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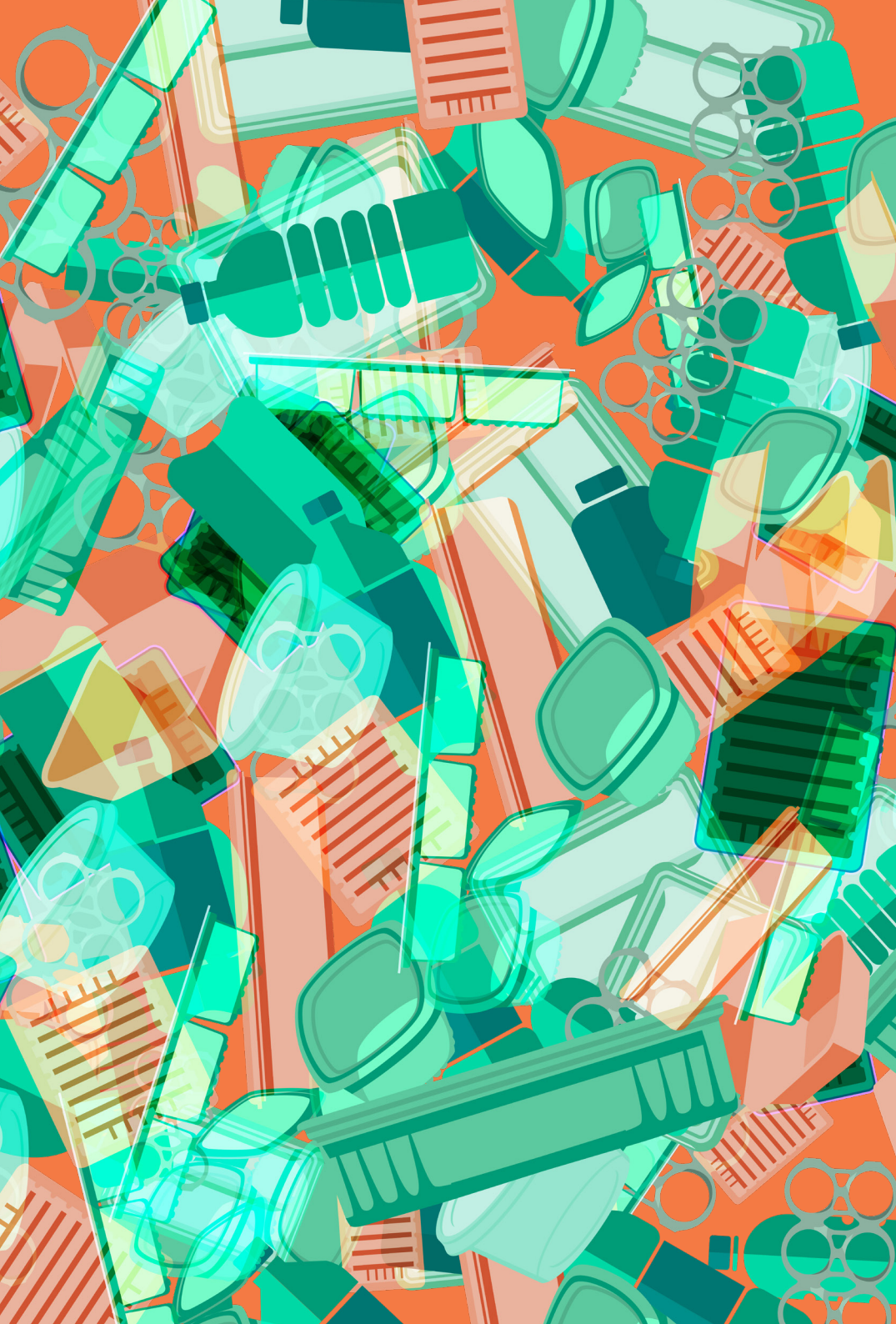
The University of Manchester

Tackling Household Plastic Waste: Best Practice for a Circular Plastics Economy

@OneBinUoM
one.bin@manchester.ac.uk

Dr Helen Holmes
Prof Michael Shaver
Dr Torik Holmes
Dr Kris Kortszen

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Contacts

Dr Helen Holmes

helen.holmes@manchester.ac.uk

Prof Michael Shaver

michael.shaver@manchester.ac.uk

Dr Torik Holmes

torik.holmes@manchester.ac.uk

Dr Kris Kortsen

kristoffer.kortsen@manchester.ac.uk

Executive Summary

In 2021, 2.5 million tonnes of plastic waste was generated in the UK – just 44% of that was recycled

DEFRA, 2022

‘The UK sends over 60% of its plastics abroad, exporting the problem of plastic waste to countries that often do not have the ability to dispose of this waste sustainably’

House of Commons Environment, Food and Rural Affairs Committee (EFRA), 2022

There is a lack of standardisation across UK waste practices: there are over 391 different local authorities in the UK, with an estimated 39 different bin regimes, that send waste to approximately 3,500 waste recycling plants with varying capacities and infrastructure.

