

# Plastics Explained Exploring the Key Topics

# Reducing global greenhouse gas emissions is of urgent necessity if mankind is to minimise the impact of climate change.

Plastic is a resource efficient, recyclable and lightweight material, vital for every major industry to function.

In the same way we value the modern comfort and safety it brings, the material needs to be valued as a resource that is kept in functional use for as long as possible.

All plastics that are commonly used in everyday life can be recycled. And technologies are rapidly developing that mean even more of the plastic we rely upon can be recycled at scale.

However, the UK needs to improve its plastic collection and recycling infrastructure if it is to achieve a truly circular economy for plastics.

All plastic packaging should be collected, for example, as it is in most other European countries.

It is simpler for everyone to understand and helps to develop markets for recycled material.

Plastic is an amazing material when it is used intelligently.

#ValuePlastic

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## AT A GLANCE

# The UK plastics industry



**182,000**

People directly employed



**500,000+**

Employment including indirect jobs



**£9.6**

**billion**

Value of exports



**3.3**

**million tonnes**

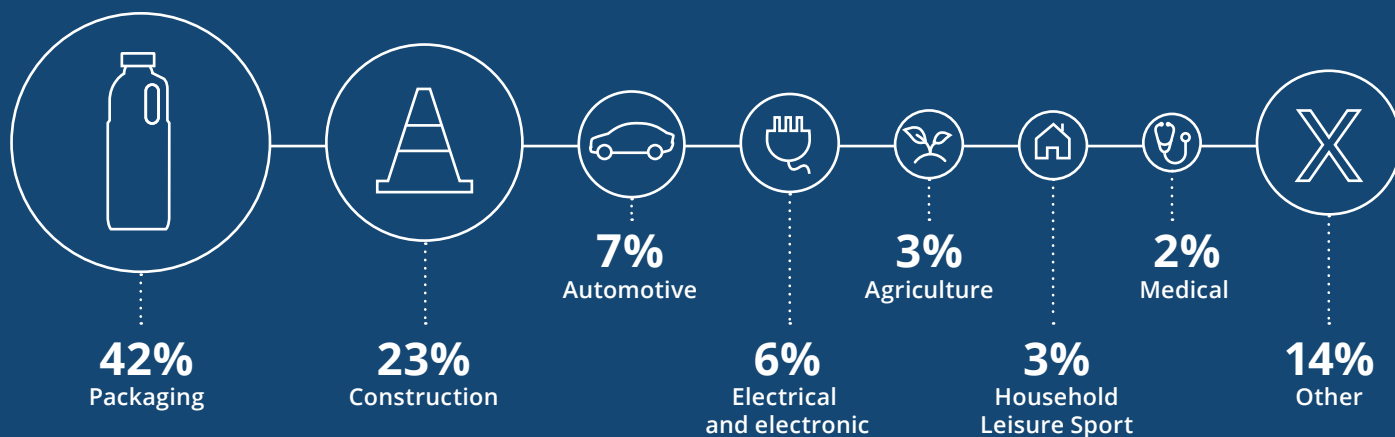
Plastic materials processed



**6,200**

Companies in the plastics industry

### What is plastic used for?



### UK plastic recycling figures

**86%**

plastic packaging is recovered\*

**77%**

plastic drinks bottles are recycled

**50%**

plastic packaging is recycled

**78%**

post-consumer plastic of all types is recovered\*

**59%**

plastic bottles collected for recycling\*\*

**32%**

all plastic is recycled

\* Recovered includes plastic packaging that has gone to an energy from waste facility, as well as recycling. \*\* Includes non-drink such as shampoo and bleach bottles, etc For a full list of sources on this page visit: [www.bpf.co.uk/sources/plasticsexplained](http://www.bpf.co.uk/sources/plasticsexplained)

# Why value plastic?

Plastic keeps food fresher for longer, extending shelf life and protecting products on journeys that may be thousands of miles. Chemically inert, safe, hygienic and shatterproof, it is vital to a wide range of industries, including healthcare. For example, it helps extend the shelf life of blood from seven to 30 days. Plastic keeps the weight of cars, planes and trucks low, meaning far less fuel is burnt over their lifetime. Recyclable plastic pipes, windows and doorframes are essential to the construction sector. Without plastic, no modern electronics would be possible. The list goes on.

But mismanaged plastic waste is entering the oceans, which can cause harm to wildlife and ecosystems. Everybody knows that, so clearly things have to change.

When it comes to plastic packaging, which is where most media attention is focused, sometimes a reuse or refill system is the most appropriate option for the environment – but providing people with a range of options seems the most likely and sensible outcome for a modern society.

Switching away from plastic packaging is often not the best thing for the environment, as other materials can be heavier and require more land, energy and water to be produced.<sup>1</sup>

Using recycled plastic lowers the carbon footprint of a plastic product even more. For example, using 30% recycled content in PET packaging reduces carbon emissions by over 15%.<sup>2</sup>

Collecting as much plastic waste as possible so that it can provide much-needed recycled material for a range of markets therefore seems logical.

In most major EU countries, all plastic packaging is collected. The UK should collect it too. This will increase recycling rates and increase the amount of recycled material available. Revenue raised from the forthcoming plastic packaging tax could and should be used to expand and develop the UK's recycling infrastructure.

Plastic – and plastic waste – should be thought of as a valuable resource that is vital to a modern economy and vital to reducing carbon emissions.

**That is why society should #ValuePlastic.**

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1. Imperial College – *Examining Material Evidence: The Carbon Fingerprint* (2020)

2. Source: How2Recycle Recycled Content Calculator

# What role does the plastics industry play in a sustainable future?

Plastics have been under increased scrutiny over the past years. Mismanaged plastic waste escaping into the environment can cause well-documented harm. So why do we use plastics in the first place?

Alternatives to plastic might not be as desirable as many would like to think. The overall life cycle impacts of materials need to be considered early in the decision-making process. All materials have environmental costs and plastic often has lower overall impacts from a life cycle perspective.

This is because plastic typically requires less material to perform a specific function when compared to alternative materials. There are other factors to consider too, such as preventing food waste, using less energy when transporting goods, and the net benefits of recycling and recovering plastic, which are often higher compared to other materials. People often forget about the many long-life applications plastic has, such as making vehicles lighter, homes more energy efficient or providing us with clean, safe drinking water (via plastic pipes). It is also used in onshore and offshore renewable energy generation.

In 2021, the British Plastics Federation published *Sustainability in the Plastics Supply Chain*, which demonstrates how the plastics industry is embedding sustainability initiatives within all stages of the supply chain.<sup>3</sup> Examples range from reducing energy demand in plastics processing to facilitating the uptake of eco-design principles, as well as establishing the first international standard on preventing plastic pellet loss.

The recent UK government announcement regarding the ten-point plan for a green industrial revolution, as well as the UK's net zero emissions target by 2050, will not be possible without the use of plastic. The BPF has also published a webpage that shows how plastic is vital in meeting the United Nations General Assembly's Sustainable Development Goals (SDGs).<sup>4</sup>

However, when it comes to capturing more plastics in the national recycling infrastructure, reducing the UK's reliance on exports and developing new business models to support a truly circular economy, there is more to be done. Improving the situation involves industry, government and the public working together to ensure that the materials we use have multiple, useful lives wherever possible.

► *Sustainability in the Plastics Supply Chain can be downloaded for free*

3. This can be viewed or downloaded at: [www.bpf.co.uk/sustainability](http://www.bpf.co.uk/sustainability)

4. Viewable at: [www.bpf.co.uk/sdgs](http://www.bpf.co.uk/sdgs)



# Plastics and net zero

The UK was the first country to legislate the commitment to achieve an economy-wide net zero target by 2050. This means that by 2050, the entire country's greenhouse gas (GHG) emissions need to be zero, while the remainder of any emissions resulting from industrial sectors that might not have the technological capabilities to achieve zero emissions will be offset, either through carbon offsetting or by deploying carbon capture technologies.

The net zero emissions target is needed to put countries on track to achieve the goals of the Paris Agreement to arrest climate change and to meet the goal of limiting the global temperature increase to 1.5°C.

In 2019, the highest volume of GHG emissions in the UK was from the transport sector, accounting for 27% of overall GHG emissions, followed by energy supply (21%), business (17%), residential (15%) and agriculture (10%).<sup>5</sup>

Recognising the urgency of addressing climate change, other countries around the world have also taken strong steps to achieve net zero emissions. The European Union (EU) has recently launched the Green Deal strategy, which aims to deliver the goal of climate neutrality by 2050 across the EU. The strategy brings together the green energy transition, the circular economy, and research and innovation into one framework to provide cohesion and better integrate previous policy areas to achieve climate neutrality goals.

Plastics need to be used more sustainably in conjunction with the goal of reducing GHG emissions. However, unintended consequences arising from transitioning to alternative materials which are often heavier, require more resources to produce and have different environmental impacts need to be carefully considered.

Achieving the goals of the circular economy, increasing the amount of plastics recycled through mechanical and chemical recycling, as well as maximising the amount of recycled content integrated into products will help bring down GHG emissions from plastics products. Other innovative technologies are needed in the long term, such as carbon capture and utilisation (CCU), to decarbonise feedstock production while bio feedstocks for plastics can also play a role.

However, throughout their lifecycle and use phase, plastics contribute significantly to keeping down GHG emissions. Plastic products used for thermal insulation and renewable energy generation enable climate change mitigation strategies that play a key role in reducing GHG emissions. In the transport sector, motor vehicles and aircraft are much lighter and more fuel efficient as a direct result of the amount of plastics incorporated in their design. It is important to note that there are a multitude of applications where no other material can fulfil the same functions with an equal or lower GHG emission footprint than plastics.

While there is a need to reduce the amount of GHG emissions from plastics production and end of life options, society also needs to consider the negative impact on the climate that transitioning to other materials can have.

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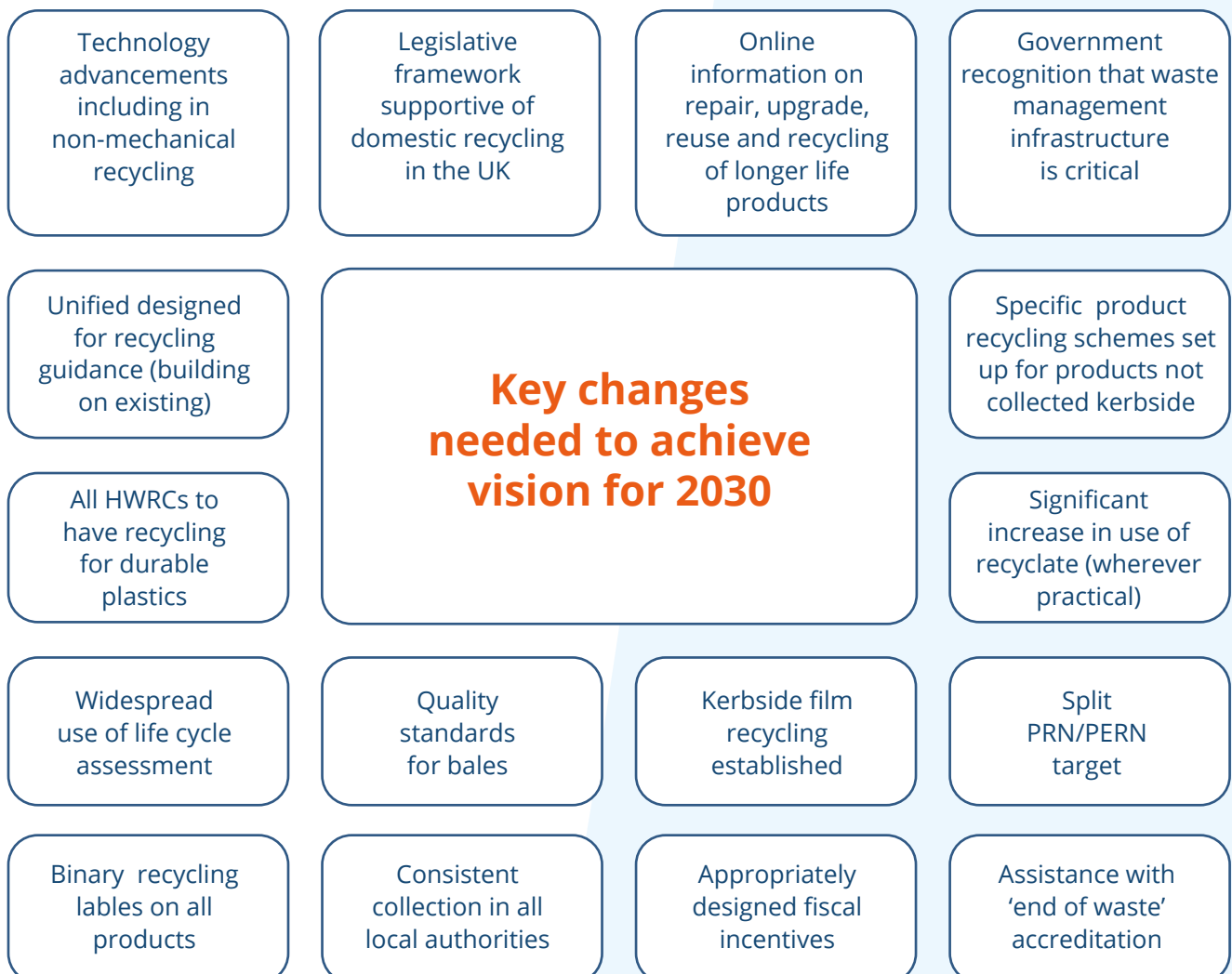
5. The Department for Business, Energy and Industrial Strategy – 2019 UK Greenhouse Gas Emissions

# How do we improve recycling in the UK?

In January 2021, the British Plastics Federation (BPF) released a roadmap showing how the UK recycling industry could expand over the next ten years, more than tripling the amount of plastic waste recycled in UK facilities – if the right drivers are in place. It shows what the UK needs to achieve to drastically reduce its reliance on exporting plastic waste for recycling and reduce the amount of plastic going into landfill to 1% by 2030.

