

Plastic Surgery: Managing Waste Plastics

September 2019

Reality Check
series. Issue: 4

biffa.co.uk/publications

Biffa[®]

Foreword

“Plastics are now at the centre of the sustainable waste management debate due to the growth and prevalence of plastic packaging resulting from growth in global trade, on-line retail and ‘on-the-go’ consumption of food and drink.”



Everyone is rightly concerned about our dependence on plastics and on how we deal with our plastic waste. The time has come for decisive action to ensure we only use plastics in a sustainable manner, and to restore confidence in our waste management systems. In this report, Biffa is calling for a total ban on the export of unprocessed plastic waste. This will not only ensure our plastic waste is dealt with properly here in the UK but will also support investment and jobs and provide vital raw materials for the UK circular economy. At the same time, we must phase out plastics that cannot be recycled, and deliver labelling and collection systems that are easy to understand and work with for households and businesses.

As the UK's leader in sustainable waste management, including the collection and recycling of plastics, Biffa is ideally placed to help shed some light on the real-world practical issues associated with managing waste plastics. I hope you find our contribution to this important debate both interesting and informative.

Michael Topham
Chief Executive - Biffa



About the Authors

Jeff Rhodes BSc (Hons), BTP, MRTPI
Head of Environment & External Affairs - Biffa

Jeff's responsibilities include environmental matters across policy, regulatory affairs, development and operating consents, compliance and sustainability. He has worked in the sector for over 30 years and for Biffa for the past 17 years. Jeff has been heavily involved in engagement with government's new waste strategy and recent consultations.



Simon Rutledge
Group Sustainability & External Affairs Manager - Biffa

Simon has worked for Biffa for over 25 years and specialises in environmental and waste policy and law, national policy and regulation and sustainability. Simon has also been heavily involved in current waste policy consultations work and engagement with Government waste policy makers and regulators in England, Wales and Scotland.

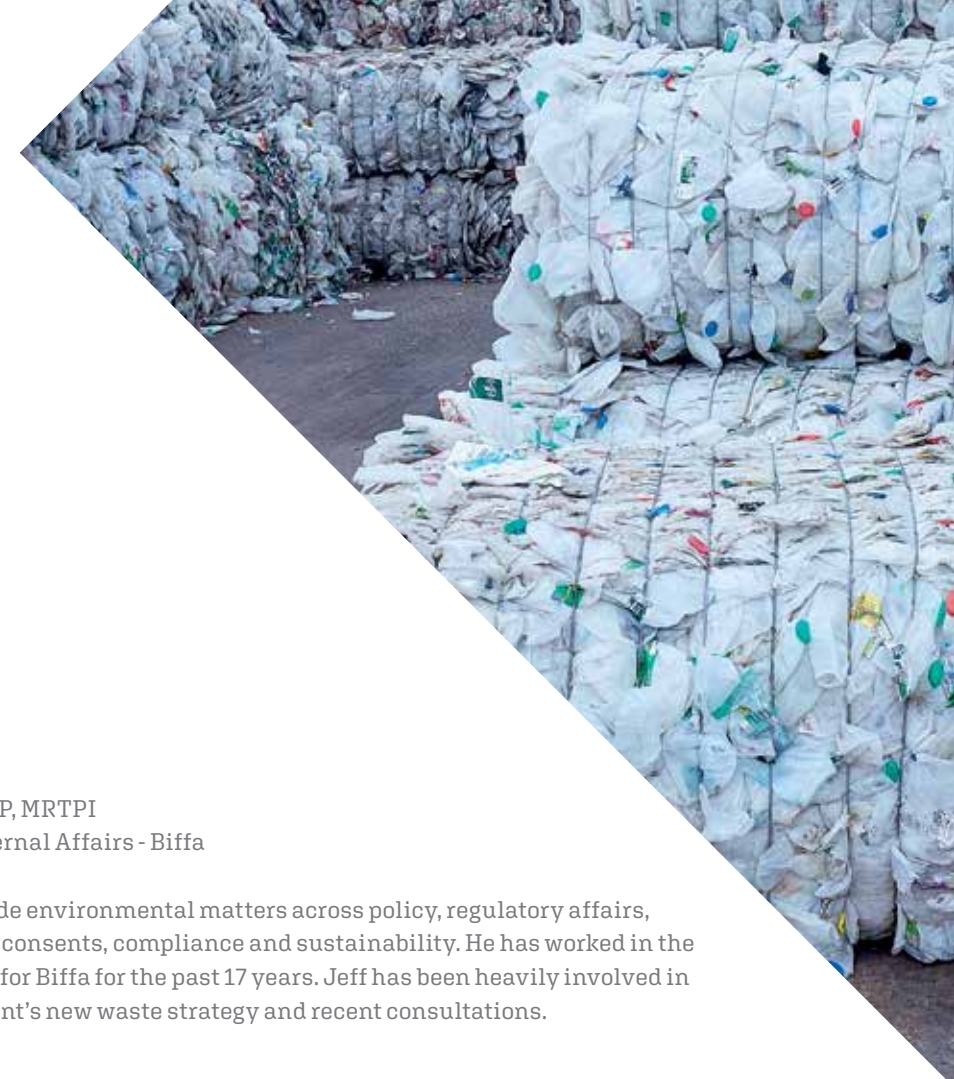
The authors would like to thank the invaluable contributions and insights from colleagues around the business in preparing this report.

Reality Check series.

Further reading

This report forms part of a growing series of position papers published by Biffa. The Reality Check series can be viewed and downloaded from:
www.biffa.co.uk/publications

To request a printed copy of this report please contact:
press@biffa.co.uk





Introduction

Plastic use and plastic waste is the focus of major debate at present, with significant public interest and emerging Government policy, not just in the UK but globally. Public awareness and interest in issues such as ocean plastics and single-use plastics has scaled new heights, fuelled by media commentary and polemic from high-profile commentators.

However, there remains confusion in the debate over what plastic is recyclable, which new initiatives are genuinely helpful and which are short-term publicity exercises. We need to differentiate between necessary, recyclable plastic which protects products, food and drink and unnecessary, unrecyclable plastic. And we certainly need to stop all plastics ending up as litter. It is not the material which is the problem, so much as how it is used, re-used and managed. The UK has also become too reliant on plastic recycling options overseas and needs to do more here within the UK.

Government waste strategy across the UK is beginning to reflect these concerns, with a new focus on waste producer responsibility and tackling waste at source, including designing products and packaging for recyclability, reversing a previous focus on what to do with it after it has become waste. The 25-year Environment Plan (January 2018) and England's Resources and Waste Strategy (December 2018) reflect rising interest in the circular economy and green consumerism, as do subsequent consultations on key proposals, in which Biffa has been actively involved.

In response to this public pressure and ahead of new Government policies and regulations coming into effect over the next 3-4 years, many big-name retailers and manufacturers have already initiated various changes and trials. Some actions are certainly helpful and long term, such as many retailers now phasing out black plastic food trays in recognition of the recycling limitations resulting from the colour. Other responses are more

short-term publicity exercises with questionable long-term impacts, such as switching to alternative materials such as bioplastics, which could cause more consumer confusion, have worse lifecycle impacts or create new waste management problems.

We need to avoid these types of knee-jerk decisions taken in isolation, however well-intentioned, which can then result in undesirable unintended consequences, replacing one problem with another. Indeed, actions taken in isolation without consideration of other supply chain consequences are the very antithesis of the new Government policy measures, which aim to drive recycling improvements through a co-ordinated, coherent set of measures and recommendations.

Unlike materials such as paper, cardboard, glass and metal, plastic covers a vast spectrum of different polymer types with different applications and properties. Because of this, it is plastics in recycling streams which cause most confusion about what is recyclable and what isn't, compounded by confusing or non-existent labelling, differing end markets and variations in what types of plastics are collected for recycling around the country.

This paper sets out the waste management issues relating to plastics we commonly deal with, as a society and within Biffa, together with our thoughts on how we think plastics waste management should be addressed through emerging policy and regulation, what could be done now and what should be avoided.

Biffa: Speaking from experience

The overall drive to increase recycling is something Biffa keenly welcomes and strongly supports, being the biggest service provider overall for business waste and household waste in the UK.

Biffa has over 100 years of operational experience. We collect over 4 million tonnes of waste every year in the UK, from 74,000 businesses and 2.2 million households. This service is backed up by strength in depth on recycling services, geographical coverage and infrastructure, combined with an enthusiasm and capability to do even more. We also operate a specialist compliance scheme (Biffpack) which provides compliance services relating to plastic (and other) packaging waste and we have a world-leading plastics re-processing division in the form of Biffa Polymers. More information about those parts of our business can be found later in this report.



Key Recommendations

1. Stop exporting waste plastics.

It is clear that, for plastics, global markets cannot always be relied on to deliver the environmental standards now demanded through heightened public concern and new political environmental ambition. We can, and should, aim to recycle all plastics within the UK, optimising the material as a resource, generating UK investment and jobs and avoiding unintended environmental problems in other countries due to the inherent difficulties faced by UK-based regulators monitoring activities overseas. There are important issues to consider in this context:

- Government's stated aim is to support UK recycling: "Our Waste, Our Resources: A Strategy for England" (also known as the Resources & Waste Strategy or RWS) states: "Our primary aim is to process more waste at home. We also want to ensure, however, that any waste which we do send abroad is fit for recycling, and that it is recycled to equivalent standards as required in the UK".

