BRITISH PLASTICS FEDERATION

RECYCLING ROADMAP

BPF
British Plastics Federation

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The British Plastics Federation (BPF) is the trade association representing the entire plastics supply chain in the UK, from polymer producers and distributors, converters, equipment suppliers and recyclers. The BPF works in close collaboration with its member companies and liaises closely with government departments, as well as a broad range of non-governmental stakeholders such as charities, brands and retailers.

The plastics industry is one of the UK manufacturing sector's biggest strengths, comprising around 6,200 companies and directly employing 180,000 people.

This report has been produced by the British Plastics Federation.
The BPF would like to thank Keith Freegard of Keith Freegard Consulting Ltd for all his work on this report and all other reviewers who have provided valuable comments and feedback during its production.

This report does not necessarily reflect the views of individual companies mentioned in this report and information provided by companies does not necessarily reflect the views of the BPF.

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Foreword

Over the past year, we have faced unprecedented challenges during the Covid-19 outbreak. Protective personal equipment, often made from single-use plastics, has played a vital role in reducing transmission of the virus and safeguarding citizens working in critical industries. I would like to thank the plastics industry for their efforts during these extraordinary times, especially manufacturers who have pivoted to producing essential protective personal equipment, helping to support our NHS.

However, whilst demand in certain areas has necessarily increased, we must continue our work to reduce plastic waste and tackle plastic pollution as quickly as possible. It is encouraging to see the British Plastics Federation demonstrating that industry ambition to tackle plastic waste has not diminished.

'A Recycling Roadmap for 2030' outlines the current position of the UK plastics industry, the current evidence base and how they can achieve the transition to a circular economy within the plastics industry. To move forward, it is essential that we have robust data readily available to inform decisions, with gaps identified, and common strategies in place so we all move in the same direction together. The broad range of data drawn together makes for some thought-provoking reading which will be a valuable springboard for future thinking.

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. The Bill will include powers to create extended producer responsibility schemes; introduce deposit return schemes; establish greater consistency in the recycling system; better control the export of plastic waste; and give us the power to set new charges for other single-use plastic items.

Working closely with industry, we will continue to make great and necessary strides over the next decade. Taking decisive action now on plastic waste is crucial if we are to meet our commitment to eliminate avoidable plastic waste by 2042. We welcome the ambition of industry and together we will continue to work towards leaving the environment in a better state than we found it in for the next generation.

Rebecca Pow MP
Minister for the Environment

Introduction

The next decade will bring with it huge challenges and opportunities for the UK plastics recycling industry as the plastics value chain continues its move towards a circular economy and companies are increasingly incentivised to use more recycled content in their products.

This roadmap has been created by the British Plastics Federation (BPF) following detailed analysis of available market data and consultation with leading experts to provide an ambitious vision for how the UK could deal with plastic waste by 2030.

It will provide a clear overview of the plastics industry today, examining how much plastic is placed on the market, how much is recycled and what the capacity for plastics recycling in the UK is today. The report will look not only at how we deal with our waste today but also at how we could deal with it by 2030, including an examination of the emerging technology of non-mechanical recycling and the key role it will play in the future. A significant part of this is to move to zero reliance on low-quality export to reverse the current dependence on export as an outlet for end of life plastics.

Britain has the chance to lead the world in the rapid transition to a circular economy for plastics, where a 'full-system' approach is taken for collection, sorting and reprocessing of plastic products. The roadmap will examine the drivers of change required to make this possible.

The Case for Recycling

If all plastic were recycled globally, this could result in mean annual savings of 30 to 150 million tonnes of CO2, equivalent to shutting between 8 and 40 coal-fired power plants globally[1]

The global warming potential associated with plastics recycling is **at least half** of that associated with incineration or landfilling.[2]

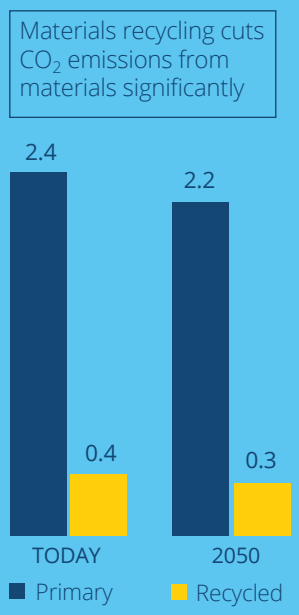
The Collaborative Industry Group, who produced the report '*Future of Packaging Report*' as part of The Retail Institute, Leeds Beckett University, commented '*The view of our Collaborative Group is that due to the potential consequences of abandoning plastic in some product categories, greater effort is necessary to improve the systems for collecting and recycling waste*'.

Using post consumer resin (PCR) in products significantly reduced greenhouse gas (GHG) emissions. 30% PCR in polyethylene terephthalate (PET) packaging on average results in a reduction in GHG by **15.25%**, High Density Polyethylene (HDPE) is **10.23%** and Polypropylene (PP) is **6.38%**.[3]

Recycling saves between **30%** and **80%** of the carbon emissions that virgin plastic processing and manufacturing generate.[4]

Improvements in product design and materials choice, combined with increased collections, recycling and improvements in underlying technologies, could create an additional **€30bn** of revenue across Europe.[5]

FIGURE 1: CO2 emissions from primary and recycled material



Source: Material Economics The Circular Economy a Powerful Force for Climate Mitigation, https://materialeconomics.com/publications/the-circular-economy-a-powerful-force-for-climate-mitigation-1

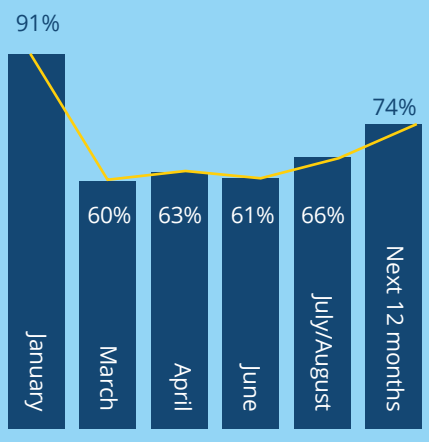
Note:Plastics:primary versus recycled tCO2/tPLASTICS

COVID-19 UPDATE

The majority of this report was produced before the Covid-19 pandemic. The plastic recycling industry has been affected with facilities running at reduced capacities (av. 60%) during the initial lockdown. Low virgin prices due to lack of consumption in light of the pandemic have compounded this impact. There is uncertainty over the long-term impact of the pandemic around capacities and commercial viability.

As a result of the pandemic, it is likely that rates of growth will be lower and timings for regulations delayed. However, there is an opportunity for the UK to build a green economy as we move out of this crisis.

FIGURE 2: Operational capacity of BPF Recycling Group Members duting 2020



Executive summary

Executive summary

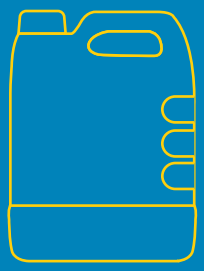
The Recycling Roadmap sets out all the current data available for plastic recycling in the UK in all sectors. It also looks at the material which is placed on the market (POM) and in the waste arising to show the opportunity to increase recycling. This report has found there are areas where data is limited, and expert views have been sought to make estimates where this is possible. Below is an overview of the key data – the latest available data has been used.

3,600 kT
UK Plastic Consumption[6]

Packaging

560 kT
Household packaging collected for recycling[7]
2019

2,290 kT[8]
POM produced 2019*



77%
PET/HDPE plastic bottles are recycled[11]

1,141 kT
Plastic packaging recycled (consumer and non-consumer)[9]

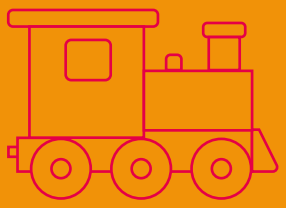
49.8%
Recycled
of which **61%** is exported[10]
2019

*assumed to become waste within the same year.

Building and construction

143 kT[12]
Polyvinyl Chloride (PVC) recycled in UK and Ireland
2019

Toys



73 kT[13]
POM

Note: No figures on recycling volumes for used toy products could be sourced for this report, although a significant proportion of electrical toys will be captured within WEEE collections

Waste Electrical and Electronic Equipment (WEEE)

505 kT[14]
WEEE collected for recycling

1,714 kT[15]
Electrical and electronic products are POM

386 kT
estimated to be plastic

111 kT
Plastic recycled from WEEE
2019

End-of-Life Vehicles (ELVs)

250–360 kT
Estimate of all polymer types in ELV waste stream
(includes textiles; elastomers; seating foams)

~150 kT
Rigid plastics suitable for mechanical recycling.

1.75 million ELVs
Average mass 1.2 tonnes
~15% plastic.

450–600 kT
Plastic POM in new vehicles.

2.3 million[16]
New cars sold in 2019.

40-60 kT
Plastic recycled from ELVs to final output polymer.

Medical

RecoMed
a PVC medical recycling scheme
Run by BPF
funded by VinylPlus

23 tonnes
PVC recycled[17]

Expanded Polystyrene (EPS)

18 kT
Produced, UK

24 kT
Disposed of, UK

13 kT
Recycled/collected[18]

While there is limited data on where recyclate is currently used, PlasticsEurope have estimated UK post-consumer consumption as 275kT. The BPF are also working with EUPC on the MORE tool and will be gathering data to fill the knowledge gap. This roadmap sets out some of the markets which use recyclate and also commitments made by companies.

In Section 3 of the report, the vision for 2030 is set out. A key part of the vision for 2030 is that there will be zero reliance on low-quality export. Any export taking place would be good-quality material driving overall quality up by removing an outlet for low quality material. This will focus on material where there are no UK facilities to handle it and/or it is surplus to UK capacity; it therefore represents the best environmental outcome. The roadmap also has minimal landfill (1%), and this would be used in exceptional or unavoidable circumstances. Starting with these two key areas, an estimate has been made by seeking expert views and opinion on the amount of plastic which will go to mechanical recycling, non-mechanical recycling, composting and Energy from Waste (EFW). The breakdown of this vision compared to 2020 is available in Figure 3.

The estimates are designed to be ambitious but also show what can be achieved with the correct drivers and investment in place.

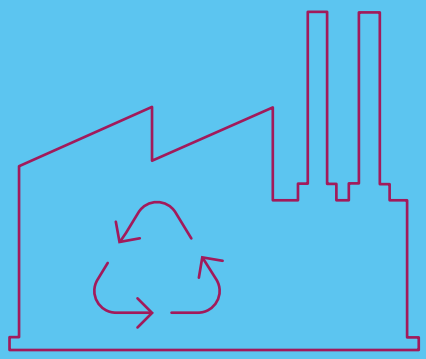
Section 3 of the roadmap goes on to look at key areas in the plastic supply chain and what these will need to be like in 2030 in order to achieve the estimates (see Figure 4).

Estimated capacity in the UK

150–200 kT pa
Film capacity

440 kT pa[19]
Household packaging

230 kT pa
capacity output



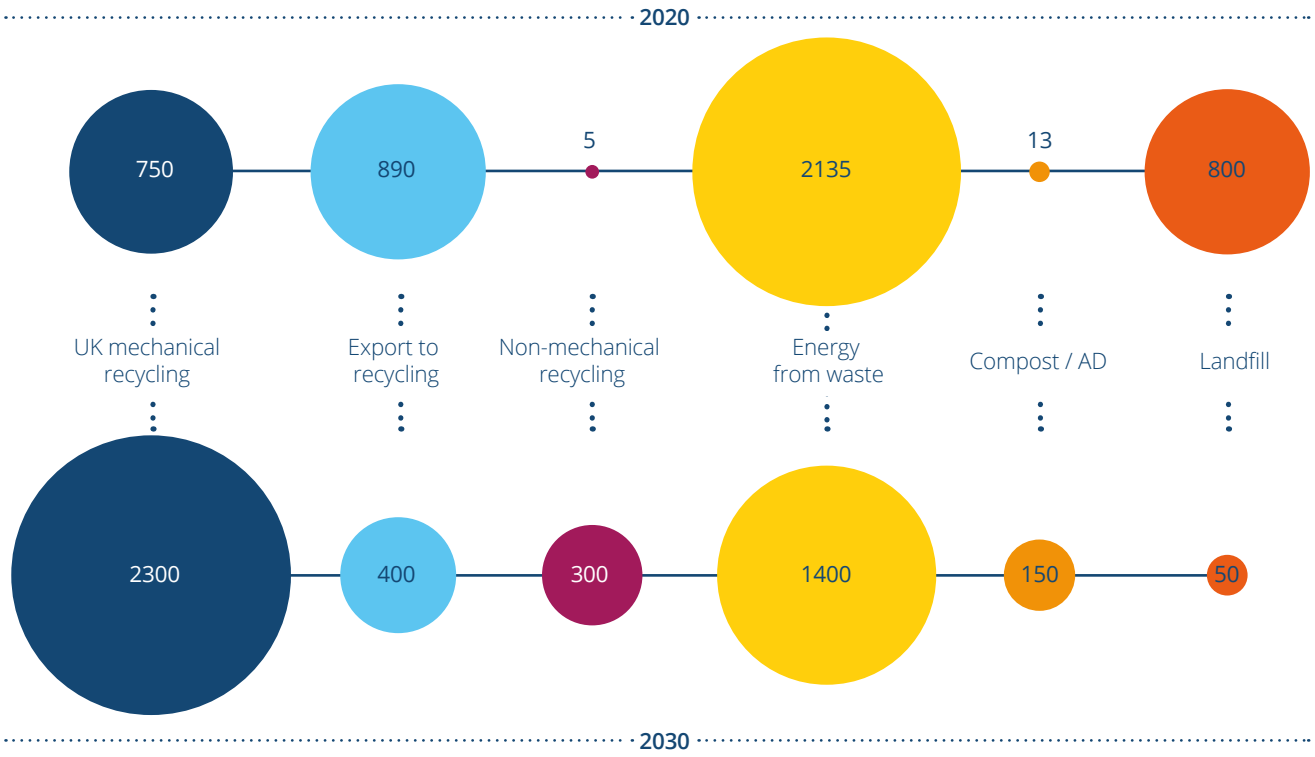
800–1000 kT pa
Total capacity in UK

120–140 kT
ELVs and WEEE

50 kT
capacity output

FIGURE 3: UK Waste Plastic Flows 2020 and 2030

Tonnage, kTonnes



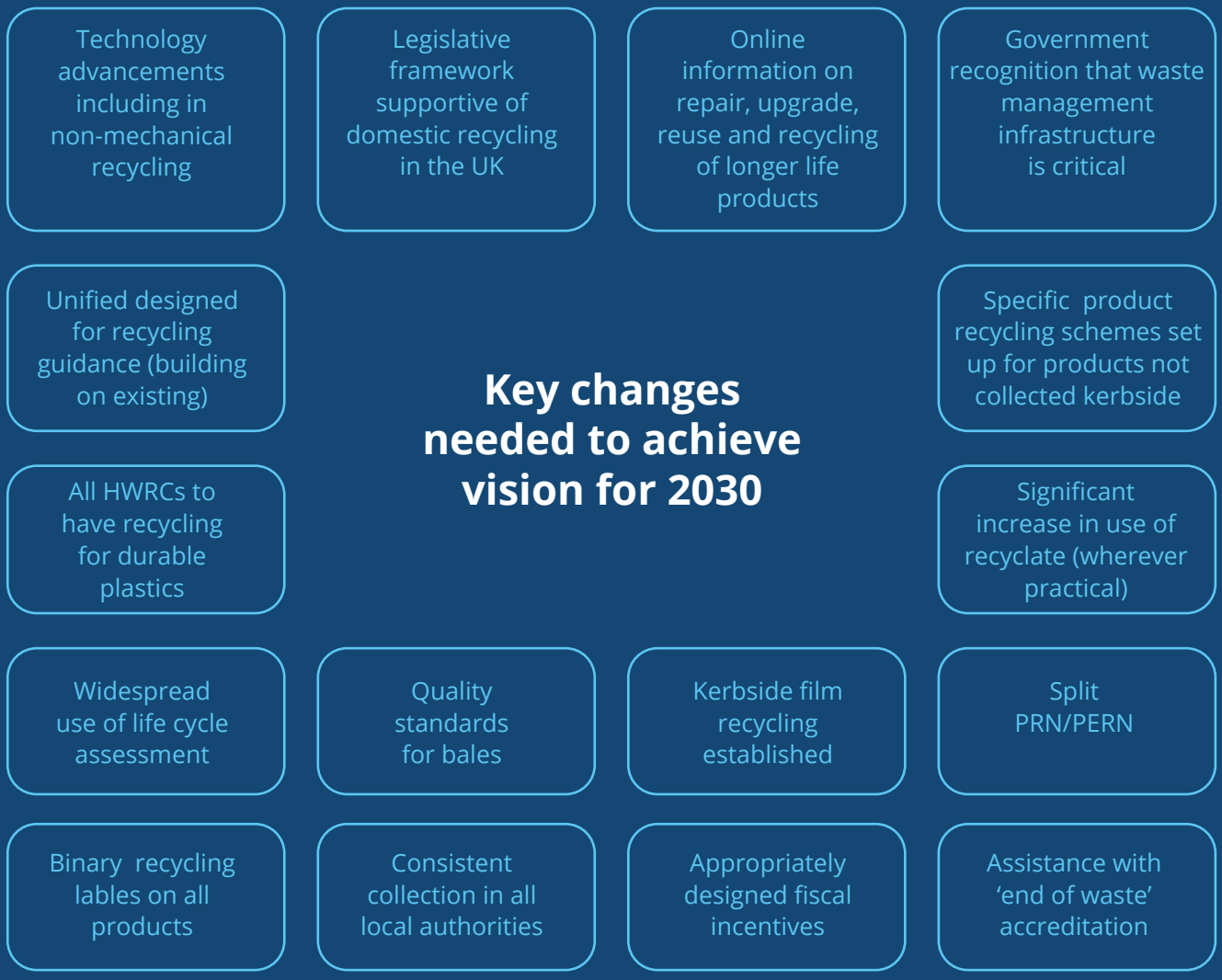
Key assumptions

- Plastic tonnage in the waste stream is stable
- Non-mechanical recycling technology proven at scale
- Zero reliance on low quality export
- Extended Producer Responsibility (EPR) is in place and other legislative drivers developed have a meaningful positive impact on the industry
- Increase in high-quality recyclate used in open and closed loop applications
- Biodegradable and compostable plastic used in controlled systems
- EFW capacity remains stable
- Efficiency of facilities increases
- Landfill is minimal
- Significant increase in the amount of recyclate incorporated into all plastic products.
- Mechanical recycling in advanced UK-based sorting, cleaning and reprocessing plants is operating efficiently
- Waste crime significantly reduced
- Standardisation of collection

Key predictions for 2030

- Minimal plastic to landfill (1%)
- Zero reliance on low quality export (9%)
- Over 30% reduction in EFW
- Over 3 times increase in UK mechanical recycling tonnage
- 3.5 times increase in reprocessing in the UK
- Growth in the non-mechanical recycling industry

FIGURE 4: Key Drivers for Change



Where are we now?

Snapshot status of UK plastics recycling, 2020

1. Where are we now? Snapshot status of UK plastics recycling, 2020

1.1 UK plastic market consumption to make products

UK consumption is estimated to be 7.1% of the European demand (50.7 MT). Split across the primary markets, this gives UK tonnages at the converter level, shown in Figure 5.

Figure 5 gives an indication of the plastic volumes being used to make products but is not an accurate representation of products POM because import and export trade movements account for significant material flows and are much harder to track.

UK consumption
is estimated at
3,600 kT[20]

FIGURE 5: UK plastic consumption estimates by converters 2018

Sector	Packaging	Building and construction	Automotive	Electrical and electronic	Agriculture	Household sports and leisure	Medical	Other	Total
kTonnes	1,512	828	252	216	108	108	72	504	3,600
Percent	42%	23%	7%	6%	3%	3%	2%	14%	100%

Source: based on data from PlasticsEurope on plastic conversion sectors in Europe[28]

1.2 Packaging

1.2.1 Material flows – POM

As plastics packaging has its own regulatory control system to measure the total volumes POM, it is possible to quote figures for the retail sales and used packaging waste arisings with a degree of confidence.

In the PackFlow Covid-19 Report, the total POM figure for Plastic Packaging is quoted at 2,290 kT for 2019. The packaging used for consumer retail products is estimated at 1,447 kT, of which approximately 2/3rds is used for grocery items (987 kT) – see Figure 6.

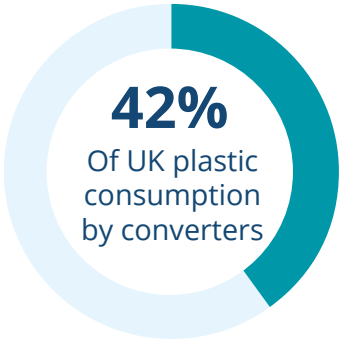
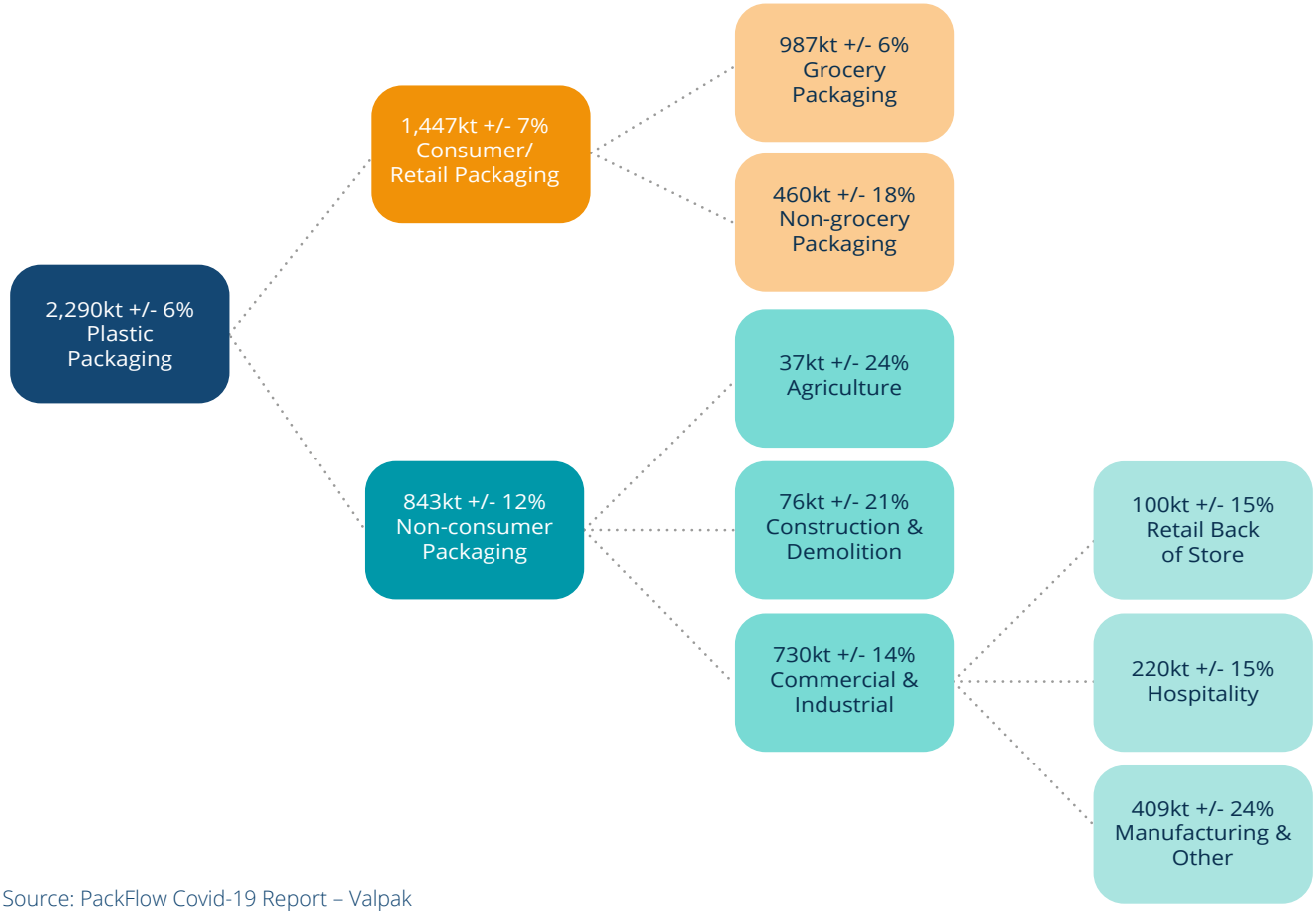


FIGURE 6: Plastic Packaging POM per sector



Source: PackFlow Covid-19 Report – Valpak

FIGURE 7: UK Consumer Plastic Packaging, 000s tonnes/yr

UK Consumer Packaging POM 2019	HDPE	LDPE	PE	PET	PP	PS	PVC	Other	Total kT/yr	%
Film	16	103	17	43	80	4	3	46	643	44
Bottles	274	0	2	348	17	0	0	1	311	22
PTT	5	0	3	164	92	28	3	4	194	12
Other	43	21	3	44	77	2	1	2	300	21
Total:	**338**	**125**	**24**	**599**	**267**	**35**	**7**	**53**	**1447**	
%	**23**	**9**	**2**	**41**	**18**	**2.4**	**0.5**	**4**		

Source: PackFlow Covid-19 Report – Valpak

The Consumer Retail packaging volume of 1,447 kT is split down into individual polymer type and pack format in Figure 7.