The *Recycling Roadmap* has been welcomed by industry experts and MPs, with Parliamentary Under-Secretary of State for Defra Rebecca Pow stating in the foreword:

*The 2030 British Plastics Federation's vision sets out a clear pathway for progress, including an increase in recycling rates, minimal reliance on landfill and no exports of low-quality material. I am pleased to say this vision aligns with the government's own resources and waste strategy. Our environment bill will enable us to significantly change the way we manage our waste and take forward a number of the proposals from the strategy.*







In addition to investment in UK recycling systems, the *Recycling Roadmap* calls for there to be the same plastic waste collection schemes across all local authorities, the kerbside collection of plastic film, increases in the use of recycled material in new products and better communication to the public about what can be recycled. In total, 16 key changes are required.

New technologies will also need to expand, with the roadmap estimating if chemical recycling and other new recycling methods are proven to work at scale, the amount of material processed this way could increase by sixty times. This would mean newer recycling technologies would be able to process 300 kilotonnes of plastic waste per year by 2030 (up from five kilotonnes currently), including currently hard-to-recycle plastics.

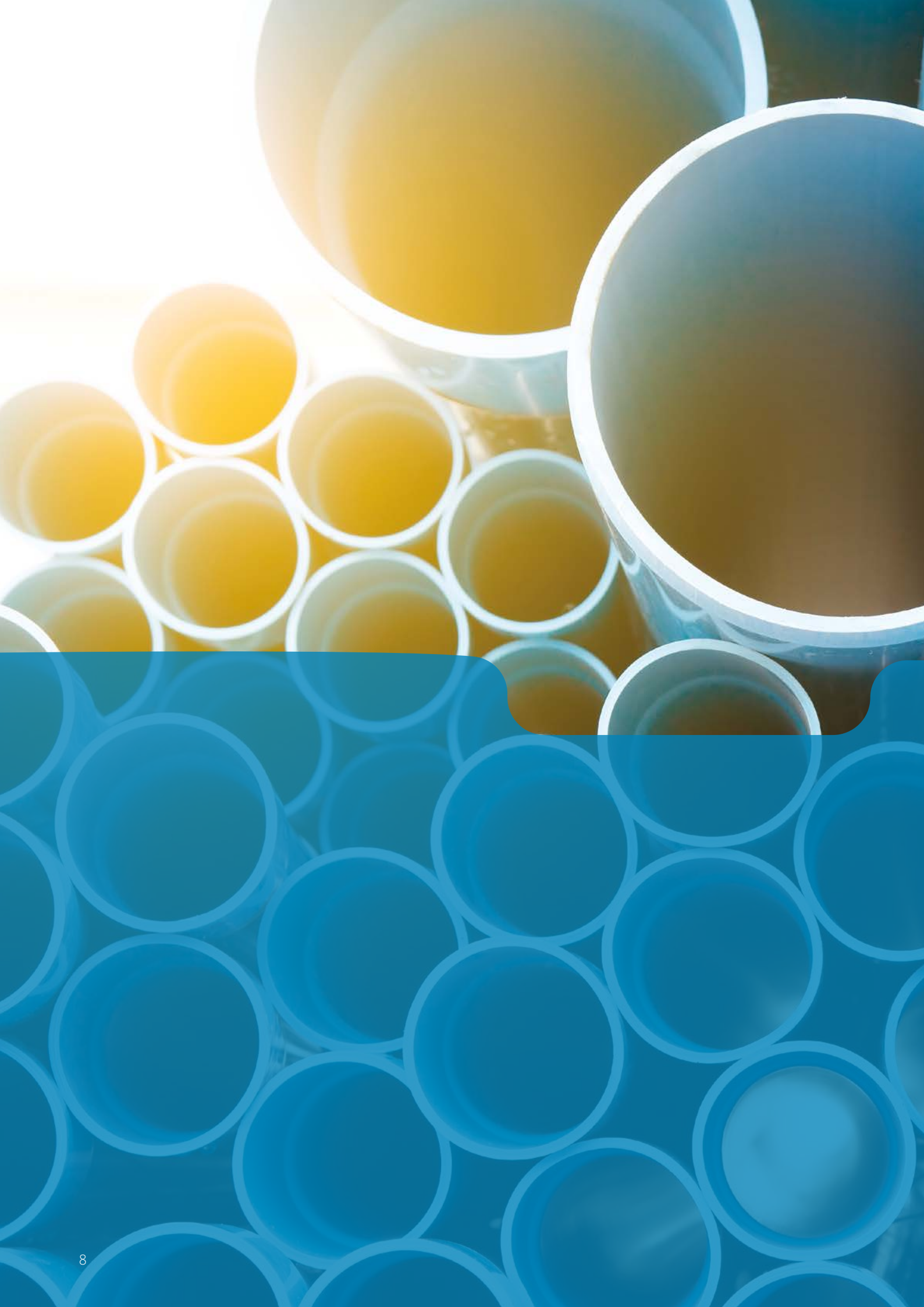
But to significantly increase domestic recycling capacity, recycling rates need to increase for a range of plastic products – not just packaging. The construction, automotive, electrical and electronics, household, sports and leisure, and agriculture sectors represent a higher amount of plastic use in total than packaging and more needs to be collected and recycled. Specific product recycling schemes need to be set up for products not currently collected at kerbside.

Data within the report shows that the amount of overall plastic being recycled has grown by 150% since 2006. Over the same period, plastic going into landfill has reduced by 70%, so the UK has a track record of progress to build upon.

With the global market for plastic recycling expected to grow to £31 billion by 2025, the BPF report highlights that there is an opportunity for great growth in the recycling sector in the UK in the years ahead.

► *The Recycling Roadmap can be viewed or downloaded for free at: [bpf.co.uk/roadmap](https://bpf.co.uk/roadmap)*







# Some key issues in more detail

Below you will find a number of the key issues facing the plastics industry examined in more detail. Each section below outlines the complexities surrounding each issue and states the position held by the UK plastics industry.

In this section we look at:

- Taxing plastic packaging based upon the amount of recycled content
- Extended producer responsibility
- Collecting plastic film and other flexible plastics for recycling
- Deposit return schemes
- Split Targets and PRN reform
- Exporting plastic waste for recycling
- Fraud and waste crime
- Chemical Recycling
- Open and closed loop recycling
- Bio-based, biodegradable and oxo-degradable plastics
- Microplastics
- Marine litter

# Taxing plastic packaging based upon the amount of recycled content



The BPF supports the UK government's overall objective of increasing the use of recycled content. The government is intending to implement a tax of £200 on all plastic packaging components that do not contain at least 30% recycled material. The tax, however, does not recognise technical, regulatory or supply constraints and as a result will risk not meeting the intended government policy objectives and will also disadvantage UK competitiveness.

## **What are the issues with taxing products based upon the amount of recycled content they contain?**

- The barriers to increasing 30% recycled content are not primarily financial but are regulatory, technical and supply related.
- 25% of plastic packaging is incapable of incorporating 30% recycled content due to current regulations.<sup>6</sup> Taxing companies in cases where regulations do not permit the use of recycled material would arguably be unfair and is likely to result in extra costs for consumers.
- In addition, a further 25% of the market will not be able to include recycled content due to supply and technical constraints.<sup>7</sup>
- A thin plastic film contains a minuscule amount of plastic, is exceptionally resource-efficient and saves huge amounts of food from spoiling every year. Many of these also cannot contain recycled content due to food safety laws.

Some plastics are perfect for packaging particular food products, are widely collected, easy to recycle and have thriving end markets, such as the construction industry, but cannot legally incorporate recycled content when used for packaging. To incorporate recycled content, some products would need to be made thicker and probably multi-material — a retrograde step that introduces problems for recyclers as well as using more plastic.

## **What other impacts might the tax have?**

- There is a current lack of recycled material available in the UK and Europe. This will disadvantage SME businesses that may not be able to compete on price with the larger established brands and retailers.
- Not all plastic packaging is presently collected for recycling by councils and waste management companies. This will place a further constraint on the availability of material. The government does not plan to address this until at least 2023/4, whereas the tax will be introduced before this, in April 2022.
- Recycled content cannot be measured at packaging item level, thus making it difficult to enforce and will require a transparent worldwide certification system to prevent fraud.
- Currently the UK exports 59% of plastics packaging waste and imports high quality food contact recycled material.<sup>8</sup> An opportunity exists to divert the tax revenue raised towards investing in creating a world-leading collection and recycling infrastructure.

*The government is intending to implement a tax of £200 on all plastic packaging components that do not contain at least 30% recycled material.*

6 & 7. Source: BPF & EY Tax Report 2019

8. Source: National Packaging Waste Database (NPWD)



### Based on the evidence, the BPF believes...

Policies that require recycled content in all plastic packaging components can result in unintended consequences and market distortions. Analysis conducted by the BPF and EY concluded that the current proposal is not an effective option for reducing plastic waste. As a result, the BPF advocates the design of the tax is modified to recognise the constraints. Although the intent of the tax is to motivate positive change, the unintended consequences and risks need to be fully recognised.

In this regard:

- Recycled content should be maximised where it delivers the most benefit to the environment.
- There need to be exemptions when recycled content cannot be incorporated due to food safety or other regulations.

The implementation date for applications where regulatory permission and supply and technical constraints are most significant could be moved to align with the other changes in legislation, which will help overcome these barriers. The BPF has previously indicated that the earliest date these constraints can be addressed is 2025.

In addition, the BPF recommends that waste occurring in ancillary processes in packer fillers is allowed to be credited, otherwise UK packer filler operations will be disadvantaged against plastic products already imported prefilled. As products imported prefilled in plastic packaging account for approximately one third of the plastic packaging placed on the UK market,<sup>9</sup> and as waste at this stage in some packaging operations can be as high as 40%, there is significant risk this undermines the UK competitiveness of packaging and filling operations, resulting in UK job losses from the entire UK packaging supply chain.<sup>10</sup>

The terminology and definitions used in primary and secondary legislation needs to be clear and consistent with other terminology and definitions used in packaging regulations, PRN systems and other legislation, otherwise

it is likely to give rise to confusion both in the UK and for those involved in supplying the UK market. This is particularly important when it comes to the intent to include certain packaging used by the consumer.

In terms of preventing fraud, recognisable international standards need to be used in relation to recycled content, which is particularly important due to the international nature of the supply chain for both packaged goods and packaging. This is vitally important to prevent imported packaging and goods not undermining UK competitiveness and to reduce the incidence of fraud (both intentional and unintentional). Also, when the tax is introduced, any definition and verification of recycled content must recognise the different sorts of recycling in use both now and in the future. The BPF stands ready to work with the government to ensure a robust method for verifying recycled content is in place and any wording on the definition of recycled content is clear and not open to misinterpretation.

To ensure export competitiveness is not adversely impacted, consideration needs to be given to how export credits can be enabled in a cost-effective way, otherwise the competitiveness of those involved in the export of packaging and packaged goods will be undermined. In addition, if UK goods are exported to nations that also apply taxes, they may be taxed twice.