Improving plastic waste management is a core policy issue. Waste prevention should always be a priority, with reduction and reuse taking precedence over recycling (Keep Britain Tidy, 2023). Nevertheless, recycling remains a policy priority to prevent plastic release into the environment. Yet current policy remains fragmented and siloed with a lack of consistency, standardisation and rationalisation.

We deliver this report at a crucial point in UK plastic policy with the introduction of the plastic packaging tax in 2022, both extended producer responsibility (pEPR) and Deposit Return Scheme (DRS) set to roll out over the next two years, alongside work to improve consistency in collections and a proposed ban on the export of plastic waste to non-OECD countries by 2027. Whilst the introduction and effort of such policies is welcome, whether they are sufficient to deal with the scale of the challenge remains questionable.

As a redress, this report details the necessary policy solutions to tackle the complexity of the current plastics recycling system and to enable the UK to transition to a circular economy of plastic waste. Drawing on our extensive, interdisciplinary research, we demonstrate how a One Bin system, underpinned by an open-source hierarchy of fates for end-of-life plastics and integrated with micro-level understanding of household practices, offers a roadmap to standardise and simplify plastic recycling.

We deliver three best practice goals to demonstrate where policy and investment can tackle the challenge of plastic waste. These are:

- 1. the need to understand consumer practice to shape recycling infrastructure and policy;**
- 2. standardisation and consistency across the supply chain;**
- 3. maximising value and sustainability of plastics via an open-source hierarchy of fates.**

Simplified policies which draw on the best practices of this report are needed to create a robust and sustainable circular plastics economy.

[@OneBinUoM](#)

one.bin@manchester.ac.uk

This document shares insights from an in depth interdisciplinary research project called ‘One Bin to Rule Them All’ as part of the Industrial Strategy Challenge Fund in Smart Sustainable Plastic Packaging. Through this funding we have sought to develop best practice for future UK household plastic recycling policy.

This white paper demonstrates how household plastic recycling rates in England can be vastly improved to enable a circular economy of plastic waste. A suite of recommendations, ranging from simple measures local authorities can take, to wider infrastructural investment, all support a system designed to recover value and integrate standards.

Our research speaks to existing and future policies related to improving household plastic recycling – including Extended Producer Responsibility and the Plastic Packaging Tax at national level, OECD and UN standards at international level, and local decisions made by councils across the UK.

Importantly, our research advocates that tackling the plastics challenge requires a holistic approach, which includes the whole of the supply chain – from manufacturers, retailers, policymakers and consumers – taking account of the material, social and economic circumstances which underpin it.



The UK Plastics Challenge

Plastic recycling in the UK is currently overly complex and in need of vast improvement.

- In 2021 2.5 million tonnes of plastic waste was generated in the UK – just 44.4% of that was recycled (DEFRA, 2022).
- ‘The UK sends over 60% of its plastics abroad, exporting the problem of plastic waste to countries that often do not have the ability to dispose of this waste sustainably’ (EFRA, 2022).
- There is a distinct lack of standardisation across UK waste practices: there are over 391 different local authorities in the UK, with an estimated 39 different bin regimes. This is coupled with approximately 3,500 waste recycling plants – with varying capacities and capabilities in infrastructure requiring feedstocks in different forms that maximise individual margins rather than systemic economics.
- Flexible packaging currently accounts for around a fifth of consumer packaging (e.g., films) (WRAP, 2021a), yet it is not widely collected by local authorities, nor does UK waste infrastructure have the capacity to deal with it. According to RECOUP’s (2021) recent report, only 8% of flexibles are recovered for recycling.

As per the House of Commons Environment, Food and Rural Affairs Committee (EFRA) Report (EFRA, 2022), improving plastic recycling is a core policy issue. Plastic is invaluable but also problematic. Its unique material features - lightweight, sterile and low cost - have enabled its proliferation in healthcare, food retail and manufacturing sectors for over 50 years. It is such features that meant plastic played a vital role during the pandemic - from protective face masks to anti-bacterial hand sanitiser (Holmes and Shaver, 2020).

Waste prevention should always be a priority, with reduction and reuse taking precedence over recycling (Keep Britain Tidy, 2023). However, until there are significant shifts in the way we consume, recycling remains a core policy focus to tackle plastic release into the environment. Most plastic can be recycled, either mechanically or chemically, with mechanical recycling remaining the most efficient option (Schyns and Shaver, 2021), but it often is not (>50% lost, DEFRA, 2022). A sizeable proportion of the UK’s plastic waste is sent abroad for processing, adding to the environmental footprint and lack of trust in recycling. Often this waste is incinerated rather than recycled further adding to its environmental impact and disabling the circular economy. When ‘leaked’ into the environment, through littering or incorrect disposal, plastic poses various environmental threats. Most are now familiar with the Great Pacific Garbage Patch and fears surrounding littering and micro-plastics.





