding and any other additional components.
- Make it easy to strip and/or wash off all decoration (such as labels, sleeves, adhesives, printing and inks) from the main functional part of the packaging
- By no means, should packaging designed according to the DfR Codes impact the preservation/protection the food or product, however do ensure that the requirement is really necessary and not over-engineering.

The following “do's and don'ts” help our partners and customers navigate the relatively new and complex field of DfR in Polyolefins.

Be sure to. . .
1. Use PE or PP whenever possible to form a mono-material flexible or rigid packaging body.
2. Use transparent, clear or white, for the main body of the pack.
3. Design the package in such a way that it can be fully emptied after use.
4. Use compatible and separable combinations of polymer types, barrier layers, dyes and adhesives.
5. Use aluminium foil as a barrier layer only when it can be easily separated from the pack for aluminium recycling.
6. Follow specific density guidelines when selecting pack components, including labels, sleeves and metallisation.
7. Design labels, sleeves and other on-pack printing in such a way that they can be easily separated from the main pack body. For both PE and PP packs, use the same polymer and same colour for the entire pack – body, caps, closures and labels.
8. Use as little surface space as possible for printing or labelling on the pack.
9. Use light-coloured, non-gassing inks for essential on-pack information.
10. Ensure that when paper is designed in combination with plastics on a single pack, it must be separable and separated from the main plastic body by the end user in order to access the contents.

RECOUP Member

De-Labeller… The sleeves are not a problem anymore

Renmar/Amut

The De-Labeller, developed by AMUT, is a **dry pre-cleaning system removing full-body shrink sleeve labels from PET bottles**. After the removal phase, the bottles still have a good integrity without damage or loosing necks. The De-Labeller has a **continuous working process** and it is the best solution to value bottles otherwise eliminated by sorting.

The De-labeller is suitable to be added at the beginning of a washing line.

FUNCTIONING

- The labels are removed dry, thanks to the considerable friction performed by the machine moving on their surface.
- The flow of bottles is treated with a continuous process. An appropriate residence time in the machine ensures high efficiency of separation, integrity of bottle and necks.
- The bottles are fed with a conveyor belt and, after treatment, discharged continuously with a screw feeder extractor.
- The tattered labels are collected in an underlying hopper, extracted with a belt and conveyed to a compacting press or a container.
- The perfect separation of any remaining free labels from bottles can take place downstream the machine through an air system or a ballistic sieve.

BENEFITS

- Recovery of PET bottles with PVC or PETG sleeves label;
- Almost total detachment of the labels: with a flow of 100% of bottles with sleeves we can achieve detachment results more than 80%;
- Continuous process;
- Settable treatment residence time, all through the continuous process;
- Integrity of bottles and necks, to allow the use of downstream detectors and prevent good material loss;
- Recovery and valorisation of the dry labels, reducing disposal costs;
- Polymer and colour recognition efficiency by electronic detectors;
- Great PET flakes purity.

Three models are available depending on PET Bottles quantity:

DLB 10	1000 kg/h
DLB 30	3000 kg/h
DLB 60	6000 kg/h

End Products

The Use of Recycled Material in New Products

Awareness of value and versatility of used plastics packaging needs to be developed further. Whether it be post-consumer or post-industrial, the opportunity to recycle this valuable resource into new products and applications is expanding and should be recognised.

Recycled plastics can not only replace or partly replace virgin material and reduce manufacturing costs, but can also add to a companies' environmental credentials and/or deliver an environmentally enhanced product, such as in carbon footprint reductions, lifecycle analysis benefits or in developing its corporate social responsibility agenda.

There are a wide range of products now produced which contain recycled plastics, and these include food grade applications such as bottle to bottle and fresh food trays, and non-food applications such as in construction (e.g. pipes and building site screens), garden furniture, pens and kitchen utensils, paint pots and using polymer yarn and fibres to produce clothing such as t-shirts and fleeces.

Many of these products can be found on the RECOUP end products database on the website. Products can also be entered in the UK Best Recycled Plastic Product Award that RECOUP sponsor at the Plastics Industry Awards, and all finalists get automatically enrolled in the EPRO Best Recycled Plastic Product Award, which is for European entries.

Case Studies

Recycled plastics -
A complete solution for home and garden

Many companies seek to incorporate recycled content into their plastic packaging as part of their marketing strategy. It helps to demonstrate their commitment to sustainability and becomes part of their overall CSR policy.