Just six polymer and pack formats dominate the overall tonnage at 73% of the total, polyethylene (PE) and PP films; HDPE and PET bottles; PET and PP Pots, Tubs and Trays (PTT) [shaded in orange on the table]. It is these primary packaging types that will have to deliver the mainstream flow of post-consumer recycling in the UK over the next 10 years.

In the PackFlow Covid-19 Report, the total POM figure for Plastic Packaging is quoted at 2,290 kT across all markets, more than the consumption by converters figures of 1,512 kT (Figure 5) which indicates the large net flow of plastic packaging into the UK annually.

An estimate of the 'net import' of plastic packaging has been made using data from the National Packaging Waste Database (NPWD) reported figures. This is summarised in Figure 8.

This data indicates that around 50% of the estimated 2,290 kT of plastic packaging is imported into the country (as 'filled packs' or 'unfilled packaging'). The reported data also shows that about 25% of UK converted packaging gets exported out of the country, either filled or unfilled, so the 'Net Import' balance is then approximately 670 kT (+/- 10% error). This gives an approximate volume of UK-based plastic packaging conversion at around 1,600 to 1,750 kT pa.

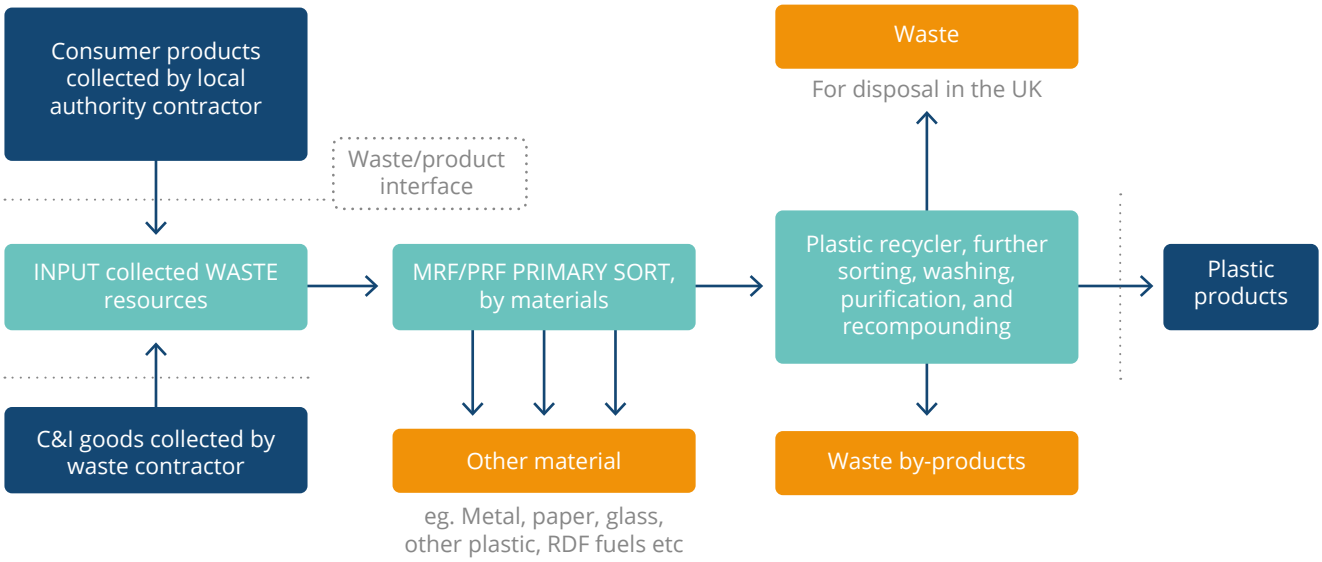
As most packaging has a short 'in use' phase, it is reasonable to assume that the majority of the used packaging goes into the waste stream within the same year. This means the total waste plastic packaging arisings will be roughly equal to the POM figure in the same annual period.

FIGURE 8: Estimate of the net import of plastic packaging

Estimate of packaging net imports, 2018	kT	Percent of UK POM
1. Import of plastic packaging unfilled	486	Figures are indicative & adjusted for non-obligated packaging
2. Import of plastic packaging filled	737	
3. Export of plastic packaging unfilled	345	
4. Export of plastic packaging filled	211	
Filled + Unfilled IMPORTS	1,223	52%
Filled + Unfilled EXPORTS	556	24%
Net Unfilled packaging imported	141	6%
Net Filled packaging imported	526	22%
Overall net IMPORTs balance	667	28%
% of POM all UK packaging (Plastic Flow 2025)	2,360	100%
Approx. tonnage of UK conversion (UK POM – overall net import)	1,693	72%
Potential UK-based demand for recycled material (based on 30% content)	508	N/A
DATA ex NWPDB – Valpak April 2019		avg. RC%

Source: based on data from the NPWD

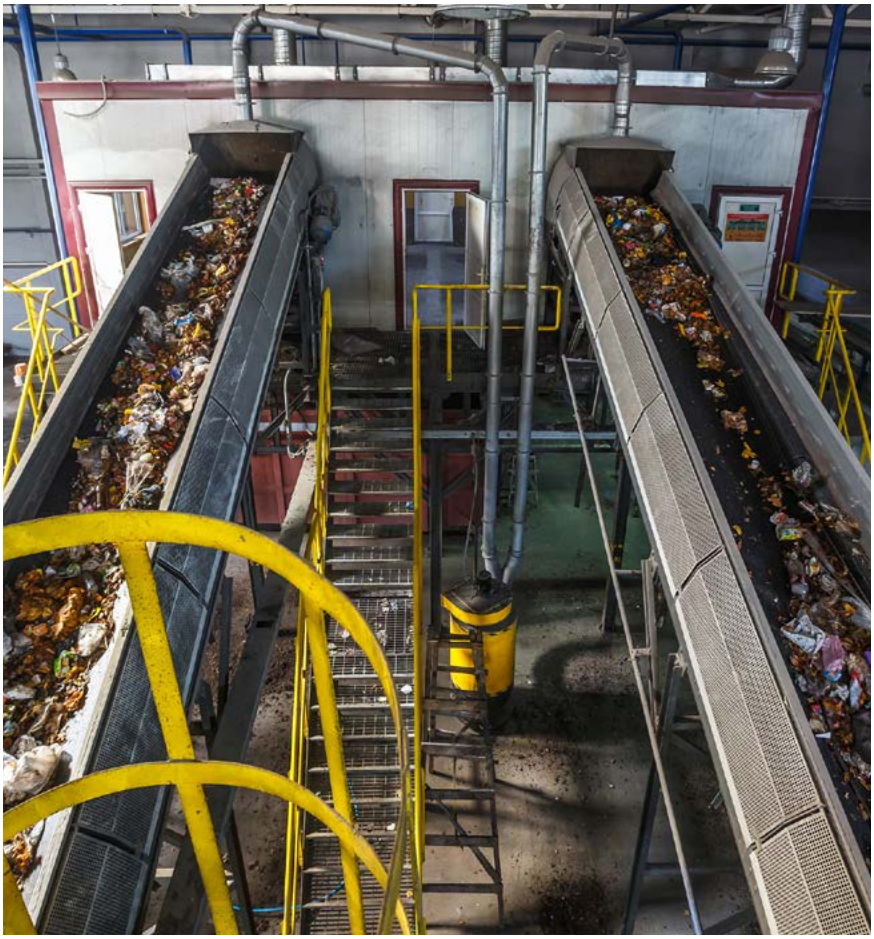
FIGURE 9: Product and Waste Flow – Plastics Recycling Industry



1.2.2 How much plastic packaging is recycled?

Figure 9 indicates how this process works in the UK. It is important to note that losses occur in sorting and reprocessing facilities (percentage varies based plastic materials on quality), impacting the final output tonnages.

In all cases, it is the effectiveness of the initial collection system that determines the ability of the downstream processing steps to deliver high-quality output plastics at a high yield efficiency.



1.2.2.1 Household collection rates

Plastic packaging collections started as a voluntary measure from industry. The BPF were involved in the 1980s in a project called PET-A-BOX which provided collection facilities for PET bottles in supermarkets in Yorkshire. More thorough collection schemes started in 1994 with the introduction of the Producer Responsibility Regulations in 1997. In this time, the industry has gone from near zero recycling to over half a million tonnes of household plastic packaging being collected for recycling.[21]

This impressive growth curve for household collections over the past decades shows that plastic bottles are the main component in the plastic mix from UK residents (67%). PTT have shown strong increases for the past 10 years (to 29%), and now plastic flexible films are also being added by some councils (up to 4%).

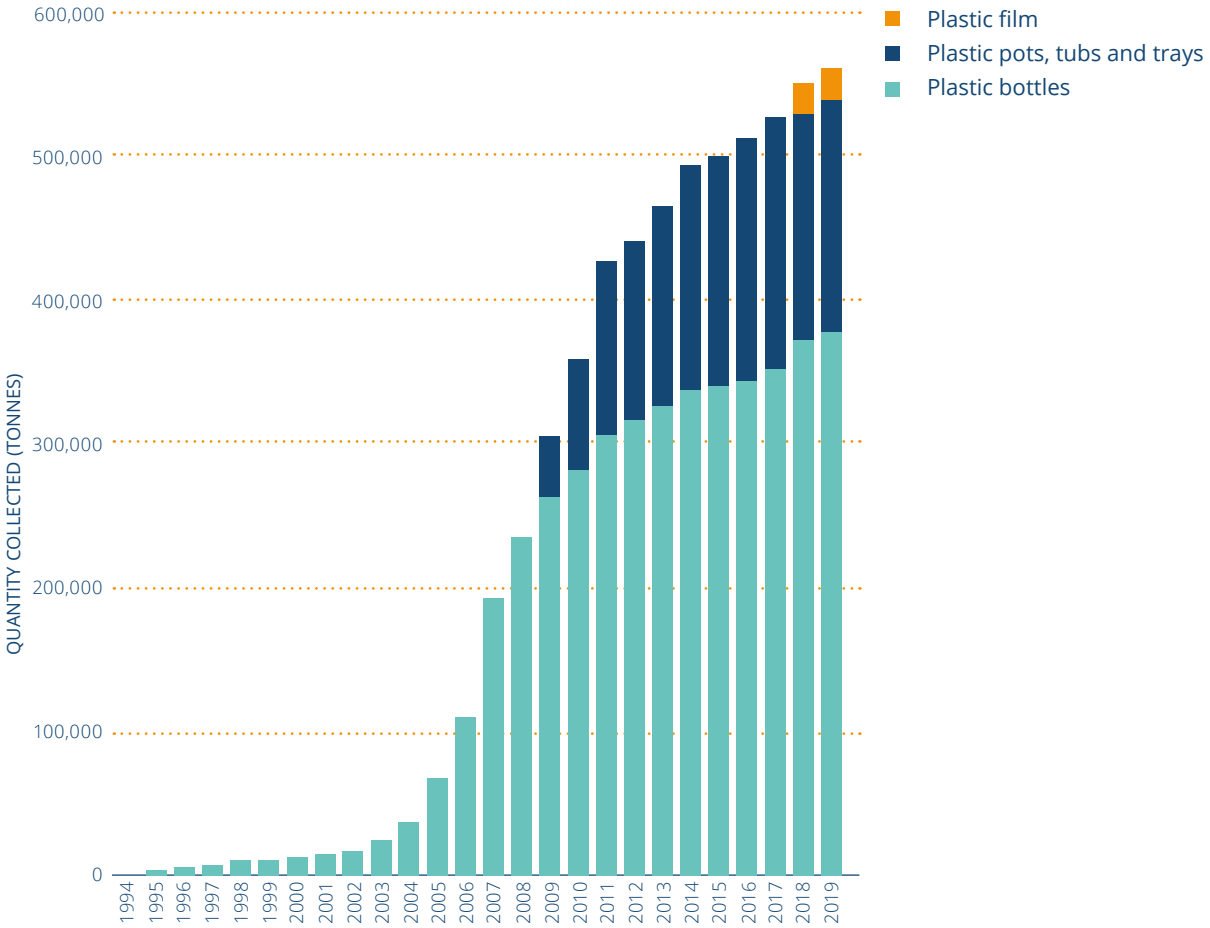
There is an additional volume of waste post-consumer plastic taken for drop-off at the UK's 550 HWRCs. In a recent study by RECOUP,[22] it is estimated that 54,000 tonnes of mixed plastics are collected via HWRCs, but it is not known how much of this is packaging and also how much is separated for recycling.

FIGURE 11: Tonnage of plastic packaging collected for recycling in 2019

	2019 (tonnes)	% Split
Plastic bottles	377,000	67%
Plastic pots, tubs and trays	161,000	29%
Plastic film	22,000	4%
TOTAL	**560,000**	**100%**

Source: RECOUP Household Plastic Collection Survey, 2020

FIGURE 10: Household collection tonnages – UK Plastic Packaging 1994 – 2018



Source: RECOUP UK Household Plastic Collection Survey 2019

1.2.2.2 Plastic packaging recycling

Figure 11 is the household plastics collection rates (i.e. what is collected by local authorities via kerbside schemes), whereas the actual total tonnage recycled from household and non-household sources is measured from the NPWD based on material accepted for recycling by UK accredited reprocessors and accredited exporters, which is slightly more than the PRN/PERNs issued (see Figure 12 for how the PRN system operates). This includes both household and the non-consumer packaging sectors of commercial & Industrial (C&I), construction and agricultural packaging products (approximately 843 kT of C&I plastic waste on top of 1,447 kT consumer).

NOTE: These 'evidence notes' or PRNs can be created at two different points on the recycling system:

1. As PRNs related to each tonne of fully recycled plastic pellet or flakes measured at the output from accredited UK-based reprocessor plants (so includes net of any yield losses during the recycling process).
2. As PERNs – Export evidence notes created by the measured tonnage of material shipped out of the UK for recycling or recovery overseas. This therefore includes any contamination within the load.

49.8%
Plastic packaging recycling rate with **1,141 kT** recycled[23]

77%
The recycling rate for PET/HDPE plastic drink bottles[24]

39%
of plastic packaging was recycled in the UK in 2019
449,332 T[25]

61%
of plastic packaging was exported in 2019
691,993 T[26]

FIGURE 12: PRN system in the UK

WHAT IS THE PRN SYSTEM?

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.

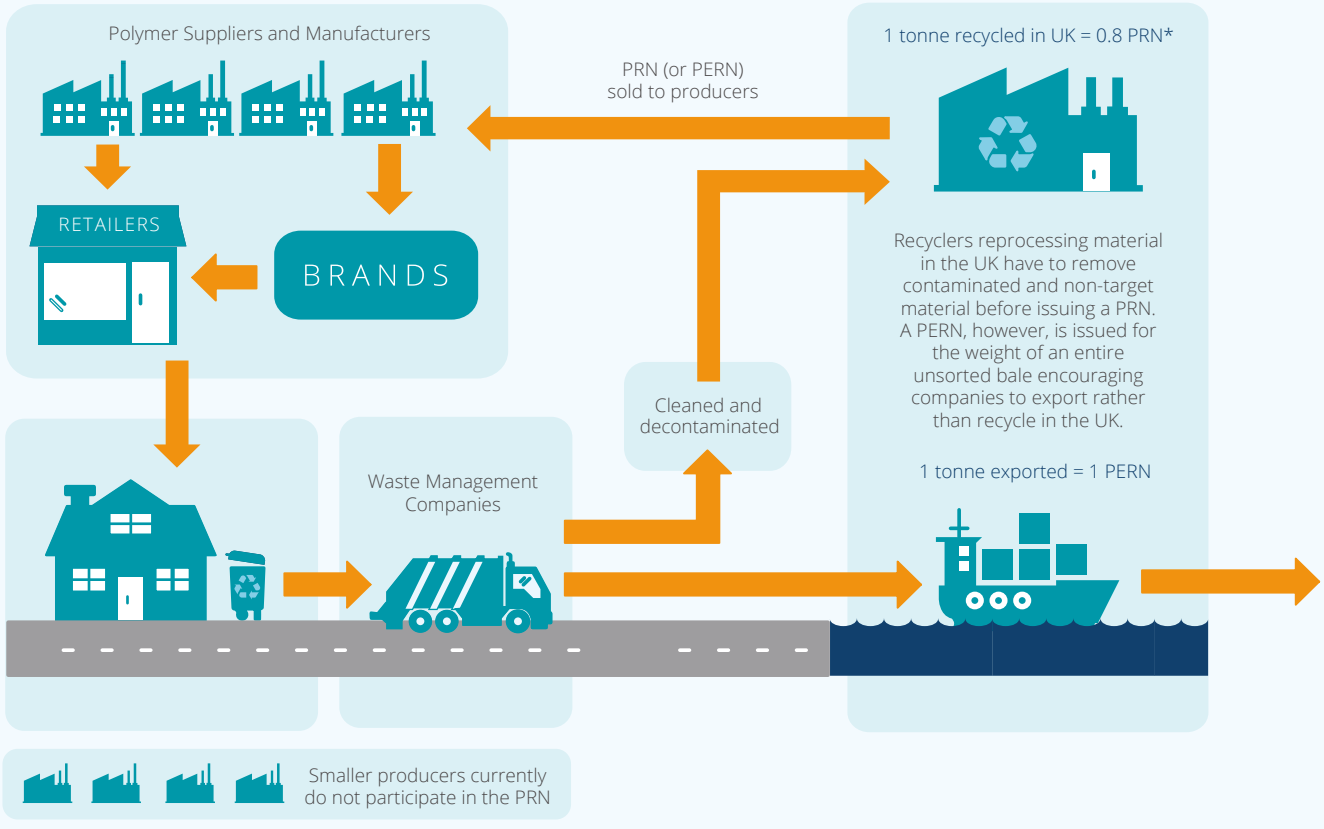


FIGURE 13: Plastic Packaging Recycling 2013 – 2019

Year	UK (tonnes)	Export (tonnes)	Total sent for recycling	% Export
2019	449,322	691,993	1,141,315	61%
2018	384,848	649,562	1,034,410	63%
2017	358,467	685,896	1,044,363	66%
2016	330,731	684,495	1,015,226	67%
2015	327,591	563,550	891,141	63%
2014	327,751	514,437	842,188	61%
2013	283,853	430,371	714,224	60%

Source: NPWD – 360 Env. Feb 2020

The trend of exports versus UK recycling is shown in Figure 14:

FIGURE 14: Plastic Packaging Recycling 2013 – 2019 – Source: NPWD – 360 Env. Feb 2020

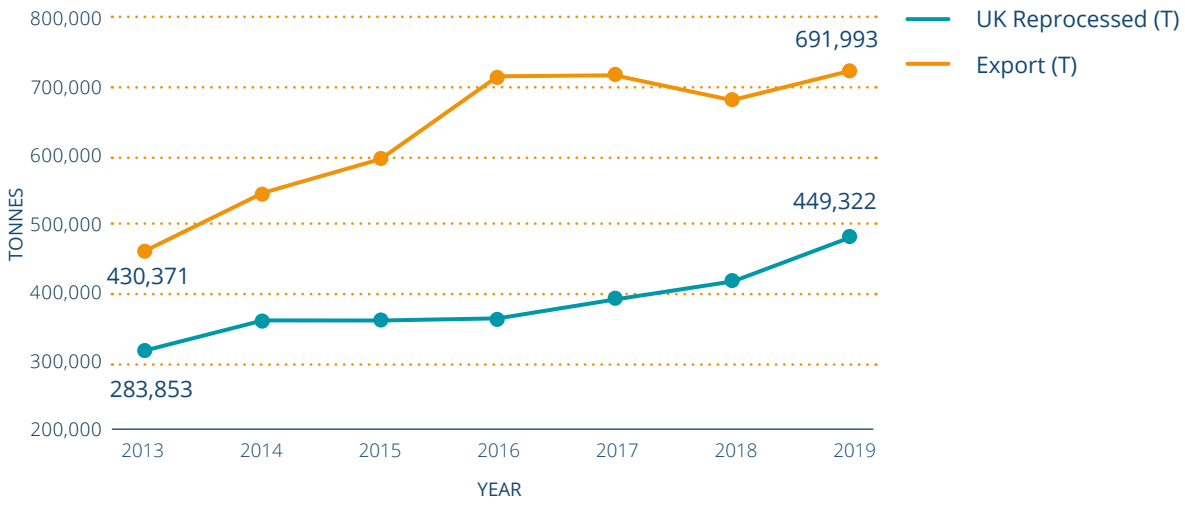
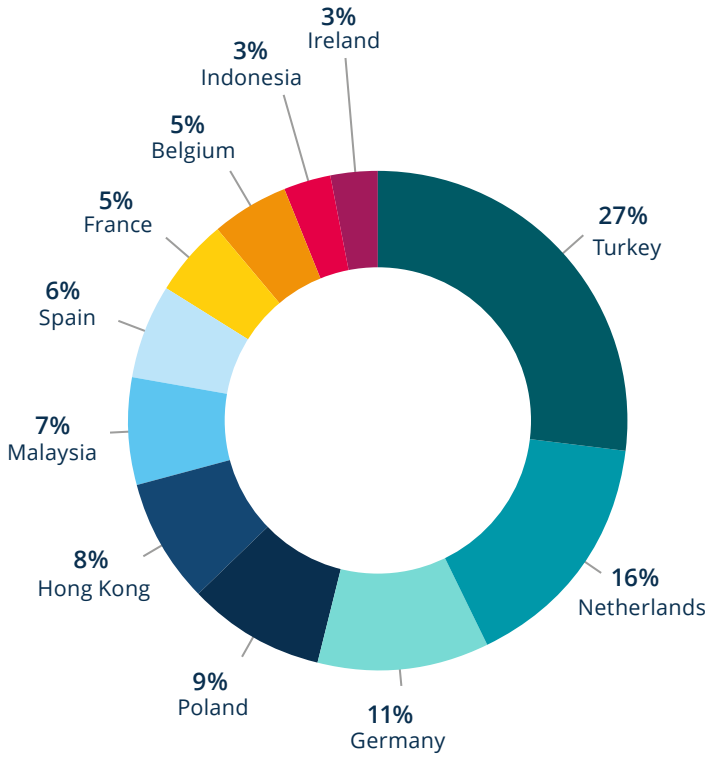


FIGURE 15: Plastic Packaging Export Destinations 2019



Source: National Packaging Waste Database – 360 Env. Feb 2020

Figure 15 above highlights the current export destinations for UK plastics packaging waste.