To ensure the supply issues can be addressed and appropriate recycling infrastructure created, money raised by the plastic packaging tax needs to be reinvested to address the lack of suitable UK collection, sorting and recycling infrastructure for plastic. Now we have left the EU, this could provide the UK with a significant opportunity to build a world-beating recycling infrastructure, providing high value, high quality recycled materials for plastics and an increase in associated jobs and economic activity.

9. Source: Valpak

10. Source: BPF member research

# Extended producer responsibility

Extended producer responsibility (EPR) aims to cover the costs of end of life treatment and to incentivise producers through the fees they pay to ensure the products placed on the market are recyclable and that any unnecessary packaging material is reduced (this includes minimising packaging and using refillable or reusable packaging).

## What is it intended to cover?

Full net costs of end of life and associated litter costs, as well as communication programs and promotion and education campaigns. In the UK the PRN system presently recovers only partial costs necessary to ensure recycling targets are met.

What is in discussion today is household and household-like waste, not commercial and industrial (C&I) business waste.

## Timings?

EPR will be implemented in 2023/2024.

## How is it operated?

A producer responsibility organisation (PRO) operates and manages the scheme.

## What are the scheme objectives?

To meet waste reduction targets, meet recycling targets, increase reuse and arguably to reduce litter as well.

## Who pays and what is the expected cost?

Producers of packaging placed on the market. In Europe, this usually means the brand/packer filler.

In the UK, the anticipated cost of the proposed scheme is estimated at between £1.5-2 billion per year for all packaging types.<sup>11</sup>

The UK plastics industry supports the government's objective of reducing plastic waste and improving recycling rates. Refining existing extended producer responsibility (EPR) obligations is a means of improving the design of plastic packaging to aid recycling and paving the way to harmonising the various kerbside collection schemes across the UK. However, there are several aspects to take into consideration.

## Why have EPR reforms been proposed?

- Improving the EPR system is intended to achieve more consistent collections of used plastic packaging across the UK, which will lead to more plastic being recycled, therefore reducing plastic waste.
- Other aims and objectives include transferring the cost of collecting, sorting and cleaning materials intended for recycling away from local councils to industry.
- Proposed reforms also support communication initiatives, which will lead to increased consumer participation in kerbside recycling and raise awareness of littering.

## Are there any complications?

- It is important that when defining the recyclability of materials that all recyclable plastics are recognised and collected. This is the approach that has been adopted in many other European member states with an operational EPR system.
- When allocating costs and modulating fees, it is imperative that both resource use and resource efficiency are considered alongside end of life considerations to establish the relative carbon impacts.

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11. Source: UK Government Extended Producer Responsibility for Packaging Consultation Document, 2021







### Based on the evidence, the BPF believes...

During the process of reforming EPR, any measures should ensure continued improvement in the collection of waste for recycling and the development of a robust and efficient domestic recycling infrastructure.

Key considerations include:

- Modulated fees should not solely be based upon whether an item is recyclable or not. It should ensure that resource efficiency is incorporated as well as the recyclability of the product.
- Modulated fees should be applied to the entire packaging item entering the waste stream.
- As recycled content for plastics is being accommodated in the plastic packaging tax, EPR could risk double taxation. However, it would be appropriate to consider in a new EPR scheme the best way to incentivise a reduction in raw material use and how best to link EPR modulated fees to reducing climate change impacts and carbon emissions.
- Fees related to litter should be aligned with activities that can reduce littering and include a contribution to behavioural change and education programs, as well as the development of infrastructure to encourage the correct disposal and recycling of packaging items used outside the home.
- Reusable and refillable packaging should be included in an EPR scheme with the design based on first use to ensure the product is resource efficient and recyclable at the end of its life.
- Compostable materials should also be included in an EPR scheme, utilising a separate collection system dedicated to organic recycling, and only certified compostable materials should be included in scope.
- Ensuring businesses continue to bear the costs associated with business waste, whether or not it takes the form of 'household' or 'household-like' waste.
- If producers are to bear the costs of collection, then a producer advisory board should determine how the funds collected are allocated. Funds should be used to support:
  - Achieving consistent collection of all plastics within the UK.
  - Developing an improved recycling infrastructure, including sorting.
- Local councils should have an obligation to collect waste for recycling in the most efficient way, ensuring high consumer participation and delivering materials for sorting and recycling with the lowest level of contamination.
- Local councils should be rewarded and incentivised based on achieving best practice in relation to consumer engagement, with recycling initiatives and the efficient collection of segregated waste for recycling.
- Those involved in the collection and sorting of material should be responsible for reprocessing that material to the required bale quality as specified by leading European member states.
- We support the government's proposal to require exporters of plastic waste ensure that waste is recycled.
- EPR modifications need to embrace the overseeing and monitoring of compliance.

# Collecting plastic film and other flexible plastics for recycling

At present in the UK, most councils provide a collection service for plastic bottles, pots tubs and trays. However, very few councils collect flexible plastic packaging such as plastic film, wrappers and bags. As a result, only 38% of all plastic packaging was collected from households for recycling in 2019.<sup>12</sup>

This lack of consistency creates a great deal of confusion for consumers who do not know which items of plastic packaging they can put out for recycling and creates unnecessary complexity. If all plastic packaging is collected for recycling this creates one clear message.

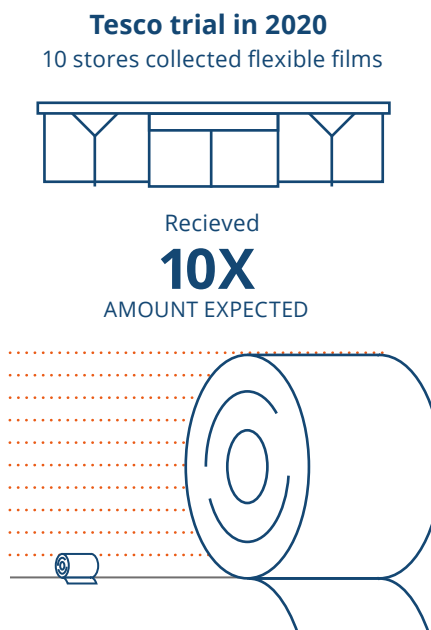
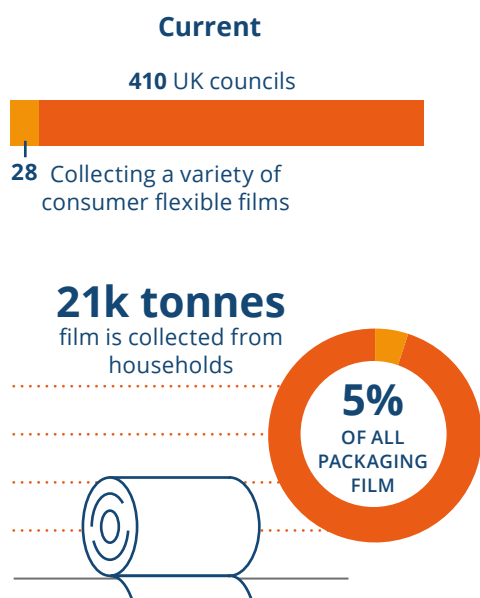
In the UK only 55 councils out of 410 are presently believed to be collecting a variety of consumer flexible films.<sup>13</sup> Some only collect shopping bags (only six) but others collect a wide range of consumer flexible films.

But despite this, only 22k tonnes of film is collected from households, which accounts for less than 7% of all packaging

film.<sup>14</sup> Presently, this would barely justify building one recycling plant in the UK.

Most European markets provide for the collection of consumer flexibles. The UK is one of the few that does not offer a comprehensive service. The collection in Europe is facilitated by funding provided by industry through the Extended Producer Responsibility (EPR) schemes in operation in each country.

In the UK, front of store trials by supermarkets have shown customer appetite to engage in collecting and recycling films. This appetite has been matched by brand and retailers in programs like EPPIC. Tesco operated a trial in 2020 involving 10 stores collecting flexible films. The trials were very successful, with customers returning more than ten times the amount of plastic Tesco expected.<sup>15</sup>



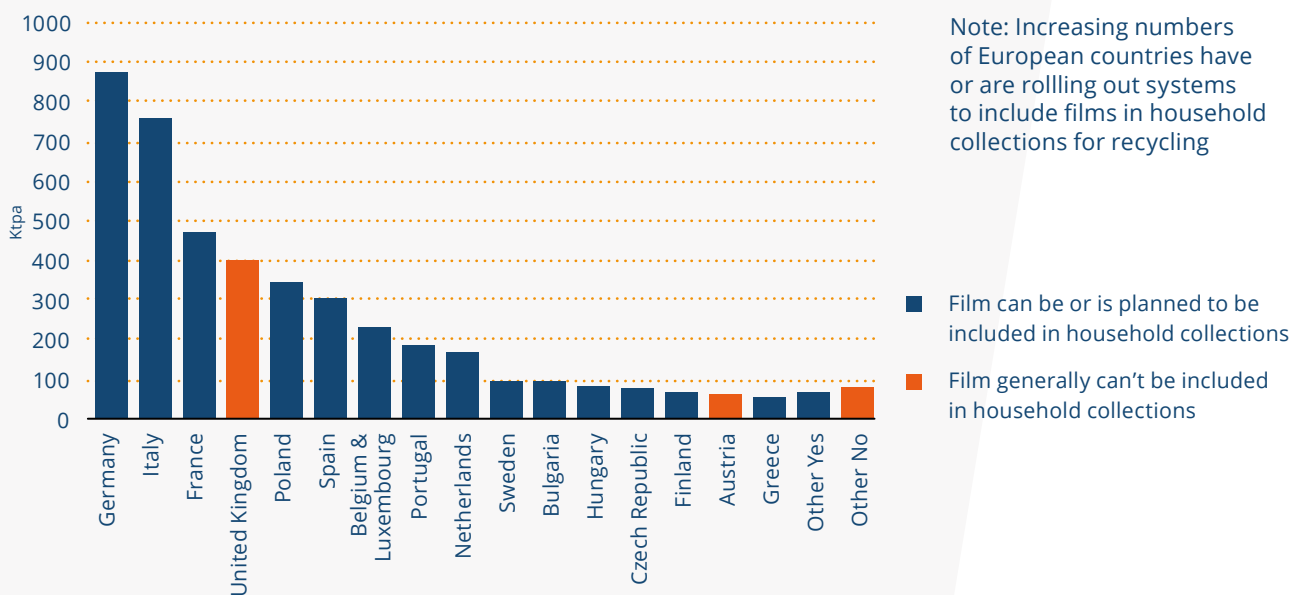
12. Valpak Packflow October 2020

13 & 14. Source: RECOUP UK Household Waste Collection Survey 2020  
[www.recoup.org/p/380/uk-household-plastics-collection-survey-2020](http://www.recoup.org/p/380/uk-household-plastics-collection-survey-2020)

15. Source: Tesco – 'Tesco to launch UK's biggest network of recycling points for soft plastic' - [www.tescopl.com/news/2021/tesco-to-launch-uk-s-biggest-network-of-recycling-points-for-soft-plastic](http://www.tescopl.com/news/2021/tesco-to-launch-uk-s-biggest-network-of-recycling-points-for-soft-plastic)



**FIGURE 9: Flexible packaging placed onto the market by country**



Source: Ceflex, 2020

With the introduction of EPR, the cost of collection for recycling from kerbside will be funded by the UK-proposed EPR scheme and must be a priority if we are to catch up with the rest of Europe. This collection will also encourage investment in UK recycling infrastructure, lower climate change and meet future recycling targets.

Also, there is an opportunity that will arise with the introduction of the DRS scheme, as collection vehicles will have spare capacity to collect additional materials for recycling.

Material Recovery Facilities (MRFs) will also need to be reconfigured to reflect the changed composition once Deposit Return Scheme (DRS) materials are no longer present in kerbside collection and new materials are introduced into the core set of materials collected kerbside. Taking early steps in anticipation of all these changes will be beneficial.



## What about separating films from other packaging materials?

Separation from paper can be achieved with a combination of air-based and near-infrared (NIR) technologies but this can be further facilitated if paper is collected separately to plastic films. Trials to separate plastic from paper were conducted by WRAP some years ago. Trials have also been undertaken in the USA where there is no producer responsibility scheme in operation.

The decision of whether paper should be collected separately to other recyclable materials should be made by local councils and their waste management partners.