Consumer plastic packaging is a significant issue, accounting for a large percentage of the 30 million items littered in the UK each year (Keep Britain Tidy, 2022). A recent study estimates that 63% of all littered items are made of plastic (Stanton et al., 2022). Whilst local authorities have designated kerbside collections for plastic packaging, differing bin colours and rules regarding what type of plastic packaging is accepted creates consumer confusion, further heightening the potential for costly contamination, littering and fly-tipping.

The transition to a circular economy of plastic waste requires standardisation across the supply chain, simplification (e.g., of waste streams, polymer types) and importantly investment (Burgess et al., 2021). Legislation including packaging extended producer responsibility (pEPR) policy, the Plastic Packaging Tax and the planned implementation of a Deposit Return Scheme (DRS) (DEFRA, 2023) offer the potential to create revenue to unlock investment in infrastructure capable of improving plastic recycling and standardising the current system. As does the progress of WRAP's (2022) [UK Plastics Pact: Roadmap to 2025](#). However, delays to pEPR and concerns as to how the funds generated will be spent by local authorities raises questions over the reach of such policies in addressing the UK's plastic challenge. Similarly, uncertainties persist concerning the delivery and detail of DRS.

This paper highlights that such policies and associated reports only assess the current complexities of UK plastic waste policy and infrastructure and do not pay adequate attention to the vital role of the consumer, the household or the material complexity of different environments. What households 'do' with diverse plastic waste has repercussions which extend along the supply chain.

The Research

One Bin to Rule Them All (One Bin) is a three-year project researching household plastic recycling in Greater Manchester. The project is unique as it involves an interdisciplinary team of researchers collaborating with 30+ policy and industry stakeholders to deliver three work packages focused on materials, economics and social practices. It therefore takes a holistic and integrated approach to the whole of the plastics supply chain. This policy white paper draws on the integrated findings of the material and social practices work packages to provide policy recommendations for a more circular and sustainable plastics future.

The main premise of One Bin is to simplify plastics recycling for households – one bin for all plastic packaging waste – while using advanced sorting strategies to simultaneously improve economic outcomes for industry. This has two main integrated benefits:

It simplifies household practices by making them consistent. Anything households think is plastic packaging goes in the bin. This therefore overcomes the multiple different local authority rules and bin regimes.

Through the development of a materials hierarchy, we can determine the most appropriate fate for different forms of household packaging. Our analysis has identified a standard set of materials from which the most economic value can be recovered and how that would change with infrastructure investment.

In what follows, we present the core findings of the research, and their relevance for future best practice of UK household plastic recycling policy.



Materials

Explores the potential decisions that could be made in Material Recycling Facilities (MRFs) and Plastic Recycling Facilities (PRFs) and identifies decisions that could add material value (e.g., create a higher value product) and thus identify investments in infrastructure that would add economic value.

Together, these create a materials hierarchy of key decisions that enable a circular economy.

One Bin Household Trials

Social Practice

Explores qualitative research into how households engage with plastic recycling. A trial of the One Bin system with 30 households in Greater Manchester, located across a transect of differing deprivation (English Indices of Deprivation, 2019), alongside pre and post-trial interviews has illuminated the recycling practices and lived experiences of households. Together, the team analysed the plastic collected during the trial, with the results integrated into the hierarchy of decisions.

Best Practice Learning 1: We need to better understand consumer practice

Household practice is at the heart of our study. To fully understand the plastics supply chain policy needs to better understand what consumers are doing to plastic waste and the implications this can have both upstream and particularly downstream.

We identify two main findings which we believe are vital for future UK plastic recycling policy:

- **Households need simple, straight-forward recycling systems**
- **Households care about doing the right thing**



1. Households need simple, straight-forward recycling systems

We are not the first to highlight that consumers are confused about plastic recycling and that this confusion compounds low recycling rates. Whilst we highlight that consumer confusion is not the only reason for low household plastic recycling, it is certainly a key factor.

Our evidence shows that confusion occurs due to several interrelated reasons:

Confusion over which items go in which bin

As discussed, different rules in different local authorities cause issues. Some local authorities will take a variety of different plastic items (e.g., pots, tubs and trays), others will only take plastic bottles.

This is further compounded by consumers being overwhelmed by ambiguous messaging from:

- **Logos on packaging**
For example, “Terracycle”; “resin codes (1-7)”; recycling symbols
- **Statements on packaging**
For example, “widely recycled”; “empty and replace cap”; “recycle lid on”; “plastic in product”
- **Social media posts**
- **Regional, national and international print and TV press**
- **Documentaries**
For example, Blue Planet



“A lot of my information in fairness is from what other people say you can and can't do, or on social media; people say different things on there.”



“This doesn't say anything on it about recycling. This one, crumpets, terracycle. What's that? That would suggest it's recyclable.”



“Worst of all is the one that says ‘Can be recycled in certain areas’”

Best Practice Learning 1: We need to better understand consumer practice

Confusion over the materials packaging is made from
Many types of household plastic packaging are made of multi-materials – combinations of materials (e.g., plastic and cardboard), alongside multiple polymer types and additives. This makes it difficult for consumers to determine what items are made of and therefore which bin they should go in.