For this reason, the use of recycled plastics is very often proactively promoted and consumers might be forgiven for thinking that this is a relatively new development. The reality of course is that recycled material has long been an important part of the plastic products manufacturing process.

Incorporating recycled plastic into certain types of products and packaging can be a challenge. It is vital to ensure that the physical properties of the both the recycled and virgin materials can be maximised in terms of strength and durability to deliver a finished product that is fit for purpose and reflects the appropriate brand image.

Nevertheless, there are many products which can be made entirely of recycled plastic and still meet all marketing and branding requirements.

For example, Strata Products', a Berry Global company, entire ranges of watering cans and water butts, as well as a number of storage boxes, lids for boxes, and various other home and garden products and accessories, are all made of 100% recycled plastic – PP, HDPE and MDPE. Around 55% of the plastic processed annually by the company – in excess of 5,000 tonnes - is recycled material.

The material is sourced from a variety of suppliers, predominantly from post-industrial use as well as some from post-consumer use. Industrially sourced waste includes items such as redundant crates, off cuts and scrap mouldings. Naturally the company also recycles its own off cuts and scrap.

The material is robust and durable and therefore ideal for products that need to withstand heavy usage and storage outdoors. At the same time, careful selection and sourcing of material is still necessary to ensure products are manufactured to the required specification and quality. For example, the melt index of the material is particularly critical for larger-size products – a high melt recycled polymer is needed for an effective spread of the material throughout the mould.

Equally important, the use of recycled plastic makes excellent commercial sense. The material can be more cost-effective than virgin polymer and this is a critical factor for products which are often sold in cost-sensitive and competitive markets.

Recycled plastics have been an important part of manufacturing for a long time. And while their use in garden and home products is well-established, in the current environmentally-conscious climate, this could still provide a useful marketing opportunity.

Berry

RECOUP Member

Ecover Ocean Plastic Project

Cleaning Oceans and Cleaning Dishes

Ocean Plastic is currently the hot topic, as it affects every major body of water, with 46,000 pieces of waste plastic in every square mile of ocean. This plastic damages the marine environment, harms fish and sea mammals and is all out bad news.

Ecover thought this is a cause worth paying attention to and took the first step by creating the first ever bottle made from waste plastic fished out of the ocean. The special edition Ocean Bottle holds Ecover's dish washing up liquid and is made with ten percent recycled Ocean Plastic (the remaining plastic is recycled from other sources). The Ocean Bottle represents a big step both in raising awareness of Ocean Plastic and also beginning the process of prevention and a much needed clean up in our oceans across the world. This new bottle follows an Ecover pledge of using new types of recycled plastic in their packaging. This year, it will be using one tonne of Ocean Plastic and expect to increase to three tonnes next year.

Another important and relevant fact is related with the Bottle Design whose development was fully supported by Biomimicry Thinking methodology. The design of the new Ecover Ocean bottle is directly inspired by the structural design principles of the skeletons of Diatoms and Radiolarians, helping optimise the mechanical performance of the bottle while allowing a weight reduction of 20%. These organisms form a large part of the plankton and zooplankton at the base of the marine and freshwater food chains, and are one of the most important photosynthetic organisms in the ocean. The overall pollution and plastics contamination is having a dramatic impact in their populations and compromising the entire ecosystem balance.

This ground breaking bottle design goes beyond the point where it tries to be 'less bad', and effectively supports the brand's strategy to be positively good for the world.

Logoplaste

RECOUP Member

Improving Recyclability
Enval

Laminate Packaging Recycling

Enval unlocks the potential of high performance materials by creating sustainable and economically viable end-of-life solutions. Our microwave induced pyrolysis process is the only method for recycling plastic aluminium laminates.

Plastic aluminium laminates consist of aluminium foil sandwiched between plastic layers. This material combines lightweight, flexible properties, with protection against gases (including oxygen), moisture and light.

Enval has created a unique solution for recycling plastic aluminium laminates using microwave induced pyrolysis. Our process is clean, efficient and economical for both post-consumer and industrial waste.

Enval operates its own plant at Alconbury, UK and can design and manufacture plants according to our clients' individual requirements. As a modular process, the plant can be economically operated at a variety of scales, allowing for local treatment.