### Are there end markets for this material?

Present end markets for recycled flexible films include non-food contact packaging for polyolefins and non-packaging applications. This is due to regulatory barriers that prevent mechanically recycled film from being included in food contact packaging.

For polypropylene (PP) recycling, trials on various PP films, including those that are metallised (e.g. those used in crisp packaging), have been conducted. End markets presently exist for PP recyclate in products used in automotive, horticulture, DIY and building industries.

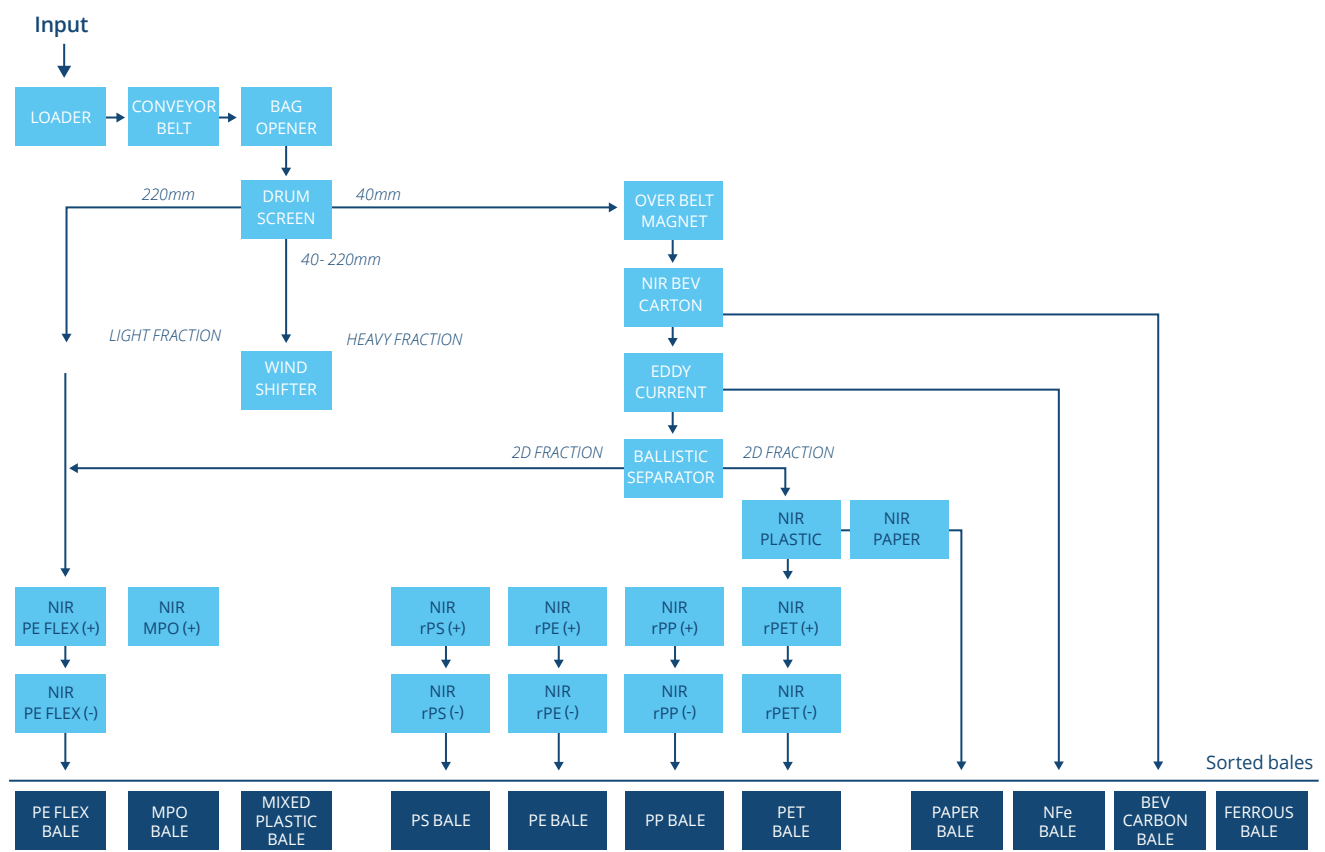
End markets also exist for mixed polyolefin polymers, including those in pallets and street furniture etc.

The total UK market for non-food contact packaging that can include recycled content now represents around 450k tonnes.<sup>16</sup>

Including recycled content in food contact polyolefin packaging will require regulatory approval to be developed further or 'chemical' (non-mechanical) recycling technologies to be deployed.

At present, chemical recycling is an umbrella term for a range of non-mechanical recycling processes, which are currently being developed to work at scale. However, many companies are now operating pilot plants across Europe and

**FIGURE 10: Flowsheet of plastic waste sorting**<sup>17</sup>



Configurations vary with incoming waste composition and local variations

Consumer flexible packaging can be mechanically sorted for waste streams by polymer type.

Different countries have different strategies but the most common specifications are:

- PE flex rich bale
- PO flex rich bale.

Modern sorting facilities examples include: Suez Ölbronn and Suez Rotterdam both with sorting capacities of over 100,000 tonnes per year per site.

16. Source: BPF estimation based on POM data for plastic packaging

17. Source: Adapted from Ceflex

two commercial plants have been operating in Spain for several years. The BPF expects up to 7 companies to be either operating or planning to be operational in the UK in the next two to three years. Some are planning multiple sites. However, the technology is still at a very early stage. For this reason, mechanical recycling will be the main option for the interim until these non-mechanical recycling plants are operational.

Furthermore, non-food contact applications and non-packaging end markets will continue to be the main end markets for recycled flexible packaging until chemical recycling is widely available.

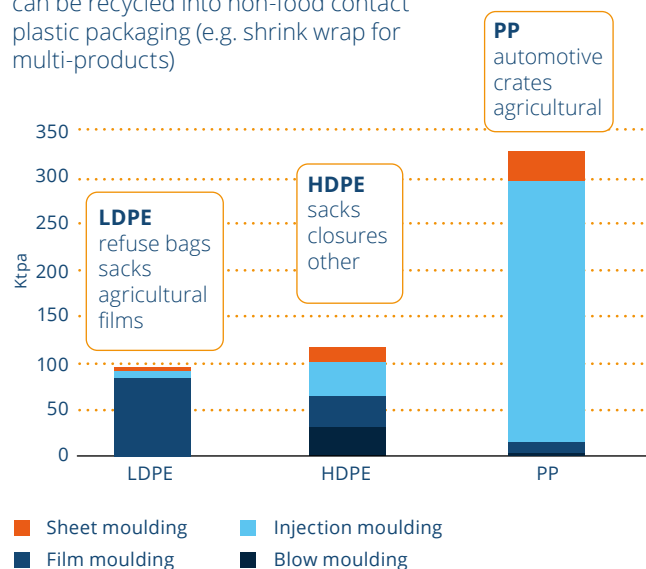
In terms of regulatory approvals, some initiatives for mechanical recycling into food-contact recyclate are underway. When it comes to utilising existing chemical recycling capacity for food contact applications, the recently announced Sabic, Plastic Energy and Tesco partnership is just one of several examples. This particular initiative is using recycled material in food contact films for the packaging of cheese.

Other developments being explored include the use of barriers in PP films to allow food contact packaging to include mechanically recycled content.

**FIGURE 11: Potential end markets in the UK for recycled flexible packaging<sup>18</sup>**

*Selected non-packaging applications*

Industrial scale trials have demonstrated that both post-consumer PE and PP films can be recycled into non-food contact plastic packaging (e.g. shrink wrap for multi-products)



### Based on the evidence, the BPF believes...

End markets exist, methods of collection and separation exist, and a lot of developments are underway that will ensure circularity can be a reality for all flexible plastic packaging and films in the near future. The introduction of the UK plastics tax will generate a huge increase in demand for recycled plastic in plastic packaging. To meet this demand the collection of feedstock needs to commence as soon as possible to provide recyclers with adequate material. In addition, early signalling from government of the intention to collect films is required. This will then give investors in the UK certainty to continue to invest in the separation, wash plants, and recycling solutions, including non-mechanical recycling technologies.

Collecting flexibles and films will result in lower environmental impacts, including reducing climate change, enabling recycling targets to be met and a more circular economy for plastics packaging. Without the early collection of flexible plastic packaging, future recycling targets will not be met, including those set in the UK Plastics Pact.

Finally, collecting all plastic packaging including flexible film will make the recycling of plastics packaging much simpler and convenient for the consumer.

18. Source: Adapted from Ceflex  
Photo by Emily Bernal on unsplash.com









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# Deposit return schemes

A deposit return scheme (DRS) involves increasing the cost of particular products – typically beverage containers – and having the extra cost refunded to you when you return it to a specific location.

Most DRSs in Europe were introduced over a decade ago, before kerbside systems were developed. In the UK, we have a mature kerbside collection scheme and growing recycling rates. In 2019 the collection rate for PET containers was 69%, with the highest rate being achieved in Wales.<sup>19</sup>

All governments within the UK are committed to introduce a DRS in the coming years. Scotland is due to be the first government to implement a DRS for PET, glass, steel and aluminium drinks containers. The scheme will involve a deposit of 20p for all containers and an objective of improving collection rates to 90% over three years.<sup>20</sup>

The governments within the UK are working together to agree the design of a DRS for beverage containers.

For a DRS to be successful in the UK, it must be introduced nationwide, while providing a convenient way of returning containers used both 'on the go' and in consumers' homes. At the same time, it must not undermine or inconvenience consumers recycling packaging at their kerbside.

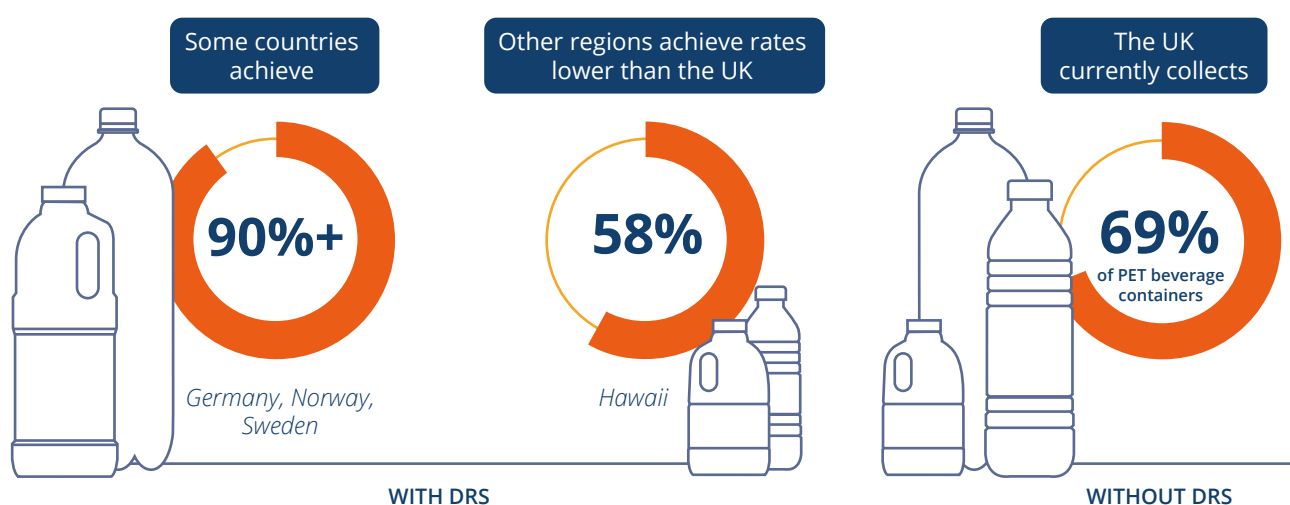
## Can a DRS increase recycling rates?

- Some countries (Germany, Norway, Sweden) achieve higher rates of plastic bottle recycling with DRSs: over 90%.<sup>21</sup>
- The UK currently collects 69% of PET beverage containers - this is similar to the rate for other materials.<sup>22</sup>
- The countries that have experienced a higher rate of recycling launched a DRS scheme before kerbside systems. Therefore, at the time of implementation it could have been the only form of collection system.
- Although these examples may provide key learning opportunities, it must be considered that the UK has a different recycling system and culture. For any scheme to be successful it is reliant on participation by the consumer, which constitutes changing behaviour. At present, it is unclear how long it takes to engage the consumer to participate in a DRS as there is limited data in this area.

## Does a DRS reduce littering?

- Research around the world has found no direct correlation between the introduction of DRS schemes and a reduction in the overall amount of litter.<sup>23</sup> For this reason, behavioural and anti-littering initiatives will still be required.