There were multiple examples of hard to determine items from our research including fruit netting, crisp tubes, crisp packets and cartons. Often households would use tactile skills – what an item feels and sounds like – to try to determine the material it is made from and therefore which bin it should go in.

Not knowing what something is made of often leads to items being treated in specific ways, such as households trying to pull apart the different materials so they can be recycled separately (e.g., windowed envelopes, crisp tubes and blister packs).



“Crisp packets are kind of like... Are they foil or are they plastic? You kind of find yourself questioning how much plastic there might actually be in that.”



“Tetra Paks I would rip off the plastic top and then I'd recycle the card but then that's foil lined?”



“Pringles tubes are also a – they have plastic lids but you can't throw them in the plastic recycling. They have metal base, cardboard tube. But the cardboard cylinder has got foil on the inside. So, it's like, where does that go? It's everything.”

Confusion regarding how plastic items should be treated before being recycled

Rules relating to treatment depend on the requirements of the municipal recycling facility accepting the waste. For example, in some recycling plants crushing of plastic bottles prevents it being easily identified by separators using optical detection systems. However, in others, not crushing means bottles roll back on conveyors and can end up in the wrong waste stream. There are similar inconsistencies with regards leaving lids on packaging.



“It's silly things like if you have a plastic, you know the 500ml bottles of Coca-Cola, you might put the lid on, you might take the lid off, the lid might go in a different bin it's even the stupid little things like that... It is basically guess work isn't it!”



“For example, Marks & Spencer, they're very good; they will tell you this is recyclable, the bottle is recyclable, but the lid is not recyclable yet. But others, you know, if you buy something from Aldi, it doesn't tell you what you should do with the lids and whether it's recyclable or not.”



“Lids on. I scrunch the bottles up, as a rule, to make them more compact, and then put the lid back on to keep the air out and then put them in.”

Best Practice Learning 1: We need to better understand consumer practice

2. Households care about doing the right thing

The trope that consumers are not interested in recycling is not only damaging for future consumer engagement with recycling but is also inaccurate. Our research found that most householders want to do the right thing when it comes to recycling. However, they are limited by complex and unclear messaging, restrictions regarding what can and cannot be recycled and on how such recycling should be treated, and the huge array of material complexity.

Our findings illustrate the care and attention households give to plastic recycling - including various treatment practices but also the lengths households will go to reduce the impact of their waste. Many of the households we interviewed had found alternative routes of recycling for items the local authority would not recycle. Importantly, these activities span household socio-demographic differences meaning they are not only undertaken by more middle-class, typically determined as sustainability 'savvy', households with storage space.



"I take my pots, tubs and trays to my mum's in Cumbria - they recycle them."



"Occasionally if it's full, Hannah next door and I help each other. We all help each other. We'll just send a WhatsApp message asking if anybody has room in their grey bin and if I can put a bag in the grey bin."



"Plastic film, film wrapping, which we've now got the Co-op round the corner... I collect it up in a big bag, anything soft like bread wrappers or things like that I put in the bag and take it to the Co-op."

Example: Alternative recycling pathways

We found that many households developed alternative recycling pathways for items the local authority could not recycle:

1. Several households discussed how they travel to friends and relatives in other local authorities which do accept more types of plastic waste to dispose of items that cannot be recycled in their own area.
2. Some households store items to take to retailers offering specific recycling schemes - such as flexible packaging recycling schemes (e.g., crisp packets, bread bags, pet food sachets) offered by some supermarkets or specific retailer recycling or reuse schemes (e.g., make-up packaging, printer cartridges).
3. Inter-household co-ordination provides a further alternative route of recycling - contacting neighbours, often through social media (e.g., neighbourhood WhatsApp groups) when household bins are full to see if any neighbours have space in their bins which can be used instead.

Such alternative pathways have their own implications requiring effort, time and negotiation on the part of the householder; space for storage of items prior to its alternative disposal; in the case of (1) and (2) they also require transport and therefore have an added carbon footprint.

Best Practice Learning 1: We need to better understand consumer practice

Recommendation

Future policy needs to start from an understanding of consumer practice and must stress the role of everyone along the supply chain in contributing to improving recycling.

Standardisation and rationalisation (see [Best Practice Learning 2](#)) will only be achieved if consumers are engaged. How consumers understand and negotiate recycling rules, how they determine what different packaging is made of and how they then treat items prior to disposal are crucial to effective plastic recycling policy.

The narrative of ‘blame the consumer’ is damaging to future consumer buy-in. Encouraging and potentially rewarding good recycling practice, alongside clear, simple systems, will increase recycling.

There are opportunities to encourage and build on the alternative recycling pathways that households already use, including working with retailers to offer recycling schemes for hard to recycle products and working with local authorities to further encourage inter-household waste co-ordination.

Example: Reducing the size of general waste bins does not always improve recycling*

Many local authorities have recently introduced a policy of smaller general waste bins to combat contamination and improve compliance.

Our findings show that rather than improve recycling, this policy can lead to households having to find alternative means of disposal – in some instances leading to fly-tipping and contamination (‘hiding’ waste in the wrong bins).