For more information visit the website

www.enval.com

enval

RECOUP Member

SHARP EYE Technology

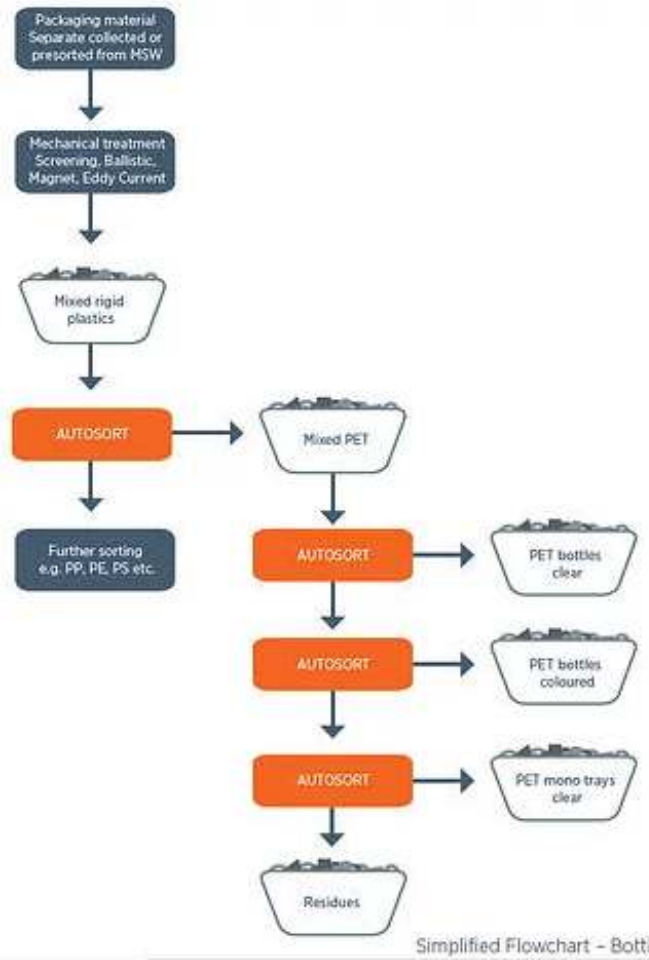
TOMRA

A new application of TOMRA's sorting technology, TOMRA SHARP EYE, has made it possible to separate single-layer PET trays from PET bottles. This breakthrough, which enhances the previous capability of TOMRA's AUTOSORT machine to separate multi-layer trays, is important: small but critical differences in the chemical properties of PET food trays and PET bottles mean that they have to be separated for equivalent-product recycling.

The key to this innovation is an enhancement of TOMRA's FLYING BEAM®, which was already the best sensor technology available. As the first near-infrared (NIR) scan system with point-scanning (and no need for external lamps), this focuses only on the area of the conveyor belt being scanned. Allowing a wide range of calibration possibilities, this can distinguish even the finest molecular differences in materials flowing down the recycling line – and now that TOMRA SHARP EYE introduces a bigger lens for higher light intensity, it is possible to detect even the properties that are most difficult to distinguish.

The step-by-step process which concludes with the separation of single-layer PET trays and PET bottles is seamless and flexible. During the preparation for sorting mixed plastics into different polymers, packaging material collected or pre-sorted from municipal solid waste (MSW) first runs through a mechanical treatment process which reduces voluminous materials, mainly soft items such as plastic, film, and non-plastic products. To then separate mixed PET into different polymers,

TOMRA's AUTOSORT machine functions as a combined system, detecting material and colour in combination with grain size. Even with a very mixed material input, this process achieves an impressive sorting efficiency of 95% or greater.



Simplified Flowchart – Bottle vs. Tray Sorting

TOMRA SORTING SOLUTIONS | RECYCLING

RECOUP Member

Appendix - Legislation and Targets

Legislative & Environmental Change

Packaging has a very negative perception with consumers and environmentalists. It is sometimes perceived by the public to be a waste of resources and a significant contributor to the growing levels of waste. In addition it is often also linked to litter issues.
Politicians are very aware of this with the result that pressure has been and continues to be applied on packaging through the introduction of legislation in Europe, the USA, Japan and other countries around the world. The general approach to packaging legislation traditionally has been very much 'command and control' for example regulating how much packaging needs to be recovered, recycled, what percentage of packaging needs to be refillable, etc. rather than dictating the overall desired environmental goal and leaving industry with the flexibility of deciding how this might best be achieved.