The UK has been reliant on export in order to recycle plastic packaging. The PRN/PERN system has contributed to this reliance due to the different measurement points described earlier. There has therefore been a lack of investment in new recycling facilities in the UK which has led to a further reliance on export. As seen in figure 14, the proportion of material sent for export has been stabilising since 2016, but it is still the dominant end of life route for recycled material.

Previously, the material would have gone to China; however, with China placing heavy restrictions on recycling material they import, Figure 15 now shows Turkey, the Netherlands, Germany and Poland covering 63% of the Top 10 volume. Hong Kong, Malaysia and Indonesia remain significant end-destinations, although there is a continued trend away from sending material to these countries where stricter requirements are being put in place.

Through the Basel Convention, waste shipment regulations are changing in 2021 with more material being notifiable. The impact of this on export remains to be seen, but without clear guidelines on acceptable levels of contamination or what constitutes 'one polymer' there is an opportunity for misinterpretation.

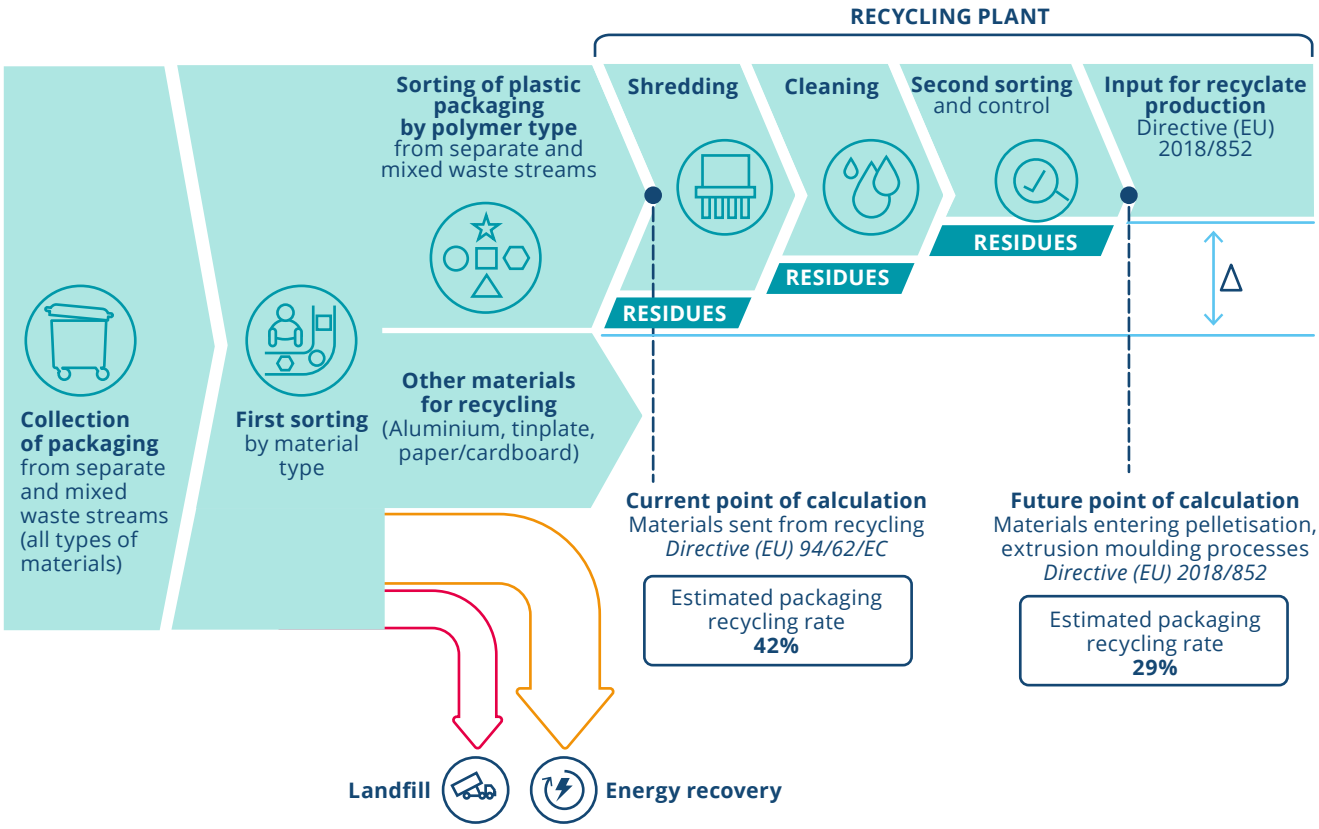
Basel Convention

From January 2021 all imports and exports of plastic waste will need notification unless they meet the requirements of being:

- Almost exclusively of one type of plastic, almost free from contamination and other types of waste.
- A mixed shipment of PET, PE and PP provided all waste is destined for separate recycling in an environmentally sound manner and almost free from contamination and other types of waste.

There is a specific list of what falls within 'one type of plastic'.

FIGURE 16: Impact of changing the measuring point for recycling



Source: Plastics Europe – The Circular Economy for Plastics – an overview. 2019

1.2.3 New measuring point for packaging recycling across Europe

The need to create a common 'point of measurement' for reporting of national recycling rates across Europe has been recognised by the EU Commission. A new Commission Decision was made in June 2019 '*laying down rules for the calculation, verification and reporting of data on waste*' recycling rate for Member States.[27]

This will be at the 'point where material enters the final recycling process', and for plastics that means:
'Plastic separated by polymers that does not undergo further processing before entering pelletisation, extrusion, or moulding operations, OR Plastic flakes that do not undergo further processing before their use in a final product.'
(ex Annex 1, EU Decision 2019/1004, ref 5)

Proposed UK Government Policy Measures

A deposit return scheme for drinks containers
2023

EPR measures
2023

Consistent collection systems across UK households,
2023

Tax on plastic packaging with less than 30% recycled content
April 2022

1.2.4 Policy changes for UK packaging

With its high visibility in use and frequency of disposal by UK consumers, packaging has come under increased focus of attention in the media and from NGOs. This has happened at a time when climate change, environmental impact and marine litter have all become mainstream news items. Governments across Europe have responded to this with a raft of new regulations and policy directives included in its 25 Year Environment Plan and Resource and Waste strategy.

At the state opening of parliament in December 2019, the Queen's speech included a reference to banning 'polluting plastic waste' to non-OECD countries. It is expected that a consultation linked to this will be released in 2021.

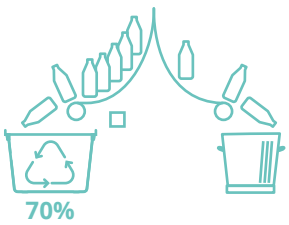
In addition to measures expected to come into force from the UK government, there is also measuring being put in place at a European level. It is expected the UK will want to equal or better these measures. This includes an objective that 'all packaging on the EU market is reusable or recyclable in an economically viable way by 2030', and part of the review of the Packaging and Packaging Waste Directive will be how to achieve the ambitions set out in the European Green Deal and the New Circular Economy Action Plan (CEAP).

2.2.5 UK Plastics Pact

The UK Plastics Pact brings together the plastics value chain. There are more than 120 business, government, local authorities and organisations who are signed up to the pact.

UK Plastics Pact Targets, 2025

100%
of plastic packaging will be reusable, recyclable and compostable



70%
of plastic packaging effectively recycled

30%
average recycled content across all plastic packaging

Eliminate problematic or unnecessary single-use packaging items through redesign, innovation or alternative (reuse) delivery models

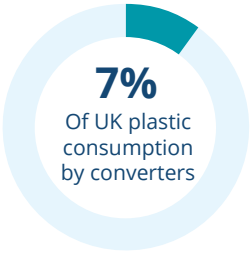
1.3 Other major UK plastic markets and waste arisings

The UK converter demand for non-packaging plastic is estimated at 2.1 million tonnes.[28] WRAP have a similar figure of 2.5 million tonnes.[29] However, as mentioned, due to imports and exports this does not represent the total tonnage of non-packaging POM in the UK in any one year. The UK motor vehicle market is a good example of this, with the SMMT[30] data showing that for 2019:

- Cars built in UK = 1.3 M
- Export of cars out of UK = 1.06 M
- New car UK registrations = 2.3 M

Hence using the 'plastics converter consumption' volume estimates as an indicator of future waste plastics arisings in the UK would be erroneous and misleading.

1.3.1 Motor Vehicles and ELVs plastics arising



1.3.1.1 POM vehicles

UK new car registrations
in the past 20 years
vary from 2.0 to 2.6 million vehicles
Additional 12 – 14%
for commercial vehicles and lorries[31]

Plastics used in cars has increased
and is currently between
~12 and 17% of vehicle mass
(up to 50% of volume)

Average vehicle weights
have **increased** from
1 tonne to ~ 1.5 tonnes
per vehicle in the last 20 years[32]

450 to 600 kTpa
of plastic placed on the market
in new cars[33]

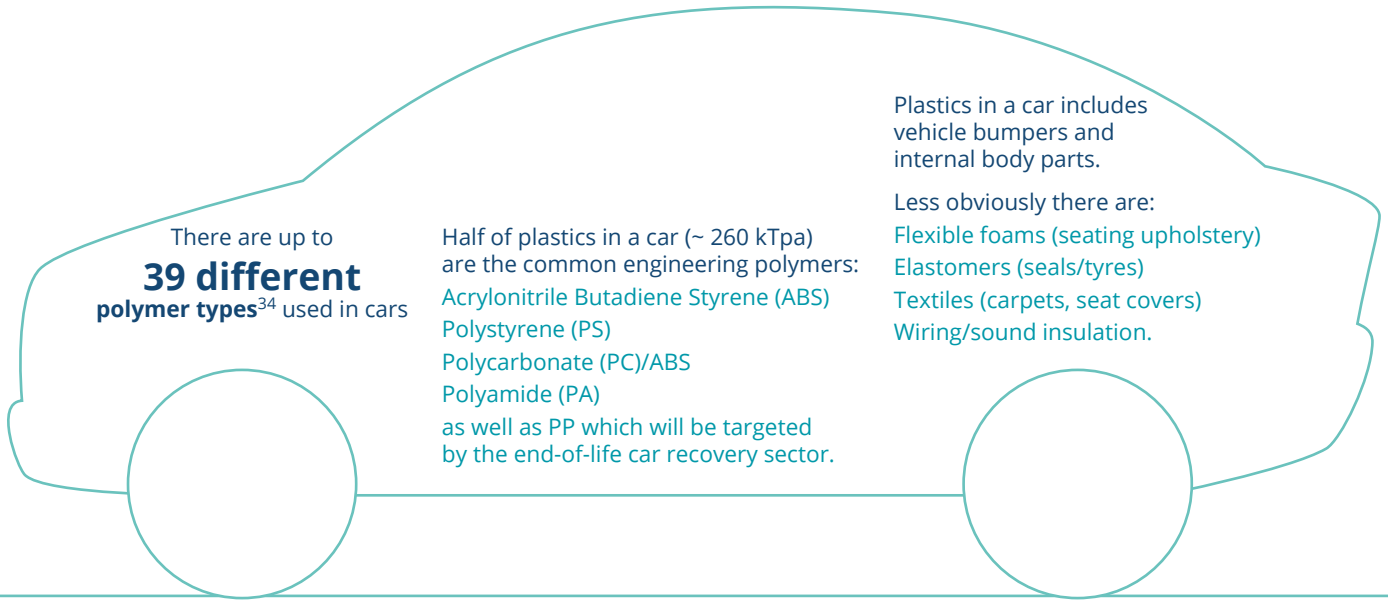
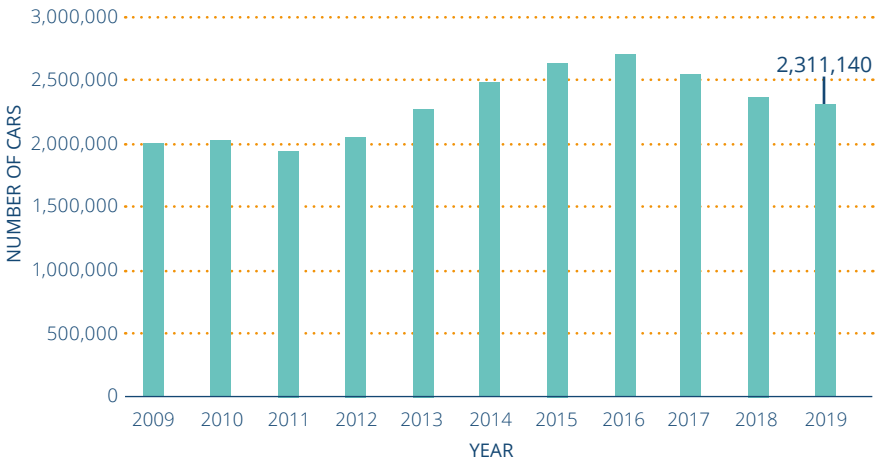


FIGURE 17: Annual New Car Registrations 2009 – 2019



Source: SMMT, SMMT Motor Industry Facts 2020

250 – 360 kT pa[35]
on average of plastic waste
arising from ELVs

1.3.1.2 ELVs POM

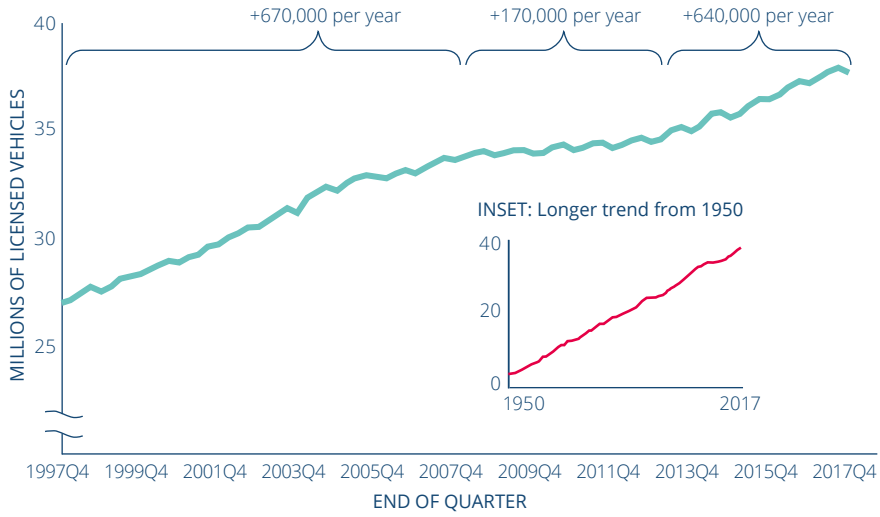
The Driver and Vehicle Licensing Agency (DVLA) has a cumulative registered number of 37.7 million vehicles.[36] This reduces to 35 million when you allow for 'ghost ELVs' which were not correctly issued with a 'certificate of destruction' when they were scrapped or exported. Using the number of vehicles POM each year (2.4 million) and the annual increase in vehicles (640,000) means about 1.75 million vehicles reached the end of life each year.

The plastic waste arising from ELVs has been estimated at 250-360 kT pa. About half (150kT) of this is rigid plastic suitable for mechanical recycling.[37] Losses of ELVs from the UK via exports are a lot lower than seen in mainland Europe where lost vehicles are as much 4 million units (6.6 million are treated within the EU[38]). The logistics of the UK being an island, administrative costs and that vehicles are left-hand drive make them less attractive.

Plastics in automotive: Light weighting vehicles

- While plastics make up to 50% of today's automobiles by volume, they account for less than 20% of weight.
- Reducing a vehicle's weight by 10% could increase its fuel economy by 6 – 8%[39]
- It is estimated that the use of plastics in cars and the subsequent light weighting saves about 750 litres of fuel over the lifetime of the car[40]

FIGURE 18: Licensed vehicles in Great Britain 1997 to 2017



Source: DVLC DoT Vehicle Licensing Statistics: Annual 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/716075/vehicle-licensing-statistics-2017-revised.pdf accessed 09.12.2020

1.3.1.3 Available material in the future

It is estimated a car's average working life is 13 – 14 years and the total car-pool is around 35 million vehicles. Using an average vehicle mass of 1.5 tonnes and plastic content of 14.5% means there is 7.6 million tonnes of polymer components in the vehicles currently in use. If half of this was viewed as potentially recoverable 'future recycled plastic resources' and valued at a modest £1,000 per tonne as raw compound, then the UK car-fleet holds an accumulated future value of £3.8 billion as recyclable 'r-plastic'.

1.3.1.4 Recycling for motor vehicle plastics

The collection and materials recycling for motor vehicles take place under the 'End of Life Vehicle (ELV) Directive' (European Directive 2000/53/EC) which was first adopted in 2000. This sets the target recycling and recovery rate for materials from the end of life treatment of cars. Originally a figure of 85% was used, and that was increased to 95% in 2015 (of which 85% is material recycling and 10% is energy recovery). The majority of this 'material target' is met from steel and non-ferrous metal recycling at ~75% of the vehicle weight, but large-scale plants which separate other materials from the bulk shredder waste have been implemented across Europe in the past decade in order to extract some of the rigid plastics for onwards reprocessing of plastics.

In 2018 there was a 92.8% reuse and recovery rate for vehicles. 85.2%[41] of this was recycling and reuse of metal and other materials. It is estimated that 40-60 kT of plastic is reprocessed to final output polymer.

The ELV Directive is currently under EU review during 2020, with an increased focus on the need for the automotive sector to increase circular economy principles and also to consider how best to handle the rapidly increasing level of electronics and electrical propulsion systems being developed. Some industry experts have commented that a modern all-electric vehicle is actually 'mobile WEEE' and thus could share some of the approaches used for Electric and Electronic Equipment (EEE) end of life product treatment. The 2020 review will also consider setting material-specific targets on the ELV recycling performance and, hopefully, introduce target thresholds for the inclusion of recycled content back into new vehicle components. Some Original Equipment Manufacture's (OEMs) do already have recycled content targets.

92.8%

reuse and recovery rate
in 2018 for vehicles[42]

1.4 EEE products to end of life WEEE

1.4.1 POM EEE

The UK EEE market has been operated under the producer responsibility mechanism called the WEEE Directive since 2007. This places a duty on obligated producers, retailers and importers of goods to report their annual POM figures and thus provides good market volume data.

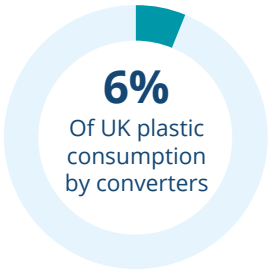
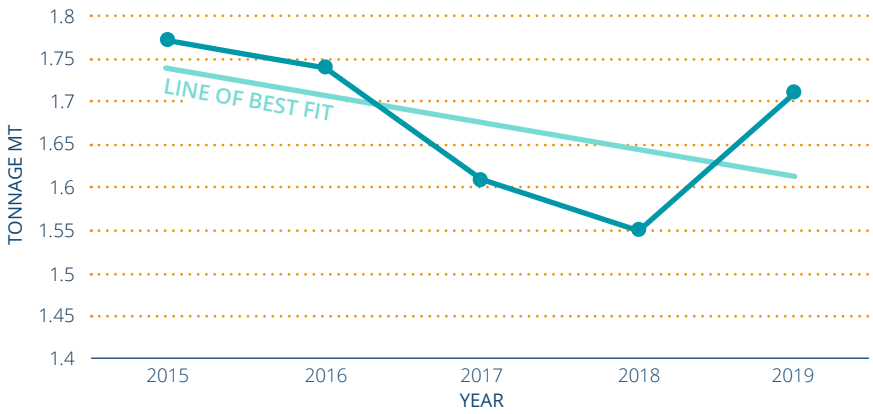


FIGURE 19: EEE POM from 2015 to 2019



Environmental Agency WEEE database accessed 05.08.2020

The reduction in MT of EEE probably reflects lighter and smaller products across many sectors of electrical goods, and perhaps the use of less metals and more plastics in EEE product design (See Figure 19).

An estimate has been made for the tonnage of plastic in EEE products (and WEEE below) for each product category. This estimate was verified against actual figures obtained from established authorised treatment facilities (ATF) operators to give confidence in the result obtained.

2015
1.77
Million Tonnes
Household and Non-Household EEE POM

2019
1.71
Million Tonnes
Household and Non-Household EEE POM

111 kT
of waste plastic collected as WEEE in 2019

FIGURE 20: EEE POM in 2019

	POM total 2019	Percentage of plastic (estimate)	Total Waste Plastic arising (tonnes)
Large Household Appliances	651,280	20%	130,256
Small Household Appliances	166,669	45%	75,001
IT and Telcomms Equipment	151,108	30%	45,332
Consumer Equipment	44,700	35%	15,645
Lighting Equipment	97,768	10%	9,777
Electrical and Electronic Tools	92,955	25%	23,239
Toys Leisure and Sports	60,527	30%	18,158
Medical Devices	12,640	40%	5,056
Monitoring and Control Instruments	43,106	20%	8,621
Automatic Dispensers	6,358	15%	954
Display Equipment	96,908	15%	14,536
Cooling Appliances Containing Refrigerants	252,668	15%	37,900
Gas Discharge Lamps and LED Light Sources	10,331	5%	517
Photovoltaic Panels	27,609	5%	1,380
Totals	**1,714,627**		**386,372**

Source: Environmental Agency WEEE database [accessed 09.07.2020] and estimated plastic content

FIGURE 21: WEEE collected in the UK

UK WEEE Data 2019	Collected total 2019	Percentage of plastic (estimate)	Total Waste Plastic arising (tonnes)
2019		plastic percent	plastic tonne
Large Household Appliances	175,484	20%	35,097
Small Household Appliances	35,579	45%	16,011
IT and Telcomms Equipment	46,704	30%	14,011
Consumer Equipment	36,055	35%	12,619
Lighting Equipment	3,279	10%	328
Electrical and Electronic Tools	18,014	25%	4,504
Toys Leisure and Sports	2,285	30%	686
Medical Devices	283	40%	113
Monitoring and Control Instruments	247	20%	49
Automatic Dispensers	124	15%	19
Display Equipment	44,634	15%	6,695
Cooling Appliances Containing Refrigerants	138,138	15%	20,721
Gas Discharge Lamps and LED Light Sources	4,555	5%	228
Photovoltaic Panels	65	5%	3
Total	**505,446**		**111,084**

Source: Environment Agency [accessed 16.07.2020] and estimated plastic content

1.4.2 WEEE collected and recycled

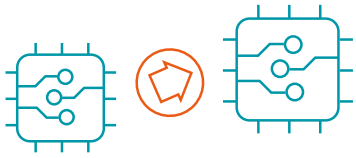
The associated reporting of collected and treated end of life WEEE items enables a relatively accurate estimate to be made for UK WEEE plastics waste arisings. Figures reported for 2019 year are shown in figure 21.[43]

Although data reporting is good, it does not capture the large metal-rich items which pass directly to UK scrap metal shredder sites and other electrical goods that are handled outside of the official system.[44]

The target collection rates for UK WEEE have risen from 45% in 2016 up to 65% of POM tonnage in 2019.[45]

Adjusting for non-recorded items and non-household material, a recovery target for UK registered WEEE treatment sites was set at 550kT for 2019. The above data shows this target has not been reached.

This estimate suggests that only about one third of plastic contained in used EEE goods is being captured by the installed WEEE collection system. Within the ~110 kT of WEEE waste plastic arisings, the most common polymer types will be PP, ABS, PS, PC/ABS and some nylons, plus PVC and composites in cables and circuit boards. Most recyclers only target the first three on this list as the plastics that can be recovered at high yield and with sufficient purity to make viable recycled materials.