- Government's current packaging producer responsibility system (PRN system) has unintentionally led to a substantial growth in export of

waste plastics - a six-fold increase since 2002, according to last year's National Audit Office report. This has happened due to the commercial advantages from high PRN certificate prices for plastics, the scope for making inflated claims for export PRNs and the knowledge that overseas facilities are harder for a UK-based regulator to monitor.

- The proposed mandatory business waste recycling collections in the recent Government recycling collections consistency consultation must also be seen through in order to help support recycling in the UK, along with the proposed tax on plastic packaging with less than 30% recyclable content, which will help support the domestic market for secondary plastic. This new, supportive and stable set of policies and regulations will help UK businesses like Biffa continue investing in UK recycling infrastructure and services but it is vital that these reforms are followed now delivered.

In the case of waste plastics export, the worst cases have resulted in organised waste crime and deliberate, illegal plastics dumping. In other cases, it has resulted in sub-optimal recycling performance due to the receiving recycling facilities being more basic and less efficient than UK facilities, failing the "equivalent standards" test now being set by Government.

Government policy should also require waste producers to cover the full cost of managing packaging waste they place on the market. These reforms are an important opportunity to address the export issue in the long term, but short-term action is also needed. We cannot afford to wait until 2023 or later.

2. Phase out problem plastics.

Recycling is not alchemy – what comes out depends on what goes in. Plastics need tackling proactively, at source, at the production and design stage. Up until now the policy approach has tended to be reactive, with most focus on post-consumption actions, when the material has already been discarded as waste. This focus has to shift. Plastic packaging serves an important role as a lightweight, durable, protective, adaptable and recyclable material. But the type of plastic, its application and even its colour need consideration at the design and production stage, so that the resulting item is genuinely recyclable in mainstream, widely available systems and the resulting re-processed plastic is attractive to the widest possible end markets.

There are measures that can be taken to address this:

- There needs to be a reduction in the use of problematic single-use plastic, such as the proposed bans on plastic straws, stirrers and cotton buds and the plastic carrier bag charge. Similar bans or charges may also be useful for other unnecessary plastic items in future. Where non-plastic re-usable alternatives exist, such as items of crockery and cutlery, the single-use plastic versions should be phased out. Impossible and difficult to recycle plastics and plastic composites also need to be phased out, wherever possible, through designing for recyclability. Such known examples currently include plastic food trays with unnecessary black or dark colouration, 'compostable' plastics, laminated packaging film, pouches and carrier bags.

- We need to recognise and optimise the use of necessary plastic packaging, where it serves a positive role, such as protecting food to reduce food waste. Compared to many alternative materials, it also has practical and environmental advantages of being lightweight to transport, adaptable for different or larger bottle or pack sizes and lends itself well to being recycled multiple times. Such packaging needs to be made as recyclable as possible and needs to make as much use as possible





of secondary plastic in its manufacture. A great example is the closed-loop ‘bottle to bottle’ type of recycling which is possible with plastic HDPE milk bottles and PET drinks bottles, which Biffa undertakes through its Polymers division. This keeps the material in the resource loop for as long as possible in place of virgin polymers and helps reduce the carbon impacts from virgin plastic production.

- Government’s reform of the PRN system needs to include higher compliance fees for non-recyclable or difficult to recycle plastic packaging to create a new system of Extended Producer Responsibility (EPR). Unintended consequences of switching to other materials which may have a worse carbon footprint or create new or more recycling problems also need proper consideration. The days of packaging design which ignores recyclability and recycled content need to come to an end.

3. Make recycling easy.

If recycling is made difficult, it is less likely that people will do it and the results will be worse. It needs to be made easier by packaging, especially plastics, being made simpler, labelling being made clearer and recycling collections being made more consistent.

- Simplify the array of plastics: There is a myriad of different types of plastics, causing significant confusion amongst consumers. The simplest plastic packaging, such as the HDPE milk bottle example mentioned above, has been proven to result in high recycling rates – around 85% recycling in that case and also already achieving 30% recycled plastic content. The whole bottle including its handle and lid is made from HDPE, with no added colouring apart from the small colour-coded cap and even that now has reduced colouring. Other plastic packaging should also be simplified, through a similar collaborative, cross-supply chain approach. There is more about this example in the Appendix 3.

- Use clear, unambiguous labelling: Use clear, nationally standardised labelling to help consumers put the right thing in the right bin and avoid problem plastics compromising the recycling of the “core” easy to recycle material (like PET and HDPE bottles and PP and clear PET pots, tubs and trays). Difficult to recycle, problem plastics can then be sent for specialist recycling if such options are available, or, if not, used as fuel in energy recovery plants.

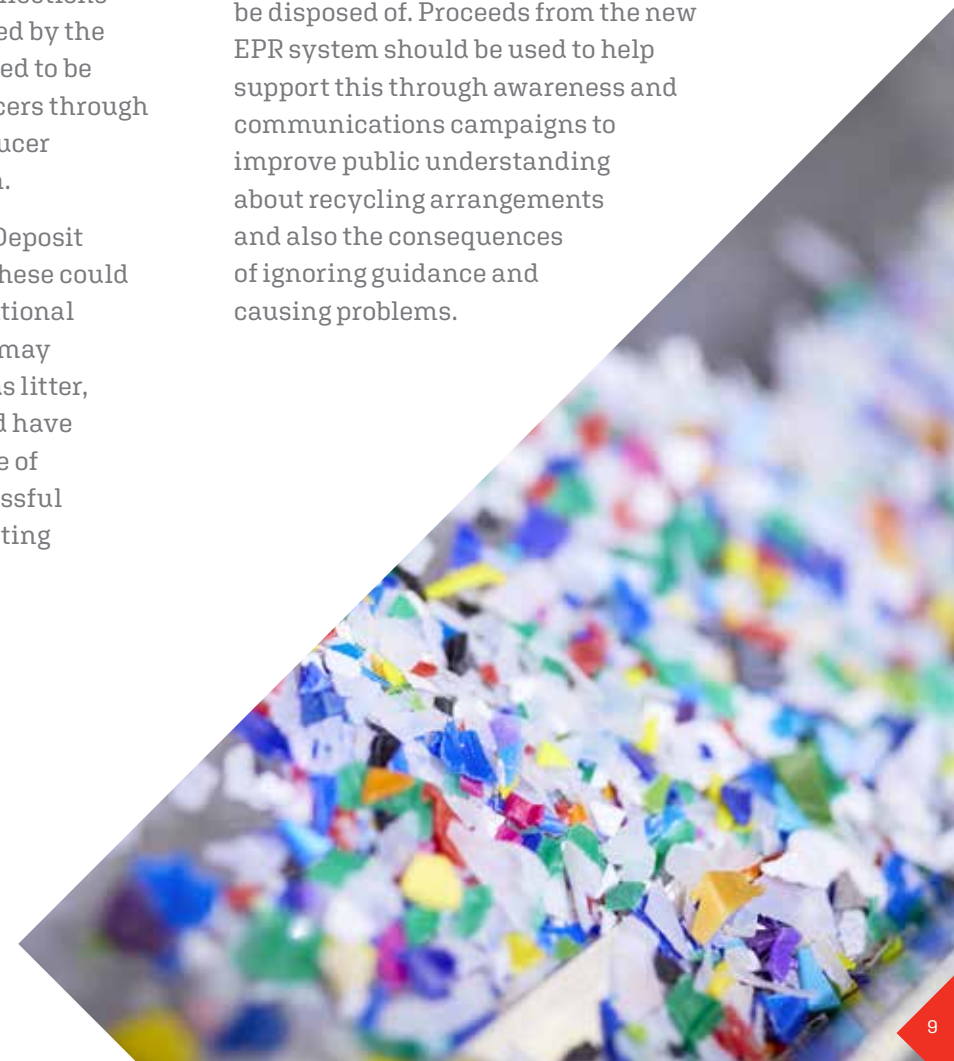
- Make recycling collections more consistent, supported by funding from the new Extended Producer

Responsibility system. More consistency over the core materials recycling collections, so that all Councils and businesses recycle nationally agreed core materials, will mean that all consumers know they can put those materials in a recycling collection bin wherever they live or work. We discuss this in more detail in our Recycling Collections Guide, which includes our recommended recycling materials and collection models, in line with current Government proposals: <https://biffa.co.uk/media-centre/publications> The recommended recycling collection models from that report are also included in Appendix 4. In that we explain that the easy-to-recycle plastics can be included in mixed recycling, but this should be kept separate from food waste and general waste:

Local Authority recycling collections in particular can be supported by the new funding streams intended to be generated from waste producers through the proposed Extended Producer Responsibility (EPR) system.

- Proceed with caution over Deposit Return Schemes. Although these could have a role in capturing additional plastics for recycling which may otherwise get thrown away as litter, there is also a risk they could have the unintended consequence of undermining existing successful kerbside recycling by competing for the same material.

- Invest in consumer awareness and personal responsibility. Whatever systems are in place, we will always need to do our bit as consumers on a personal level. When the above system improvements have been made this will be even easier – or to put it the other way, there will be no excuse not to. We need to make environmentally responsible choices when shopping and when disposing of packaging waste and products at the end of their life. ‘Wish-cycling’ by either putting the wrong materials in the recycling collection in the hope that someone else might recycle them, or by deliberately putting general waste in recycling and assuming that somebody else will sort it out is not helpful. Not only does that add cost and difficulty for whoever has to sort it out, but in the worst case it could mean the whole bin ends up having to be disposed of. Proceeds from the new EPR system should be used to help support this through awareness and communications campaigns to improve public understanding about recycling arrangements and also the consequences of ignoring guidance and causing problems.