## Plastic bottle recycling



19. [www.valpak.co.uk/more/material-flow-reports](http://www.valpak.co.uk/more/material-flow-reports)

20. See The Deposit and Return Scheme for Scotland Regulations 2020 [www.legislation.gov.uk/sdsi/2020/9780111044681/contents](http://www.legislation.gov.uk/sdsi/2020/9780111044681/contents)

21. Source: Data based on CM Consulting, Reloop 2018, Deposit Systems For One Way Beverage Containers.

22. Source: Valpak Databite No 3

23. Source: Position based on schemes operating internationally such as Germany



### Based on the evidence, the BPF believes...

- The design of a DRS for the UK should be consistent across all nations to ensure one simple system for businesses and consumers and mitigate the risk of fraud.
  - As a DRS is a form of producer responsibility, it should be introduced at the same time as the reform of EPR.
  - A DRS should utilise one level of fee to make it easy for the consumer.
  - A DRS should minimise the inconvenience to consumers who recycle using the kerbside collection system.
  - A DRS would best compliment the kerbside system if it focused on packaging typically consumed outside of the home.
  - Any proposed DRS would need to cover all beverage packaging types that are consumed 'on the go' to maximise recycling and minimising littering.
  - A DRS should be introduced in the most cost-effective way that is convenient to consumers and ensures least disruption to existing collection and recycling schemes.
- For this reason, smart technology should be considered in the design of the scheme.
- Campaigns will still be required to improve collection rates of other non-beverage bottles that tend to be recycled less.
  - Littering is best addressed through behaviour-change campaigns and these should encompass all littered items.
  - Any policy intending to increase recycling in the UK should be developed from a holistic viewpoint and should aim to increase overall recycling rates and not just those of single products categories.
  - A flat fee deposit structure for all materials and containers offers the opportunity of simplicity and may be the best way to achieve the lowest environmental impacts when designing and applying charges. However, consideration should be given as to whether multipacks should be subject to a separate charge due to the disproportionate impact on these purchases for consumers.

# Split targets and PRN reform

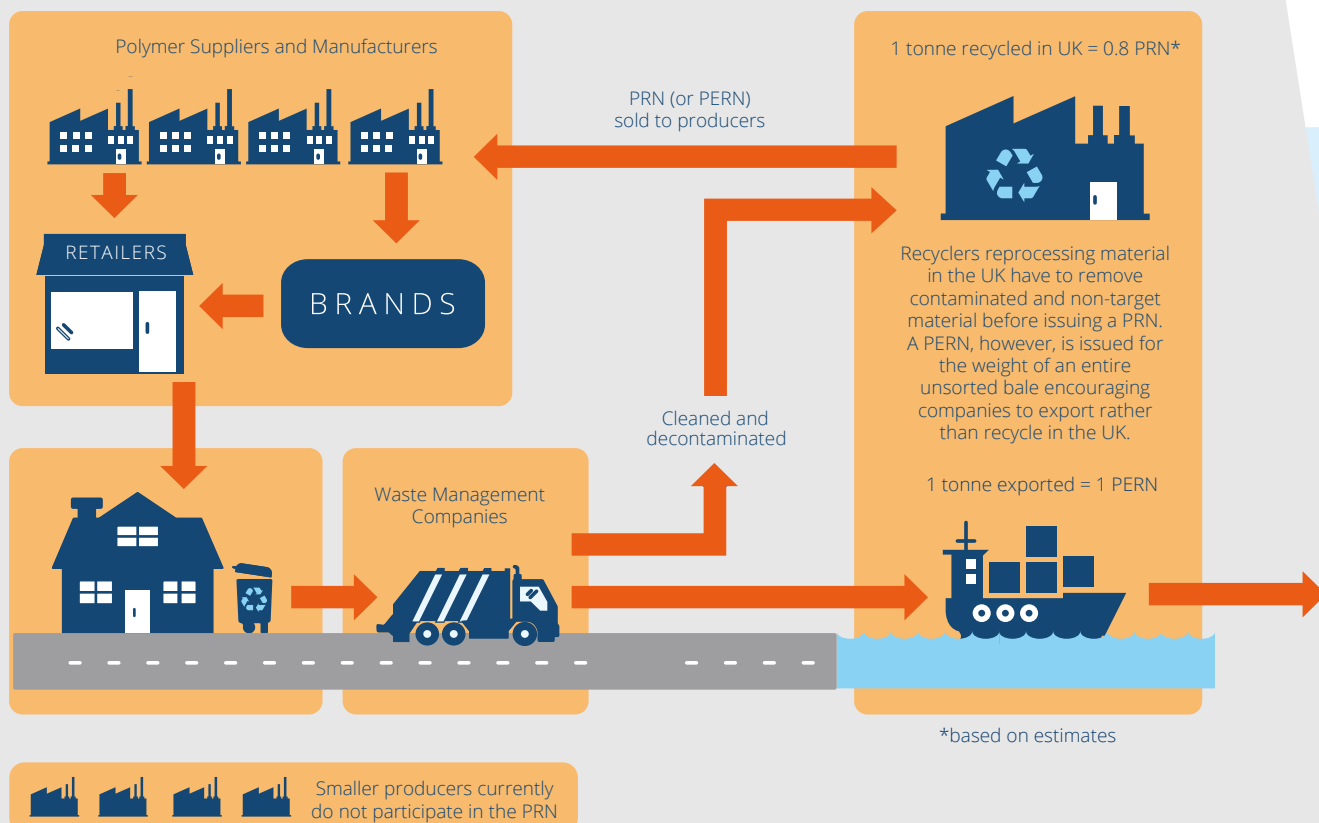
The Packaging Recovery Note (PRN) system was designed to help the UK achieve recycling targets set by the government. PRNs and Packaging Export Recovery Notes (PERNs) are issued by recyclers and bought directly from them or via compliance schemes. Obligated brands, retailers and manufacturers buy these as part of their responsibilities as a producer.

## What is a 'split target'?

A split target is when an increasing percentage of evidence needs to come from PRNs rather than PERNs. This then helps to encourage investment in UK reprocessing facilities, as there will be the demand for PRNs.

## WHAT IS THE PRN SYSTEM?

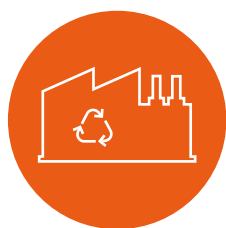
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## Why do we need a split target?

The current PRN system positively encourages the exporting of UK packaging waste in two ways:

- The value of a PRN (UK-based full melt or flake reprocessing) and a PERN (the exporting of a waste bale) is the same. However, the costs incurred in earning a PRN by its very nature are much higher than the costs of earning a PERN. Therefore, the export business model, with its low-cost base, is a much more profitable enterprise.
- UK reprocessors are audited to make sure that all non-target material in the bales they receive is not counted for a PRN, so typically they may only issue PRNs on their final output of pellet or flake. Exporters' PERNs are typically issued on the full container weight of material exported, with no physical audit being carried out by the overseas reprocessor to establish the percentage of non-target material that was exported. This leads to quality standards for export being lower whilst being more lucrative. In addition, exporters do not face the costs associated with processing low quality materials as the UK reprocessor will.



**1,141,000 tonnes**

**Total plastic packaging**  
recycled in 2019



**440,000 tonnes**

**Current capacity**  
UK household plastic packaging  
reprocessing (estimated)



**150 to 200,000 tonnes**

**Current capacity**  
film reprocessing  
(estimated)

## Based on the evidence, the BPF believes:

The government's Environment Bill is calling for a ban of plastic waste exports to non-OECD countries and various politicians have gone even further to call for significant reductions (and even bans) on the export of plastic waste in general.

The BPF therefore supports a reform to the PRN system to enable this. As part of this reform, there needs to be split targets between evidence from PRNs and PERNs. This will help to encourage investment in the UK reprocessing market and reduce the reliance on exporting material for recycling. The current split between PRNs and PERNs is 41% vs 59%, as of 2020.<sup>26</sup>

In addition to this, there will need to be various measures (e.g. quality standards for bales) to ensure that any waste exported to countries is dealt with in an environmentally sound manner.

## What about UK reprocessing capacity?

In 2019, 1,141,000 tonnes of plastic packaging was recycled in total (both within the UK and via export). The current capacity for UK household plastic packaging reprocessing is estimated at 440,000 tonnes<sup>24</sup> and film capacity is estimated at 150-200,000 tonnes.<sup>25</sup> The total recycled tonnage of packaging shows the need for investment in UK reprocessing to increase capacity and reduce our reliance on export. The split target between material reprocessed in the UK and exported material will help to address this, along with other legislative changes.

In summary:

- The split PRN target provides a driver to invest in UK reprocessing infrastructure, which will reduce the current reliance on export.
- Quality of material is key for both the UK and export markets. Defining and implementing a set of quality standards in the UK is needed to ensure only high-quality plastic waste that is uncontaminated and ready to be recycled in an environmentally sound manner is permitted to be exported.
- The UK government signalling a timetable for the consistent collection of plastic packaging will further increase the volumes available for reprocessing.

24. RECOUP, UK Household Plastic Packaging Sorting and Reprocessing Infrastructure 2020

25. BPF Recycling Roadmap (2021)

26. Source: National Packaging Waste Database (NPWD)



# Exporting plastic waste for recycling

The export of plastic waste materials for recycling, particularly to developing countries, is sometimes seen as a questionable practice. However, the UK remains dependent upon export markets to achieve its plastic recycling targets because we do not currently have capacity to recycle all our plastic waste.

## Why do we currently export some of our plastic waste for recycling?

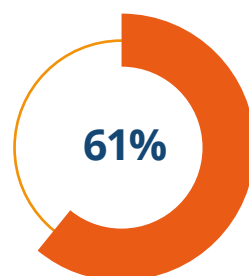
- The UK currently exports plastic because there is not enough capacity within the UK to recycle it. In 2019, the UK exported 61% of its plastic packaging for recycling.<sup>27</sup>
- When export takes place, this needs to be without a detrimental effect on the quality of material and making sure that the exported plastic waste is managed in an environmentally sound manner once it reaches its end destination. It is vital that waste exporters adhere to national and international legislation governing waste exports and robust checks are in place to prevent fraud.

## Can the UK reduce its reliance on export?

The BPF has released a Recycling Roadmap, which sets out how plastic export can be significantly reduced and low quality export eliminated. This means export would no longer be a route for low quality material and the overall quality of material would be increased. A key part of achieving the vision presented by this roadmap is investment in UK infrastructure. The right legislative framework also needs to be in place, as currently the producer responsibility scheme puts UK facilities at a disadvantage.

On 1 January 2021, the UK amended its Waste Shipment Regulations to adhere to the Basel Convention, which means that more plastic needs notification to be sent. The impact of this on export will be monitored.

*The UK currently exports plastic because there is not enough capacity within the UK to recycle it.*



UK plastic packaging exported in 2019<sup>24</sup>

27. National Packaging Waste Database



### Based on the evidence, the BPF believes

There is currently a need to export plastic waste, as the UK does not have the infrastructure to recycle all of its plastic waste. However, with the right drivers in place, the amount we export can be significantly reduced.

- By 2030, export could be the end destination for only 9% of plastic waste and the UK could eliminate low quality export.<sup>28</sup>
- Investment in expanding the UK's recycling capacity is needed to reduce reliance on exports. The Recycling Roadmap has shown that there could be three times more material recycled in the UK than currently.
- Quality of material is key for both the UK and export markets. Defining and implementing a set of quality standards in the UK is needed to ensure only high-quality plastic waste that is uncontaminated and ready to be recycled in an environmentally sound manner is permitted to be exported.
- The existing PRN/PERN system should be amended to rebalance the bias in the system towards export.
- The BPF is supportive of policies and legislation that help to accelerate the transition of the plastics recycling industry to a UK-based, resource-efficient, circular economy.

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28. BPF Recycling Roadmap (2021)



# Fraud and waste crime

Fraud and waste crime is a concern for the plastics industry, as it not only undermines the industry, but it also makes it harder for legitimate companies to operate due to the impact it has on markets.

## What about fraud and the PRN System?

Within the PRN system there are a number of areas of potential fraud which include:

- Packaging waste being landfilled or sent for energy recovery that has had a PRN or PERN issued for it.
- Double counting (claiming a PRN or PERN for the same bale of material twice).
- Non-packaging waste being passed off as packaging waste.