45%
POM tonnage
2016

65%
POM tonnage
2019

The target collection rates for UK WEEE have risen from **45%** in 2016 up to **65%** of POM tonnage in 2019.[45]

FIGURE 22: WEEE Collection Rate for 2018 and 2019

	2018 collection rate	Proposed 2019 % collection rate
1 Large Household Appliances	75%	78%
2 Small Household Appliances	25%	37%
3 FT and Telecoms Equipment	77%	89%
4 Consumer Equipment	72%	85%
5 Lighting Equipment	-	-
6 Electrical and Electronic Tools	26%	36%
7 Toys, Leisure and Sports	5%	6%
8 Medical Devices	8%	9%
9 Monitoring and Control Instruments	5%	6%
10 Automatic Dispensers	-	-
11 Display Equipment	66%	67%
12 Cooling Appliances Containing Refrigerants	68%	71%
13 Lamps	50%	60%
14 Photovoltaic Panels	0%	0%
Total WEEE	**58%**	**65%**

Source: 360 Env – Phil Conran 2019, using data from the Environment Agency.

Figure 22 above looks at the collection targets across the different WEEE product categories. These vary significantly reflecting the efficiencies of the collection schemes in place and consumer engagement in the separating and recycling of these products.

1.4.3 Available material in the future

A brief estimate of the UK's 'urban mine' of plastic held within in-use products during the working-lifetime phase (i.e. 5 – 10 years for most EEE products) suggests that the total tonnage of EEE plastic in circulation at any one time is greater than 3 MT, or higher if the tonnage of hoarded end of life items in UK households is included. This 'stored in-use phase' volume of plastic could have a value of circa £1.2 billion[46] if recovered and recycled into high-grade manufacturing raw material via a much more efficient system than that currently operating in the UK.

1.5 Building and construction – pipes/windows/flooring

The use of plastic materials in the construction sector generally covers a range of product applications with a long lifespan. Window frames, drainage and services supply pipes, building cladding, insulation foams, and flooring and roofing sheets have working lifetimes ranging from 10 to 100 years.

In many cases, the products consist of a single polymer type that is used as a mono-material throughout the product (e.g. PP & HDPE thick-walled pipes, PVC window frames). These two factors often mean that the use of recycled plastics has been fairly common across the sector and the high volumes involved create a really useful end-market 'sink' to absorb significant volumes created by the recycling chains in other sectors (e.g. PP & HDPE from consumer packaging into drainage goods).

Plastics Europe – Circular Economy Overview 2019 – Use of Plastics Recyclates

'46% of recyclates in the EU28+2 are used in BUILDING AND CONSTRUCTION APPLICATIONS that require high-performance and durable products. The longer the lifespan of a product, the greater its contribution to resource efficiency and circularity'.

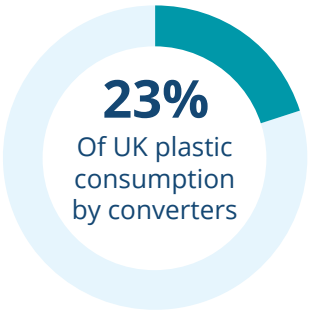
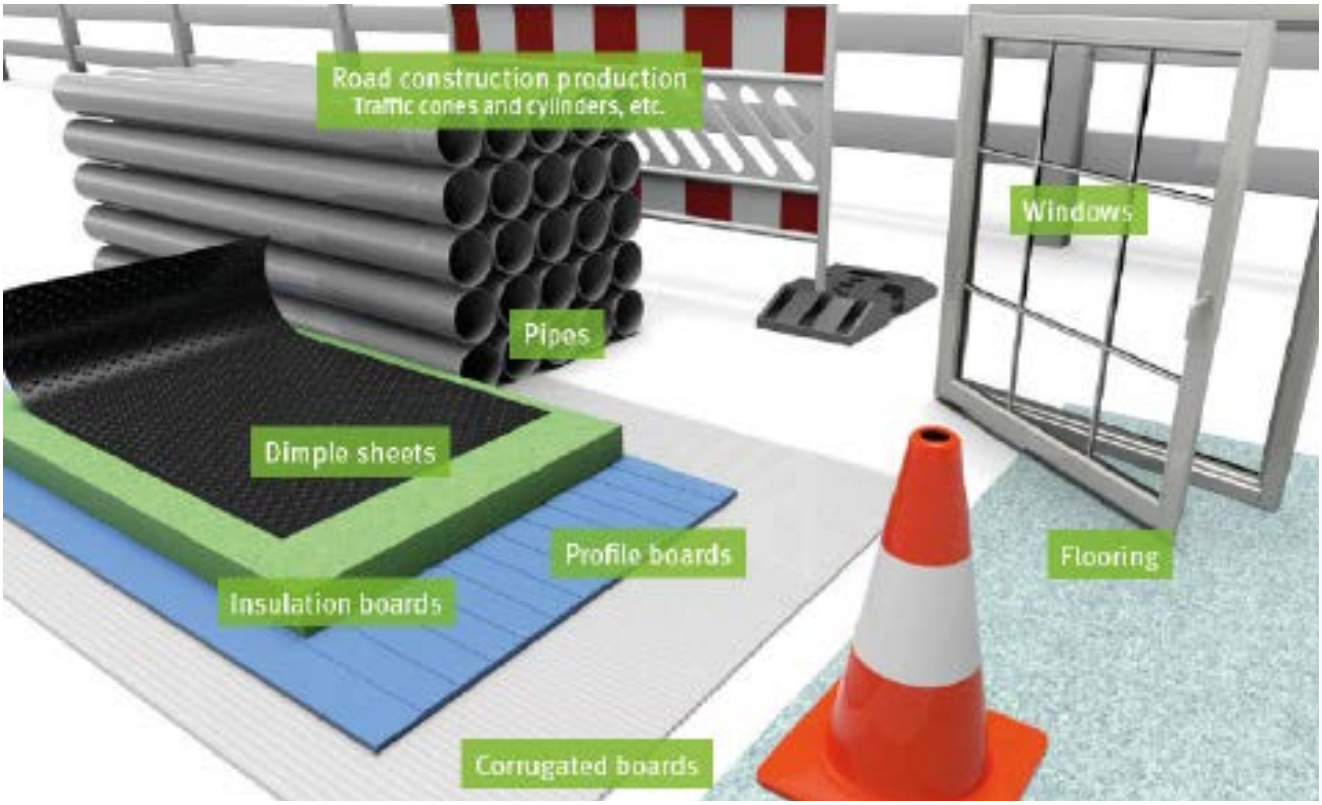


FIGURE 23: Example end-products with high recycled content in building and construction

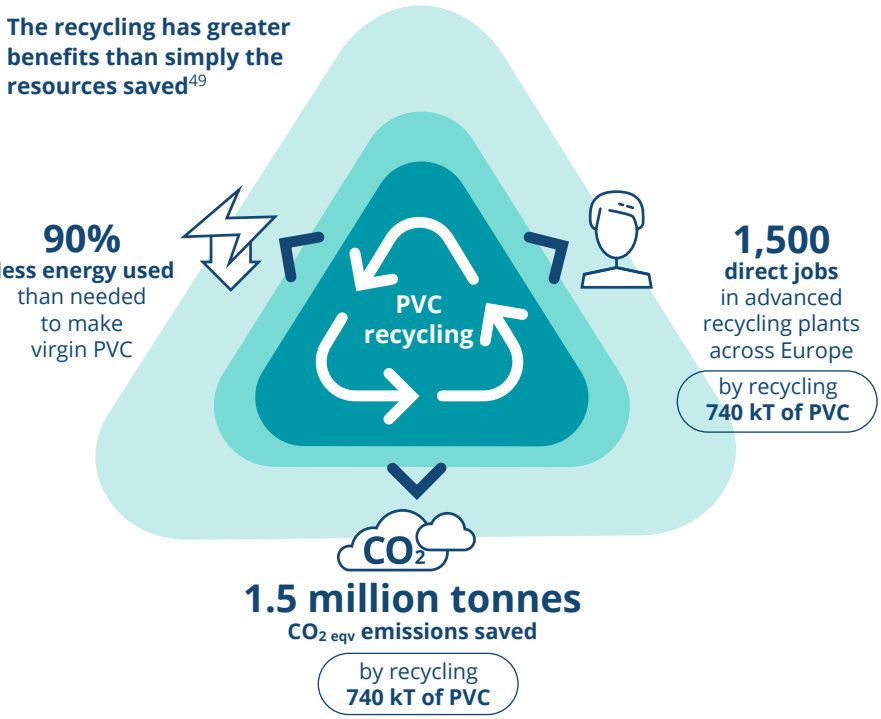


Source: Plastics Europe

1.5.1 PVC in construction plastics industry

The PVC industry set up a project called VinylPlus which built on the achievements of Vinyl 2010. The programme, funded by industry, is a voluntary initiative focused on sustainability. Through this initiative, collections have been set up for end of life products and these have been recycled back into new construction items in the PVC industry.

PVC is a stable and strong engineering polymer that is well suited for the long life and exposure to the elements required by building materials. PVC recycling figures are reported through VinylPlus. The European framework reported PVC recycling figures of 771.3 kT in 2019 (4.3% rise from 2018).[47] 143.4 kT of this was from the UK.[48]



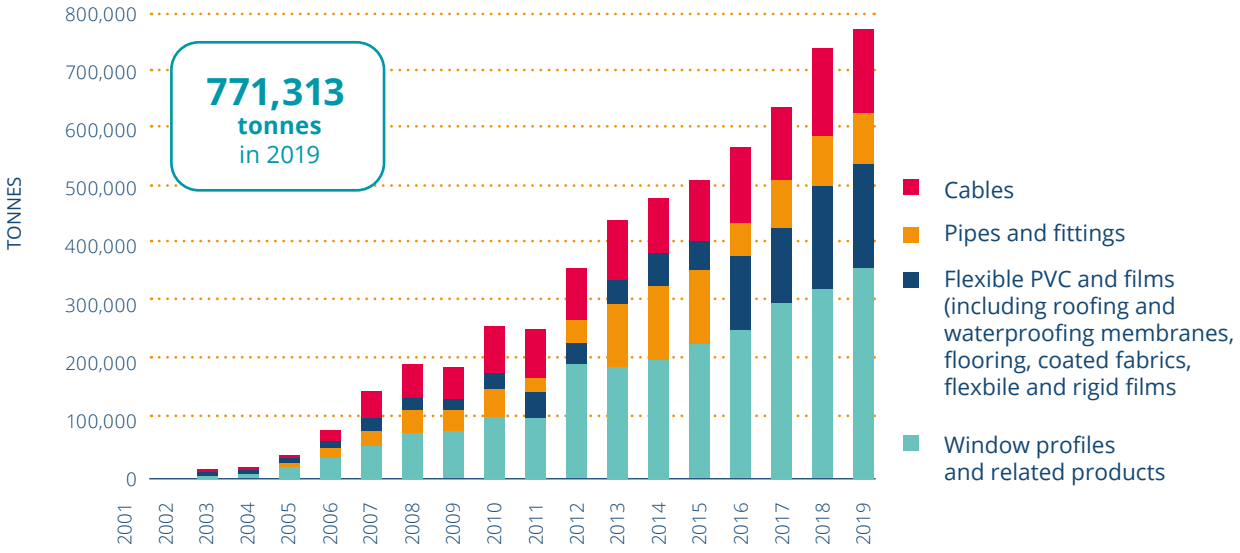
1.5.1.1 UK pipes conversion industry

Plastic pipe manufacturers have been committed to recycling and reuse from the early days when plastic pipes were put on the market more than 70 years ago. Today the majority of the plastic pipes recycled feedstock volumes go into high-quality below-ground stormwater and sewage pipes as well as cable ducts without compromising on the adequate performance for the particular application.

Below is a list of the type of products where significant levels of recycled content can be used:

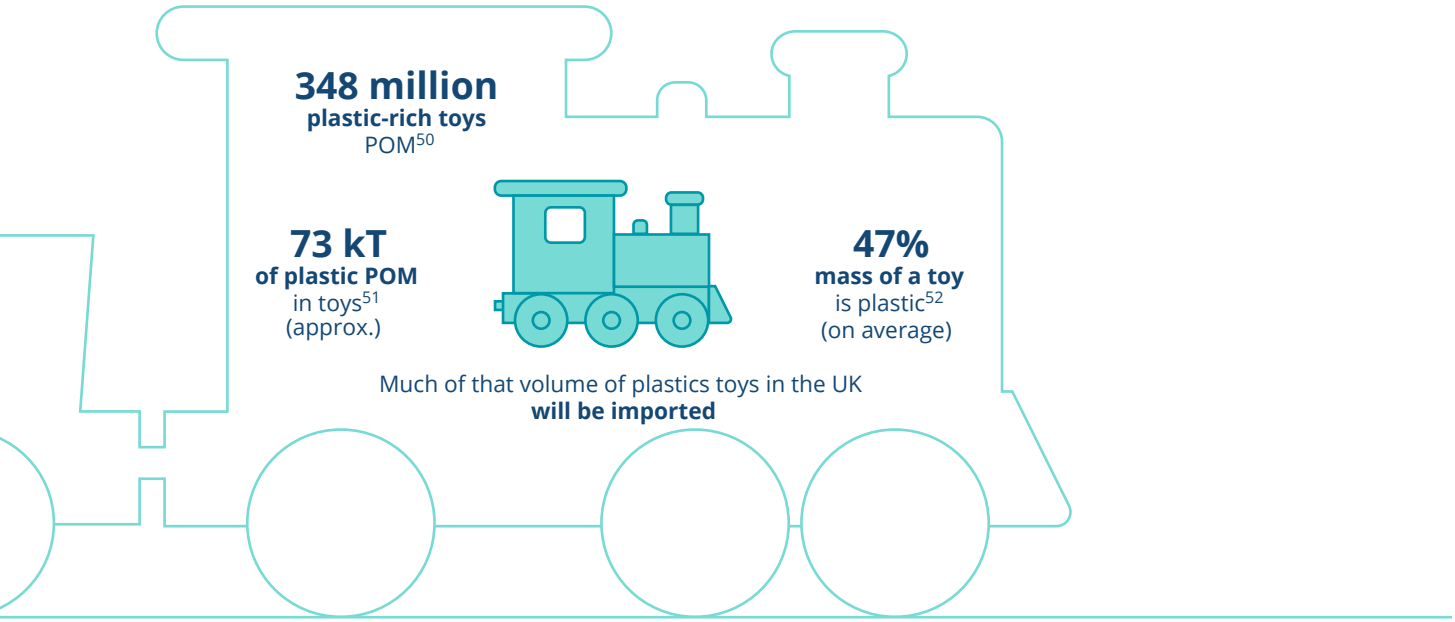
- Rainwater systems
- Waste/overflow/traps systems
- Soil systems (PVC and polyolefin)
- Buried Drain Systems – PVC
- Structured wall systems (all materials, all applications)
- Geocellular drainage systems

FIGURE 24: PVC recycled through vinyl 2010 and Vinylplus



Source: VinylPlus 2020, Progress report 2020 – Reporting on 2019 Activities

1.6 Toys/medical/other



1.6.1 Toys

Many toys are durable and get passed down through families. A reuse study by the British Toy & Hobby Association found that 70% of parents pass on toys. A study from their European organisation found that toys remained in a home for an average of 10 years. However, clearly a lot are broken and thrown away each year. While some larger toys find their way to HWRC sites (adding to the 54,000 tonnes[53] of mixed plastic collected via HWRCs), the majority enter the residual waste stream and are therefore 'lost' as a potential source of recycled plastic. A small percentage of electrical and battery-operated toys are captured by the UK WEEE system but the target 'Toy, Leisure and Sports' (TLS) category for WEEE is less than half a percentage of the WEEE target and therefore not a significant volume.

1.6.2 The RecoMed take-back scheme

Collecting PVC medical devices including nasal cannulas; oxygen tubes; anaesthetic masks and oxygen masks. The scheme collects non-infectious items.

23,000 kg[54] collected since the scheme started – equivalent to **768,932** oxygen masks.

Run by **BPF** and **Axion** Consulting with collections funded by **VinylPlus**.

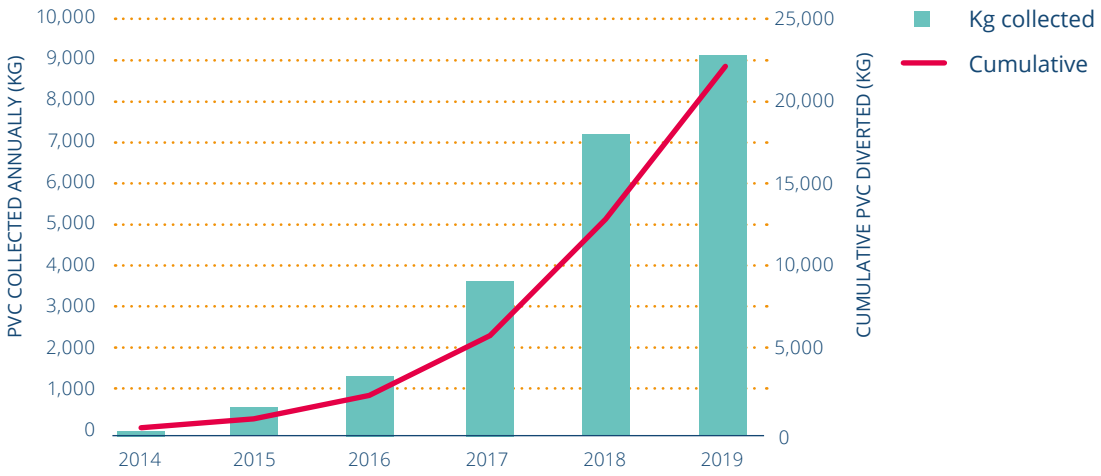
With 40% of plastic healthcare devices made of PVC there is an opportunity to grow this scheme.

Operates in **37 NHS hospitals** in England and Wales **with 91 hospitals** on the waiting list to join.

RECOMED PVC Take-back Scheme

Due to Covid-19 this scheme was temporarily stopped in 2020 but has since been restarted.

FIGURE 25: PVC collected through RecoMed



Source: RecoMed

1.6.2.2 EPS

EPS is a rigid cellular plastic which is found in a multitude of shapes and applications. It is used for fish boxes, packaging for electrical consumer goods and for insultation panels for building.[55] The BPF's EPS Group (www.eps.co.uk) has provided the following data, which shows that over half of all EPS packaging is recycled. It is worth noting that currently nearly all of this material is exported to be recycled.

The BPF is currently working with councils across the UK to set up a network of HWRCs who are able to take EPS from householders for sorting and reprocessing and has recently had a very successful pilot project in Leeds. The material is compacted on-site meaning reduced transportation costs and the carbon footprint produced.

Additionally the BPF is completing a mapping project of companies who are able to take back polystyrene at their premises so that householders would be able to access collection containers and will be producing a directory which will be available online.

FIGURE 26: EPS produced and recycled – May 2020

UK EPS Recycling rate	Updated 30 May 2020
Market structure	**Tonnes**
UK produced EPS Packaging	18000
Exported with products	4000
Imported with products	10000
Disposed of in the UK	24000
Recycled/collected	13140
Recycling Rate	55%
	Tonnes
Recycled in the UK	1000
Exported to EU	12140

Source: BPF EPS Group

1.7 Reprocessing capacity 2020

This section makes a review of the current UK capacity to reprocess waste.

1.7.1 UK plastics packaging re-processing capacity

The 'UK Household Plastic Packaging Sorting and Reprocessing Infrastructure' report (2020) by RECOUP identified 16 reprocessors who manufacture washed flake from household plastic packaging. Although their capacity is 440 kT, the operational output capacity is 230 kT (some C&I will be included in this although outside the scope of the report). The difference between the estimated output and operational output is important as capacity and feedstock availability and flow is never exact; operations change as well as commercial conditions and contract variations, so this does need to be considered.

Within this capacity is 65 kT (at the start of 2020) of plastic reprocessing capacity to produce food-grade flake and pellet. This includes 35 kT of food grade PET pellet and 30kT of food-grade HDPE.

There is currently no data on film recycling capacity in the UK, and this is an area which needs to be addressed to understand additional capacity needed. The capacity given is an estimate with an error margin and is based on the capacity of main companies recycling film.

1.7.2 ELV & WEEE reprocessing capacity

The plastic types found in ELV and WEEE are similar to the main polymers targeted for recycling, being PP, PS and ABS. These materials are often separated in a primary shredding or fragmentation operation as part of the treatment phase and then size reduced further and separated to a bulk 'mixed plastic shred' secondary raw material, prior to the final reprocessing and extrusion stages.

The number of players and operating sites involved in local collection and primary waste treatment for ELV and WEEE products in the UK is very large. However, the number of advanced plastic sorting and refining facilities able to complete the final recycling stages is small (i.e. less than five large sites), due to the fact they are large scale and highly capital intensive. These facilities will normally process a mix of WEEE and ELVs.

The installed capacity was estimated following a series of direct interviews with the four leading companies. At that time (Q2 2019), the companies were working at about 70% of their maximum capacity (input volume about 100 kT). Output polymer compound was estimated at about 50 kT pa. This reflects the high losses found in these complex separation processes with highly mixed, dirty plastic infeed streams.

Household packaging capacity
440 kT pa[56]

Film capacity
150–200 kT pa

Installed capacity for WEEE and ELV reprocessing plants
120–140 kT
in 2019

Figure 27 below makes an approximate comparison between the total waste arisings of rigid ELV and WEEE plastics and the volumes arriving at advanced UK reprocessing sites. There is an estimated 30 – 35% loss of 'rigid plastic' in the primary treatment/metal sorting sites and then an estimated 174 kT of mixed rigid plastic shred available after primary treatment for onward advanced sorting and reprocessing. In mid-2019, only around 36% of that available shred volume was actually entering the final reprocessing step in UK plants. [Note: Rigid moulded parts are estimated as circa 50% of the many formats of plastics used in motor cars, so excluding items such as seating foams and textiles.]

All sites interviewed were predicting significant tonnage increase over the coming three to five years. Since that time, other new players have entered the market to process mixed shredded plastics from small domestic appliances (SDAs) and refrigerator treatment plastic (e.g. AO Recycling's new plant in Telford). So in mid-2020, the installed capacity is probably closer to 60 – 65 kT (as output polymer_product or washed flake) for WEEE and ELV plastics in the UK [this equates to around 120 – 140 kT capacity measured as 'input mixed shred' to those re-processor sites].

The figures above suggest that about 80 kT (+/- 20%) of WEEE and ELV plastic shred generated by primary treatment/ shredding sites is not being reprocessed through UK facilities. Up until recently, much of this would have been exported.

FIGURE 27: UK WEEE and ELV rigid plastic arisings

Source: Data in table sourced from direct discussions with UK main players – Q2 2019

UK WEEE and ELV rigid plastic arisings		Lost in primary treatment site	Plastic shred available for recycling	% of UK arising processed	Input UK tonnes reprocessed
2019	t/yr				
ex ELV	152,250	53,288	98,963	30%	45,000
ex WEEE	116,889	42,008	74,882	44%	51,000
Total	**269,139**	**95,295**	**173,844**	**36%**	**96,000**

1.8 Levels of recycled plastics being used back into new products

Once material has been reprocessed and emerges from the waste sector ready to be used in the manufacture of new products, it is essential there is enough demand to absorb these products. These end markets are what drives the recycling system and delivers the value from the material from an environmental and economical perspective. This section looks at the data available on end markets for plastic. This information is limited and is an area where more data is needed.