Key Recommendations: The Detail

1. Stop exporting waste plastics.

UK recycling rates have quadrupled since 2000, with some of the fastest recycling growth in Europe over that period. Recycling growth in the UK since 2000 has run alongside very successful diversion of general waste from landfill in the UK, driven by the even earlier introduction of landfill tax in 1996, with higher tax levels being applied year on year. However, with the benefit of hindsight it is arguable that this approach from the “back end” has been the wrong the way around.

It has been effective in terms of achieving the climate change objective of reducing methane emissions from landfilling biodegradable waste, but it has not, in itself, tackled waste generation or recyclability at source, at the ‘front end’. It has helped get us to where we are now in terms of recycling generally (up to around 45% but stalled at that level) but this performance has also been increasingly dependent on exporting materials for recycling, rather than investing more in the UK. This needs to change. Specific relevant elements of current policy reforms are discussed below.

Current policy reform proposals

“Our Waste, Our Resources: A Strategy for England” is the Government’s new resources & waste Strategy (“RWS”) published in December 2018. It is a key element of its 25 Year Environment Plan, taking forward EU Circular Economy Package requirements and including a range of measures intended to increase current stalled recycling, ramping up to achieve at least 65% recycling of municipal waste by 2035. ‘Municipal waste’ is now defined as including both household waste and similar business waste.

The Strategy explains how it will contribute to the delivery of five strategic ambitions, as reflected in the 25 Year Environment Plan. In relation to plastics, these include:

- To work towards all plastic packaging placed on the market being recyclable, reusable or compostable by 2025 and
- To eliminate avoidable plastic waste over the lifetime of the 25 Year Environment Plan

Generally, the proposed new approach in the RWS, together with similar actions in the UK Devolved Administrations includes more of a focus on waste producers and the waste material at source to encourage packaging design for recyclability rather than just for product protection and marketing. In parallel with this are plans for clear and unambiguous labelling, higher costs recovery from packaging waste producers so that they pay the ‘full net costs’ of dealing with the packaging waste they place on the market, more consistency around recycling collections, a proposed tax on plastics packaging which contains less than 30% recycled content, bans on some single use plastic items like plastic straws and stirrers, an increase on the plastic carrier bag charge, the potential to implement a deposit return scheme for plastic drinks containers and a greater effort to tackle business waste as well as household waste.

In February 2019 four consultations on key measures in the new Strategy were launched, open for consultation until mid-May, namely consultations on:

- Consistency in household and business waste collections in England
- Reforming the UK packaging producer

responsibility system (PRN reform/ Extended Producer Responsibility)

- Introduction of a Deposit Return Scheme (for drinks containers) in England, Wales and Northern Ireland
- Introduction of Plastic packaging tax (HM Treasury, UK-wide consultation. Proposal to tax plastic packaging with less than 30% recycled content)

Experts in Biffa have been actively engaged with Government policymakers and trade bodies during the drafting of the new strategy, which we fully support, and the subsequent consultations on key measures. We will be continuing that liaison and engagement, not just in those main waste policy measures consultations but also in a variety of other related work we are directly involved in with Government specialists around issues like better waste data provision, the development of a new national waste tracking/Duty of Care system, the development of a new Sector Deal for resources as part of the Industrial Strategy, intelligence sharing to help tackle waste crime and the planned review of the National Planning Policy for Waste, to help embed new waste management policy considerations in Waste Local Plans and waste infrastructure planning applications.

Results of the above four initial consultations were published in late July, concluding that all of the proposals are intended to be taken forward, subject to further consultations on specific implementation and operational details over the next couple of years as new systems and regulations are drafted. In most cases the aim is to publish regulations in 2021 with compliance from 2023, although Government encourages

waste producers to act now rather than wait. The plastic packaging tax is proposed to be implemented from 2022. Many big retailers and manufacturers are already reacting in response to consumer pressure, including action to produce less packaging waste and to improve its recyclability through better design and though phasing out known problem materials like black plastic food trays and composite materials.

Delivering on these policy reforms will be important to help provide the stable and supportive policy and regulatory regime we need in order to attract more investment in UK recycling and less reliance on export markets.

End markets at home and abroad

There is no hiding from the fact that end markets are key to recycling and particularly so in the case of plastics. After collecting, sorting and preparing for market, usually through a materials recycling facility (MRF), all recyclable materials outputs (also known as commodities or secondary materials) rely on a buyer for the prepared material. As the Appendix to the national Resources and Waste Strategy notes in relation to end markets ‘Products that are difficult to recycle fail to deliver secondary materials the producers want’.

Depending on the material and the demand for it, producers in those end markets are in the UK, Europe and Asia. China, in particular, became the major global buyer of fibre (paper and card) for its cardboard mills and, until relatively recently, waste plastics. China sought those materials for products and packaging to satisfy the huge growth in demand from UK consumers, amongst others, for their products.

The effect has been that UK consumers have imported materials destined to become waste, which in turn has created a reciprocal growth in the UK's reliance on the same offshore markets for sale of recyclable materials back. However, China's clampdown on imports for recycling in January 2018 (operation National Sword) has placed a spotlight on material value, price volatility, quality, end-user demand and end market availability in general. Other Asian and Indonesian countries which started receiving more waste plastics after China's clampdown are now applying similar restrictions of their own.

In its environmental and waste strategy documents, the Government supports greater investment in UK recycling infrastructure and Biffa has been leading the way. The RWS states "Our primary aim is to process more waste at home. We also want to ensure, however, that any waste which we do send abroad is fit for recycling, and that it is recycled to equivalent standards as required in the UK". However, as already noted, there are imbalances in the current system that work against that goal and which need addressing now. Plastic scrap export not only represents a lost resource, investment and jobs opportunity but it also increases the risk of materials being processed at overseas facilities which do not have equivalent standards to the UK, or, in the worst cases, being dumped illegally, out of sight of UK regulators. We can, and should, aim to recycle all plastics within the UK, optimising the material as a resource, generating UK investment and jobs and avoiding unintended environmental problems in other countries.

High quality, high value materials generally find good end markets, but lower grade materials present the biggest challenge, particularly given China's quality clampdown. The resulting diversion of large volumes of plastics to other, new markets in Southeast Asia and Europe has created market disruption and, in some cases, has also raised some environmental concerns about end destinations and uses.

The UK Government needs to work with recyclers and end-market customers to agree quality standards for recycled materials. Although there are already industry and customer standards for some materials, better certainty and endorsement by national Government and regulators will give better market confidence and operational clarity.

Consequently, end markets, demand, material values and prices will continue to warrant regular review and market-responsive measures in collection and sorting arrangements. Measures to address designing for recyclability, phasing out 'hard to recycle' material and clearer labelling should assist with creating stronger secondary material value and reducing contamination, as could separate collection of some key materials with quality issues, such as paper/card and certain 'at risk' low grade plastics like plastic carrier bags/sacks made from LDPE.

Biffa strongly supports investment in plastics recycling in the UK and has very much 'walked the talk' in that respect, with many millions of pounds of investment in collections and sorting infrastructure over the years as well as plastics reprocessing through our Biffa Polymers division – see Appendix 3.

UK Packaging obligations system (current PRN system)

Compliance with packaging obligations is an area in which Biffa has considerable experience through our Biffpack scheme, which has operated successfully for over 21 years, helping obligated packaging waste producers to manage their legal compliance obligations and helping the UK to achieve its national packaging waste recycling targets in line with EU law. Nationally, Biffa is a leading compliance scheme operator and is the larger of only two waste management companies which offer a compliance scheme service. Being the biggest collector of commercial waste in the UK, we also have the full range of operating knowledge around waste collection, recycling, disposal and compliance.

Biffpack manages the compliance for many of the large UK producers across the community including; food and drink, packaging, automotive and communications manufacturing plus various retail sectors. Our scheme works closely with our members to capture the information on the packaging that they place on the market and accurately report this to the various UK Agencies. We also work with reproprocessors and the Biffa commodity team to acquire the required evidence (PRNs) to meet and fulfil our members obligations. There is more information about our Biffpack compliance scheme on our website, along with information on consultancy support.

On one level the current PRN system has achieved what it was designed to achieve in terms of meeting packaging materials targets at minimum cost to producers. Compliance fees only equate to roughly 10% of the actual cost of managing the

packaging waste placed on the market by producers. However, the EU Circular Economy Package and the UK's own reform proposals now recognise that a new system of extended producer responsibility is required, so that waste packaging producers cover the full waste management costs of packaging they place on the market. The intention is that this additional funding stream from producers can help support recycling collections, especially Local Authority recycling collections experiencing funding challenges and where most packaging waste ends up in.

On another level though, in relation to more investment in UK recycling, the current PRN system in the UK has unintentionally supported and favoured waste plastics exports over UK recycling, as noted in last year's National Audit Office report (National Audit Office: Packaging Recycling Obligations report, July 2018). This report recorded that packaging waste exports for recycling from the UK have grown six-fold since 2002. Exports were around 0.6 million tonnes in 2002 rising to around 3.8 million tonnes in 2017, out of a total of nearly 7.5 million tonnes. Of that total, the report showed paper and card export to be greatest at around 2.5 million tonnes (out of around 3.8 million tonnes), followed by plastics export at approaching 0.7 million tonnes (out of around 1 million tonnes).