In addition, legislators and environmentalists continue to encourage the application of a strict waste hierarchy where the order of priorities is:

Prevention > Reuse > Recycling > Energy recovery > Landfill

This is exemplified in the Waste Framework Directive in Europe. The Directive requires that this waste hierarchy be applied as a priority in waste prevention and management legislation and policy. Such a rigid interpretation is not supported by Industry. This has been recognised at least to some extent within the review of the European Waste Framework Directive as the revised Directive allows a departure from this hierarchy when justified by life cycle thinking on the overall impact of generation and management of specific waste streams.

Regardless of technical correctness however, recycling is seen by many as the most important recovery route and, therefore, the one that should take precedence.

The European Packaging and Packaging Waste Directive (PPWD) sets the current framework for National packaging legislation across the European Union and acts as a model for many other parts of the world. The basic legislation (Directive 94/62/EC) came into force in 1994 and required amongst other things, that by 2001 Member States achieve packaging recovery levels of 50-65% and recycling levels of 25-45%. In addition, no individual material (e.g. plastic) was to have a recycling rate <15%. The revision of this legislation in 2004 (Directive 2004/12/EC) further increased the recovery and recycling targets to >60% and 55-80%, respectively and by so doing increased the relative importance of recycling over general recovery. In addition, differentiated material specific recycling targets were introduced with the level set for plastic being a minimum of 22.5%.

Circular Economy

The requirement to protect resources and work towards circular economy goals does create an interesting debate over the best environmental approach for plastic packaging.

The EU provided a policy landscape in plastic recycling that was stable and effective for business and environmental development. If a circular economy package is a good idea, we now look to UK government to make sure a plan is implemented to give us the resource and recycling roadmap we need. This will apply even after the UK has left the EU, following the 'Brexit' decision.

To help to optimise recycling and maximise the environmental benefit, there is a real need for the circular economy movement to help RECOUP to continue leading the plastic recycling agenda, and ensure circular economy thinking moves beyond recycling.

Appendix - Legislation and Targets

Plastic Packaging Recycling Targets

Plastic packaging recycling targets have been increasing gradually up until this year. More ambitious recycling targets are expected to be implemented through the European Circular Economy Package, which the UK might be adopting. Through UK packaging waste legislation, a 57% business target has been set which translates to an estimated 1.1 million tonnes of UK plastic packaging to be recycled from all sectors – the main two being from household and commercial and industrial sources. The UK producer responsibility system for packaging was implemented in 1997, and this is now under review after the Defra consultation about Reforming the UK Packaging Producer Responsibility System and the subsequent discussions and further consultations that are due to take place.

The New Plastics Economy

The New Plastics Economy is a collaboration between the Ellen MacArthur and UN Environment Framework, focused on the circular economy for plastics. The elements of the program focus on six key points, with deadlines focused around 2025:

- Elimination of problematic or unnecessary plastic packaging through redesign, innovation and new delivery models;
- Reuse models are applied where relevant, reducing the need for single-use packaging;
- All plastic packaging is 100% reusable, recyclable or compostable;
- All plastic packaging is reused, recycled or composted in practice;
- The use of plastic is fully decoupled from the consumption of finite resources;
- All plastic packaging is free of hazardous chemicals, and the health, safety and rights of all people involved are respected.

EU - Circular Economy

In 2014, the European Commission put forward an initial *Circular Economy Package*, which was replaced at the end of 2015 by a more ambitious and wider *Circular Economy Action Plan* for the circular economy. In 2018, the first set of measures was complemented by the second Circular Economy Package, including: *An EU Strategy for Plastics in the Circular Economy* and annexes to transform and measure the way plastics products are designed, produced, used and recycled; A Communication to address the interface between chemical, product and waste legislation on how the rules on waste, products and chemicals relate to each other; A Monitoring Framework on progress towards a circular economy at EU and national level; and, A report that highlights the potential to make the use of the 27 critical materials in the economy more circular.

The regulations surrounding these being focused around legislative amendments and the new *EU Strategy for Plastics in the Circular Economy* and associated action plan and a *Single Use Plastics Directive*. There were amendments to four legislative directives:

- Waste Framework Directive
- Packaging Waste Directive
- Landfilling Directive
- Directives on end-of-life vehicles, on batteries and accumulators and waste batteries and accumulators, and on waste electrical and electronic equipment (WEEE)

In 2019, the *Circular Economy Action Plan* was communicated as being completed, its 54 actions have been ‘delivered or are being implemented’ i.e. included or being actioned in legislation, strategy, methodology development, stakeholder platforms and reports, even if the work on some of them continues.