Fraud distorts the system, which is designed to have high prices when evidence is low and more investment is needed in recycling, and low prices when there is sufficient material to reach the target. Fraudulent evidence is particularly prevalent when prices are high, which then brings down prices even if, in real terms, recycling has not increased.

It is important to note that despite there being an upcoming replacement to the PRN system on the horizon, this does not mean waste crime will disappear.

## Are there other examples of fraud in the plastic waste export market?

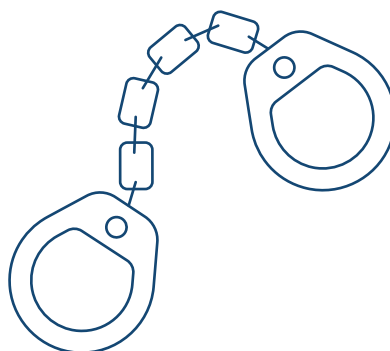
Export of plastic for recycling is currently needed, as the UK does not have the capacity to reprocess all the material collected. However, there have been several reports of material that has been sent for recycling being dumped in the export destination and not recycled (e.g. certain cases in the export of some agricultural films). This type of waste crime in particular undermines the image of recycling, as public trust in the recycling process is lost. This has further costs to both the recycling sector and also producers. Current legislation, including the PRN system, also gives exporters an advantage in some scenarios over UK reproducers, which can further increase incidents of this type of fraud. (Please see the section on *Split targets and PRN reform* for further details.)

Waste Shipment Regulations were amended in January 2021 to implement the Basel Convention amendments, which means more material needs notification to be shipped. The impact of this is still to be understood but further restrictions are expected. Some countries have also put their own restrictions in place on material being imported. There is a concern that to bypass restrictions, material will be exported to a country with less restrictions then re-exported again to another country.

## Verification or certification of recycled content

With upcoming legislative changes in the UK and Europe incentivising the uptake of recycled content, the verification/certification of material becomes even more important to reduce fraud further. International and national efforts to certify material will ensure a level playing field for legitimate companies and ensure the circular economy is not undermined.

*Fraud and waste crime is a concern for the plastics industry, as it not only undermines the industry, but it also makes it harder for legitimate companies to operate.*



### Based on the evidence, the BPF believes...

A verification/certification scheme is needed for recycled content. This is to ensure that claims made on recycled content inclusion are legitimate, and virgin material is not being sold as recycled material where there are financial gains to be made, and fraudulent claims are not being made for particular food contact items.

- The current enforcement action is not sufficient to deter criminal activity and therefore needs to be tightened.
- The regulator should monitor those companies who increase PRN/PERN evidence when prices are high.
- Auditing needs to take place when material is exported to ensure it is managed in an environmentally sound manner. A database of licensed export facilities would assist with this.
- Investment in UK recycling infrastructure is required. This will make material easier to trace and reduce the opportunity for criminal activity.
- More emphasis should be placed on full traceability, duty of care requirements and the principle of broadly equivalent standards.





# Chemical recycling

Chemical recycling (a subset of non-mechanical or advanced recycling) offers the opportunity to process plastic waste - both fossil and non-fossil derived - that is difficult to recycle into high quality, high value recyclate. The type of plastic input varies based on the technology but can include material that has product residues, additives, fillers, high print coverage, colourants, mixed plastics or multi-material packaging waste. This waste is presently difficult to mechanically recycle into high grade material that can be used in a circular economy. Currently, most of it is sent to energy recovery facilities or landfill.

Chemical recycling technologies will complement both mechanical and purification recycling. It is important to note that, as a complementary technology, chemical recycling is there to help increase the range of plastics that are recyclable and therefore drive up recycling rates rather than to divert material from mechanical recycling facilities. Any plastic waste material stream that can be mechanically recycled should continue to be recycled via this route.

Chemical recycling is the missing link necessary to achieve a truly circular economy for plastics. By doing so, chemical recycling will reduce carbon emissions by:

- Reducing the reliance on the use of virgin material.
  - Diverting waste from energy recovery and landfill.
  - Helping to realise wider 'net zero' ambitions.
  - Opening up new material streams to recyclers that would otherwise be unrecyclable.
- *For more information on the current regulations on the safe use of recycled content, please refer to the BPF document [Recycled Content Used in Plastic Packaging Applications](#), which can be downloaded for free.<sup>29</sup>*

## How do you define 'chemical recycling'?

Chemical recycling converts polymeric waste by changing its chemical structure to produce substances that are used as products or as raw materials for the manufacture of products (e.g. feedstocks or monomers). Products used as fuels or a means to generate energy are excluded from this definition. In some applications not all the feedstock will be able to be converted back to polymers (e.g. some pyrolytic oils) - however, this definition is intended to exclude material that is solely going for fuel. 'Chemical recycling' is an umbrella term covering a number of processes - some of these processes are collectively referred to as 'feedstock recycling'.

In order to be considered true chemical recycling the end product must be 'a recyclate' - not used as a fuel.

Conversion to energy is termed 'recovery' - therefore it is **not** chemical recycling.

Chemical recycling differs from mechanical recycling, which uses operations to prepare waste polymers for reuse without significantly changing the polymeric structure of the material. Chemical recycling, however, breaks down the long hydrocarbon chains in plastics into shorter hydrocarbon fractions or into monomers using chemical, thermal or (chemical/thermal) catalytic processes.



29. Visit: [www.bpf.co.uk/recycledcontent](http://www.bpf.co.uk/recycledcontent)

## What are the different types of chemical recycling?

Various types of chemical recycling exist including gasification, pyrolysis, hydrothermal treatment and depolymerisation. Feedstock recycling derives its name from the primary output that is produced, namely a petrochemical feedstock. The term 'feedstock recycling' is used to differentiate thermal processes that convert the waste plastic into feedstock for a petrochemical plant, from chemical processes that break down the waste product into monomers (i.e. depolymerisation) for further repolymerisation.

Purification (e.g. solvent dissolution), uses solvents to remove additives from the polymers, resulting in a purified polymer as its product. Purification therefore is complementary to both chemical and mechanical recycling. However, it is still a subset of non-mechanical recycling.

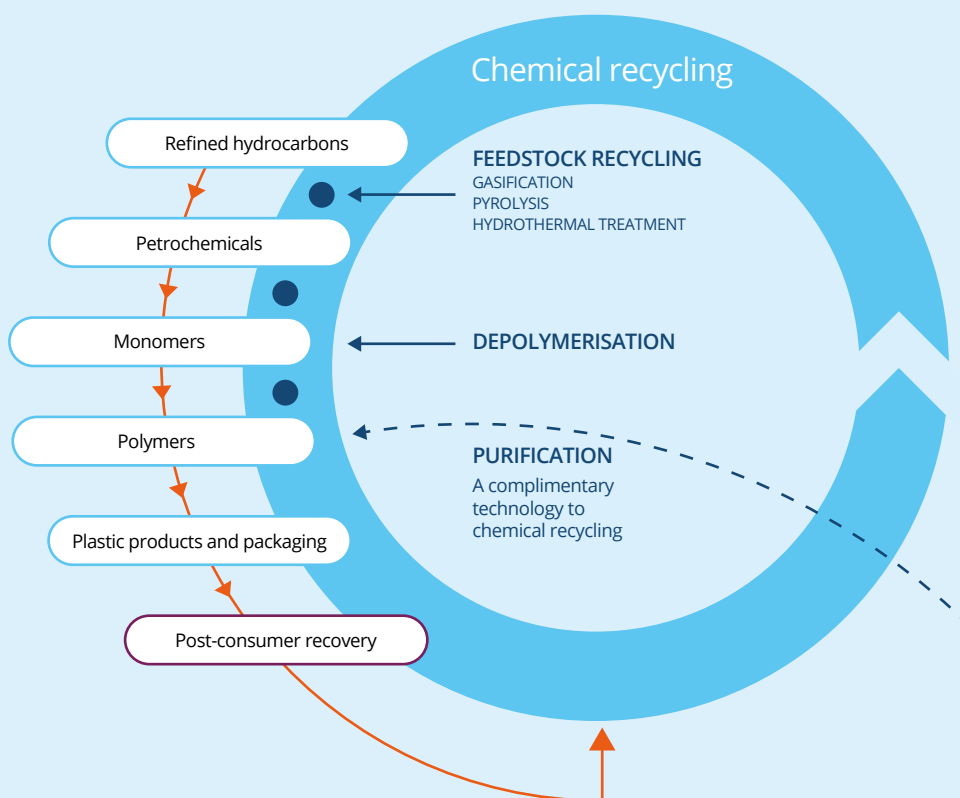
The noted chemical recycling processing technologies that make a 'chemical feedstock' for onward conversion back into new polymer molecules can be considered recycling because they are maintaining most of the original material-value of the polymer molecules and enabling a circular flow of plastic to take place.

Each process type has a different level of energy demand and output mass yield of useful product. In addition, some are more suited to particular polymers and some are more tolerant of additives and contaminants than others.

Further information on chemical recycling technologies can be found at:

- [BPF 'Chemical Recycling' Plastipedia page](#)
- [Coalition for Chemical Recycling](#)
- [Chemical Recyclers Europe](#)
- [Cefic](#)

FIGURE 12: Chemical recycling supply chain schematic



## What benefits can chemical recycling deliver?

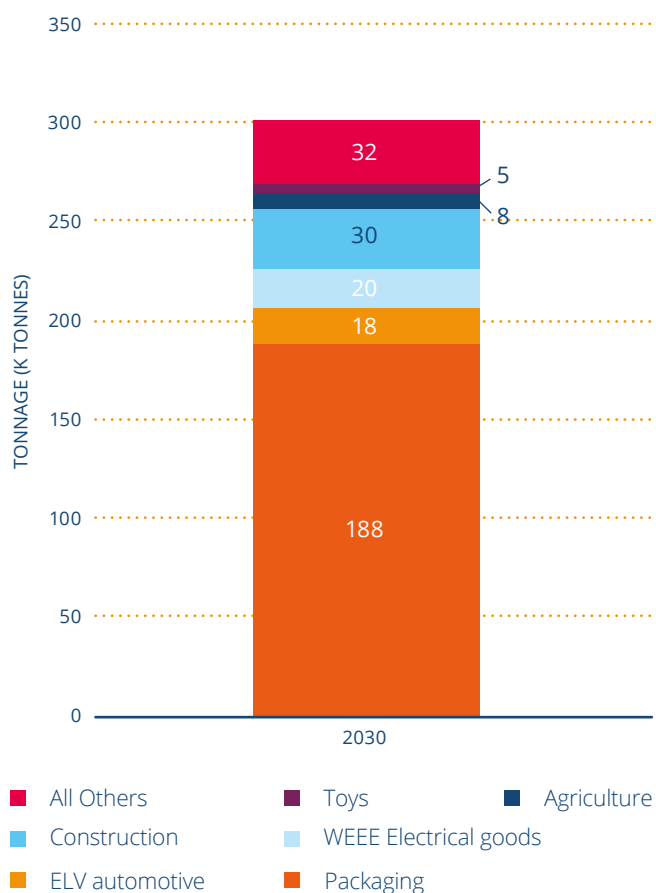
Chemical recycling can address more complex plastic waste streams that cannot be recycled mechanically for re-use into sustainable end-use applications such as food contact or long-life applications.

Chemical recycling can enable the recycling of:

- Plastic waste with organic product residues.
- Mixed plastic waste.
- Plastic waste that has high levels of print coverage and colourants.
- Mixed material structures.
- Waste streams that are currently unrecyclable.
- Thermoformed composites.

The development of chemical recycling will result in higher recycling levels by enabling the recycling of plastic waste that is not currently recycled. Chemical recycling can also increase the number of times a polymer can be recycled, further avoiding waste. It is important that it drives up recycling levels rather than diverts material from existing waste streams.

**FIGURE 13: Non-mechanical recycling 2030 forecast**



Source: BPF Recycling Roadmap

It could increase the availability of high quality recycle.

It offers opportunities for the UK to become a leading nation in recycling and will create new employment opportunities at a critical point in time.

## How does chemical recycling compare with other forms of recycling and end of life options?

It should be pointed out mechanical and chemical (non-mechanical) recycling are addressing solutions to recycling for different input materials and providing different solutions to address regulatory constraints and therefore end markets. So, comparing these two types of recycling solutions is not entirely relevant, as chemical recycling is complementary to existing mechanical recycling. However, some studies have been done of this relatively new and emerging technology.