The plastics export trade has been subject to abuse by waste criminals, notwithstanding that the vast majority of exported materials are successfully recycled. In relation to supporting UK recycling more than exports, the current PRN system is a broken system and needs fixing sooner rather than later.

We cannot afford to wait until 2023. As well as competing with investment in UK-based plastics recycling, export also brings added regulatory and environmental difficulties and risks.

At Biffa, 90% of waste plastics we trade from our sorting and transfer facilities is sent to UK companies and we are also a leading UK waste plastics reprocessor. For the few waste plastics which we do still have to export due to insufficient end markets here in the UK, we operate to our own plastics export policy which gives priority to UK markets and means we will only work with accredited, trusted partners. We have always limited ourselves to a small number of well established, reputable companies who we've been able to build strong relationships with. The minimum detail we require from potential brokers/ reproducers is

- evidence of a valid broker/dealer licence;
- If the end destination is UK, evidence of a valid permit or exemption;
- If the end destination is export, confirmation that the broker is on the current National Packaging Waste Database (NPWD) approved list;*
- If export, evidence that relevant licence/ permit is in place for the final destination;
- If export, evidence of EA approval for issuing PERNs (Packaging Export Recovery Note)*

*The relevance of these items is that brokers must undergo an application and auditing process by the EA in order to be accredited to issue PERNs. The National Packaging Waste Database has an updated list of all accredited exporters and updates details of any brokers whose accreditations

are suspended. In addition, as part of the application process, the broker must demonstrate that the end destination they supply to operates to an environmental and health and safety standard that is broadly equivalent to that in the EU. We also physically visit UK sites and in targeted key export destinations. A copy of our waste plastics policy statement is included in Appendix 1.

UK recycling with international responsibility – WasteAid UK support

Not only should we work to maximise plastics recycling in the UK and prevent plastic being littered in our own country, but we should also work to help combat the impact of plastic pollution elsewhere in the world, particularly developing countries with little or no waste collection systems but where a lot of waste from developed countries can end up. Out of sight, out of mind is not an acceptable or responsible approach.

It has been widely reported that 10 rivers in the world, in developing countries, contribute to 90% of all ocean plastics, based on research published in July 2017 by the Helmholtz Centre for Environmental Research Centre in Germany. Biffa has linked up as a proud partner with charity WasteAid UK to help combat the problem of waste dumping in developing countries. More information about that can be found in Appendix 2.

2. Phase out problem plastics

It is important to remember that plastic packaging provides an important and useful purpose. As a material, it is lightweight, durable, protective, adaptable and recyclable. For example, on its website, Arla Foods, an international cooperative based in Denmark and one of the leading dairy products businesses in the UK notes 4 main reasons for moving away from glass bottles to plastic:

1. It ensures longer shelf life
2. Plastic allows bigger pack sizes
3. Plastic milk bottles containing recycled HDPE have lower total carbon emissions than the equivalent volume glass bottles over their life cycle
4. Plastic bottles need less protection when packaged so can be packed closer, meaning more efficient transport

Arla's new eco-cycle milk bottle now contains 50% recycled material.

However, the sheer range and complexity of different polymer types presents a major challenge as does its unnecessary use, as discussed below.

Plastic packaging types (WRAP 2018 Understanding Plastic Packaging report)

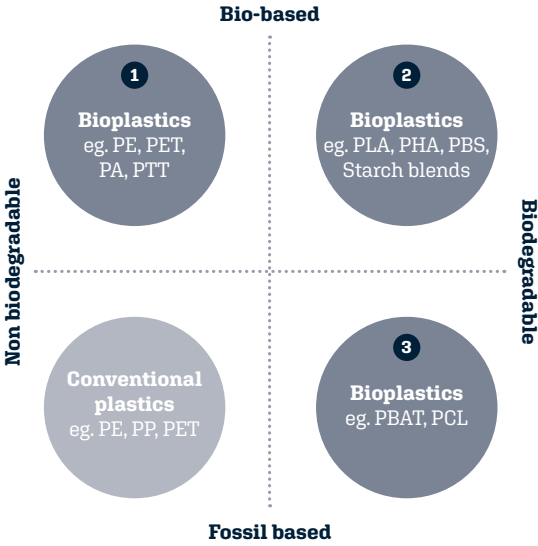
There is a myriad of different types of plastic, which is increasingly causing confusion, with a knock-on effect on recycling collections and end market options. WRAP's 2018 report helps to explain the different types of plastic packaging.

Plastic can be made from fossil-based or bio-based materials. Both can be used to make highly durable, non-biodegradable

plastics, or plastics which either biodegrade or compost. However, these terms do not necessarily dictate the way it will behave at the end of its life. For example, a bio-based plastic or bioplastic does not automatically mean it is biodegradable.

This diagram from the WRAP report demonstrates the complexity of the term bioplastics; which refers to a diverse family of materials with differing properties. There are three main groups: 1 Bio-based or partially bio-based non-biodegradable plastics such as bio-based PE or PP; 2 Plastics that are both bio-based and biodegradable, such as biodegradable PLA and PHA or PBS; 3 Plastics that are fossil-based and biodegradable, such as PBAT. See glossary for acronyms.

Fossil-based or conventional plastic can be made from a wide range of polymers derived from petrochemicals. It is designed to be long-lived, durable and nonbiodegradable. However, fossil-based plastic can also be designed to bio-degrade and, confusingly, this type can also be referred to as "bioplastic" despite being made from petrochemicals.



Bio-based plastic is made from plant-based sources using materials like starch, cellulose, oils and lignin. Bio-based plastic refers to any plastic made from bio-based polymers but refers to the source from which the plastic is made, not how the material will function. Bio-based polymers can be used to make plastic packaging that behaves like conventional plastic and is long lived, durable and non-biodegradable but it can also be used to make biodegradable and compostable plastics. Both these types are referred to as bioplastics.

Unnecessary single-use plastics

Opportunities to reduce unnecessary single-use plastic can and should be taken, such as Government's proposed bans on plastic straws, stirrers and cotton buds from April 2020, along with increases in the plastic carrier bag charge. Similar bans or charges ought to remain as a consideration for other unnecessary single-use plastic items in future. At European level there are also plans, through a new Single Use Plastics Directive aimed at tackling marine plastics. It targets the 10 single use plastic materials which are most commonly found on beaches, including the above items but also plastic plates and cutlery and plastic balloon holders. Where non-plastic re-usable alternatives exist, such as items of crockery and cutlery, opportunities can and should be taken to either phase out or substantially reduce the unnecessary single-use plastic versions.

The UK government has already banned the production and sale of products containing plastic microbeads as they are not captured by the waste-water collection and treatment infrastructure. That ban came into force in June 2018.

Addressing problem plastics

Impossible and difficult to recycle plastics and plastic composites need to be phased out wherever possible through eco-design. Current known examples include plastic food trays with unnecessary black or dark colouration, 'compostable' plastics, laminated packaging film, pouches and carrier bags, which are considered in more detail below. However, it is vital to consider potential unintended consequences of changes, such as causing more food waste through less effective protection or switching to other materials which have worse carbon footprints or which create other recycling problems. Plastic packaging serves an important role as a lightweight, durable, protective, adaptable and recyclable material. But the type of plastic, its application and even its colour need consideration at design stage so that the resulting item is genuinely recyclable in mainstream, widely available systems with the widest possible, reliable end-markets available to it thereafter. This will then enable the benefits of necessary plastic packaging to be realised.

Unfortunately, too much of the plastic packaging in use at present has not been designed with these sorts of recycling considerations being factored in, although excellent success story can be found in relation to plastic milk bottles and the Dairy Roadmap initiative, which Biffa Polymers plastics reprocessing operation plays a leading supply chain role in – see Appendix 3.

Problem plastics examples

'Compostable' and bio-degradable plastics:

Bio-degradable plastic (which includes 'compostable' bioplastic) is specifically designed to break down rather than to last. Whilst this bio-degradable quality may be helpful in parts of the world without recycling collections and where plastic is more likely to escape into the environment, it is inherently incompatible with recycling of conventional oil-based plastics designed to last. Unless bio-degradable plastic is collected separately and is clearly labelled as not being suitable for mainstream conventional plastics recycling collections, consumers are likely to put it in their recycling bin, creating contamination of the plastics recycling stream.

Some bio-degradable plastics are marketed as "compostable" in commercial composting systems along with food waste. However, this is a type of single-use plastics application, rather than multi-use, closed loop applications which can be possible with conventional, mechanically recyclable plastics. Biffa's experience with trials of compostable bioplastics has revealed processing difficulties. Hard-form biodegradable plastics such as plates, food boxes, cutlery and cups need additional processing by fine shredding to be able to blend the finely shredded plastic with the other green waste which needs to form the bulk of the material in the compost process. Without this fine shredding the items do not break down in the necessary timescales and generally remain as whole items in the process and resulting compost. Some proponents of sending this type of bioplastic to composting claim that it can add useful structure to the compost. However, structure is not normally a

problem with the right mix of green waste and food waste and green waste is preferred for structure. Bioplastic does not contain useful nutrients and therefore not a beneficial feedstock, more a problem to be managed, due to the fact that the material cannot be sent to conventional, mechanical recycling at a MRF. It also creates the potential for contamination at collection points, due to the risk of non-compostable plastics being put in with composting collections in error, since to the naked eye the types of plastic appear similar. If non-compostable plastic enters the composting process it will never break down, but this will not become apparent until months later, when it is too late and has become plastic pollution in the soil where it has been used. Such contamination would render batches of compost unusable.