Appendix - Legislation and Targets

EU - Waste Frame Directive

The EU directive for waste management is the *Waste Framework Directive*, which is an overarching legislative structure for the management of waste in EU countries. Monitoring and setting targets relating to the recycling rate of household and municipal waste, plastics and packaging and landfill use for the EU member states. As of 2019, the target was 22.5% of all household waste to be recycled by EU member states. For 2020, this has increased to 50%. In 2018, the UK plastic packaging recycling rate was in the region of 44% for plastic packaging, and 46% for household recycling.

A revised waste legislative framework entered into force in July 2018 outlining “ambitious yet realistic recycling rates”, including: Recycling 55% of municipal waste by 2025, 60% by 2030 and 65% by 2035; Recycling 65% of all packaging by 2025 and 70% by 2030; Recycling 50% of plastic packaging by 2025, and 55% by 2030; and, to Reduce landfill to maximum of 10% of municipal waste by 2030.

EU - A European Strategy for Plastics in a Circular Economy

The European Commission’s *A European Strategy for Plastics in a Circular Economy* (January 2018) is part of the EU’s *Circular Economy Package* and addressed three interrelated issues:

- A current high dependency on virgin fossil feed-stock;
- A low rate of recycling and reuse of plastics; and
- A significant leakage of plastics into the environment.

It outlined a vision for Europe’s new plastics economy to develop “a smart, innovative and sustainable plastics industry where design and production fully respects the needs of reuse, repair, and recycling, brings growth and jobs to Europe and helps cut EU's greenhouse gas emissions and dependence on imported fossil fuels” by: Reducing the leakage of plastic in the environment by transforming the way products are designed, manufactured, used and recycled; Making better use of taxation and other economic instruments to reward the uptake of secondary plastics; Putting in place well- designed EPR schemes, support recovery and recycling schemes including introducing deposit return incentives, particularly for beverage containers; Raising the cost of landfilling and incineration and promote plastic recycling and prevention of use; Developing a global response to the increase in marine litter; and, Use of economic incentives to develop and reward sustainable plastic products.

The strategy describes how the vision can be turned into reality in 4 key areas:

- Improving the economics and quality of plastics recycling – including design for recyclability, boosting demand for recycled plastics, and better and more harmonised separate collection and sorting
- Curbing plastic waste and littering – including preventing plastic waste in our environment, establishing a clear regulatory framework for plastics with biodegradable properties and dealing with the rising problem of microplastics
- Driving innovation and investment towards circular solutions
- Harnessing global action

Appendix - Legislation and Targets

The relevant aims and targets in the vision includes: Plastics and products containing plastics are designed to allow for greater durability, reusability and high-quality recycling. By 2030, all plastics packaging placed on the EU market is to be either reusable or can be recycled in a cost-effective manner; Changes in production and design enable higher plastics recycling rates for all key applications; EU plastics recycling capacity is significantly extended and modernised. By 2030, sorting and recycling capacity has increased four-fold since 2015, leading to the creation of 200,000 new jobs, spread across Europe; Thanks to improved separate collection and investment in innovation, skills and capacity upscaling, export of poorly sorted plastics waste has been phased out; The plastics value chain is far more integrated, and the chemical industry works closely with plastics recyclers to help them find wider and higher value applications for their output; Substances hampering recycling processes have been replaced or phased out; The market for recycled and innovative plastics is successfully established, with clear growth perspectives as more products incorporate some recycled content; Innovative materials and alternative feedstocks for plastic production are developed and used where evidence clearly shows that they are more sustainable compared to the non-renewable alternatives; Plastic waste generation is decoupled from growth. Citizens are aware of the need to avoid waste and make choices accordingly. Consumers, as key players, are incentivised, made aware of key benefits and thus enabled to contribute actively to the transition. Better design, new business models and innovative products emerge that offer more sustainable consumption patterns; Many entrepreneurs see the need for more resolute action on plastics waste prevention as a business opportunity. Increasingly, new companies emerge that provide circular solutions, such as reverse logistics for packaging or alternatives to disposable plastics, and they benefit from the development of digitisation; The leakage of plastics into the environment decreases drastically and marine litter from sea-based sources; and, Innovative solutions are developed to prevent microplastics from reaching the seas.