Reducing general waste bin sizes does not always improve recycling, because households still have the same amount of general waste to get rid of.

When given the One Bin to hold all plastic waste, households commented how little general waste they now had, illustrating that reducing general waste bins does not reduce household waste as this material has to go somewhere.

*What counts as general waste differs from one area to the next, depending on the waste regime in place.



“The grey bins (general waste) just aren’t big enough for non-recyclable stuff that comes into the household.”



“If the bins are overflowing, I’ll get “creative” and hide some stuff.”



“I’m so conscious that we only have that smaller grey bin, and a lot of the space is taken up with nappies that we don’t have that much more extra space to keep putting in stuff... I put stuff down the sides and hide it.”

Best Practice Learning 2: Standardisation and consistency will improve recycling rates

The evidence from our research is clear: to improve recycling rates requires standardisation and consistency across the whole of the plastic packaging supply chain. This involves targeted standardisation and consistency in three overlapping priority areas – materials, infrastructure and messaging.

Materials

The complexity of current packaging materials limits recyclability. Packaging made of multiple materials (e.g., combinations of plastic with card, metals or other materials) or multiple polymer types pose problems along the supply chain. As noted, consumers cannot determine what packaging is made from, resulting in items ending up in the wrong bin. This then increases overall contamination rates. Multi-material packaging is difficult for waste processing facilities to identify and then deal with.

- The 30 households involved in our One Bin project trial produced 5,800 pieces of plastic over the two-week trial period. That's 196 pieces of plastic from an average household.
- Understanding practice is essential to creating an effective waste management system. While we wouldn't normally expect polystyrene (PS) films in grocery packaging, material analysis showed a significant number of the windows of envelopes were this plastic type. This can contaminate recycling processes.
- Efficient sorting is essential, but this is also complicated by practice: many households collected their flexible packaging – composed of a multitude of different polymers – and stuffed them into a plastic bag, tied tight. Separation, sorting and segregation all become nigh on impossible, suggesting broad scope chemical recycling (i.e., pyrolysis or hydrocracking) might be a better solution for flexibles.

Example: The issue with flexible packaging

Our One Bin trial found that 24% of the items collected (by weight) were flexible packaging (e.g., crisp packets; bread bags; wraps around multipacks). This represents nearly half of the waste items put in the 'One Bin' bins.

Maximising the recycling of flexibles will involve reducing the complexity of their design and would also require broad adoption across sectors to see real change.

Making sure flexibles are aggregated at scale is a major challenge. By item, flexibles account for a large amount of the plastics in people's homes and bins, by weight, they comprise much less. Weight is crucial because waste is valued according to tonnes of materials. Many more flexible items are needed to make up a tonne than heavier items, such as bottles or pots, tubs and trays.

A large-scale standardised approach to the sorting, collection and processing of flexibles remains key.



Best Practice Learning 2: Standardisation and consistency will improve recycling rates

Infrastructure

Current infrastructure capability and capacity is a major barrier to recycling (EFRA, 2022). Waste infrastructure is hugely variable across the UK and this impacts upon local waste policies and efficiency. It is a postcode lottery as to what sorts of packaging can or cannot be recycled in your area. Some local authorities accept plastic bottles, pots, tubs, and trays, whilst some will only take plastic bottles. There are also some local authority trials to collect flexible packaging.

Not only does capability vary at waste processing plants, so does capacity. Our research has found that if a processing facility is at capacity, sometimes waste will be transported hundreds of miles to another facility - further adding to its carbon footprint.

- 100% of UK local authorities offer plastic bottle collection. 87% also collect pots, tubs and trays (RECOUP, 2021).
- The [FlexCollect](#) project is a trial involving nine local authorities to collect flexible packaging for recycling. The project began in April 2022 with initial findings expected soon.
- Over 4,000 supermarkets in the UK also now offer flexible recycling schemes.

Messaging

Inconsistent communication about recycling plastics is a core and repeated issue. As discussed in [Best Practice Learning 1](#), consumers are overwhelmed with inconsistent messaging from multiple sources making it difficult to discern what applies to them.



“A TV show was talking about recycling, and it said if you can't recycle it, it goes in the black bin. If I put it in the black bin, that is recyclable.”



“There was something on the BBC website about recycling and it said, as long as it's not really greasy, it's fine to recycle. The same day I saw something on telly saying, no, if there's any spot of anything on it, don't recycle it. That was literally the same day.”

Labelling materials as 'compostable' or biodegradable' misleads the consumer, as no detail is given regarding processing, and there is no standardisation in labelling. This can lead consumers to discard materials alongside compost, or as litter, assuming it to be naturally degradable or short-lived in the environment.



Best Practice Learning 2: Standardisation and consistency will improve recycling rates

Recommendations

Materials *design to recycle*

- Clearer rules on material composition (i.e., polymer type; use of multi-materials; additives, colourings).
- Reduction of contaminants (i.e., additives, colourings, bio-degradable polymers; potential toxic contaminants – PVC, polystyrene).
- Collection led transformation – collect more materials to tip balance in favour of investment in infrastructure for recycling.
- Design can lead to either mechanical or chemical recycling pathways, but should be based on available infrastructure.