Thin bio-degradable plastic bags such as those used for some food waste caddy liners break down more quickly in the composting process but are still not ideal as they can add to wind-blown litter. For that reason, some Councils will not accept compostable bags in composting collections.

Food waste packaging – whether biodegradable or not – which is included with food waste sent to anaerobic digestion is removed by the de-packaging part of the process prior to the food waste entering the digestion tanks. The digestion process is aimed at recovering biogas from the actual food waste, not its packaging, which has no biogas potential. The removed plastic packaging residue is then either sent for recovery (energy from waste) or, failing that, safe disposal via landfill.

This example highlights the dangers of plastic manufacturers or retailers acting in isolation in response to consumer pressure

over plastics, without properly considering other impacts and management issues further along the resource management chain. This is why the national Resources and Waste Strategy is based on the fundamental principle of a coherent, joined up and collaborative approach.

Since biodegradable plastics contain no recycled content they are also likely to be impacted by the proposed plastics packaging tax in future, which may deter their use. They should certainly not be exempt from the tax, otherwise they would enjoy an unfair and unhelpful advantage over conventional, mechanically recyclable plastic.

Black plastics:

Prior to optimised recyclability becoming a concern in packaging design, black colouration for food waste trays, particularly ready meal trays, was popular for marketing purposes due to the belief that it creates a more flattering background to display the contents. Unfortunately, this colouring makes it impossible for optical plastic sorters at sorting plants to detect, unlike clear or light coloured plastics. Hand sorting is therefore required to separate it from the reject stream. This further sorting and process cost is only commercially viable if there is a good enough end-market for the material. However, the black colouring also constrains the end-market options as demand is strongest for natural un-coloured plastic.

From previously being regarded as a marketing “positive”, black coloured trays may now becoming off-putting for some conscientious consumers who are aware of these recycling problems. A growing number of high profile retailers now appear

to acknowledge this and are phasing out black colouring. It is already noticeable that more food trays and ready meal trays are now made from clear plastic rather than black. Biffa welcomes this.

Carrier bags and bin bags:

In relation to conventional plastic carrier bags and bin bags (LDPE film), China has now banned imports of that material and there are currently very limited offtake markets within the UK or the EU. The main offtake markets presently are new markets in Southeast Asia since China’s ban. However, at the time of writing the material value itself is now negative and it also attracts a high Packaging Export Recovery Note (PERN) value. Whilst the volumes are very low (only 2-3% of the traded secondary materials in Biffa’s case), the current negative material value combined with a high PERN value create a potential opportunity for abuse in export markets. Consequently, Biffa considers this type of material to be “at risk” and has currently suspended exports of it, considering that it is best kept out of recycling collections until more reliable and environmentally sound end markets are available. Some carrier bags are now being made of biodegradable plastics but that can raise other issues, as described above.

UK Plastics Pact

The UK Plastics Pact was launched by WRAP in April 2018, bringing together governments, business, local authorities, citizens and NGOs. Biffa is a member through our plastics re-processing division, Biffa Polymers. WRAP estimate that nearly 70% of all plastic waste is packaging and that is the focus of the Pact actions. Together, the 68 members of the Plastics Pact are estimated to be responsible



- 1 **Eliminate problematic or unnecessary single-use packaging through redesigns, innovation or alternative (reuse) delivery models**
- 2 **100% of plastics packaging to be reusable, recyclable or composted**
- 3 **70% of plastics packaging effectively recyclable or composted**
- 4 **30% average recycled content across all plastics packaging**

for 80% of plastic packaging sold in UK supermarkets and half of all packaging placed on the market. The Plastics Pact targets for 2025 are:

Proposed reform of the Packaging Obligations system

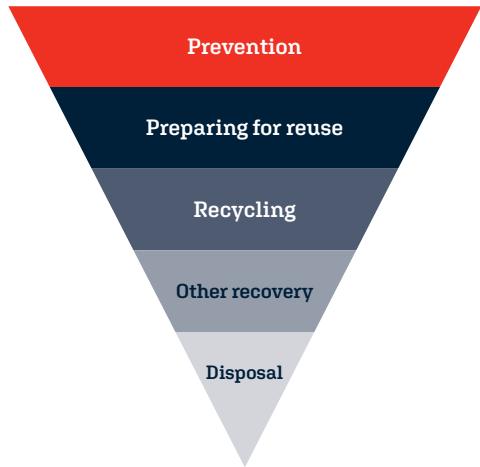
This is explained and discussed in more detail below, but also has a potentially important role to play in helping to phase out problem plastics. Part of Government’s current proposed reforms includes the concept of modulated compliance fees, through which packaging producers would have to pay higher compliance fees for problematic hard to recycle plastic packaging, in order to deter its use.

Plastics in the context of the Waste Hierarchy

Plastics waste management can usefully be considered in the same waste hierarchy context as waste in general, as the same general principles apply.

Prevention (reduction)

Plastic manufacture from virgin polymer relies on the consumption of raw materials in addition to emissions from production processes and transport. The carbon impact of producing new plastic is far greater than the carbon impact of managing the resulting waste, making waste prevention the most effective means of reducing waste plastic carbon impacts.



Re-use

Designing plastic items and containers which can be used in their current form again and again is the next best option from an environmental and carbon benefit perspective. It does not avoid the carbon emissions associated with the production of the material initially, but the longer the item stays in use the lower the overall carbon impact.

Recycling

For plastic waste which cannot be avoided or reused, recycling is the best option.

- Recycling waste plastic means:
- It is kept out of the environment where it can harm animals, people and ecosystems

- It is kept in the resource use cycle
- less new plastic needs to be manufactured
- less energy is used compared to new plastic manufacture

The Ellen MacArthur Foundation New Plastics Economy report identifies three broad types of recycling: mechanical closed loop, mechanical open loop and chemical recycling.

Mechanical closed loop recycling is the most value-preserving loop, followed by mechanical open loop. In mechanical recycling the polymers are kept intact after physical sorting and shredding, whereas in chemical recycling where the polymers are broken down. Closed loop means the plastic is re-processed into the same or similar usage as the original plastic. This is the type of recycling undertaken at the Biffa Polymers HDPE plant and the PET plant under construction in 2019, where waste plastic from bottles is re-processed into pellets and flake for making new bottles: bottle to bottle recycling.

Mechanical open loop recycling is the same mechanical process, but the plastics are recycled into lower grade, often non-packaging end uses, such as plastic drainage pipes, polyester carpets, clothing and plastic lumber. Depending on the end use and its own recyclability, this may only

add one additional use cycle.

Chemical recycling breaks down polymers into individual monomers or other hydrocarbon products that can then be used to produce polymers again. It is therefore less value-preserving and is also less widespread and not yet commercially viable for most common plastics packaging but longer term it has potential to deal with plastics not suitable for mechanical processing, e.g. composite and multi material plastics

WRAP (Plastics Market Situation Report, 2016) estimated that if all of the 456,000 tonnes of plastic packaging collected kerbside from UK households in 2013/14 was recycled, it would save almost 400,000 tonnes of CO2 equivalent emissions compared with landfill, which equates to taking around 125,000 cars off the road.

The WRAP PlasFlow Carbon Report (2013), based on Zero Waste Scotland’s Carbon Metric Methodology suggests, for example, that the recycling of HDPE saves over 2 tonnes of CO2 equivalent emissions when compared to energy from waste and just over 1 tonne when compared to the landfill of a tonne of HDPE

Recovery: energy from waste

Burning waste plastics in an Energy from Waste plant releases the CO2 associated

with the hydrocarbon base from which the plastic was derived. However, there is a benefit or offset associated from the generation of electricity and heat from this waste material, compared to energy generation from coal or gas. Even so, an excess of plastic in the feedstock is not helpful to the EfW process and EfW operators do not intentionally target plastics, preferring to recycle them wherever possible. EfW is therefore not a barrier to plastics recycling, which is also cheaper than sending plastic waste to EfW.

Landfill

The landfilling of plastic waste (as a component of general waste) locks up the carbon within the landfill body and therefore it does not emit greenhouse gas emissions and is not associated with a high carbon impact. It is now sometimes referred to as ‘sequestration’ for that reason. However, once buried, the material is lost to the economy as a resource, at least for the foreseeable future until such time as techniques and commercial viability may lend themselves to future re-excavation for recycling. At the current time, since landfill is regarded as disposal, it is at the bottom of the waste hierarchy. However, this may warrant review in future if landfills assume a new role as a new source of secondary plastic (and other materials).

3. Make recycling easy.

The easier recycling is made to participate in properly, the more successful it is likely to be. There are many factors which currently make it unnecessarily complex and confusing. From a consumer perspective, the sheer plethora of different types of plastic, particularly in packaging, is bemusing. This is compounded by confusing, vague, misleading or even

sometimes incorrect claims on package labelling, due to the lack of a national agreed, mandatory labelling system. This complex array of plastic materials also presents varying recycling and end-market challenges, which, when combined with the potential for contamination due to consumer confusion, has resulted in different plastics being collected for recycling by different Local Authorities, depending on their local circumstances and access to suitable infrastructure and end-markets. The continued introduction of new types of plastic to the market, like bio-degradable plastics described above has added to the confusion, rather than helping to simplify and reduce the already over-complicated array of plastics consumers and recyclers are confronted with.