EU - Single Use Plastic (Directive)

The *Single Use Plastics* Directive, finalised and published 5th June 2019, is part of the *EU Plastics Strategy* and *Circular Economy Action Plan* and is primarily targeted at reducing marine litter. On the 21st May 2019 the EU adopted the measures proposed by the Commission to: ***"Tackle marine litter coming from the 10 single-use plastic products most often found on European beaches, as well as abandoned fishing gear and oxo-degradable plastics."***

Specific targets as part of this directive include:

- 77% of plastic bottles to be collected for recycling by 2025 and 90% by 2029.
- 25% recycled content from 2025 for PET bottles and 30% from 2030 for all beverage bottles *(note the HMT Plastic Packaging Tax states 30% recycled content for plastics packaging)*.
- The introduction of design requirements to connect caps to bottles
- Ban on selected single-use products made of plastic for which alternatives exist on the market: cotton bud sticks, cutlery, plates, straws, stirrers, sticks for balloons, as well as cups, food and beverage containers made of Expanded Polystyrene and on all products made of oxo-degradable plastic
- Consumption reduction - no specific reduction target but Member States are to prepare a description of all the measures they have adopted and make it publicly available.
- Commission Guidelines on what is to be considered a single use product will be developed as well as guidelines on clean-up costs.
- In 2027 after evaluation of progress made, the EU Commissions will submit a report, accompanied by legislative proposal if appropriate.

Appendix - Polymer Densities

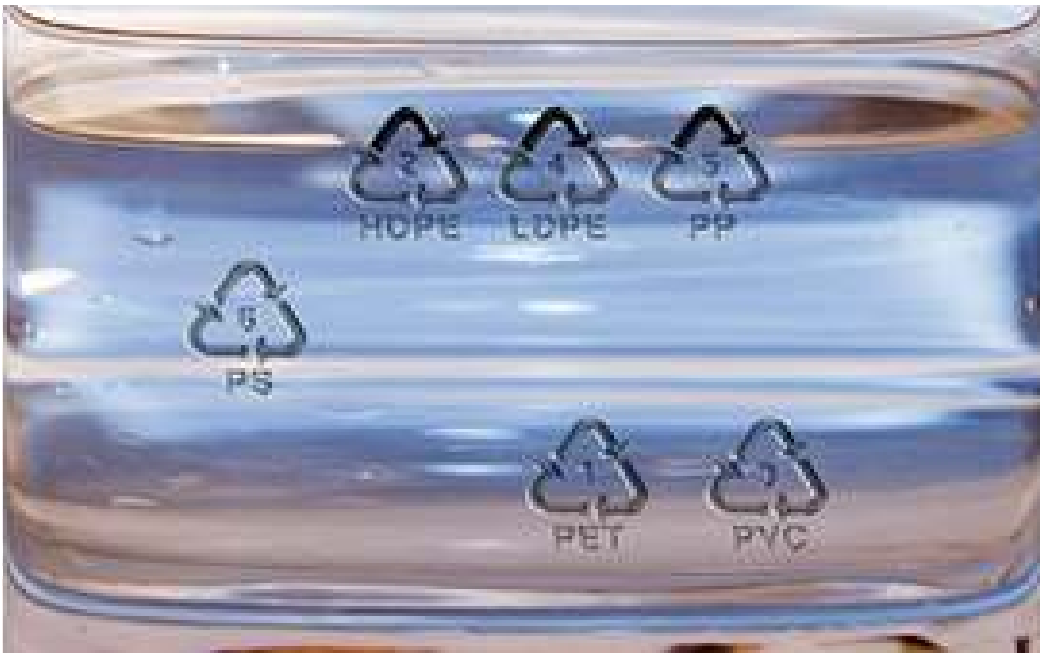
The table below shows the density ranges of plastics commonly used to make plastic packaging and components.