Infrastructure *invest to recycle*

- Consistent kerbside collection across the UK and beyond of all plastic packaging.
- Targeted investment in infrastructure to enable consistent kerbside collections, reuse, mechanical and chemical recycling.
- Ringfenced funding to support transformation.
- Investment portfolio guided by volumes of materials, with locations supporting regional development to minimise transport.

Messaging *encourage to recycle*

- Standardised labelling that mirrors underpinning rules of consistent collections.
- Support roll out of WRAP's (2021b; 2021c) **labelling guidance** (as part of the UK Plastics Pact: Roadmap to 2025 (WRAP, 2022)) for rigid plastic to all plastic packaging.
- Agreement across retailers on messaging and complementing legislation.
- Standardised messaging across UK local authorities concerning disposal expectations.
- Multi-channel mass marketing campaigns that encourage reuse, waste prevention and recycling (see, for example, suggestions in Keep Britain Tidy Report, 2023).

Best Practice Learning 3: Both the real and potential fates of materials matter

- The current plastics supply chain shows a disconnect between production, use, and end-of-life of plastics, slowing progress towards improvements.
- Policies such as pEPR and DRS are a good start towards increasing accountability and encouraging cooperation along supply chains, but more needs to be done.
- To improve the sustainability of plastics to maximise material value, in-depth information about potential end-of-life fates for plastic waste needs to be considered across the supply chain.

A hierarchy of fates for end-of-life plastics

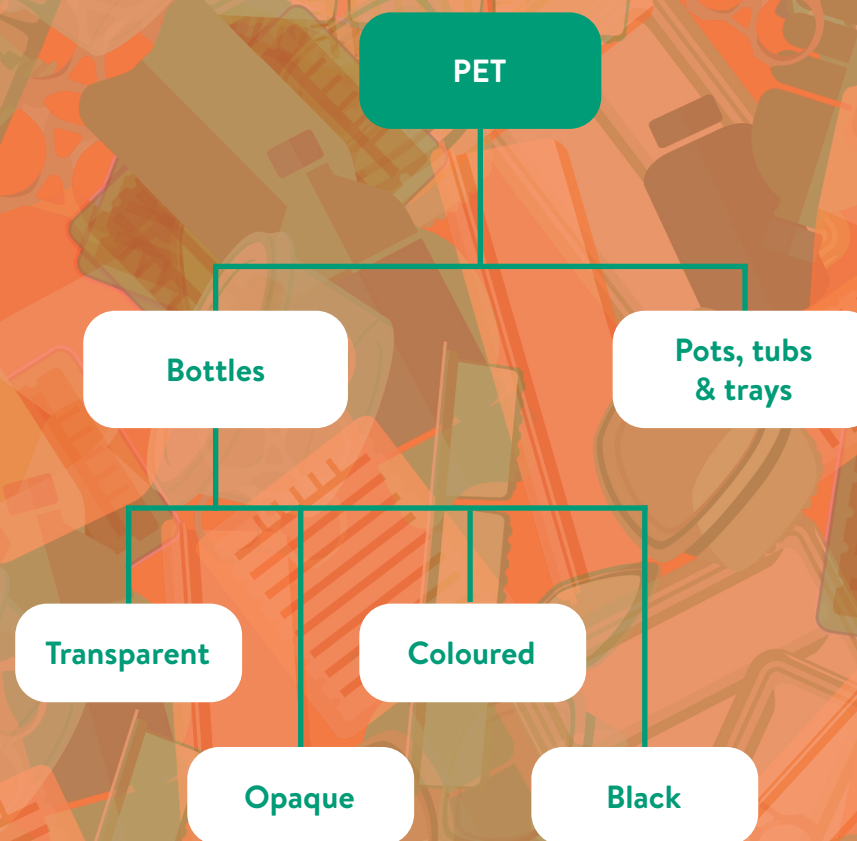
We have developed an interactive tool with information and guidance on plastic waste. The hierarchy of fates allows for a clear overview of what choices and investments can lead to a more sustainable future. Here are three examples of the hierarchy in practice:

Easy decisions... plastic bottles

Within the hierarchy some end-of-life choices seem obvious, for example mechanical recycling of PET bottles is the most sustainable choice. This retains the plastic in its highest value and returns the product to its original state. The infrastructure already exists, and value is being created throughout a healthy supply chain.

However, it is not always straightforward. Plastic additives, colourings, labels, and lids can all introduce contamination that may affect mechanical recycling.

While the recycling of PET bottles fundamentally works, sustainability improvements can be made. For example, by enforcing specific 'design for recycling' guidelines into legislation, sorting can be simplified, waste PET purity can be enhanced, and mechanically recycled PET will be of higher quality.