This confusion and complexity has also made plastics recycling in the UK a challenging area to invest in commercially, although Biffa has a long and successful history of investment in UK plastics recycling and re-processing and is continuing to invest – see Appendix 3 for more information.

Plastics content in household waste streams in the UK is reasonably consistent and predictable. However, there is locally variable access to sorting infrastructure, variations in sophistication of sorting infrastructure and treatment facilities and variations in access to end markets. Consequently, some Councils include some types of plastic in their recycling collections which others don’t. The move towards less complex varieties of plastic packaging in future, better design for recyclability, national standards for core recycling materials to be collected and greater UK infrastructure availability should all result, over the longer term,

Summary of Carbon Factors [Source: WRAP PlasFlow carbon report]

Waste Management Option	LDPE & LLDPE (kg CO2eq per tonne material)	HDPE (kg CO2eq per tonne material)	PP (kg CO2eq per tonne material)	PVC (kg CO2eq per tonne material)	PS (kg CO2eq per tonne material)	PET (kg CO2eq per tonne material)	Average plastic film (kg CO2eq per tonne material)	Average plastic rigid (kg CO2eq per tonne material)	Average plastic (kg CO2eq per tonne material)
Waste Prevention (Preparation for) Reuse	2,612	2,789	3,254	3,136	4,548	4,368	2,591	3,281	3,179
Open Loop Recycling	620	620	620	620	1,957	620	620	620	714
Closed Loop Recycling	1,549	1,662	2,340	2,283	3,342	2,698	1,549	2,159	1,998
Energy Recovery (Combustion)	1,057	1,057	1,357	1,833	1,067	1,833	1,057	1,057	1,197
Energy Recovery (AD)									
Composting									
Landfill	34	34	34	34	34	34	34	34	34
Carbon Factor (Recycling V EfW)	-2,120	-2,183	-2,270	-2,686	-2,272	-3,503	-2,099	-2,179	-2,378
Carbon Factor (Recycling V Landfill)	-1,098	-1,1610	-948	-888	-1,240	-1,705	-1,076	-1,156	-1,215

in more consistency over the types of plastics collected for recycling and better recycling performance.

Business waste varies considerably compared to household waste. It varies hugely from one sector to another depending on the nature of the business activities but can be very consistent from a single customer across the country. Unsurprisingly, offices, factories, restaurants and supermarkets have very different waste outputs. In relation to plastic packaging, the proportion of PTTs (pots, tubs and trays) is typically much lower overall in business waste than in household waste but plastic food waste packaging can be significant in cafés and restaurants, for example. By their nature, business waste collections have to be responsive and often bespoke to specific customer waste types and operational requirements. Also, unlike in Scotland, Wales and Northern Ireland legislation which places a recycling duty on business waste producers, in current legislation in England the collector has to offer the recycling service but the producer can decline it.

We discuss the issue of collections consistency and what to do to improve it in our Recycling Collections Guide. Easy to recycle, widely recycled plastics like PET and HDPE bottles and containers and PTTs (pots, tubs and trays) should continue to be collected in mixed format in mainstream recycling collections and we agree with Government that recycling collections for all these types of plastic should be available to local residents in all Local Authority areas and, indeed, at their place of work through mandatory business waste

recycling collections. As well as improving capture of the right plastics for recycling, this will help address public confusion resulting from some types of plastic being recycled in some areas but not in others.

Easier and more consistent recycling collections need backing up by a new nationally agreed system of clear, unambiguous labelling reflecting the agreed list of core, 'easy to recycle' materials, which Government is proposing, through the Collections Consistency consultation, that all Councils and business should recycle. Such labelling also needs to match the 'hard to recycle' packaging materials, once defined, which Government proposes will attract a higher compliance fee penalty for packaging waste producers through the new EPR system due to come in in 2023.

This new labelling also needs to inform consumers about the amount of recycled plastic content used in the packaging, to help inform responsible consumer choices when shopping and to help give transparency in relation to the proposals for a plastics packaging tax in 2022, taxing plastics packaging with less than 30% recycled content.

We cannot rely on consumers to get recycling right if it is not clear whether and how something is recyclable. This will only lead to intentional contamination, or 'wish-cycling' where items are put in recycling collections in the vague hope they might be recycled but in fact causing problems further down the chain.

Deposit Return Schemes (DRS)

Although plastic drinks bottles (the vast majority of which are made from PET) are already collected for recycling through kerbside recycling systems in the UK, a properly focussed deposit return scheme could help capture additional, good quality PET bottles. To do that, it should be focussed on capturing the small size plastic drinks bottles (sub 750ml size, often referred to as 'on the go' drinks bottles) which are most commonly discarded as litter, causing environmental problems and being lost to the recycling resource use chain. It also needs to be easy to use and not result in people driving significant distances just to visit deposit return points,

thereby defeating any carbon savings benefits from the additional recycling.

However, we urge real caution when it comes to DRS scheme introduction, because of the potential to undermine existing, successful kerbside recycling scheme by competing for the same, higher value material. Also, since the plastic drinks bottles are a type of packaging which is and will continue to be regulated through the revised PRN/EPR system, there is potential for DRS schemes for the same packaging material to conflict with or undermine intended benefits from the new EPR system.



Closing thoughts

We hope these observations, examples and recommendations are helpful, whether you are a player in the supply chain or just interested in the subject. If, as a plastic waste producer you are considering making changes to materials in response to consumer pressure we urge you to seek advice from Biffa or your waste management service provider, to avoid falling into the trap of solving one problem only to create another. If you are a currently obligated packaging waste producer under the packaging waste

regulations, or may become one under the new extended producer responsibility, Biffa can also provide expert knowledge, advice and services on that front. Our best chance of solving the plastics recycling problems is through collaborative working across supply chains, supported by a new, supportive and comprehensive policy and regulatory framework to support plastics recycling generally, and plastics recycling in the UK specifically.



Appendices

Policy Statement

Appendix 1: Waste Plastics for Recycling policy statement

Background

This policy statement sets out our over-arching approach to managing plastics sent for recycling, including plastics which are exported.

The need to increase recycling is high on the public and political agenda, coupled with a recognition that materials need to be reprocessed in a sustainable manner and not to the detriment of people, our oceans or wildlife. Biffa wholeheartedly supports this initiative and wants to see it underpinned by the development of new reprocessing capacity within the UK.

The plastics we manage and the challenges we face

Presently, around 90% by weight of the waste plastics Biffa trades from our sorting and transfer facilities is sent to companies within the UK, including for reprocessing into secondary raw materials such as at our own award-winning plastics reprocessor, Biffa Polymers. Only around 10% (mainly comprising LDPE film) is exported, predominantly to reprocessors within the EU.

Lower grade ('C' grade) film like plastic carrier bags and sacks, which makes up about 2-3% by weight, is currently considered to be at greatest risk of not being properly recycled if exported and therefore is not currently exported but is sent for energy recovery in the UK.

Our approach and commitment

1. We will only export plastics for recycling where there is no commercially viable market within the UK and we will continue seeking out more opportunities for our own investment in UK based recycling operations

2. We will only export plastics through well-established, trusted and accredited partners, with a reliable document trail, who are also accredited by the Environment Agency

3. We will unilaterally suspend exports of any plastics if our tests for export are not met

4. We will continue working with the waste industry and regulators to help combat waste crime by sharing intelligence and highlighting known risks

It is incumbent on industry to show true environmental leadership. Our policy shows a clear drive to put the protection of the environment at the centre of how to manage recycled plastics.

Michael Topham
Chief Executive - Biffa
July 2019 update



Appendix 2: WasteAid

WasteAid

Waste management is often taken for granted in the developed world, however this is not the case in developing countries where 1 in 3 people globally do not have access to a basic waste management service. This can lead to environmental and public health challenges, at a time when the issues of product design, ocean plastics and responsible waste management have never been more prominent. Without positive intervention, these challenges will continue and invariably get worse.

In April this year, Biffa became a partner to WasteAid, a UK based charity whose vision is 'A world with equal access to waste services for all'. Although Biffa's operations are UK only, joining forces with WasteAid is a great opportunity to align our experience and expertise to a contemporary global issue.

Biffa will provide financial, technical and fundraising support over the next three years to help with overseas projects. We will also provide opportunities for employees and customers to fundraise and help to make a positive difference in parts of the world where there are no structured waste management systems in place.

One such project Biffa is supporting is a community recycling project in the village of Kwa-Muhia, Kenya. Biffa's Landfill Business Director, Dean Willett, and CEO of WasteAid UK, Mike Webster, spent a week there in late April this year. The project is managed through the Kwa-Muhia Environment Group (KMEG) which is made up of local community members. The funding WasteAid have secured includes the purchase of land for a recycling area and wages for a Project Manager and operatives.

Kwa-Muhia resides on the edge of Lake Navaisha, a freshwater lake covering some 140km2 at an elevation of 6000ft. It is an internationally important site supporting some 400 bird species and a good size hippo population. It provides drinking water for the neighbouring towns and villages, water for the horticultural farms and water for the neighbouring thermal electric power plants that provide 15% of Kenya's electricity.