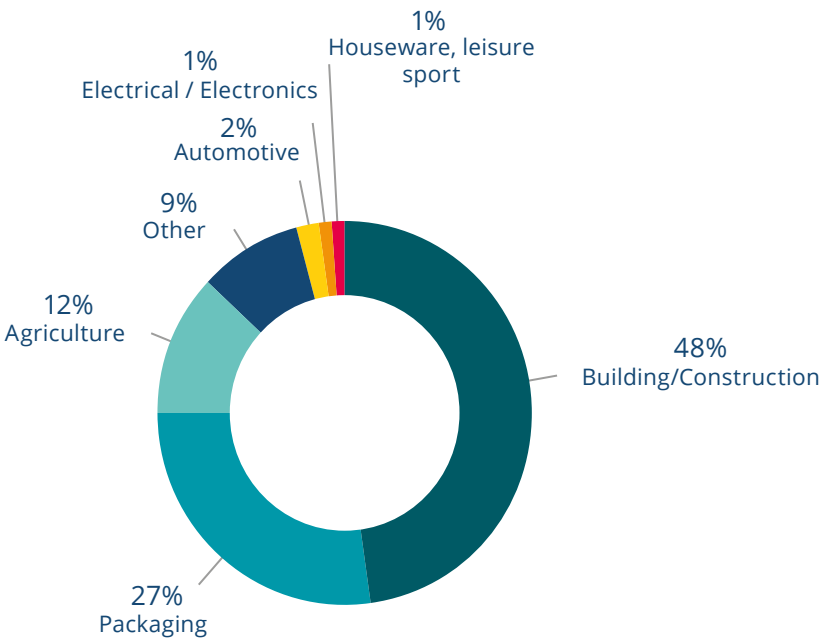
1.8.1 Use of recycled plastics in all sectors

As mentioned, there is currently limited data available on recycled plastic within products. However, a recent European study for PlasticsEurope produced the approximate distribution of recyclate use across the main application types for the UK in 2018 year. (See Figure 28)

This data refers to post-consumer sources of recyclates and is based upon an assumed UK total converter demand for polymers of 4 MT. Construction and building products account for 134 kT at 48% of all recyclate use, packaging is next at 27% and the total volume used is around 275 kT or approximately 7 – 8% of the total converted plastic material. The more complex technical products, such as automotive and electricals, show disappointingly low uptake of recycled plastics in comparison to their virgin polymer consumption levels. It is important to note there are a number of examples, including those presented in this report, where companies have incorporated significant percentages of recycled materials.

Across Europe as a whole, 4 MT[57] of recyclate is used in new products from post-consumer sources, with a similar breakdown across each sector.

FIGURE 28: Converting of post-consumer recyclates by applications 2018



Source: PlasticsEurope

This lack of reliable data on the actual levels of plastic recyclates being used across the major polymer product categories probably indicates why there has been a recent strong focus on 'Monitoring and Reporting' under the European DG GROW 'Circular Plastics Alliance' (CPA).[58] All the major plastics consumption sectors have been tasked with reporting on the current level of recycled plastics used in making their products by the end of 2020. The BPF has a partnership agreement to use the MOnitoring Recyclates for Europe (MORE) tool in the UK to monitor the uptake of recycled polymers into products.

1.8.2 Use of recycled plastic back into UK plastics packaging

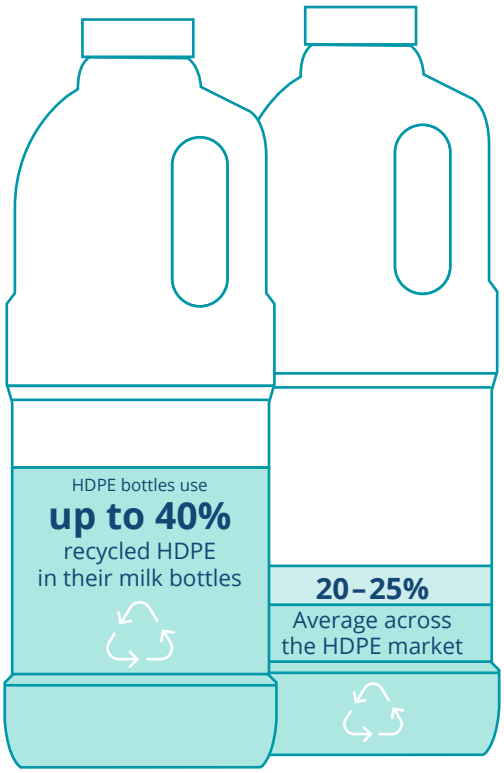
Blow-moulded, mono-layer bottles in PET and HDPE have been using high-quality, closed-loop polymer recyclates for many years, with some manufacturers adding 30 – 50% of recycled material. There are even examples of 100% recycled content used such as Tesco's carrier bags and Faerch's MAPET®II tray.

Thermoformed PET tray packs are also a high-volume user of super-washed flakes, with the ability to add up to 95% recycled content into extruded sheet by use of A-B-A layer structures, where the recycled material is sandwiched between outer layers of virgin food-grade PET.

With the huge media and consumer focus on 'plastics' that has arisen following the 'Blue Planet effect', there are now even greater drivers for brands to actively promote and market their use of recycled content. In bottled water and soft drinks, it is not uncommon to see packs labelled with *'Made from 100% recycled plastic'* or *'More than 50% rPET'*.

This sudden increase in demand for rPET has led to food contact rPET attaining up to a 50% premium over virgin PET in 2019. This proves that once recycled content becomes a marketing attribute, the 'supply: demand' dynamics become less linked to virgin market pricing. This clearly challenges the long-held belief that 'recycled plastics' must always be sold as a discounted percentage of the prime polymer price index.

There are concerns in some parts of the industry that this may result in fraud as virgin material could be sold as 'recycled material' as it commands a higher price, particularly in light of the incoming plastic packaging tax in 2022. In early 2020, there were some press reports of such activity[59] and the BPF strongly supports the need for a recycled content verification certification scheme to avoid this in the future. The BPF is ready to work with government to develop a robust certification scheme. The BPF is aware of a Recycled Content Verification System (RCVS) RECOUP has proposed as part of its tax response.



As mentioned, a number of companies are using high levels of recycled content, and there are commitments in place for even higher recycled content. However, across the whole UK PET blow-moulded bottle market, average level of recycled content was estimated to be around 15 – 18% in 2019.[60]

In the UK market for HDPE natural food-grade dairy bottles, some producers have used up to 40% recycled HDPE in their milk bottles. However, limitations in supply of material and technical challenges mean that the average recycled content in this pack type is probably around 20 – 25%.[61]

Within the packaging market there will be variations in the levels of recycled content used. One of the reasons for this is the food contact regulations which prevent some applications being able to use any recycled content. The BPF has produced a guidance document 'Recycled Content Used in Packaging Applications' which sets out these restrictions and provides advice on using recycled content.

'Recycled Content Used in Packaging Applications'
www.bpf.co.uk/recycledcontent

The latest annual report from WRAP's UK Plastic Pact, Blazing a Trail on Plastics, estimated that the average level of recycled plastics being used by its members in 2019 was 13% across all pack-formats. This figure reflects the much lower levels of recycled content that are technically possible in multi-layer, thin film packs and food-contact PP PTT.

Taking this 13% figure as representative of ALL UK consumer packaging would indicate an average packaging market consumption of recycled plastic for 2019 at around 190 kT although this volume will be dominated by the 'main user' pack and polymer formats mentioned in the examples above (i.e. PET bottle and tray; HDPE dairy market).

With the UK Plastics Pact members (who represent approximately 80% of retail volume) having a declared target to reach 30% recycled content by 2025 (and the soon-expected 30% plastic tax), this figure will need to more than double to around 450 kT of recycled content in plastic packaging over the next four years.

While a predicted growth in demand for recycled plastic of 300% sounds very optimistic, it is supported by a long list of declarations and claims made across all of the major food, drink and grocery brands in Europe in the past 24 months. Below are some recently made statements by leading brands.

There is also innovation taking place which gives the potential for further use of recycled content. A project between Tesco, Plastic Energy, SABIC, Sealed Air and Bradbury's Cheese has recently announced that the first food-grade recycled flexible packaging is on the shelf in Tesco.[62]

There is little available data on the levels of recycled plastics being incorporated into Commercial & Industrial (C&I) packaging products, even though that represents a further ~800 kT of volume in the UK and there are many types of industrial packaging that do represent good end-markets for recyclates, for example: plastic boxes and crates; plastic pallets; thick-wall protective cover sheeting. On the assumption that market and regulatory drivers will also impact upon the C&I packaging sector, then a similar 2025 average 30% recycled content target would equate to a further 240 kT of demand for recyclate. It is worth noting that certain formats of C&I already use higher levels of recycled content.

Coca-Cola

2020 targets

Currently at **25%** recycled plastic in bottles

Have since reached **50%** across all brands in 2020[63]

Nestlé (Europe)

2025 targets[64]

PET bottles will contain at least **25% rPET**

Caps on our glass jars and tins will contain **30% rPP**

Trays for meat products will contain **50% rPET**

Display trays shrink films will contain **50% rPE**

Unilever

2025 target

Increase the recycled plastic material content in our packaging to **25%**.[65]

Pepsico

2025 target

At least **25%** recycled conte in plastic packaging.[66]

2.8.3 Where ELV and WEEE recyclates are being used to make new products

A 2019 survey conducted across the four main players in the UK who reprocess WEEE and ELV waste treatment sites indicated a combined annual output as polymer compound in the range of 45 – 50 kT. This is made up primarily of injection grade PP (over 50%) and then PS (or High Impact Polystyrene (HIPS)) plus some ABS and a small amount of PC/ABS.

The 2019 survey also gave a combined spread of the output markets into which those polymers are being supplied as shown in figure 29.

The construction pipe market (for generic grey/black PP into drainage goods) represents the largest end-use market at 36%. Furniture parts and garment-hangers cover the next 23%. The 'low' 8% figure for automotive parts and 10% for E&E goods reflects higher technical specifications and tightly controlled supplier sourcing systems. While these tend to dominate use within those industries, there is also a lack of engagement with the recycling sector to help maximise recycled content. Both these sectors have had producer responsibility regulations in place since 2005 – 2008 in the UK, but this has not led to high levels of recyclate use. European recyclers have recently called for more ambitious targets to be set under the ELV Directive review. This is to increase the use of recycled plastics and improve eco-design to enable higher recovery rates, as follows:

'Gradual and fully achievable recycled content targets for post-consumer thermoplastics in new cars should be set as follows: - 25% by 2025, - 30% by 2030 and, - 35% by 2035.' – EuRIC Position paper Feb 2020.[67]

Some vehicle manufacturers have taken leading positions on this subject:

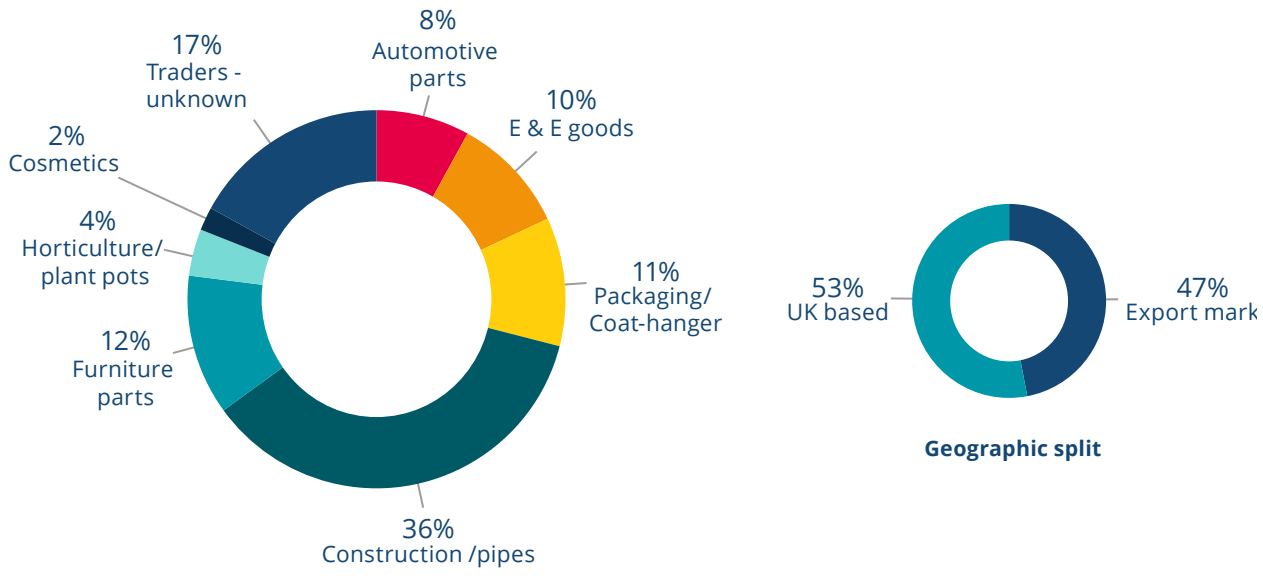
- Volvo – 25% recycled plastic in every new car from 2025.[68]
- Ford – Ford used 1.2 billion plastic bottles a year for vehicle parts.[69]
- Renault – 36% of the total mass of a newly produced vehicle in Europe comes from recycled material.[70]

FIGURE 29: Output plastic markets – WEEE and ELaV

Output Plastic markets – WEEE & ELV UK	
End Markets	**Market % share**
Automotive parts	8%
E&E goods	10%
Packaging/coat-hangers	11%
Construction/pipes	36%
Furniture parts	12%
Horticulture/plant pots	4%
Cosmetics	2%
Traders – unknown	17%
	100%
Geographic split	
Export market	47%
UK based	53%

Source: direct interviews – Q2 2019

FIGURE 30: Output plastic markets – WEEE and ELV



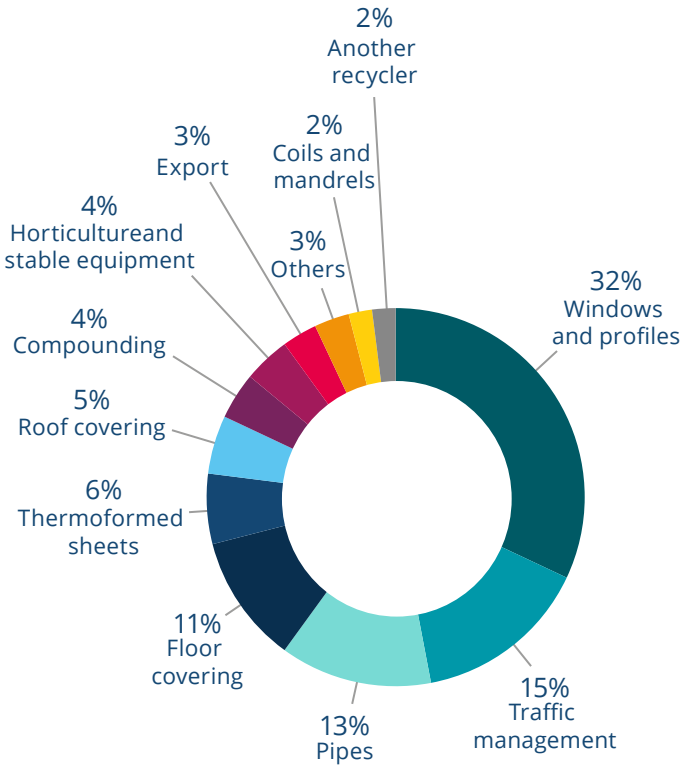
Source: direct interviews – Q2 2019

It is expected that the growing European focus on a circular economy under the Green Deal will add momentum to the drive for greater use of recycled plastics. As part of this, the signatories of the CPA[71] have a target of 10 MT of recycled plastic used back into consumer goods by 2025 from a baseline of 5 MT. With over 200 signatories to the CPA Declaration document and a structured working group programme already running, the BPF expect to see many more well-known brands making similarly strong statements to those listed above.

1.8.4 The PVC example – use in new products

Figure 32 below shows the industries which PVC is sold into across Europe. The most significant market is windows and profiles at 32% with traffic management, pipes and floor covering being the next biggest markets.

FIGURE 31: Recovinyl Traceability Survey 2019: Usage of 2018 r-PVC



Source: VinylPlus 2020, Progress report 2020 – Reporting on 2019 Activities

Future vision

'Plastics Recycling 2030,' the end-destination goals

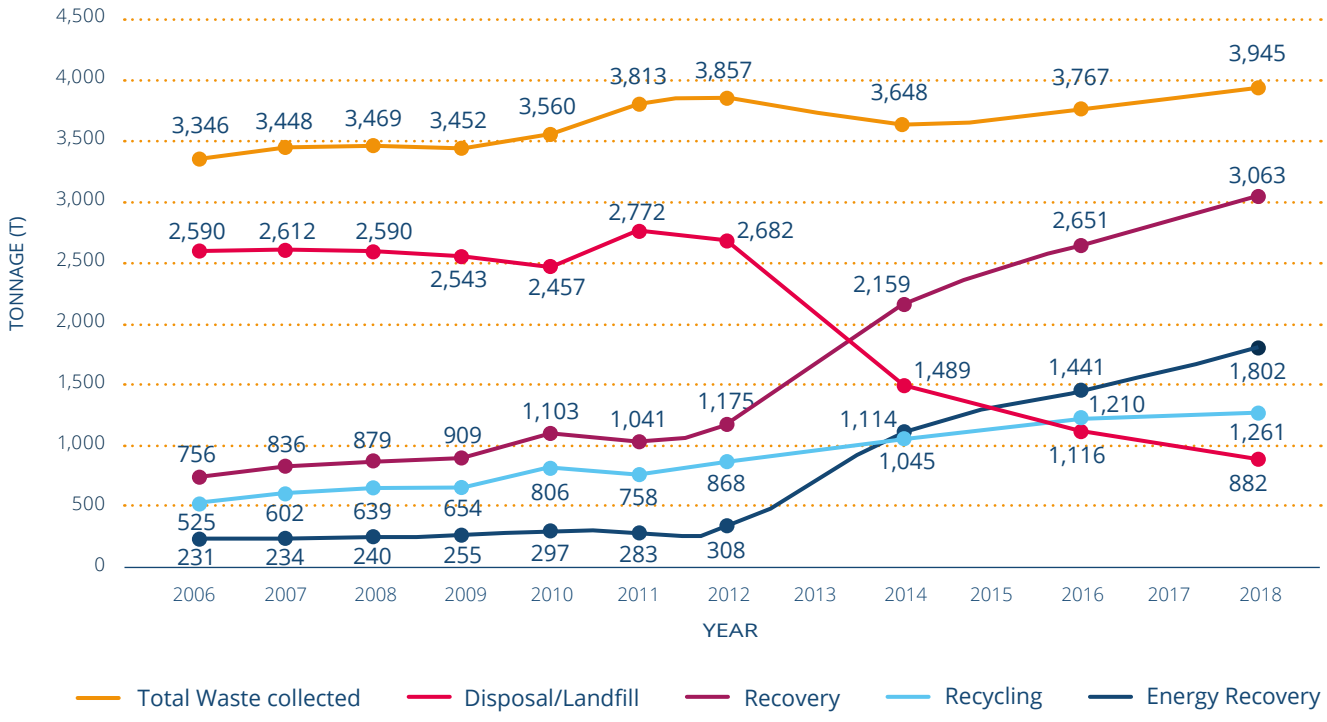
2. Future vision – 'Plastics Recycling 2030' – the end-destination goals

In this section, we look at an overall of UK plastic waste arisings in 2020 and the split between recycling, recovery and other disposal routes. After this, we present a vision for what the UK plastic recycling could be like in 2030. This vision has been put together taking into account the views of experts in the industry and is ambitious but shows what can be achieved with the right investment and drivers in place. With the global market for plastic recycling expected to grow to $34.4 billion by 2025, there is an opportunity for significant changes over the next decade.[72]

Figure 32 provides an overview of the management of post-consumer plastic waste between 2006 and 2018.[73]

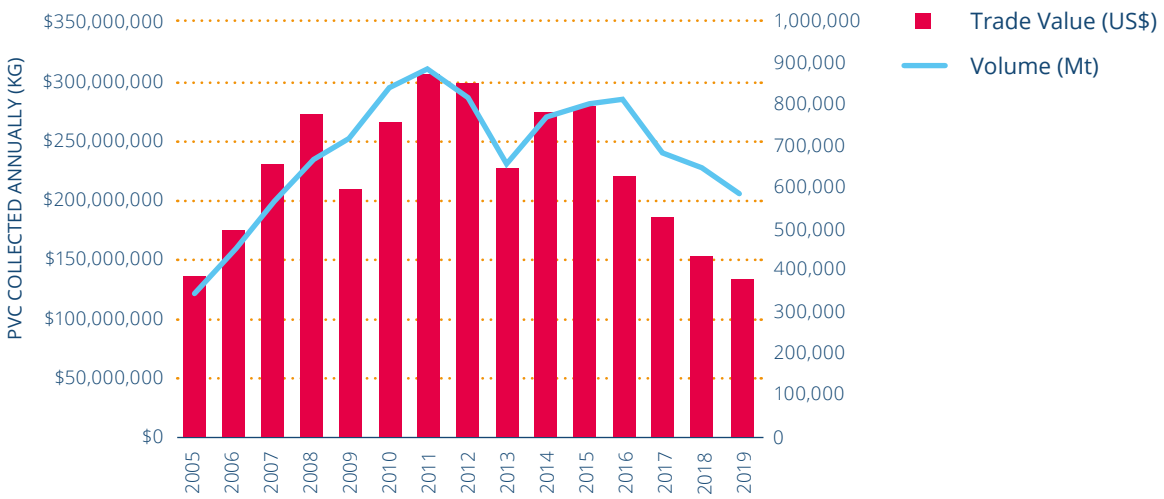
This graph shows a rapid increase in post-consumer plastic recycling of over 150% from 2006. Expanding kerbside recycling systems, establishing collections for WEEE and ELV, the continued influence of legislation as well as re-educating the public to view their waste in a different way have all contributed to the rapid increase. The recycling rate is now 32% for all post-consumer plastic, which is significantly higher than the global formal recycling rate of 14 – 18%.[74]

FIGURE 32: Development of post-consumer plastic waste in the UK 2006 – 2018



Source: PlasticsEurope/Conversio

FIGURE 33: Export of Plastic Waste from UK to World (2005-2019)



Source: UN Comtrade Database https://comtrade.un.org/data/ accessed 16.06.2020

Within this time, landfill has decreased by nearly 70% (to 882 kT) which, in part, is due to the increasing cost of landfill due to the landfill tax as well as a recognition of this not being the best environmental solution for waste. This has also contributed to the biggest increase, which was in EFW of over 650% (to 1,802 kT).

It is once again worth stating that the export market does play a significant part in the recycling tonnages reported. Figure 33 does show that export is beginning to decrease, with 2019 volume shown as 575 kT, but the reliance on export is going to continue until there are enough UK facilities available to handle the material.

2.1 UK plastic waste estimate for 2020

Figure 34 shows a summary made by combining the various estimates used to create the individual sections of this report. It compares two methodologies for estimating UK waste flow, and for simplicity 2019 data has been used when available (Note – 2020 actual figures are unlikely to follow a normal trend as a result of the Covid-19 pandemic).

Lower estimate – combines estimates based upon the Plastic Flow 2025 report, Defra figures (for packaging flows) and information described earlier in this report for non-packaging waste arisings and recycling volume estimates.

Higher estimate – works from the overall bulk waste flow to the residual stream and composition analysis applied to those flows.

The major difference in the two 2019 columns can be seen in the 'Energy from Waste' estimates, where an additional 1,230 kT of waste plastic is estimated to be entering the EFW disposal route in 'higher'. In the 'Recycling' section of the table, the reported NWPD figures have been used in both 'higher' and 'lower' estimates, but the volume of non-packaging is shown to be increased.