Polymer	Density g/cm^3	Behaviour in float process*
Ethylene vinyl acetate (EVA)	Less dense than water	Float
Polypropylene (PP)	0.90 - 0.92	
Low density polyethylene (LDPE)	0.91 - 0.93	
High density polyethylene (HDPE)	0.94 - 0.96	
Polystyrene (PS)	1.03 - 1.06	Variable
Nylon (PA)	1.13 - 1.14	Sink
Acrylic (PMMA)	1.17 - 1.20	
Polycarbonate (PC)	1.2	
Polyethylene terephthalate (PET)	1.30 - 1.38	
Polyvinyl chloride (PVC)	1.32 - 1.45	

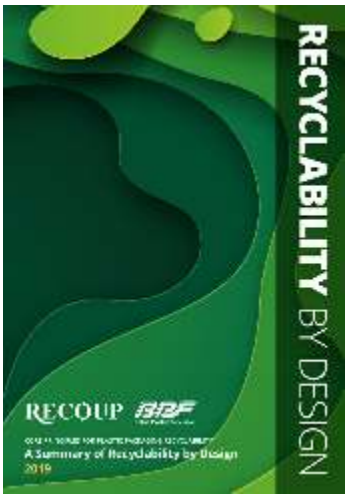
Densities are approximate and relate to virgin unpigmented and unfilled polymer. Colouring with a 4% pigment can raise density by 0.03 g/cm3 which may cause further overlaps of polymer densities.

Hydro cyclones can be fine-tuned to separate plastic materials provided their densities differ by ca > 0.05 g/cm3. The densities of flake derived from PP and HDPE packaging overlap and are difficult to separate. The density difference between PS and HDPE whilst sufficient to permit separation in a hydro cyclone, is not sufficiently large from water to ensure that is fully separable with either the light or heavy fractions and thus can cause recycling issues with for example, PET.

A density difference between the polymer and water of ca>=0.05g/cm^3 is required to ensure that the material will either sink or float in a sink/float tank.



Recyclability by Design - Versions



Core Principles - A summary of Recyclability by Design

RECOUP and the British Plastics Federation (BPF) have launched new guidance to help packaging designers create easy-to-recycle plastic packaging. The guide outlines which combination of closures, seals, labels and materials ensure recycling plants can easily separate and recycle the plastics.

Big brands are being encouraged to use the guidance to ensure their packaging products can be easily processed at the end of their lives to avoid going to landfill, and instead be recycled into new products in an important move towards developing a circular economy.

Rigid Plastic Packaging - Design Tips for Recycling

This document explains to all who have an involvement in packaging the simple steps which can be taken to maximise the recyclability of rigid plastic packaging products. This version includes detailed guidance from Recyclability By Design; including best practice and tables for PET Bottles, PET Trays, HDPE Bottles, PP and PS containers.

Guidance for Plastic Plant Pots

RECOUP worked with The Horticultural Trades Association (HTA) to develop a plan to promote the recyclability of polypropylene plant pots. The project brought together RECOUP members from the industry and other stakeholders to provide the best available information and to produce a clear plan to ensure plastic plant pots are recycled.

As with all types of packaging; recyclability guidelines play an important role in providing important information to the industry which will in turn benefit the recycling chain. The Horticultural version of Recyclability By Design includes basic information on the stages of recycling; to illustrate how changes make a difference.

All documents are available to download on the RECOUP website.

Glossary of Terms

APR	The Association of Post Consumer Plastic Recyclers
CEN	The European Committee for Standardisation
CEPE	The European Council of Paint, Printing Ink and Artists' Colour Industry
COTREP	Comite Technique de Recyclage des Emballages Plastiques
EPS	Expanded Polystyrene
EuPC	European Plastics Converters
EuPIA	The printing ink group within the European Council of Paint, Printing Ink and Artists' Colour Industry
EuPR	Plastics Recyclers Europe
EUROPEN	The European Organisation for Packaging and the Environment
EVA	Ethylene vinyl acetate
EVOH	Ethylene vinyl alcohol
FTIR	Fourier Transform Infrared Spectroscopy
HDPE	High density polyethylene
HCl	Hydrochloric acid
HIPS	High-impact polystyrene
IPP	Integrated Product Policy
IR	Infrared (radiation)
ISO	International Standards Organisation
LDPE	Low density polyethylene
LLDPE	Linear low density polyethylene
MDPE	Medium density polyethylene
MRF	Material reclamation facility
NAPCOR	National Association for PET Container Resources
NIR	Near infrared (radiation)
OPET	Oriented PET
OPP	Oriented polypropylene
OPS	Oriented polystyrene
PA	Polyamide (nylon)
PBT	Polybutylene terephthalate
PC	Polycarbonate
PCR	Post-consumer recycled material
PEN	Poly (ethylene 2,6 napthalate)
PET	Polyethylene terephthalate
PETG	Polyethylene terephthalate glycol
PLA	Polyactic acid
PMMA	Polymethyl methacrylate
PP	Polypropylene
PPWD	The European Packaging and Packaging Waste Directive
PRS	PET recycling schweiz
PS	Polystyrene
PU	Polyurethane
PVdC	Polyvinylidene chloride
PVC	Polyvinyl chloride
REPA	Service organisation for all recovery organisations in Sweden (except glass)
RPET	Recycled Polyethylene Terephthalate
SPI	Society of plastics industry
6EAP	European Union sixth environmental action program