Kwa-Muhia itself is a village of approximately 7000 people, mostly migrant workers who work at the neighbouring horticultural farms. They grow mostly flowers for the



European market inside vast poly tunnels. Virtually all residents exist below the poverty line. The municipalities do not provide waste collection, instead licencing contractors to collect waste, who in turn charge plot owners/residents for collection. However as most have barely sufficient funds to survive, paying for waste collection is very low down the priority list.

Up until January 2019, there were 9 'dumpsites' in Kwa-Muhia. KMEG organised, with local volunteers and business for these dumpsites to be cleared. The waste was taken to the 'official' Navaisha dumpsite.

It is estimated that 70% of unattended waste in Kwa-Muhia ends up in Lake Navaisha. The waste (mostly plastics, organics, paper, glass etc.) is dumped, burnt or washed into ditches which block, causing local flooding and stagnant water. The resulting effect on human health is problematic, with many residents (mostly children) suffering from diarrhoea, typhoid and cholera. The local healthcare worker said that the number of cases of diarrhoea in children has dropped 60% since the village clean up in January.

KMEG currently have a temporary site in the village, with an office, training room, works room and storage. The area is very small and only allows for some basic waste activities, which include;

- Storage of recyclables – glass, plastics, card/paper etc. No organics
- Manufacture of drinking glasses from old bottles and briquettes from charcoal dust.

KMEG plan to use funding to acquire 2 acres of land on the outskirts of the village to build the community recycling centre. They are in discussions with a local horticultural farm to purchase/gift the land. The recycling centre will also need access, road, water, power and basic set up facilities. This facility will then manage a wider range of wastes, which in addition to the manufacturing of products for sale, will also include bulking of various recyclables for sale and composting of organics. KMEG intend to expand its use, to include neighbouring villages to ensure long-term funding.

During their week in Kenya, Dean, Mike and KMEG's Project Manager, Duncan Oloo, visited a number of villages, Manager,

undertake reciprocal arrangements and ideas for future waste and recycling activities.

Commenting on the visits, Dean said "There are some fantastic projects going on in Kenya, including Purity at Kamera village, who look after their own waste and volunteers collect from the plots or from community bins. Waste is recycled by tipping in the open, using the goats, chickens, cattle to eat any food and then collecting anything of value."

In Navaisha there are two sanitation 2 facilities that turn human faecal waste into briquettes and a charcoal alternative. The first facility is a trial operation using solar to sterilise the waste. The second facility is a full scale operation, taking the solids from tankers.

We also visited a plastic recycling facility in Gilgil, where the owner takes shredded plastics (all types), mixes them with sand and a dye and makes them into roof tiles - very impressive.

However, Nakuru dumpsite can't be called a landfill, as there is no engineering or management control. It's just open land, where waste from 280,000 people is dumped. I was pleased to discuss landfill management and offer my expertise to a local official who was very interested in improving the site".

There is still much more to be done in Kwa-Muhia, with the 2 acre land purchase vital to the project's success. Both WasteAid and Biffa believe that concentrating on health benefits of good waste management will be the greatest motivator for the residents of Kwa-Muhia, with environmental benefits and preservation of the Lake and species dependent upon it a close second. For developing countries like Kenya, projects like KMEG need to have a business plan that makes and sells products from secondary materials to prevent their inappropriate disposal, along with the space to bulk materials and create an economy to sell them. The time spent visiting other villages, projects and meeting with local government officials has assisted KMEG in developing a local network for trade, and Biffa, along with WasteAid, look forward to seeing and supporting the progress the project makes over the coming months and years.

“ The partnership between Biffa and WasteAid is going to be transformational. We are so excited about the journey we are going to go on with the amazing people at Biffa ”
Zoe Lenkiewicz WasteAid

Appendix 3: Polymers

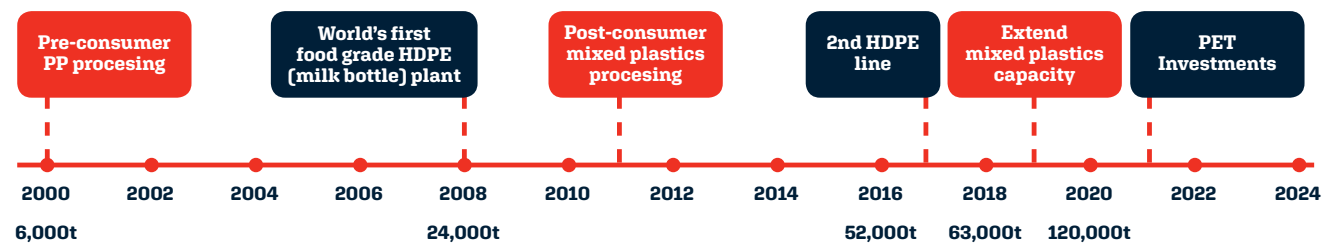
Biffa Polymers: from success to success when it comes to plastics recycling

Biffa Polymers is a leader in UK plastics recycling and began production in 2000, recycling pre-consumer polypropylene. The plant was the first in the world to commercially produce food-grade rHDPE plastic pellet from recycled plastic milk bottles in 2008. Having undergone the most stringent testing, the product is manufactured from hot washing, density-separated and super-cleaned raw material, and compounded into a pellet of agreed specification. This pellet is used as recycled content in manufacturing new plastic milk bottles, plastic food trays for supermarkets, cosmetics containers as well as for use in non-food items such as paint trays and plant pots. Using recycled content reduces the need for virgin plastic, therefore saving costs in the manufacture of plastic products.



Biffa Polymers was awarded the Queen's Award for Excellence in Innovation in 2009 for its food grade facility specialising in the recycling of HDPE milk bottles. The facility is designed to process 50k tonnes of material through its three business processes. The Queen's Award for Innovation recognises a company for an innovative product or service that has been on the market for at least 2 years. To gain this prestigious award you must also have demonstrated commercial success as a result of your innovative product or service. It is estimated that around 85% of plastic milk bottles in circulation in the UK now contain recycled plastic from our plant and Biffa has been a key player in helping to achieve the recycling ambitions of the dairy sector through the Dairy Roadmap initiative (see over).





Manager, Duncan Oloo, visited a number of villages, initiatives and meetings, building up contacts for KMEG to send their bulked up recyclables to in the future, and in 2019 Biffa Polymers announced its first investment in a PET recycling facility at Seaham in County Durham. The initial planned £15 million investment was increased to £27.5 million to increase capability and capacity, taking the plant up to 120ktpa of processing capacity, with further investment planned in future years.

Biffa Polymers worked closely with the UK Dairy Roadmap to supply recycled HDPE for use in the dairy industry.



The UK Dairy Roadmap

The UK Dairy roadmap is a collaborative group which includes all sections of the British dairy supply chain. It is formed of Dairy UK, National Farmers Union (NFU), and the Agriculture and Horticulture Development Board (AHDB) and aims to deliver Environmental improvements across the whole supply chain. One of the early work streams was to collaborate with WRAP, the polymer recyclers and the packaging industry to improve the environmental footprint of the packaging which was used in milk supply.



In May 2008 they set inclusion rates for recycled content of the packaging:

- 10% to be achieved by 2010
- 30% to be achieved by 2015
- 50% to be achieved by 2020

In relation to milk bottle design, eco-design has been achieved through only one polymer, HPDE being used for the bottle, the integrated handle and the cap, combined with reduced pigments in the bottle caps so as to reduce the impact on colour of recycled pellets. Labels are also now easily removable rather than being glued to the actual bottle. The result so far of this is a recycling rate of 85% for plastic milk bottles and over 30% recycled content.

Biffa Polymers plays a leading role in this story of supply chain and eco-design success and it provides a model for the sort of collaborative working and success which could potentially be achieved in respect of other types of plastic packaging, given a similar structured and collaborative approach.

On its website, Arla Foods, an international cooperative based in Denmark and one of the leading dairy products businesses

in the UK notes 4 main reasons for moving away from glass bottles to plastic:

1. It ensures longer shelf life
2. Plastic allows bigger pack sizes
3. Plastic milk bottles containing recycled HDPE have lower total carbon emissions than the equivalent volume glass bottles over their life cycle
4. Plastic bottles need less protection when packaged so can be packed closer, meaning more efficient transport