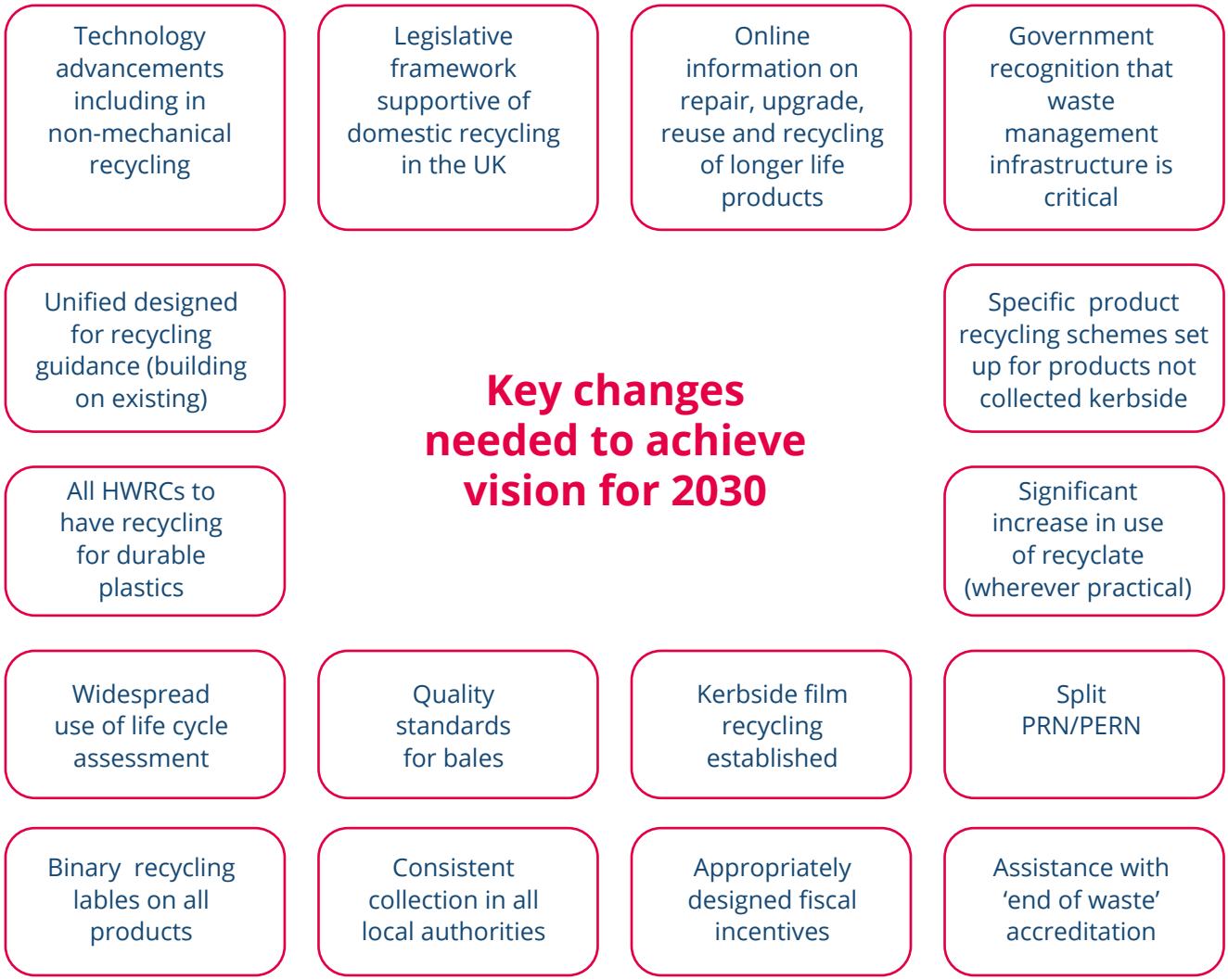
The 'Median Estimate' column has then been used to reflect mid-point between these two data sets for a 'normal' 2020 year (i.e. assuming no huge Covid-19 impact on markets and waste arisings). This is to allow for a 'normal' baseline year to be used as the foundation for the future 2030 predicted tonnages.

FIGURE 34: UK Plastic Waste Flows Estimate for 2020

UK Plastics Waste Flows	Comparison of estimate methods				000's tonne	% Tot. Waste
	Lower estimate		Higher estimate		Median Estimate	
As INPUT volume to:-	2019	%	2019	%	2020	%
Total Plastic Waste	**3765**	**100%**	**5420**	**100%**	**4593**	**100%**
Mech. Recycling UK - Packaging	450	12%	450	8%	450	10%
Mech. Recycling UK - Other Plastic	250	7%	350	6%	300	7%
Export Recycling - Packaging	690	18%	690	13%	690	15%
Export Recycling - Other Plastic	150	4%	250	5%	200	4%
Non-mechanical Recycling UK - Packaging	0	0%	10	0%	5	0%
Non-mechanical Recycling UK - other	0	0%	0	0%	0	0%
Total Recycling	**1540**	**41%**	**1750**	**32%**	**1645**	**36%**
Energy from Waste UK	1520	40%	2750	51%	2135	46%
Compost / AD	5	0.1%	20	0.4%	13	0.3%
Landfill	700	19%	900	17%	800	17%
Residual + Compost Total	2225		3670		2948	
Plastic Packaging in Residual Waste	1220	32%	2250	42%	1735	38%
Other Plastic in Residual waste	1000	27%	1400	26%	1200	26%
Plastic IN Residual waste	**2220**		**3650**		**2935**	
Total UK Residual Waste MT	25		25		25	
Plastic % in Residual Waste	9%		15%		12%	

2.2 Predicted UK waste plastic flows in 2030

FIGURE 35: Key changes needed to achieve the vision for 2030



Key assumptions

To estimate these plastics flows, the following assumptions have been made and expert views have been sought:

- Total plastic tonnage going into the waste stream remains stable for the next decade.
- There is no longer reliance on low-quality export. Export takes place where it is the best environmental outcome. Material which has reached end-of-waste status will also continue to be exported.
- Non-mechanical recycling technologies are proven at significant scale and infrastructure is installed and working as a complementary technology to mechanical recycling. Non-mechanical recycling is counted as 'recycling'.
- Biodegradable and compostable polymers are used where there is an established end of life collection and management system in place already, so they pose no risk of contaminating the mechanical recycling streams or the environment.
- EFW plants are still used for those highly contaminated, hazardous or complex plastics where no suitable material recycling option exists. The capacity for EFW is predicted in the report by Tolvik Consulting 'Filling the Gap – The Future for Residual Waste in the UK' to remain consistent through to 2030. The level of plastics within the overall residual waste infeed mix drops, as new recycling technologies come on stream and waste-to-energy producers seek low calorific value waste fuels and try to reduce long-life carbon impact from exhaust stack gas flows to atmosphere.
- Mechanical recycling in advanced UK-based sorting, cleaning and reprocessing plants is operating efficiently and is used for all suitable waste resource infeed materials.
- Plastic waste to landfill in 2030 is minimal. It is used in exceptional circumstances or for material not suitable for recycling or EFW.
- High-quality UK-produced plastic recyclate is used in both closed-loop and open-loop applications, to deliver environmentally sustainable benefits to the UK manufacturing industry.
- There is a significant increase in the amount of recyclate incorporated into all plastic products.
- EPR is put in place for packaging and other legislative drivers being developed all have a meaningful positive impact on the industry.
- Waste crime will have been significantly reduced with the right level of enforcement and penalties in place to deter criminals

Figure 37 shows the overall picture for predicted UK waste plastics flows in 2030. To achieve this vision for 2030 will require significant changes across the whole value chain and most importantly investment in UK recycling infrastructure to stop the reliance on export. Without the drivers outlined in this roadmap, the forecast will not be achievable. This will leave the UK reliant on waste export and investment not taking place in new facilities or technologies. Figure 36 sets out the areas where change will need to occur and Section 2.2 describes this in more detail. Figure 36 summarises the predicted future flows for waste plastics through the main channels of UK recycling, recovery and landfill options. For simplicity, we have chosen the mid-point estimate for total plastics waste arisings at 4,593 kT and, to aid clarity, have made an assumption that plastic waste arising volumes will remain broadly level over the next decade (i.e. nil volume growth in waste generated).[75]

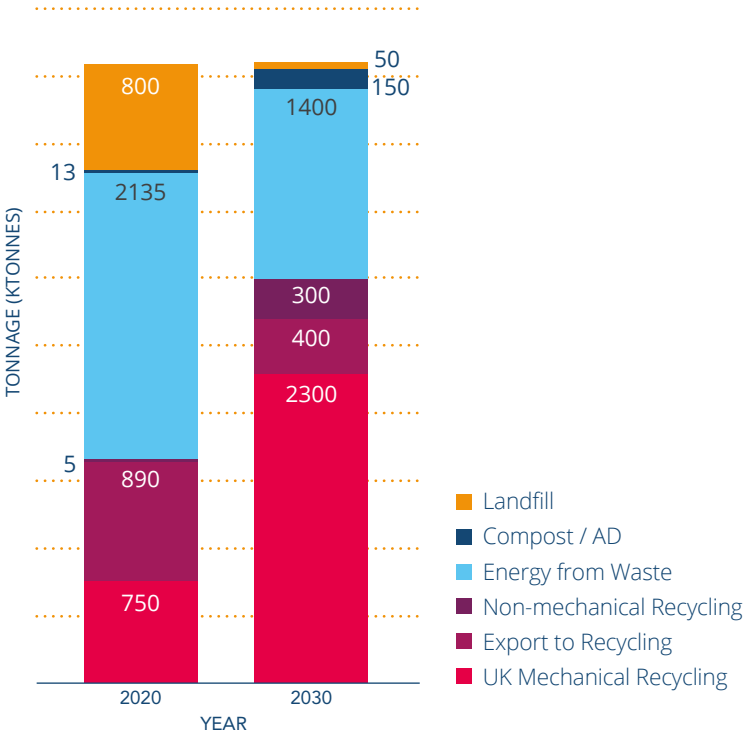
In the vision for 2030 it is assumed that there will be significant increases in the capture rates for all materials. That would deliver an overall plastic packaging collection for recycling rate of ~75% in 2030.

Figure 37 compares the end of life options for 2030 with 2020. As mentioned, export will be significantly reduced, and landfill will be minimal (1%). Composting and anaerobic digestion becomes 3% of the overall mix and would be through a separate stream. Plastics waste volume destined for EFW plants (including Refuse-derived Fuel (RDF) and Solid RecoveredFuel(SRF) as mentioned earlier) drops by over 30%. Non-mechanical recycling technologies deliver 7% of UK waste re-processing capability (this is less than what has been provided by McKinsey & Company for European overall, which is 17%).[76]

FIGURE 36: UK plastics waste flows 2020 and vision for 2030

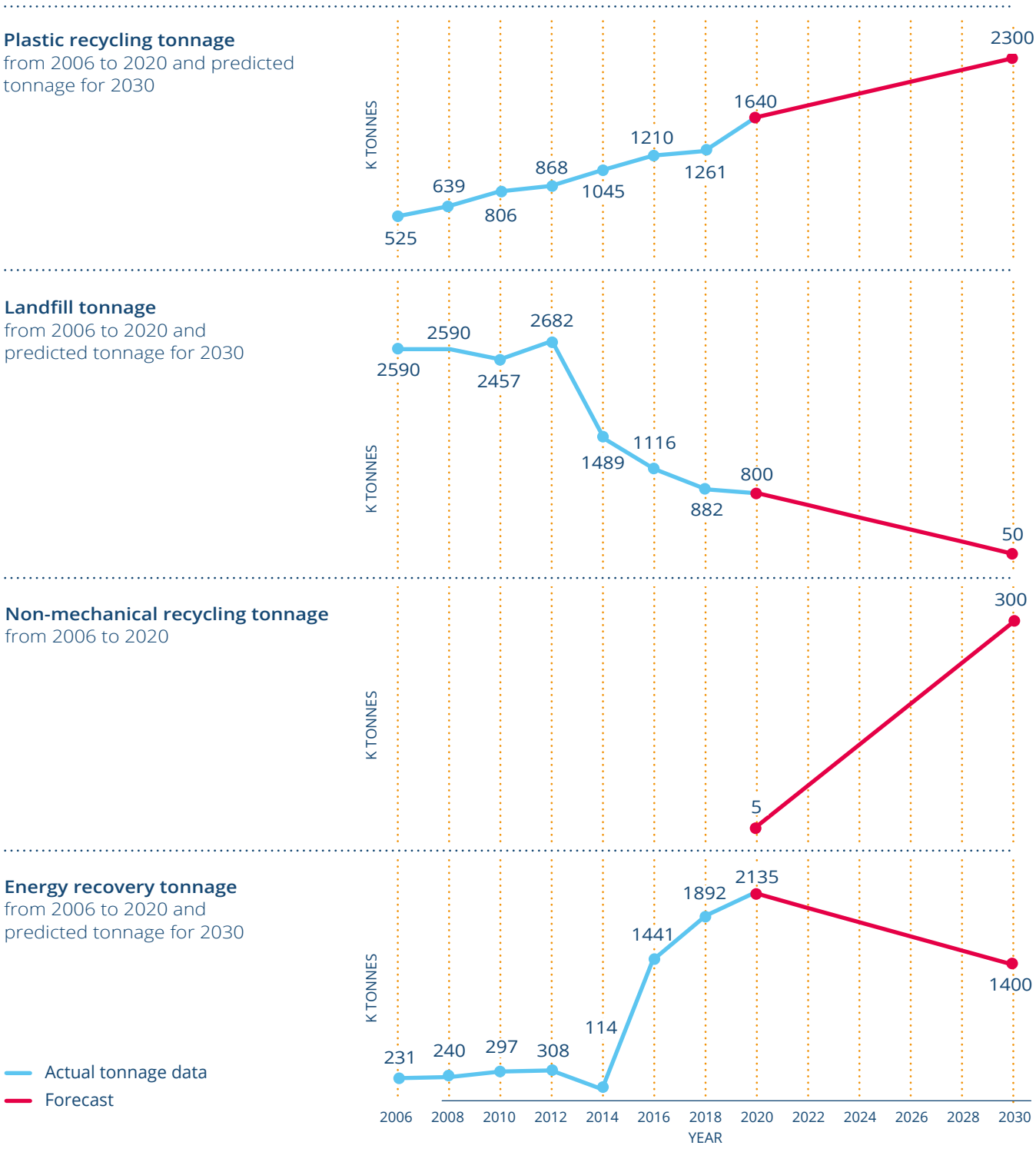
Future Prediction	UK Plastics Waste Flows			
	2020	%	2030	%
Total Plastic Waste	**4593**	**100%**	**4600**	**100%**
UK Mechanical Recycling	750	16%	2300	50%
Export to Recycling	890	19%	400	9%
Non-mechanical Recycling	5	0%	300	7%
Compost / AD	13	0%	150	3%
Total Recycling and composting	**1645**	**35%**	**3150**	**69%**
Energy from Waste	2135	46%	1400	30%
Landfill	800	17%	50	1%
Total Residual	**2935**	**63%**	**1450**	**31%**

FIGURE 37: UK waste plastic flow 2020 and 2030 (Forecast)



Mechanical recycling technologies advance in capability and efficiency to deliver more than three times current 2020 capacity. Although not shown as part of the forecast, by 2030 there will be more reusable packaging on the market.

FIGURE 38: End of life destinations for plastic waste from 2006 - 2020 and forecasted to 2030



Source: 2006 - 2020 - PlasticsEurope/Conversio; 2021 - 2030 - BPF

FIGURE 39: Mechanical recycling forecast split by sector

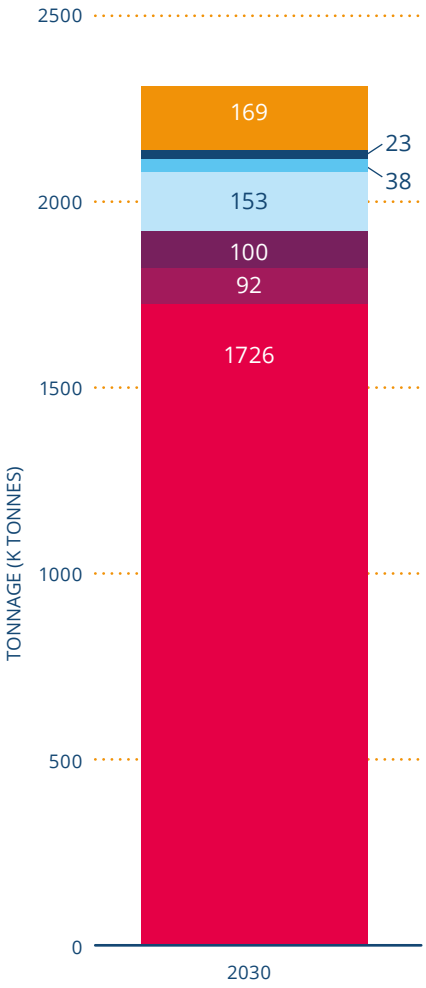


FIGURE 40: Export recycling forecast split by sector

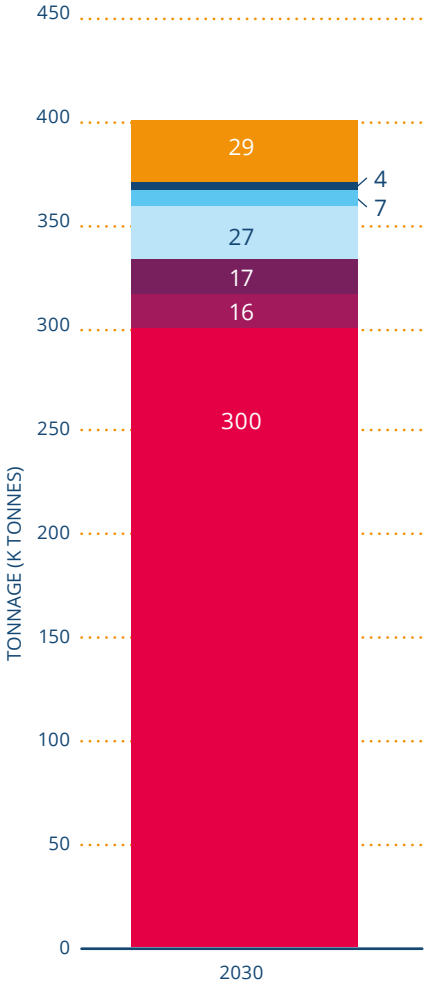
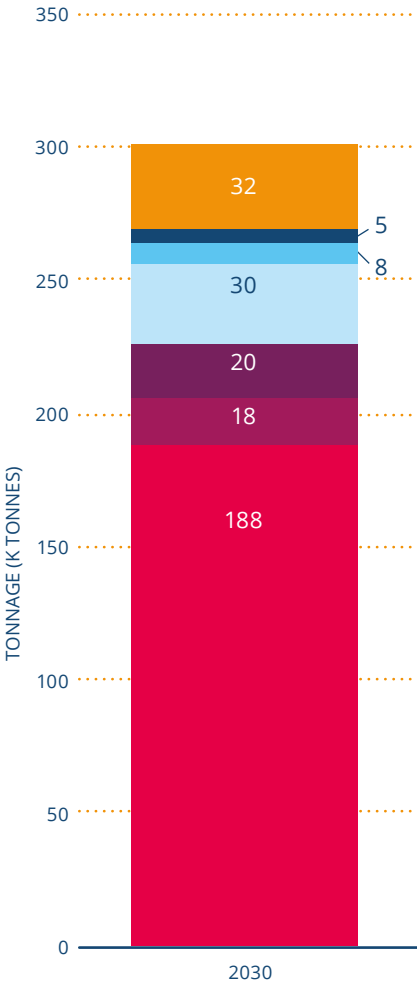


FIGURE 41: Non-mechanical recycling forecast split by sector



These estimates have been plotted alongside existing data in the figures below to show how they fit in with general trend (in reality the progress to 2030 will not be a straight line). Other than EFW, the rest of the end of life options remain in line with previous data.

The three graphs above (Figures 39 - 41) break up this forecast further. They show how the forecast for mechanical recycling, non-mechanical recycling and export will be split between packaging, construction, WEEE, etc.

As can be seen, packaging will be the dominant market in each of these sectors, particularly export. It is slightly less dominant in the non-mechanical recycling sector. This forecast was based on an expectation that with a focus on design for recycling, better separation technology and consistent collections, in the next decade there will be less 'difficult to recycle' plastics in the packaging sector. However, longer-life plastics in other sectors which need more treatment for strength, etc. will often remain harder to recycle mechanically.

2.3 What will the plastic recycling value chain be like in 2030?

2.3.1. Legislation and enforcement

Although this roadmap is not examining the potential impact of legislative changes such as the ones mentioned in 1.2.4, it is essential that legislation put in place does not have unintended consequences for the UK plastic recycling sector. As mentioned in the key drivers, there needs to be the right fiscal incentives in place to drive up recycling rates but in a sustainable way. It also needs to be recognised that waste infrastructure is critical.

One of the legislative changes in 1.2.4 is the EPR Scheme. It is noted here as it has the opportunity to be a key catalyst in the majority of the drivers and changes set out in this section. EPR can provide a funding mechanism which, if set up to support the whole value chain, can enable the recycling industry to develop.

By 2030, it is expected that waste crime will have been significantly reduced with the right level of enforcement and penalties in place to deter criminals – the Environment Agency recently set up a Joint Unit for Waste Crime to tackle this issue. There is also a Waste Compliance Taskforce (WACT) to get collaborate and cross-sector working to engage with regulators and policy makers. A tracking system for waste discussed in 2.3.11 would also be important to make waste more transparent.

2.3.2. Consistent collection service across the UK

The government consistent collection reform is expected by 2023 with all local authorities needing to put in place the collection by 2028. Consistent collection of household-like packaging from C&I sources would come into effect within the same timescales therefore, by 2030, local authorities will be collecting the following set of consistent materials:

- Plastic bottles – including clear drink containers, HDPE (milk containers), detergent, shampoo and cleaning products
- PTT including PET trays and PP tubs

Films and flexible plastic should also be part of this set of consistent material as discussed in 2.3.3.

By 2030, an agreement should have been reached with councils, waste management companies and recyclers on the specification for each of these materials. This will include producing a list of any specific products which are excluded and instructions on how material should be presented for collection, e.g. 'caps & lids on'. This would build on existing guidance.

The collection methods used by councils will also have started to be simplified by 2030 to create less variation while allowing for schemes which meet the needs of different property types and communities. This will include collection frequencies and type/ colour of containers.

Separate in-store collections will be provided for specific items which are not collected through the kerbside scheme. An example could be collections for coat hangers.

The whole value chain should be working together to increase the range of material which can be recycled through work on design and advancement in technology. The value chain would meet regularly to ensure they are working collaboratively.

The UK should be working towards accepting all types of plastics. This plastic would need to be sorted within MRF and PRF. Anything which can be mechanically recycled would follow this route with other types of plastic going to non-mechanical recycling facilities.

2.3.3. Kerbside film and flexible recycling

In 2019, only 14%[77] of local authorities collected plastic film, and the range of plastic films were limited. Supermarkets also offer collections, but these are again limited although there are commitments to expand these.

Film and flexible need to be part of the core set of material under consistent collections and in line with the other materials be put in place by 2023 so all councils collect them by 2028. This means collections would be established in all local authorities before 2030 with the required sorting and reprocessing (both mechanical and non-mechanical). The focus in 2030 would therefore be on driving up capture of this material.

There are opportunities for increased film recycling ahead of consistent collection. As Figure 46 shows, most countries are already collecting this material. Through the UK Plastics Pact there is an aim to get 30% of citizens to regularly take film to front-of-store collection points by January 2022. There is also an industry scheme, the Flexible Plastic Fund, which is working with the supply chain to provide a funding mechanism using a set PRN price to increase the collection of films. This will initially be through front-of-store collection schemes.