An example of the technologies working together is Project Lodestar, a pioneer project initiated and run by the New Plastics Economy, which identified the optimum mix of chemical and mechanical recycling technologies. The modelling showed that combining mechanical and chemical recycling processes could increase the fraction of plastics kept in circulation - instead of being lost to landfill or incineration - with both economic and environmental benefits for all parties.

A more relevant comparison for chemical recycling is to compare it with the waste disposal option, as it is enabling material to be recycled that is not currently, providing feedstock where it is not currently feasible. A report commissioned by CEFIC *Chemical Recycling: Greenhouse gas emission reduction potential of an emerging waste management route* concluded that "chemical recycling can avoid the incineration of plastics and corresponding end-of-life GHG emission, with favourable overall GHG emissions balance."<sup>31</sup> This report looked at a number of studies, including a report by CE Delft *Exploration chemical recycling – Extended summary*. This study looks at gasification, pyrolysis and hydrolysis and in all cases chemical recycling compares favourably to incineration. A Sphera report on behalf of BASF found a specific example that pyrolysis "of mixed plastic waste emits 50% less CO<sub>2</sub> than incineration of mixed plastic waste."<sup>31</sup> It is therefore clear that chemical recycling will have a significant role in reducing carbon emissions.

Whilst we transition to a higher proportion of plastics waste being recycled non-mechanically, these other formats of waste management will continue to be key parts of the mix in this transitional phase. For more information on the future of waste management, see the BPF's *Recycling Roadmap*, which was published in January 2021.

30. Cefic – Chemical Recycling: Greenhouse gas emission reduction potential of an emerging waste management route. Page 18. (2020)

31. BASF – Life cycle assessment (LCA) for ChemCycling (2020).

## Are there plans for chemical recycling plants in the UK and Europe?

Many UK-based companies are investing in the development of advanced recycling, with either existing sites or construction imminent. The BPF's *Recycling Roadmap* includes existing and projected plans of companies within the chemical recycling sector, as well as purification.<sup>32</sup>

In Europe and the USA, a total of at least 13 separate companies are now operating pilot plants, with some now moving towards a first production plant.

For more information on global associations, please see:

- [Chemical Recyclers Europe](#)
- [The Advanced Recycling Alliance for Plastics](#)
- [European Coalition for Chemical Recycling](#)

## What will capacity be like by 2030?

The *Recycling Roadmap* provides a forecast for the end destination of plastic waste in 2030. The forecast shows 7% of material going for non-mechanical recycling (300 kT). Although this is less than predicted by some reports, it represents a 60-fold increase compared to 2020.



## Based on the evidence, the BPF believes...

Chemical recycling needs a level playing field to enable it to contribute alongside mechanical recycling. At present, barriers exist that need addressing.

For the industry to play its part it will require:

- Chemical recycling to be recognised by Defra as a means of recycling and agreement by the Environment Agency (EA) that Chemical Recycling is eligible for PRNs (at present this can only be on a case-by-case basis, which is not sustainable).
- Recognition of accredited certification schemes by Defra, EA and the Treasury relating to recycled content such as but not limited to: ISCC+, RedCert or RSB.
- Legal acceptance of a mass balance approach (for reference see the Ellen MacArthur Foundation CE100 Mass Balance White Paper).
- Public sector support and investment to accelerate commercial scale development of the technology.
- Access to plastic waste feedstock (at present much of the feedstock required for chemical recycling is not collected for recycling from consumer households in the UK, therefore it needs to be extracted at source or prior to disposal).
- The consistent collection by councils in the UK of all plastic packaging waste, including films and flexibles, to commence in 2023 when EPR is introduced.
- In common with mechanical recycling, improved quality standards for pre-sorted plastic waste to be pursued in the UK and harmonised with other countries observing the Basel convention.
- End of waste approval for the products generated from chemical recycling, granted in a timely basis. Harmonised 'recycling' and 'recycled content' definitions.

32. For an overview of these, please visit [bpf.co.uk/roadmap](https://bpf.co.uk/roadmap)



# Open and closed loop recycling

## What is 'closed loop' recycling?

Closed loop recycling is when plastic is reprocessed and the recycle produced is used to manufacture another product in the same product category. The two most widely acknowledged examples of this are PET bottles and HDPE milk bottles. However, there are examples of this from non-packaging applications, such as PVC windows.

Companies are able to produce their own closed loops by collecting and reprocessing their own products and using the recycle in new products.

There are significant commitments by brands and retailers in all sectors to incorporate recycled content in their products and in many cases this will enable closed loop recycling to take place. There is also a voluntary commitment made as part of the UK Plastics Pact where participating companies have a target to incorporate an average of 30% recycled content by 2025. The UK Plastic Packaging Tax additionally sets a 30% recycled content requirement for packaging companies in all plastic packaging components by April 2022. All of these will create a significant demand for recycle.

Closed loop recycling can only take place when regulation and required technical performance are not an obstacle. Within

food-contact packaging applications there is legislation which governs whether closed-loop recycling can take place. There are plastic formats (e.g. polyolefins) which, due to food-contact regulations, cannot incorporate recycled content.

## What is 'open loop' recycling?

Open loop recycling is when products are reprocessed and the recycle produced is used in a different application. This is often into a longer life product.

An example of open loop recycling is the recycling of HDPE bottles to make plastic pipes. These pipes can have a lifespan of many decades, keeping this recycled material in functional use for an extended period.

Open loop recycling does not just take place where recycled content cannot be used in the original application but where businesses have seen the environmental benefits or business opportunities of using recycled plastic and a supply of material is available. However, in some cases where closed loop options are not possible, open loop applications may be the only option for end-of-life material.

### Closed loop recycling

Plastic is reprocessed

Manufacture of another product in the same product category.

eg. PET bottles, HDPE milk bottles and PVC windows

#### Advantages

Potential for continuous flow of resources.



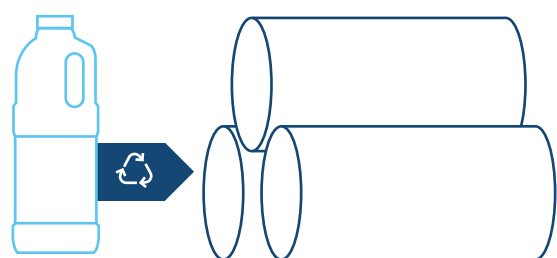
### Open loop recycling

Products are reprocessed

Material used in a different application.

Often a longer life product.

eg. recycling of HDPE bottles to make plastic pipes.



## Why do we need both?

The advantage of closed loop recycling is it creates the potential to have a continuous flow of resources. New products are produced with recycled content, before they are used, recycled and made back into new products again. This is the reason it is seen as the optimal type of recycling. In reality, most products rely on a mixture of virgin material and recycled content rather than being produced completely out of recycled material. Different polymer types, depending on the application, can incorporate different levels of recycled content due to technical performance constraints.

With a limited number of products currently able to incorporate 100% recycled content, combined with the constraints of food contact regulations, there is a need for alternative end markets.

End markets for recyclate have always been key to create demand through the value chain. Targets for the use of recycled content should produce this demand, which will encourage more investment in recycling and drive up recycling rates. However, there is a concern that new legislation and commitments, rather than increasing demand and driving up recycling, will just create a shift, with material that would have gone into longer-life (open loop) applications being used only in closed loops.

In the future, as technology develops, new end markets will become available, as barriers to closed loop recycling are overcome.

## Based on the evidence, the BPF believes...

Closed loop recycling should be encouraged as part of a transition to a circular economy. However, open loop recycling will also play a part in this.

- All sectors should be striving to incorporate as much recycled content into their products as is technically and financially feasible.
- As new technologies such as chemical recycling develop, they will provide a mechanism to overcome regulatory constraints.
- Commitments to using recycled content need to ensure there is a 'pull' to encourage investment in recycling in the UK.



# Biobased, biodegradable and oxo-degradable plastics

## Introduction

Biobased plastics and biodegradable plastics both have clear uses and these should not be discounted. For example, aqueous-soluble plastics are useful for the delivery of laundry loads into washing machines at industrial scale (e.g. in hotels), as well as for the delivery of controlled detergent doses for domestic use. Complex, multilayer items that would otherwise be unrecyclable and can be separated from the recycling waste stream again provide an opportunity for biodegradable polymers as a solution to waste and bring materials further up the waste hierarchy. Home composting bags, clearly labelled for their intended function, provide another opportunity.<sup>33</sup> This section does not look at the merits of biobased and biodegradable polymers, but rather in the context of the open environment, impacts on recycling and also key areas whereby these materials could play a valid role.

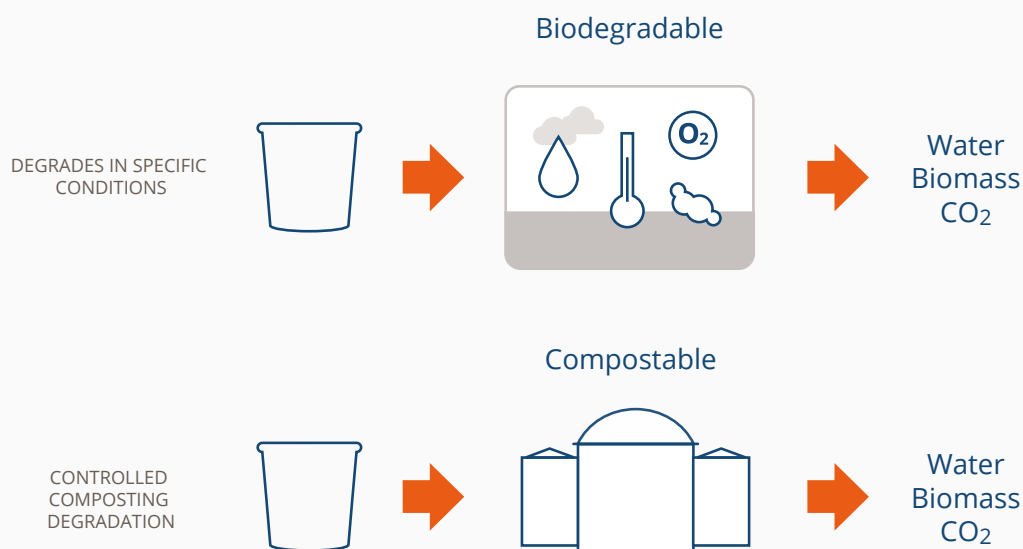
## Biobased plastics

'Biobased plastics' describe a large category of different types of plastics made wholly or partially from biomass. A clear distinction needs to be made between the various types of bioplastics. The way a plastic is designed to function, as well as what material it is made from, affects how it can be used and what management options are viable for it at the end of its life. Biobased plastics are made using polymers derived from biomass such as starch, cellulose, or lignin. Biobased plastics can be engineered to be biodegradable, or they can be made to function exactly like conventional fossil-based plastic (i.e. to have the same durability – however not all bioplastics can be made biodegradable and not all biodegradable plastics can be made recyclable).

33. For further guidance on compostable packaging see: [wrap.org.uk/resources/guide/compostable-plastic-packaging-guidance](https://wrap.org.uk/resources/guide/compostable-plastic-packaging-guidance)



## Biodegradable and compostable plastics: how they degrade



### Biodegradable plastics

Biodegradable plastics can be safely broken down into water, biomass, and carbon dioxide.<sup>34</sup> Existing biodegradability standards to date reference very specific, controlled environmental conditions including temperature, humidity, microorganisms present, and oxygen.

There is a risk also that consumers might be tempted to think that it is acceptable to discard biodegradable plastics in the environment. However, as noted, current standards for biodegradability relate to specific controlled conditions that cannot always be met in the varied natural environment. Therefore, biodegradable polymers, as with any conventional polymer, should not be discarded in the environment.

### Compostable plastics

Compostable materials are a subset of biodegradable plastics that break down into water, biomass and carbon dioxide under controlled composting conditions using industrial composters or home composting.<sup>35</sup> Materials that are designed to safely break down in industrial composters may not break down under home composting conditions (e.g. some compostable materials need a temperature trigger to break down). Therefore, compostable polymers, as with any conventional polymer, should not be discarded in the environment.

### Oxo-degradable plastics

Oxo-degradable plastics are made from traditional fossil feedstocks and are treated with additives that cause the breakdown of the polymer through oxidative degradation.

Oxo-degradable plastics have been subject to a market restriction prohibiting their commercialisation under the Single Use Plastics Directive of 2018 of the European Commission. In the UK, Scotland and Wales have proposed a similar restriction to be introduced.