Best Practice Learning 3: Both the real and potential fates of materials matter

Weighing up competing interests... flexibles

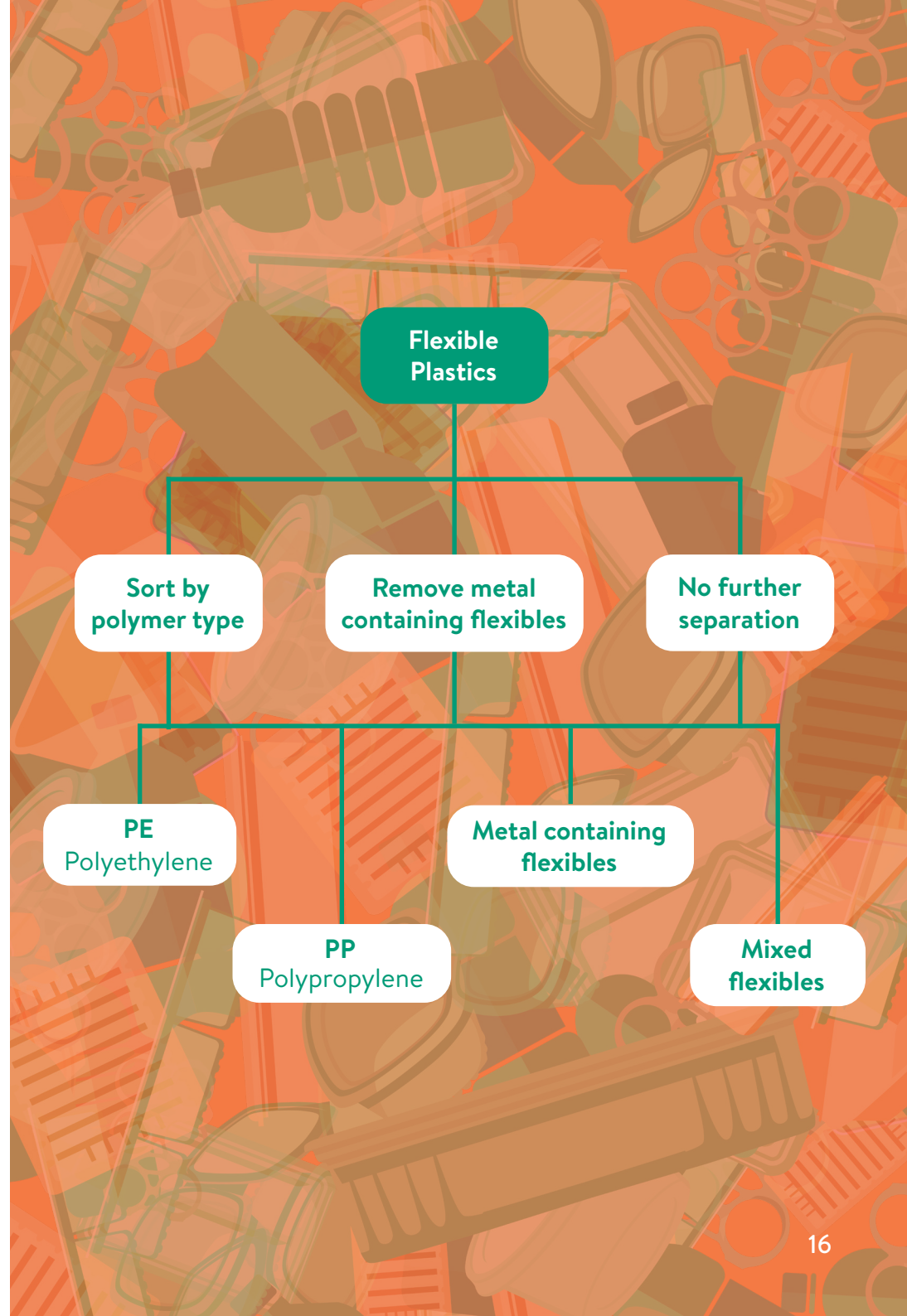
Some end-of-life decisions within the hierarchy of fates are more nuanced, such as those to do with flexible packaging.

The mechanical recycling of resin separated flexibles could provide superior quality recyclate. However, our trials and interviews show the scale of this sorting challenge, with large-scale investment needed to enable separation by resin type. Flexibles remain difficult to process because of their large volumes, small individual size, variety and tendency to tangle in sorting machines.

This raises a genuine question: Is it worth the investment to sort flexibles by resin type when there is so much variation, or is it more favourable to process flexibles as a mixture of plastics?

Large sustainability gains are currently being lost by not recycling flexibles, so the worst choice is continuing to do nothing. Further segregation within flexibles would require a prohibitive amount of investment, so optimising the mechanical or chemical recycling of mixed flexibles currently remains a more sustainable decision.

The goal here should be to use legislation to optimise the flexibles waste stream towards recycling of mixed flexibles. This could involve the banning or taxation of certain additives, colourants and resin types.



Best Practice Learning 3: Both the real and potential fates of materials matter

All is not as it seems... biodegradables

Other end-of-life decisions may seem counterintuitive, highlighting the need for better understanding of the various fates of plastics. Biodegradable plastics are gaining in popularity, as the common perception is that they are more sustainable than other plastics.