2.3.4. Recycling of plastic not collected kerbside

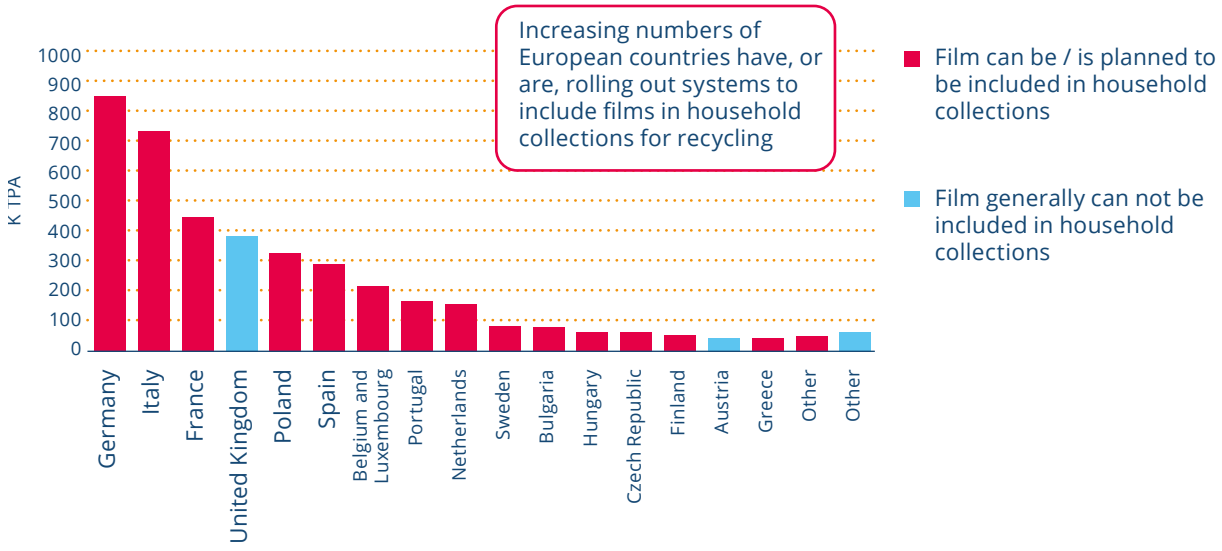
All plastic sectors not collected via kerbside collections would need a greater focus on end of life. This would ensure these valuable waste resource streams do not end up in landfill or other waste disposal routes. In line with the Circular Economy Action Plan, this could be incentivised through extending the level of producer responsibility to provide a regulatory driver to recycle and recover products from construction, leisure, toy, sports and industrial product markets.

The majority of HWRCs in 2030 will include an area/container which accepts large rigid plastic items such as garden furniture and children's toys. Facilities will be in place within the UK to mechanically recycle these products (see Recycling technology).

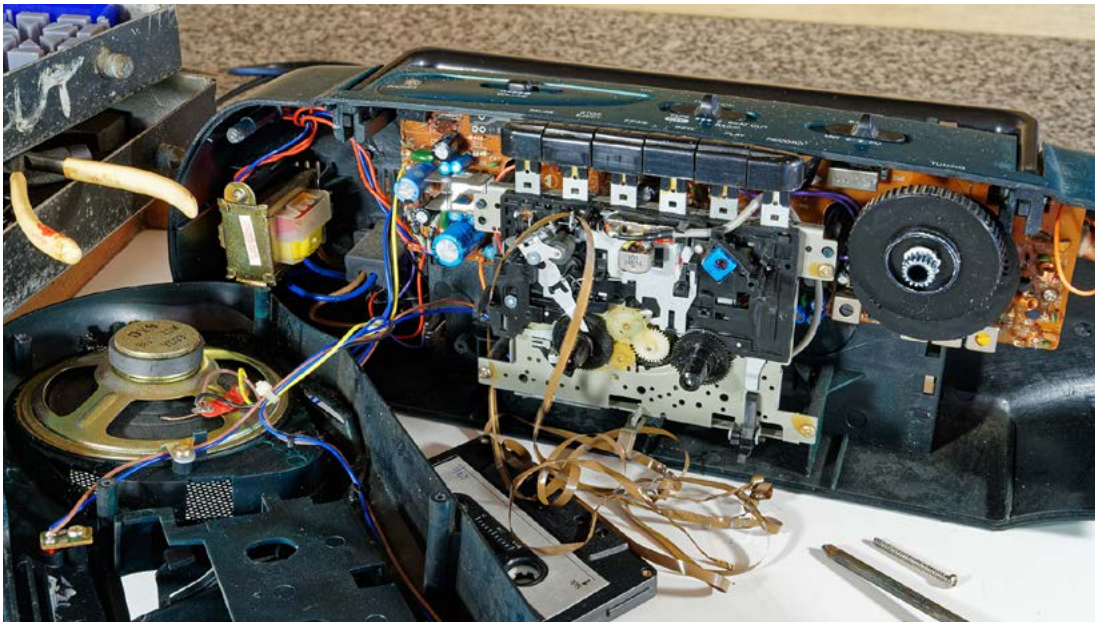
All electrical stores or shops selling electrical goods will continue to accept WEEE for recycling, but this will be advertised more widely to increase uptake. Companies will also continue to offer take-back schemes when new electrical items are delivered and allow customers to give additional WEEE items for recycling as part of the scheme.

Small electrical items will be collected as part of kerbside collection schemes and as well as being collected at HWRCs.

FIGURE 42: Flexible packaging POM market by country



Source: Ceflex



To allow more niche products to be recycled by 2030, brands will have set up product specific collection systems through take-back or collection points. These schemes may be linked to the next product purchase to enhance brand loyalty and trust but also allow brands to recapture their own material for use in future products.

It has been predicted that there will be more compostable and biodegradable packaging in 2030. This will be in niche applications such as coffee pods or closed environments like festivals. By 2030, there will be systems in place to capture this material and ensure it does not go into the mechanical recycling stream.

2.3.5. Clear, consistent and engaging communication

In the Resources and Waste Strategy it discusses eco-labels which could be brought in through EPR.

In 2030, legislation will be in place for all products to be labelled for recycling with a binary system and clear 'yes' or 'no' (building on changes made to the On-Pack Recycling Label (OPRL)) and also specify where it can be recycled, e.g. kerbside, retailers. Long-life products will also signpost consumers to information on repair/upgrade/reuse options for their products as well as recycling. This information would be available online and, where possible, would be specific for each product type.

National communication campaigns will take place targeting items known to have lower capture rates. All householders and businesses will receive at least one communication a year on recycling directly to their property as part of an ongoing comprehensive communication programme.

The increase in communication should lead to higher levels of engagement from the public and make it socially unacceptable to not participate fully in recycling.

2.3.6. Jobs

There are around 180,000 people employed in the UK plastics industry (making it the third-largest manufacturing sector by employment) with an estimated 500,000 either directly or indirectly employed (in manufacturing, commerce, transport, real estate, and other industries).[78] Investment in the recycling infrastructure in the UK would create a large number of additional jobs which would gradually be added over the time period to 2030 and would provide much needed employment. While estimating the number of jobs accurately is difficult, the European Strategy for Plastics in a Circular Economy lays out a vision whereby "A smart, innovative and sustainable plastics industry, where design and production fully respects the needs of reuse, repair, and recycling, brings growth and jobs to Europe and helps cut EU's greenhouse gas emissions and dependence on imported fossil fuels."[79] In this, they use an estimate from Plastics Recyclers Europe that states that if plastics recycling capacity is significantly extended and modernised across the EU by 2030, a total of 200,000 new jobs could be created across Europe.[80]

Not only would investment in the recycling infrastructure create significant jobs, it would always generate much-needed revenue. A report published in June 2018 by Material Economics (which was supported by the Ellen MacArthur Foundation and European Climate Foundation) estimates that improvements in product design and materials choice, combined with increased collections, recycling and improvements in underlying technologies, could create an additional €30bn of revenue across Europe.

2.3.7. Design

Building on ISO 14040: 2020 (Environmental management — Life cycle assessment — Principles and framework), an agreed methodology for life cycle assessment should be in place by 2030. This will allow fair and accurate comparisons to be made between products. Life cycle assessment will also be more widely used and form part of all product design by 2030. Where full life cycle assessment is not financially viable, simplified tools and certification should be available online such as the BPF's PackScore (www.packscore.co.uk) or OPRL's PREP assessment tool.

In 2020, there were already design-for-recyclability guidelines available such as those by RECOUP, and organisations were starting to collaborate on these to ensure consistency. A unified set of design guidelines should be produced in line with other legislative developments in the UK and

made available to designers and manufacturers. This ensures that the standard for designing and manufacturing in the circular economy is clear and prevents any conflicting advice. However, any guidelines or legislation should not stop innovation taking place (for example by restricting material choice) which could solve some of the current issues preventing us from moving to a circular economy.

As mentioned, the value chain would regularly meet; this would provide a forum to raise any concerns about design and to enable them to be effectively resolved. Product designers should be encouraged to work with recyclers to test their products can work with the current recycling system.

With clear 'yes, no' binary labelling in place, the public can clearly see which products are recyclable which would provide an incentive to meet design-for-recyclability guidance to capture consumers whose shopping habits would be influenced by this. Design for recyclability is desirable as a survey by Viridor in 2019 noted that 64% of respondents were more likely to buy products with recyclable packaging and 65% were more likely to buy products with packaging made from recyclable material.[81]

Sustainable Design for Plastic Packaging' which were the results of a workshop held of the entire plastics packaging supply chain. The report and other work carried out by the BPF on Ecodesign can be found at www.bpf.co.uk/ecodesign.

2.3.8. Split target

The BPF Recycling Group have been calling since 2012 for a split in the recycling target. This split was proposed as it would rebalance the bias in the PRN system towards export and encourage investment in UK facilities who, with the current system, struggle to compete with export markets. The PRN and PERN have always been viewed as the same, but they should be viewed as two different pieces of evidence, the first being for a fully reprocessed material and the second for a bale of unprocessed material. The BPF has supported this split target since it was first proposed.

The split target has an increasing amount of the UK's plastic recycling evidence needing to come from UK reprocessors through the purchasing of PRNs rather than PERNs. This then helps to encourage investment in UK facilities to meet the demand for PRNs. Currently over 60% of plastic packaging is exported, and targets would steadily reduce this (55% year 1, 50% year 2, etc). There would need to be an acceleration of this closer to 2030 to reduce to the levels in the forecast.

By encouraging material to stay within the UK it also enables better tracing of the end destination of waste and ensures it is being properly reprocessed.

Although EPR is expected by 2023, there is still an opportunity to revise the PRN system ahead of this and incorporate these concepts into future EPR.

More information on the split target is available here: www.bpf.co.uk/splittargets.

2.3.9. End markets

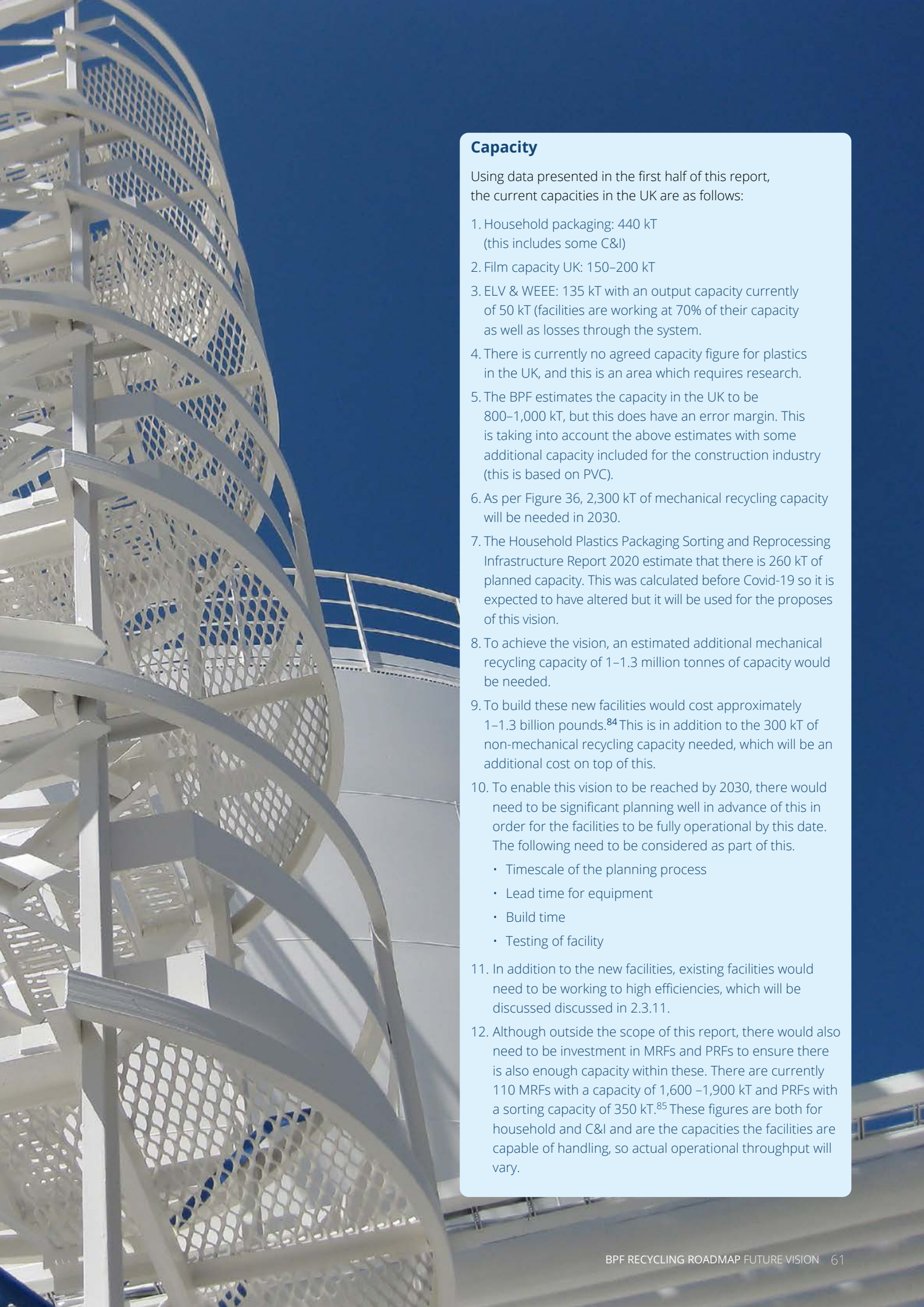
In the first half of the report, some of the commitments made by packaging companies to incorporate recycled content are outlined and this shows a lot of work has already taken place. There are also commitments under the single use Plastics Directive for PET bottles to contain 25% recycled content by 2025 and all bottles to contain 30% by 2030. The UK Plastics Pact requires members to have 30% recycled content by 2025 along with the proposed plastic packaging tax of 30% by April 2022. There is also a 10 MT target for recycled content under the Circular Plastics Alliance by 2025.

Before 2030 there needs to be a mapping exercise done for each polymer exploring the potential end-market destination in UK closed loop, UK open loop and export for manufacturing. The tonnages each market can absorb need to be understood to help to drive investment for recycling within these areas.

By 2030 there will be a strong market for recyclate with companies committed to using this material and an expectation by the public that packaging they buy contains recycled content. The majority of packaging would contain 30% recycled content in line with the packaging tax with some companies having gone further than this. Although numerous challenges would still be in place for the use of recyclate in food contact, the BPF envisages more regulatory approvals present in 2030 than are in place today, providing an increase in the 130 recycling processes submitted for food contact approval.

More information on the use of recycled content in packaging is available here: www.bpf.co.uk/recycledcontent.

The demand for recycled content in non-packaging application will also have grown. Recycled content is already used in these products and commitments to future use made. For example, Apple uses an average of 38% recycled plastic across 82 components for products released this year,[82] and Samsung have a target of using 50 kT of recycled plastic by 2020.[83] As mentioned in Section 2.7.3, there are commitments from the automotive industry of up to 36%. As with packaging, the public will expect brands they purchase to be contributing to the circular economy through not only enabling recycling to take place but also through incorporating recycled content.



Capacity

Using data presented in the first half of this report, the current capacities in the UK are as follows:

1. Household packaging: 440 kT (this includes some C&I)
2. Film capacity UK: 150–200 kT
3. ELV & WEEE: 135 kT with an output capacity currently of 50 kT (facilities are working at 70% of their capacity as well as losses through the system.
4. There is currently no agreed capacity figure for plastics in the UK, and this is an area which requires research.
5. The BPF estimates the capacity in the UK to be 800–1,000 kT, but this does have an error margin. This is taking into account the above estimates with some additional capacity included for the construction industry (this is based on PVC).
6. As per Figure 36, 2,300 kT of mechanical recycling capacity will be needed in 2030.
7. The Household Plastics Packaging Sorting and Reprocessing Infrastructure Report 2020 estimate that there is 260 kT of planned capacity. This was calculated before Covid-19 so it is expected to have altered but it will be used for the proposes of this vision.
8. To achieve the vision, an estimated additional mechanical recycling capacity of 1–1.3 million tonnes of capacity would be needed.
9. To build these new facilities would cost approximately 1–1.3 billion pounds.[84] This is in addition to the 300 kT of non-mechanical recycling capacity needed, which will be an additional cost on top of this.
10. To enable this vision to be reached by 2030, there would need to be significant planning well in advance of this in order for the facilities to be fully operational by this date. The following need to be considered as part of this.
    - Timescale of the planning process
    - Lead time for equipment
    - Build time
    - Testing of facility
11. In addition to the new facilities, existing facilities would need to be working to high efficiencies, which will be discussed discussed in 2.3.11.
12. Although outside the scope of this report, there would also need to be investment in MRFs and PRFs to ensure there is also enough capacity within these. There are currently 110 MRFs with a capacity of 1,600 –1,900 kT and PRFs with a sorting capacity of 350 kT.[85] These figures are both for household and C&I and are the capacities the facilities are capable of handling, so actual operational throughput will vary.

2.3.10. Recycling technology and standards

To enable the vision by 2030 to take place, there would need to be advancement in technology and standards to maximise the material being reprocessed.

Standards for primary sorting plants would need to ensure they all perform to best-in-class. Facilities would need to be bench-marked and visible and transparent data made available on output sorted bales. Plants would be moving towards 'clever sorting' systems based upon product marking and using robotics as part of its innovation. Sorting technology would be able to separate 2D from 3D objects. The advancement in technology would help allow for specific selection of material and help to reduce losses of target material.

Clear quality standards would be in place for each part of the recycling process including collection, sorting and reprocessing. These standards would be required by all companies, and the same standards would be needed for material exported. For example, countries such as Germany and France already have standards in place.

The key role of the standards will be to drive up quality. This is essential to ensure facilities can maximise recycling and reduce any losses in the system.

A system would be in place to be able to trace waste so it can be audited through the recycling system and into a new product. This would provide the needed confidence in recycling which will help motivate people to recycle. The Environment Bill already includes powers to introduce an electronic system of waste tracking, and money has been committed to this. Work has also already started by the CPA on tracking plastic waste including recyclers' input and output. The tracking of waste would help to reduce the level of waste crime.

Non-mechanical recycling technologies would need to be developed and implemented to 'fill the gap' where mechanical recycling is not possible. As already mentioned, this would be part of the solution for films. Non-mechanical recycling is examined in more detail in Part 2.4.

Enzyme recycling would also be starting to develop. In 2020 there is already work being undertaken in this area, for example within the Centre of Enzyme Innovation at University of Portsmouth.

Other technological advancements needed would enable an increase in the capture of plastics from durable goods. This would move from a focus on shredding to mainly capture metal from disassembly of products. This would allow for any hazardous parts to be identified and correctly disposed of and for the remainder of the product to be recycled.

Reprocessing plants would need to operate at higher efficiencies by 2030 to allow for the capture of higher amounts of plastic. This would be possible through the other measures already outlined such as improved design.

2.4 Non-mechanical recycling – part of the future solution for waste plastics?

2.4.1 Chemical Recycling

Chemical recycling is seen as a solution for 'difficult to recycle plastic' such as multi-layer films, heavily printed and filled plastics or complex components. It has attracted attention as it also has the potential to satisfy food contact regulations where not possible through existing technology. In October 2020 UK Research and Innovation (UKRI) announced that their Industry Strategy Challenge Fund will be investing in three projects which use chemical recycling, showing that it is seen as a key recycling area. Below explains in more detail how the different technologies work and the opportunities they present.

More information is available on Plastipedia: https://www.bpf.co.uk/plastipedia/chemical-recycling-101.aspx.

Four main types of chemical recycling processes are used to break down plastic materials to varying degrees, as follows:

1. Chemical depolymerisation

This technique involves a process by which a polymer is converted into a monomer via a chemically aided route.[86] A typical use of this method is for PET which is broken down to monoethylene glycol (MEG).[87]

2. Pyrolysis

Also known as feedstock recycling, this technique for recycling is the heating of polymer at elevated temperatures in the absence of oxygen to produce hydrocarbon raw materials which can then be used for polymer manufacture. Pyrolysis is typically used for polymers such as polystyrene (produces styrene as main product) and polyethylene (produces 1-phenylbenzene as main product).[88]

3. Gasification

This technique involves the partial oxidation of a polymer to produce 'Syngas' (a mixture of CO, CO_2, H_2 and CH_3) through heating with an oxidising agent.[89] In most cases the gas is then combusted for energy generation, although ethanol can be made from the gases and used to create polyethylene.

4. Hydrothermal treatment

Hydrolysis is a process where a compound is broken down by water molecules in near-critical conditions, with temperatures of about 160 – 240°C and the pressure needed to keep the water in a liquid state. This causes reactions of hydrolysis, dehydration, decarboxylation and depolymerisation. This process produces synthetic crude oil.

The above processing technologies will either produce a 'chemical feedstock', monomer or polymer which can be converted back into the raw material for products. These can therefore be considered as a type of recycling and should be counted towards recycling figures. Although the stage in the process the material is returned varies, all maintain the original material-value and enable 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; solvolysis and monomer recycling giving 95%+ useful yield, hydrothermal treatment 85% and pyrolysis near 50%.

Non-mechanical recycling can be considered as a complementary solution to mechanical recycling as its feedstock is normally focused on material which cannot be mechanically recycled. There have been a range of life cycle assessments done looking at chemical recycling, and it compares favourably with incineration and landfill, which would be the alternative end of life option. 'Chemical recycling involves some loss of carbon as C02, but the C02 savings can be as much as 75% with technologies now under development'.[90]

3.4.2 Purification

In addition to the above technologies, there is also purification, under which solvent dissolution sits. As this process returns a polymer as opposed to a monomer or chemical building block, it is considered as non-mechanical recycling, but not chemical recycling. Solvent dissolution is therefore complementary to both mechanical and chemical recycling.

Also known as solvolysis, this technique involves utilising a particular solvent to dissolve a given feedstock (e.g. Low density polyethylene (LDPE)) into polymeric raw material.[91] It can result in a high-purity recyclate with additives and impurities removed, as well as a low yield loss and fewer byproducts than pyrolysis. The recyclate also has the potential for food contact applications.

To help non-mechanical recycling to develop, the following is needed:

1. Harmonised recycling and recycled content definitions that are consistent with the countries in the EU
2. Legal acceptance of a mass balance approach - an example of mass balance is the Ellen MacArthur Foundation White Paper 'Enabling a circular economy for chemicals with the mass balance approach'[92]
3. Public sector support to accelerate production scale development of the technology
4. Access to plastic waste feedstock (at present much of the feedstock required for non-mechanical recycling is presently not collected for recycling from consumer households in the UK)
5. The consistent collection by councils in the UK of all plastic packaging waste to commence in 2023 with all local authorities needing to be collecting these materials by 2028
6. 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
7. End of waste approved and granted on a timely basis.

Non-mechanical recycling companies in the BPF Recycling Group

Below are statements made by each company on their future plans including the capacity they are planning to build.