### Impacts on the mechanical recycling stream

The industry is concerned about the impact that some of these materials can have on the established recycling stream. The materials should only be used in areas where they will be prevented from entering the recycling stream, such as established collection schemes for compostable plastics – some items cannot be easily identified and separated from conventional plastics, hence the need to ensure clear separation. The presence of some of these materials in the recycling stream can adversely affect the quality and marketability of the resulting recyclate and its use in products, particularly those with a long life such as damp-proof membranes.

34. The impact of the use of oxo-degradable plastic, including oxo-degradable plastic carrier bags, on the environment (2018), Page 1, European Commission

35. For further guidance on compostable packaging see: [wrap.org.uk/resources/guide/compostable-plastic-packaging-guidance](https://wrap.org.uk/resources/guide/compostable-plastic-packaging-guidance)





### Based on the evidence, the BPF believes

Biobased and biodegradable plastics are material types that may resonate with some of the general public, but they do not provide a viable solution to reducing the amount of plastic waste that wrongly ends up in the natural environment. While some of these might offer sustainability benefits over conventional plastics, the large differences between how these are engineered to function, the feedstocks and their related sustainability as well as the end-of-life management options need to be carefully considered.

Compostable materials should only be used in applications where there is a clear benefit in using them. Applications include compostable plant pots, liners for food caddies, coffee capsules, food service type items, and packaging that is highly contaminated by food and currently poses significant challenges to recycle economically, or in applications that prevent conventional plastics contaminating the composting stream such as fruit labels.

- The use of biodegradable products should always be accompanied by lifecycle analysis to determine whether or not they are the best environmental choice. The use of biodegradable products should be discouraged unless they meet recognised standards and certification. Identifying the right application for the right material is key to ensuring that environmental benefits are realised in line with the waste hierarchy, as well as the principles of the circular economy.

- The use of biobased products is expected to continue to grow but as with any material, lifecycle analysis can be helpful to determine whether or not they are the best environmental choice.
- It is important that any products developed from biobased materials entering the market are accompanied by adequate certification against recognised standards and clear labelling indicating the most appropriate end of life option to ensure there are no false claims and that the products perform in the way expected.
- Oxo-degradable plastics have been subject to a market restriction prohibiting their commercialisation under the Single Use Plastics Directive of 2018 of the European Commission. In the UK, Scotland and Wales have proposed a similar restriction to be introduced.
- According to the European Commission 2018 report *On the impact of the use of oxo-degradable plastic, including oxo-degradable plastic carrier bags, on the environment*, oxo-degradable plastics could break down into microplastics as “due to these additives, the plastic fragments over time into plastic particles, and finally microplastics, with similar properties to microplastics originating from the fragmentation of conventional plastics.”<sup>36</sup>
- Biodegradability in the open environment is currently being debated by the scientific community. As current standards for biodegradation relate to very specific, controlled conditions that cannot be met in the open environment, the UK plastics industry is concerned that statements related to biodegradation in the uncontrolled open environment could have a negative impact on that environment. Plastic materials, irrespective of their degradability and/or biodegradability, should not be discarded in the open environment.<sup>37</sup>
- The latest scientific evidence confirms the necessity of considering the use of biodegradable plastics only for specific applications where the potential environmental benefits are clear, e.g. applications where collection from the environment is not feasible or where separation of plastic from other waste presents a challenge, and not as a solution to inappropriate waste management or littering. The waste management authority gives priority to reduction, reuse and recycling over biodegradability of plastics, in line with the principles of the circular economy. Products should also comply with relevant standards and certification schemes.
- Another area of interest is biobased conventional polymers, which can be recycled as normal conventional polymers (the only difference being their feedstock). LCAs should be conducted to determine the uses where these materials could offer benefits to the consumer and the environment.

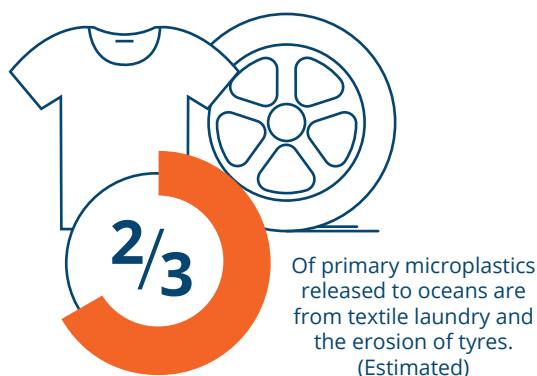
36. The impact of the use of oxo-degradable plastic, including oxo-degradable plastic carrier bags, on the environment (2018), Page 2, European Commission

37. For a BPF statement on the matter visit: [www.bpf.co.uk/press/pas-9017.aspx](http://www.bpf.co.uk/press/pas-9017.aspx)

# Microplastics

Microplastics are typically defined as small pieces of solid polymer-containing material, to which additives or other substances may have been added, five millimetres (mm) in size or less. Their release into the environment can be unintentional, for example from the erosion of car tyres or textiles during washing, or intentional such as microbeads added to cosmetic products.

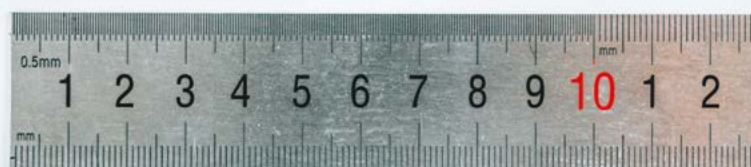
The term 'microplastics' describes a wide category with large variations in both physical and chemical characteristics as well as sources. Generally, microplastics are categorised as 'primary' and 'secondary' microplastics. Nanoplastics represent another category of microplastics, with dimensions of one to 1000 nanometres (nm).



## What are the sources of microplastics?

- Primary microplastics are a category of microplastics that includes microbeads used for cosmetic products (banned in the EU and UK), plastic pellets used to manufacture consumer goods, microfibres shed from washing clothes, as well as particles resulting from tyre erosion, road markings, marine coatings and city dust. It is estimated that close to two thirds of the primary microplastic releases to oceans are from textile laundry and the erosion of tyres.<sup>38</sup>
- Secondary microplastics are generated through the breakdown and degradation of larger pieces of plastic waste once these have been exposed to the natural environment, for example through UV degradation. It is important to note that this typically occurs with 'fugitive plastic products', i.e. those that have escaped the waste stream. Plastic packaging does not appear to be a source for *primary* microplastics, however fugitive materials may break down in the environment.

For more information on this topic, please see the section called 'Marine litter'.



38. IUCN, *Primary Microplastics in the Oceans*

## How is the presence of microplastics affecting the environment?

- Whilst more research is required, research has indicated microplastics can accumulate in the environment and can potentially be ingested by animals, potentially accumulating in the food chain. Irrespective of the true impact, the plastics industry is keen to engage and help efforts to minimise and mitigate the release of microplastics.

## How is the presence of microplastics affecting human health?

- Although some studies have documented the presence of microplastics in drinking water and food, there is currently very limited knowledge of how this affects human health. The effects of microplastic pollution on human health have not been subject to widespread research although this area of research has received increased attention from the academic community in latest years. So far, comprehensive studies from the World Health Organisation (WHO) on the effects o

## How is the industry taking action to reduce microplastics and plastic waste into the environment?

The UK plastics industry is pioneering several initiatives that reduce the input of plastic waste and microplastics into the environment.

- Operation Clean Sweep® is an initiative to prevent plastic pellet loss into the environment. The initiative helps companies in the plastics supply chain, including port authorities, transport and logistics companies, to mitigate the risk of leakage into the environment.
- Building on Operation Clean Sweep®, the BPF has sponsored the development of an internationally applicable standard on plastic pellet management throughout the supply chain.
- The industry has also long called for the consistent collection of all plastic waste across the UK, the reform of the extended producer responsibility scheme, increased investment in recycling and waste recovery infrastructure, as well as significant reduction in the amount of plastic waste sent to recycling facilities overseas.
- Furthermore, the BPF is pioneering several sustainable plastic design workstreams to help the industry design more easily recyclable products. All these initiatives will significantly increase the circularity of plastic waste and

facilitate a market for secondary raw plastic materials to create a circular economy and reduce plastic leakage to the environment, whilst also reducing the creation of microplastics.<sup>40</sup>

- The industry supported the 2018 restriction on microbeads in personal care products to help reduce the amount of microplastics in the environment.
- The industry also works to reduce the leakage of 'macroplastics' into the environment, again further reducing the production of secondary microplastics through weathering.

39. BBC News - Microplastics in water pose 'no apparent health risk'  
<https://www.bbc.co.uk/news/health-49430038>

40. For more information visit:  
[www.bpf.co.uk/ecodesign](http://www.bpf.co.uk/ecodesign)





### **Based on the evidence, the BPF believes...**

The BPF believes that the presence of plastic waste into the environment is unacceptable and a wide societal effort is needed to mitigate the risk of plastic waste leaking into the environment alongside strong industry action. Further efforts need to be made to reduce inputs of both intentional and unintentional releases of microplastics into the environment. More research is needed to understand how microplastics affect human health.

The UK plastics industry considers issues of environmental and human safety to be of paramount importance. The BPF supports global efforts to reduce plastic waste and microplastics leaking into the environment, to stop both secondary and primary microplastics from entering the environment.



# Marine litter

Plastics should not end up in the aquatic environment, where they may cause harm to wildlife. In the UK there is a well-established recycling collection infrastructure in place for rigid plastics that allows us to turn post-consumer plastics into new products.

Consumers, government and industry all have a part to play in protecting the environment and ensuring that the plastic we use to protect products and ensure safety, convenience and hygiene is easily recovered for re-use and recycling.

## What are the sources of marine pollution?

The absence of waste management facilities or inadequate waste management around the world facilitates the accumulation of litter into the environment. Hotspots of marine litter accumulation have been identified in coastal areas around the world and primarily in rapidly developing economies. Additionally, other sources such as chemicals, fertilisers and sewage are causing marine pollution.

Key sources of plastic in the oceans include:

- Personal care items being flushed into the sewage system (e.g. wet wipes).
- Waste being illegally dumped at sea.
- Primary microplastics that are either intentionally released (such as microbeads in cosmetic products, banned in the UK since 2018) or unintentionally released into the environment (such as car tyre and textile erosion or plastic pellets).
- Lost or intentionally abandoned fishing gear.
- Used articles carelessly discarded on beaches as well as other littering on both land and sea.





### Based on the evidence the BPF believes...

Based on current scientific evidence, the BPF believes that there are varied sources for marine pollution and steps need to be taken by the private sector, governments, and consumers to mitigate the risks and ensure protection of the marine environment. Marine plastics are an important source of marine pollution and the industry is proactive in ensuring that plastics are recovered for re-use and recycled in much greater proportion, so that they do not end up in the marine environment.

- Improving waste management is a critical factor in reducing marine litter.
- There is a need for more support and investment in waste management infrastructure, with a focus on Southeast Asia which is one of the biggest hotspots for marine litter accumulation.
- Current evidence suggests that the best way of reducing littering in the UK is to mount public information campaigns to discourage littering.
- Setting up efficient recycling schemes for fishing gear.
- To further increase recycling rates in the UK, the government should work with industry to improve and simplify the waste management infrastructure, particularly looking at 'binfrastructure' (e.g. 'on the go' disposal) to reduce instances of litter, as well as exploring behaviour change campaigns for those who do not recycle more generally. Better enforcement of litter laws would also disincentivise bad practices.
- Further investment should be made in the recycling infrastructure in the UK to develop a circular economy, ensuring that plastics can be recycled as close to market as possible and remain within a well-developed waste management infrastructure.
- Biobased and biodegradable plastics are not a solution for marine litter as these do not necessarily biodegrade in the marine environment.
- The shipping industry and fishing industry should continue work to minimise plastic waste entering the sea from ships, shipping containers and fishing gear.
- The UK plastics industry will continue to play a strong role in preventing plastic waste reach the environment through industry-led schemes such as Operation Clean Sweep®, as well as continuing to support anti-littering campaigns and education initiatives.
- Building on Operation Clean Sweep®, the BPF has sponsored the development of an internationally applicable standard on plastic pellet management throughout the supply chain.
- The industry has also long advocated for better 'on the go' collection of plastic waste across the UK to reduce littering, the reform of the extended producer responsibility scheme, increased investment in recycling and waste recovery infrastructure as well as significant reduction in the amount of plastic waste sent to recycling facilities overseas. Furthermore, the BPF is pioneering several sustainable plastic design workstreams to help the industry design easily recyclable products.
- The industry supported the 2018 restriction on microbeads in the UK concerning personal care products to help reduce the amount of microplastics in the environment.