Useful Organisations

These organisations encourage the concept of appropriate design for recyclability in the broader context of designing for minimum environmental impact of the packaging system. As such they encourage designers and specifiers of plastic packaging to build the considerations identified in this document into their packaging design process.

The European PET Bottle Platform

ABC
Alliance for plastic Beverage Containers Sustainability

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B-1040 Brussels
Belgium

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vandongen@eur.ko.com

EPRO
European Association of Plastic Recycling & Recovery Organisations

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Wemmel
BRUSSEL

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secretary@epro-plasticsrecycling.org
www.epro-plasticsrecycling.org

Petcore
PET Containers Recycling Europe

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1160 Brussels
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petcore@btconnect.com
www.petcore.org

Plastic Recyclers Europe

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Fax: +32 2 732 63 12
info@plasticsrecyclers.eu
www.plasticsrecyclers.eu

epbp@epbp.org
http://www.epbp.org/

COTREP

Chambre Syndicale des Emballages en Matiere Plastique

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(f)+33 (0)1 40 89 99 88
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www.ecoemballages.fr

Valorplast

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(f)+33 (0)1 46 53 10 90
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Useful Organisations

EuPC
European Plastic Converters

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(f)+32 2 732 42 18
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Plastics Recyclers Europes

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NAPCOR
National Association for PET Container Resources

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British Soft Drinks Association

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(f)+44 (0) 20 7831 6014
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PACSA
Packaging Council of South Africa

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Technical Support and Guidance for Reviewing the Recyclability of Plastic Packaging Samples

With the growing scrutiny and public interest on plastic packaging it is more important than ever to ensure your packaging meets recyclability criteria and has the best opportunity possible to be recovered, sorted and reprocessed.

In addition to The Recyclability by Design Guidelines, RECOUP can test sample packaging for both design and recovery in UK recycling facilities.

The Process

RECOUP will take sample packaging and review them based on typical UK systems, and test through appropriate sorting and reprocessing sites where required. This will be assessed against accepted recyclability criteria. A report will be provided, and test sheets completed to confirm each step of the recycling process. We will document how the samples react within those systems, with the material types and components assessed against recyclability, this will also include details of the equipment provider. If it is not deemed recyclable, the reasons will be given, and recommendations provided to improve recyclability.

The samples will be assessed in the first instance using a theoretical approach, before being taken to up to 3 different facilities to ensure good representation in the UK. Note principles of sorting and reprocessing are also the same internationally. The samples will be tested in real industrial conditions, they will be placed with other mixed material to see how they behave and will be presented to the Near Infra-Red optical sorting equipment to prove detectability. As a matter of course, where NIR tests have been specifically requested, the samples will also be placed at the front of the MRF, to determine progress through the system. i.e. to confirm that the packaging will pass through to the NIR stage, and also to document where the material finishes, after the NIR testing.

Within this work, the RECOUP team will help with further development and re-testing as needed, working confidentially RECOUP are happy to sign Non-disclosure agreements where required.

To obtain the best results samples are tested during normal operating hours.

What we test for:

1) **Size** - This impacts the recovery of the sample, if too small can be lost during sorting, if too big or heavy may not be detected.

2) **Colour** – Certain colours can impede recovery by not being recognised by the Near IR

3) **Mixed or laminated materials** – combined/layered polymer types can confuse the Near IR as they set to detect certain materials, testing is recommended to see what polymer type they are identified as.

4) **Sleeves/labels** – These can make a difference to the recovery: how much of the surface area is covered by the label and what polymer the label is derived from. Full sleeves generally impede recovery with ink and colours also impacting.

This service is free to RECOUP members

If you would like to arrange a review of sample packaging or require membership details, please contact RECOUP on T: **01733 390021** or email: **kate.bedford@recoup.org**

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