Recycling Technologies

Recycling Technologies has developed and patented a pyrolysis-based recycling machine, RT7000, to recycle a range of household and commercial plastic wastes. The company has a pilot plant in Swindon and a current project to install a full-scale commercial RT7000 in Scotland at the Binn Ecopark, due on stream in 2021, with other RT7000s in the pipeline thereafter. The Recycling Technologies business model is to centrally build the modular units, each with a throughput of 7,000 tonnes per annum, so that they can be shipped and installed at existing waste management sites to recycle suitable local plastic waste streams into Plaxx®. Plaxx comprises a wax fraction and liquid oil fractions, the latter for onward sale to petrochemical processors for use as a feedstock in new plastics production. The company has plans to supply around 50 such units across the UK by 2030, diverting each year 350,000 tonnes of plastic waste from landfill or incineration.

recyclingtechnologies.co.uk

ReNew ELP

ReNew ELP, based in Wilton, North East England, are due to begin construction of the world's first commercial-scale Cat-HTR™ plastic recycling site in early 2021. The hydrothermal upgrading technology, which uses supercritical water to convert plastic waste into short-chain, stable hydrocarbons, produces a range of valuable chemicals and oils including naphtha. These products can be used as a direct replacements for fossil sourced feedstocks in the manufacture of new polymers and other products for the petrochemical industry. The first phase of build is for a 20,000tpa line, which will be complete in 2022, with focus on recycling post-consumer, mixed rigid and flexible packaging waste. Phase 2 will see the construction of a further 60,000 t/yr capacity, due to come online in 2024.

renewelp.co.uk

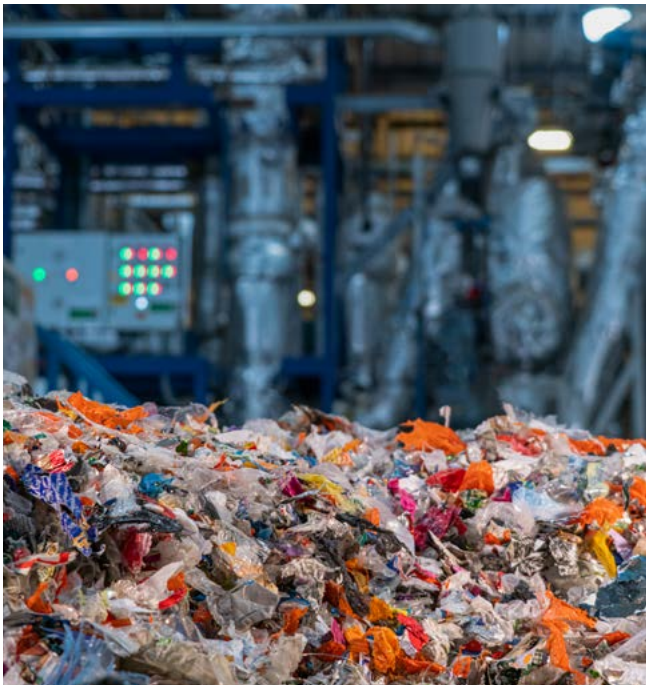


FIGURE 43: Location of pilot non-mechnical recycling plants or plants under construction

Future capacity for non-mechnical recycling

In addition to Recycling Technologies and ReNew ELP, below are other companies the BPF are aware are planning to build capacity or have existing facilities for non-mechanical recycling in the UK. Below are statements made by them.

Enval

Enval treats plastic better, enabling the recycling of valuable resources and paving the way for environmentally responsible packaging solutions. We have developed a unique, proprietary pyrolysis solution for low density packaging waste and our input materials include laminated materials and aluminium laminates. By applying cutting edge innovation to packaging recycling, Enval makes previously unrecyclable plastic valuable. We enable fast moving consumer goods (FMCGs) to strengthen profitable and sustainable brands while complying with new regulations and transform the waste sector by opening up new revenue streams for waste handlers. Enval is changing the perception of plastic and unlocking a profitable circular economy. Enval have a full scale commercial plant in Alconbury and are building a second plant due for completion in June 21.

enval.com

Low Sulphur Fuels

Low Sulphur Fuels patented Fast Electrochemical Process (FEP) converts post mechanical recycled and other non-recyclable plastic into a broad-range naphtha, equivalent to the Platts spec. LSF's chemical recycling process is also able to process other used hydrocarbon containing feedstocks. The company currently operates a pilot plant, and they are working on scaling up the technology and will operate a number of hubs across Europe each with a capacity of 50,000 – 150,000 tonnes/yr as well as licensing the technology to customers. LSF was endorsed this year by the Solar Impulse Foundation as they were selected as one of 1,000 global solutions that can protect the environment in a profitable, sustainable way.

lowsulphco.com

Plastic Energy

Plastic Energy uses patented Thermal Anaerobic Conversion (TAC) technology to convert end-of-life plastics into recycled oils, called TACOIL, which are being used as a replacement for fossil oils to create new virgin-quality plastics. Plastic Energy currently has two commercial plants in Spain that have been in operation for the past three years. In addition to developing projects across Europe, in May 2020 they signed an agreement with Viridor, who will supply plastic waste as feedstock for a new chemical recycling plant in Scotland with a capacity of 30,000 tonnes per annum, which should be operational in 2023. Plastic Energy also recently signed an agreement with Nestlé UK and Ireland to support the feasibility study for a recycling project in the UK.

plasticenergy.com

Poseidon Plastics Ltd

Poseidon Plastics Ltd is a chemical recycler of waste PET via a glycolysis platform. Poseidon's unique and efficient process takes all types of PET waste and mixed waste and converts back to a pseudo monomer material for the production of virgin quality PET materials for packaging and fibre markets.

Poseidon's first commercial demonstration will be a planned 15ktpa plant in Teesside, NE UK. This facility is being supported by a UK Gov SSPP grant with partners in the supply chain project from waste sourcing and separation to final product deployment as recycled PET (rPET). Once the 15ktpa plant is complete and proven, Poseidon will build on the technology and plans to build a ca 100ktpa facility on the same site commencing 2023.

Teesside is ideally located for this development having the two UK PET manufacturers both located here and supported by deep water port and close-by network of roads and motorways to facilitate transportation and product sales.

poseidonplastics.com

Quantafuel

Quantafuel UK Ltd is a chemical recycler with a proven unique technology and plans to build four plants, each of 80,000 tonnes capacity within the next four years at locations within the UK.

quantafuel.com

ReVentas

ReVentas is a ground breaking technology which can filter and purify Polyethylene and Polypropylene of all odours, colours and contaminants, without the need for further costly and environmentally unfriendly petrochemical processing, resulting in an ultra pure virgin-like plastic material.

Worn Again – Technologies

Worn Again Technologies has commissioned a R&D recycling pilot plant in Redcar, UK, to prove their regenerative polymer technology, which uses a dissolution process to purify and recapture both PET resin and cellulose pulp (from cotton) from PET bottles, plastic packaging and also from polyester and polycotton textiles, PET bottles and plastic packaging. The long-term vision is to license multiple plants globally.

wornagain.co.uk

Questions for the experts

We asked three experts the following four questions, and below are presented their responses.

Q1. What do you think 'Plastics Recycling UK' will (or should) be like in 2030 compared to 2020?

Q2. What do you think the medium-term (two to five year) impact will be of Covid-19 on recycling in the UK?

Q3. How important is the role of innovation and new technology (including chemical recycling and sorting technology) in delivering the recycling system of the future?

Q4. Will EFW still have a part to play for plastics waste in 2030?

Stuart Foster

CHIEF EXECUTIVE OFFICER
RECOUP

Q1. What do you think 'Plastics Recycling UK' will (or should) be like in 2030 compared to 2020?

In 2030, UK plastic recycling will be better. More plastics recycled in UK value chains, more infrastructure and innovation to efficiently collect and sort plastics, more products and packaging with end of life solutions designed in, better metrics and ways of measuring carbon and resource efficiency, and more positive wide-scale consumer and business engagement with the reduce, reuse, recycle approach.

I am optimistic that with implementation of effective policies and measures supported by an evolution in extended producer responsibility, the UK can become world leaders in plastic resource management, recycling and environmental protection in the next 10 years.

Q2. What do you think the medium-term (two to five year) impact will be of Covid-19 on recycling in the UK?

Changes in material demand, supply chain requirements and risks mean all parts of the plastic resource chain in the UK have been impacted in some way by Covid. But I believe we will see a continuation of the fundamental shift in attitude towards improved long-term use of plastic resources and the development of circular economy models. It is yet to become clear how 'green recovery' ambitions will play out and how these translate into tangible sustainable actions.

There will be ongoing considerations around the availability of physical resources, ranging from ingredients for food products to fit-for-purpose material available for packaging, to human resources and consistent staffing levels. It should not be overlooked that low oil prices have put additional downwards price pressure on virgin polymers, in turn impacting recycled polymer demand.

It is critical that UK plastic sorting and reprocessing infrastructure is protected and developed over the next five years. Volatility of demand will remain a concern, but maintaining ambitious commitments to recycled content in packaging, and increasing activity and demand in the automotive and construction industries, would support the use of significant additional tonnages of recycled plastic, while a return to pre Covid oil prices would support the commercial drivers in place to use recycled content.

Q3. How important is the role of innovation and new technology (including chemical recycling and sorting technology) in delivering the recycling system of the future?

Ongoing innovation will be needed, and some radical thinking and new approaches must be adopted. Commercialising new innovation does take time, but the level of activity already in the sector is positive, and some of the new developments will shape the recycling systems of the future. The same principle applies for reuse and refill opportunities.

Q4. Will EFW still have a part to play for plastics waste in 2030?

Yes. If we have reached a position in 2030 where the UK controls all plastic at end of life so there is no plastic leakage into the environment that would be a success, even if we are still working towards more circular and resource efficient systems.

EFW technology has markedly improved in the past 20 years, and provides a power, heat and carbon capture opportunity. EFW may also help transition to a system which minimises the landfilling or shipping of plastic waste abroad. However, I recognise that this does not fit with long-term resource efficiency and circular economy ambitions, so a scaling-back of EFW as a viable plastic waste management option after 2030 is a consideration.

Adrian Whyle

RESOURCE EFFICIENCY SENIOR MANAGER
PLASTICSEUROPE

Q1. What do you think 'Plastics Recycling UK' will (or should) be like in 2030 compared to 2020?

In 2030, recycling is likely to be different as we know it today. It is most likely that chemical recycling will have achieved scale and be working hand-in-hand with mechanical recycling in achieving recycling rates that are unimaginable today.

Q2. What do you think the medium-term (two to five year) impact will be of Covid-19 on recycling in the UK?

It is likely that Covid-19 will be still with us, and if this is the case, packaging is likely to play an increasingly important role. For the recovery of UK PLC, it is essential that the UK Government invests in a green recovery that ensures that UK businesses, particularly those engaged in the Circular Economy, are able to thrive in the future

Q3. How important is the role of innovation and new technology (including chemical recycling and sorting technology) in delivering the recycling system of the future?

The Research and Innovation agenda is essential in providing the catalyst for UK industry and has a critical role throughout the value chain. This starts with new systems for collection, advanced sorting technologies that may use enhanced digital image analysis including watermarks and digital barcodes to fully recyclable packaging formats that have enhanced protective properties as well as advanced mechanical and chemical recycling technologies.

Q4. Will EFW still have a part to play for plastics waste in 2030?

EFW is likely to be at a much-reduced level from that today as plastics are eagerly sought for recycling.

Phillip Law

DIRECTOR-GENERAL
BRITISH PLASTICS FEDERATION

Q1. What do you think Plastics Recycling UK will or should be in 2030 compared to 2020?

I'm hoping that by 2030 many of the lessons learnt in the last 20 years will have been digested and implemented in public policy and individual company practice. It's a vision of a largely domestic plastics recycling industry with legislation that gives consistent support to recycling at a fair cost to supply chain partners, much less export of waste, an eradication of waste crime, a reduction in 'greenwash', all to the point where plastics recycling is 'de-politicised' and any targets are based on real field experience not ideology. It's an approach which emphasises harmonious co-operation along the chain, one which reduces the prominence of sectoral silos and in which no-one 'plays God'. It will be based on wide ranging collection schemes and out of which plastics will emerge without question as sustainable materials. I'm also hoping that by 2030 the entire achievement of plastics recycling will be taken into account and that our efforts will not be judged solely in terms of packaging recycling. Window frame recycling for example and the recycling of bottles into long life construction products are among areas which need much greater recognition, as does the economic value of used plastics products as the basis of new raw materials.

Q2. What do you think the medium term impact will be of Covid-19 on recycling in the UK?

Recyclers as material suppliers will be affected by the pattern of demand experienced by their different market sectors. The marked trend towards online shopping as a result of Covid restrictions might well prove to be enduring and a modified pattern of used materials and packaging arise in household waste.

Like all manufacturing sectors the 'casualty rate' of Covid-19 is exacerbating the pre-existing difficulties in finding suitable workers and some companies will in the short term experience a physical shortage of people, hopefully easing as time progresses.

Depending on how long the overall recovery takes the current low prices of virgin materials, at least partly a function of Covid-19 , which have affected the competition of recycled plastics might rise to a higher level.

The Prime Minister has asked us to 'Imagine Britain when a Green Industrial Revolution has helped to level up the country,' In this ideal vision plastics recycling should benefit. Let's hope that it really does.

Q3. How important is the role of innovation and new technology (including chemical recycling and sorting technology) in delivering the recycling system of the future?

No industry can stand still. They must innovate. There is scope for innovation in product design, collection, sorting, mechanical and chemical recycling. There also needs to be innovation in the delivery of messages to consumers to increase their engagement. Legislation is putting recycling in pole position. Governments are offering R&D funding. On the back of this, financial institutions might well show more interest in funding innovation projects in plastics recycling.

A spirit of innovation should run through industry or its image will suffer and attractiveness to investors lessen.

Q4. Will Energy from Waste still have a part to play for plastic waste in 2030?

I think the consensus is that it will still be there, partly because you can't recycle plastics materials for ever and there is an opportunity to derive energy from the ultimate waste. It will also have a role in the treatment of specialist streams such as contaminated medical waste. Despite its merits in dealing with the small artefacts and in generating Energy from Waste and respecting regulatory emission limits the future focus is likely to l be on achieving as much circularity as possible through recycling.

Conclusion

3 Conclusion

This roadmap has set out where the UK currently is for plastic recycling and has brought together all available data on plastic recycling in the UK as well as POM figures across multiple sectors including packaging, ELVs, WEEE, and construction as well as other sectors such as medical. In some areas, data is very limited, and expert insight has been used to make predictions in these areas. There is opportunity to improve data capture for plastic waste to enable better analysis of it to take place.

Plastic recycling has come a long way, and the summary graph presented at the beginning of section 2 shows the rapid increase in recycling and reduction in landfill over the last decade. This reflects a shifting view towards waste and a realisation of the ability of this material to be used in a range of new products. In section 1.7, the uses of recycled plastic into new products are examined. There has been a wave of commitments from brands and retailers to use recycled material as well potential government legislation on this. However, as well as this, drive needs to continue and not lose focus due to the current tougher economic situation.

The report has gone on to predict what plastic recycling could be like by 2030. In this vision, the UK would have zero reliance on low-quality export. Minimising export would allow the UK to be less affected by global issues affecting other countries' ability to accept material and also allow the UK to maximise the value in this material. It would be hoped a lot of this material could be used in the UK, but even if markets for it are elsewhere, the UK would be exporting a resource ready to be utilised in new products rather than waste. The report also shows minimal plastic waste going to landfill as the BPF wants to maximise the value from all plastic and ensure it is used as high up the waste hierarchy as possible. It also sees non-mechanical recycling becoming increasingly important to help manage plastic waste.

The data presented for 2030, predicted by expert input, would only be possible with changes across the supply chain with well-designed legislative drivers in all the key areas set out in Figure 35, which all influence the end of life destination of plastic. This includes having a clear set of unified design for recycling guidelines, consistent collections and material quality standards.

The BPF thinks this vision, although aspirational, could be realised if the correct drivers and investment are available. One means to fund this expansion of recycling is via the Plastic Packaging Tax. It is estimated that by 2030 the tax will have raised £1.8 billion.[93] If this money was ring-fenced and used to produce UK reprocessing capacity as well as invested in collection and sorting, this would enable this vision to be realised. There is also further opportunity to use the landfill tax for investment in the industry. The provisional tax raised from landfill in 2018/19 was £683 million[94] and if there were similar amounts generated until 2030, the combined plastic packaging and landfill taxes would generate over £8.5 billion.

Further work

- Gain a more accurate understanding of existing capacity in the UK such as reprocessing, sorting capacity, existing collection schemes and washing, flaking and pelletisation capabilities.
- Understand the capacity needed in supply chain to meet forecast, e.g. sorting capacity.
- Gain more insight on level of recycled content currently used.
- Expand forecast to look at specific formats and polymer types.
- Create scenarios for the effect on the 2030 forecast of different legislative drivers.
- Explore the end markets for each sector and format. Included in this should be looking at the markets within UK closed loop recycling, UK open loop recycling and export for manufacturing. This information can be used to do economic modelling for the recycling of each type of plastic.

Glossary of terms

ABS	Acrylonitrile Butadiene Styrene
ATF	Advanced Treatment Facility
C&I	Commercial and Industrial
CPA	Circular Plastics Alliance
DVLA	Driver and Vehicle Licensing Agency
EEE	Electrical & Electronic Equipment
EFW	Energy from Waste
ELV	End of life Vehicle
EPS	Expanded polystyrene
HDPE	High-density polyethylene
HIPS	High impact polystyrene
HWRCs	Household Waste Recycling Centres
LDPE	Low-density polyethylene
MRFs	Materials Recovery Facilities
NPWD	National Packaging Waste Database
PA	Polyamide
pa	per annum
PC	Polycarbonate
PE	Polyethylene
PERN	Packaging Export Recovery Note
PET	Polyethylene terephthalate
PLC	Public Limited Company
POM	Placed on the market – plastic that has entered a market for commercial consumption
PP	Polyproylene
PRF	Plastic Reclamation Facility
PRN	Packaging Recovery Note
PS	Polystyrene
PVC	Polyvinyl Chloride
RDF	Refuse-derived fuel
SMMT	Society of Motor Manufacturers and Traders
SRF	Solid Recovered Fuel
WEEE	Waste Electrical and Electronic Equipment
Waste arising	That is materials that have reached the end of their life and entered the waste stream

Annex 1 – Plastic production in the UK

There are nearly 2 million tonnes of plastic production in the UK, and Figure 44 shows the companies producing plastic across the UK.

FIGURE 44: Plastic production across the UK

Producer	Product	Location	Capacity (t/y)
Sabic UK Petrochemicals	LDPE (Low Density Polyethylene)	GB, Wilton (Teesside)	400,000
INEOS Olefins & Polymers	HD/LLDPE swing (Polyethylene High Density/Linear Low Density)	GB, Grangemouth	330,000
Inovyn	PVC (Polyvinylchloride)	GB, Newton Aycliffe	300,000
INEOS Olefins & Polymers	PP (Polypropylene)	GB, Grangemouth	285,000
Basell Polyolefins UK	PP (Polypropylene)	GB, Carrington	230,000
Alpek Polyester UK Ltd	PET (Polyethylene Terephthalate)	GB, Wilton (Teesside)	350,000
PET Processors (UK) LLC	PET (Polyethylene Terephthalate)	GB, Dumfries	20,000
Victrex Plc	PEEK (Polyetheretherketone)	GB, Thornton Cleveleys	7,000
Asahi Glass Fluoropolymers UK Ltd	PTFE (Polytetrafluoroethylene)	GB, Hillhouse	3,000
Lucite International	PMMA (Polymethyl Methacrylate)	GB, Newton Aycliffe	3,000
Total			1,928,000

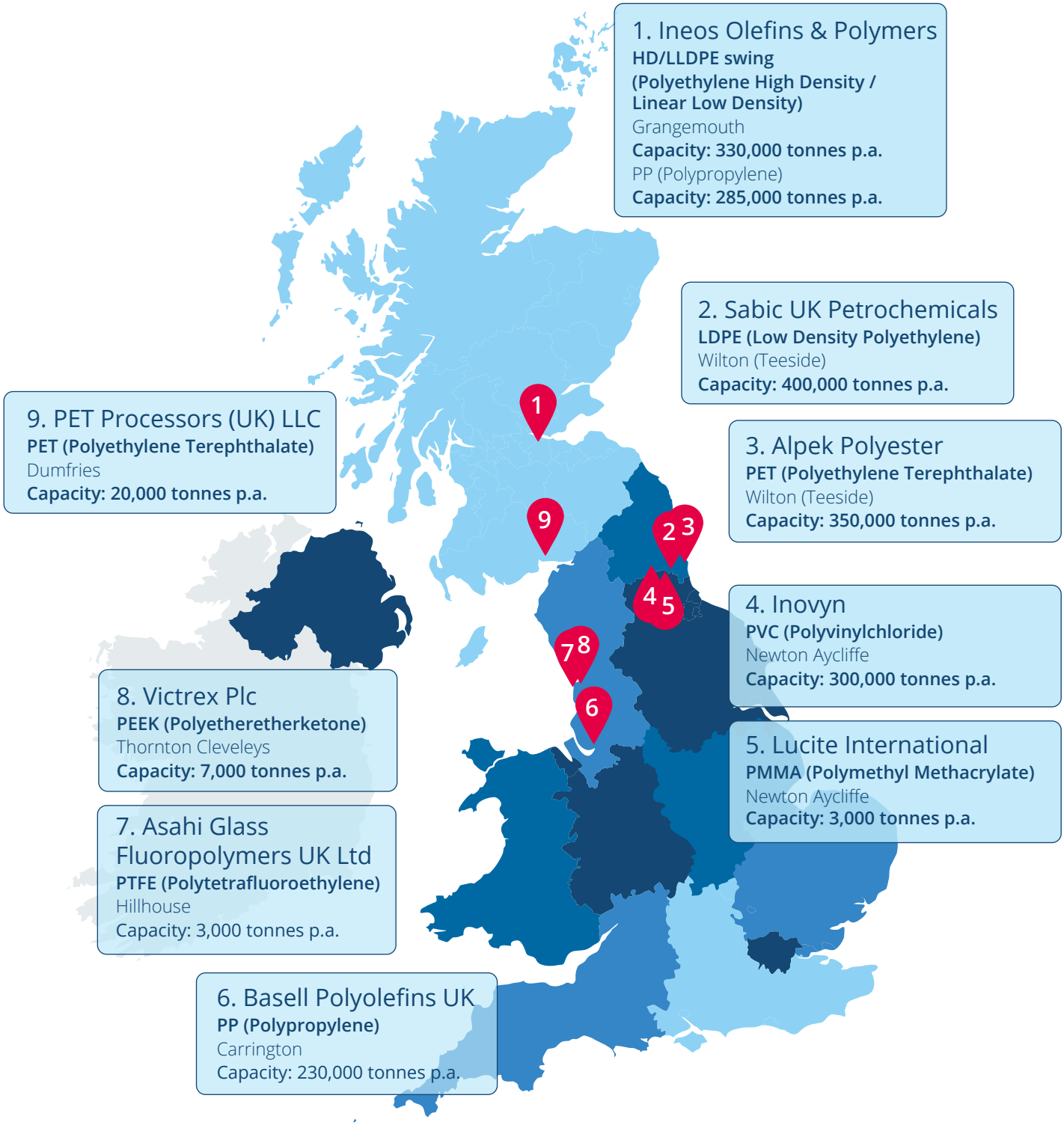
Source: Polyglobe www.polyglobe.net

Security of supply

The UK has the capacity to produce less than 2 million tonnes of polymer yet processes nearly 4 million tonnes per year. As a result, the UK is heavily reliant on the import of raw material (with 85% coming from Europe),[95] unlike most of its European counterparts, who have the capacity to produce more than they consume.[96]

Investing significantly in the recycling infrastructure in the UK not only will mean UK processors have a more secure, domestic supply of feedstock (and thus protect themselves from planned maintenance and force majeures), but there will be a significant reduction in carbon emissions caused by the logistics of importing such large volumes of raw material.

FIGURE 45: Plastics production in the UK, 2020



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