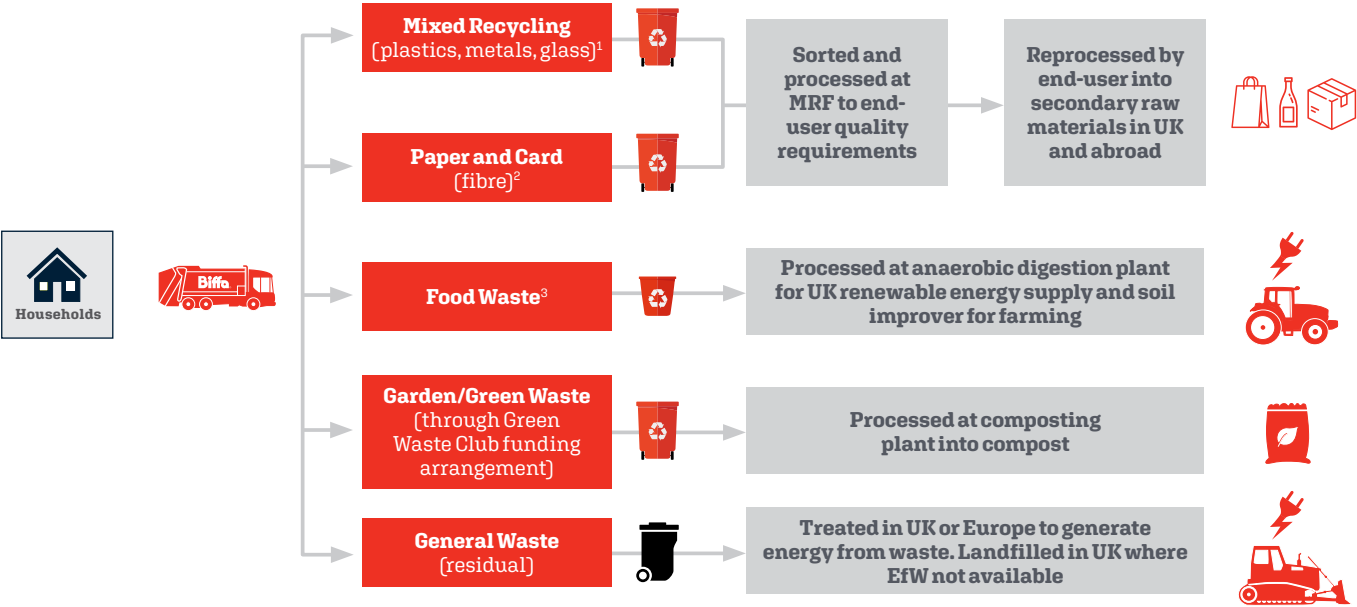
Arla's new eco-cycle bottle now contains 50% recycled material.

Appendix 4

Biffa Recommended Collection Models



Household waste: recommended core materials collection model

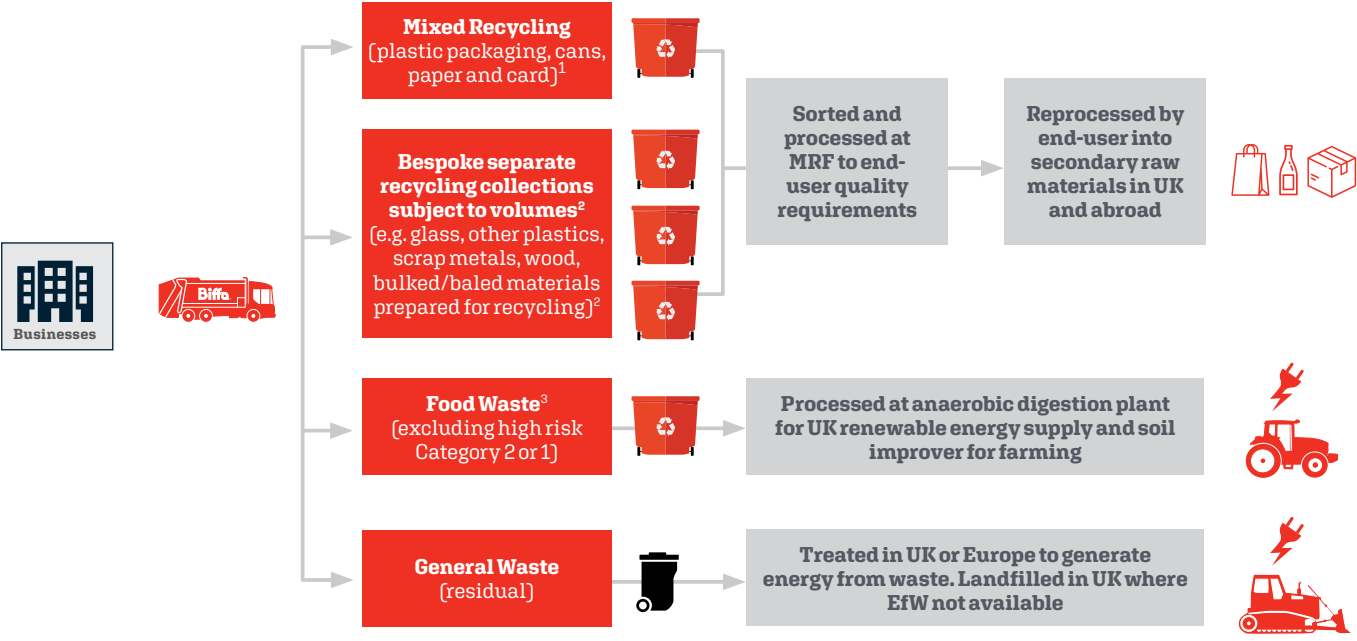


1 Mixed recycling excludes non-recyclable bioplastics. Also, some materials may be placed “at risk” as a result of changes to market conditions and outlet routes. For example, in respect of plastic carrier bags/bin bags (LDPE film) Biffa do not currently advocate their collection for recycling due to the very limited offtake markets in the UK and a potential environmental risk associated with export to some new markets in Southeast Asia due to current negative material values. Household waste recycling collections delivered to sophisticated “clean” MRFs with glass sorting capability do not require separate glass recycling collection.

2 Separate paper and card collection is recommended and can improve quality and reduce processing costs, but inclusion with mixed recycling is the next preferred option ahead of disposal.

3 Food waste can also be collected with garden/green waste as an alternative “bio-waste” collection for in-vessel composting (IVC) treatment. Where compostable bioplastic packaging, containers, cutlery, plates or cups is included with food waste sent to IVC with garden waste, additional shredding may be required.

Business waste: recommended core materials collection model



1 Mixed recycling excludes non-recyclable bioplastics. Also, some materials may be placed “at risk”, depending on market conditions and outlet routes, which can be subject to change. For example, in respect of plastic carrier bags/bin bags (LDPE film) Biffa do not currently advocate their collection for recycling due to the very limited offtake markets in the UK and a potential environmental risk associated with export to some new markets in Southeast Asia due to current negative material values.

2 Separate glass collection is generally preferred for business waste collections unless the receiving MRF has glass sorting capability.

3 Where compostable bioplastic packaging, containers, cutlery, plates or cups is included with food waste, in-vessel composting (IVC) provides an alternative treatment route although additional shredding may be required.

Glossary

Plastic ‘Jazz’	A mixture of different colours within a single polymer type, in flake form after re-processing	HDPE	High Density Polyethylene (r-HDPE recycled HDPE). HDPE has a low degree of branching. The linear molecules pack together well and so intermolecular forces are stronger than in more highly branched polymers. It has a higher tensile strength than LDPE and is commonly used in milk bottles, shampoo bottles, pipes and housewares.
PA	Polyamides (Nylon) comprise the largest family of engineering plastics, with a very wide range of applications		
PLA	Polylactic acid. A biodegradable polyester product from lactic acid		
PHA	Polyhydroxyalkanoate. A naturally occurring family of biodegradable polyesters	PS-E	Expanded polystyrene commonly found in insulated food cups and takeaway containers and protective packaging for fragile items.
PBAT and PBS	Polybutylene adipate terephthalate and Polybutylene succinate – two biodegradable polyesters	PVC	Polyvinyl-chloride
		PMMA	Poly methyl methacrylate
PLC	Polycaprolactone. A biodegradable polymer suitable for applications requiring years of stability, for example in medical applications	PC	Polycarbonate
		PA	Polyamides
PTT	Pots Tubs and Trays	TPE	Thermoplastic elastomers
PET	Polyethylene Terephthalate drinks bottles for water, soft drinks and juices.	PSU	Polyarylsulfone
		PBT	Polybutylene terephthalate
PP	Polypropylene commonly used for food packaging and crisp and snack wrappers, hinged caps, microwave proof containers, automotive parts and bank notes.	PC	Polycarbonate
		POM	Polyoxymethylene
PS	Polystyrene commonly used in spectacle frames, packaging and building insulation CD cases, disposable water cups.	PTFE	Polytetrafluoroethylene
		SAN	Styrene- Acrylonitrile copolymer
PE	Polyethylene	Thermoplastics	A family of plastics that can be melted when heated and which harden when cooled, the process is reversible and the plastic can be reheated, reshaped and set multiple times. These include PE, PP, PVC, PS, EPS, PET, engineering plastics ABS, SAN, PA, PC, PBT, POM, PMMA
PE-HD	Polyethylene High Density		
PE-LD	Polyethylene Low Density		
PE-LLD	Polyethylene Linear Low Density		
LDPE	Low Density Polyethylene. It has a high degree of short and long chain branching which means that the chains do not pack into the crystal structure. It has weaker intermolecular forces resulting in a lower tensile strength and increased ductility. Commonly used in bags, trays and containers, food packaging films and squeezezy sauce bottles.	Thermosets	A family of plastics that undergo a chemical change when heated after they have been heated and formed these plastics cannot be re-melted and reformed but can be chemically altered. (these include urea-formaldehyde foam, melamine resin, polyester resins, epoxy resins etc.)

Plastics are now at the centre of the sustainable waste management debate due to the growth and prevalence of plastic packaging resulting from growth in global trade, on-line retail and “on-the-go” consumption of food and drink. Whilst it’s right that we should reduce unnecessary plastic packaging, we need to avoid demonising it as a material. Plastic packaging serves an important role as a lightweight, durable, protective, adaptable and recyclable material. But to optimise its full potential through recycling in mainstream, widely available systems, recyclability needs properly factoring at the design and production stage. In this report we share our thoughts and recommendations to help make plastics more recyclable and to help improve plastics recycling. We hope you find it informative and useful.

To find out more information about Biffa visit our website **[biffa.co.uk](https://www.biffa.co.uk)**