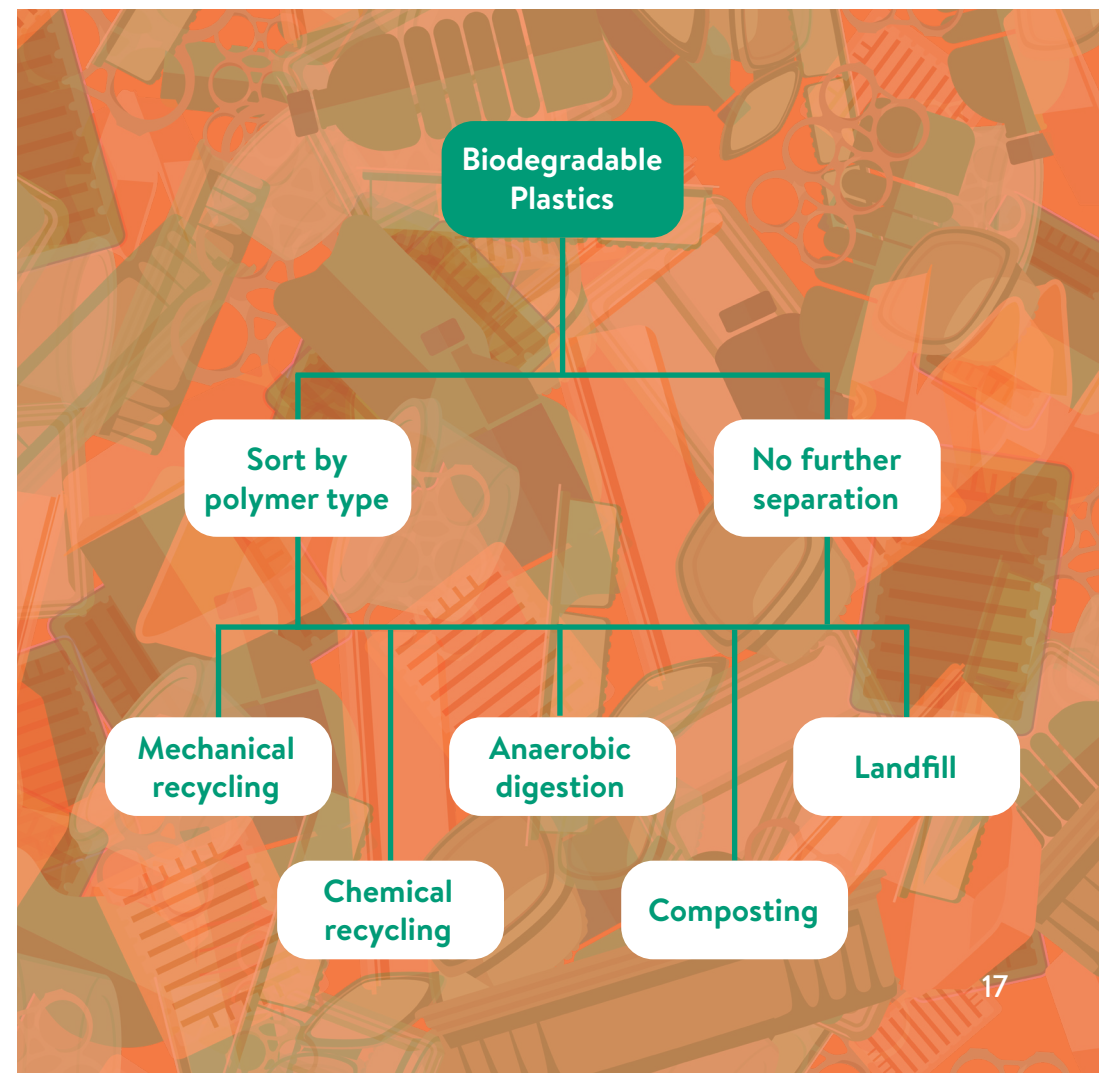
Yet composting of biodegradable plastics in industrial systems has a negative environmental impact as CO₂ is produced and the plastic is not recovered. Anaerobic digestion should be favoured over industrial composting, as the recovery of methane as an alternative fuel source slightly improves the overall carbon footprint.

BUT neither outcome should be considered the most sustainable option because:

- Some plastics that are categorised as biodegradable can undergo mechanical recycling, the most sustainable option available, but most biodegradable plastics cannot be recycled mechanically.
- Chemical recycling of biodegradable plastics has the potential to be a far more sustainable choice, but significant investment would be required in this emerging technology.
- Labelling materials as 'compostable' or biodegradable' misleads the consumer, as no detail is given regarding processing, and there is no standardisation in labelling. This can lead consumers to discard materials alongside compost, or as litter, assuming it to be naturally degradable or short-lived in the environment.

The opportunities mechanical and chemical recycling offer need to be better exploited. As part of doing so, we need to 'tidy up' definitions and be clearer about what these mean. As highlighted in previous studies (Plastic: a call to action, Birmingham, 2023), the definitions of biodegradable plastics,

bioplastics, and compostable plastics are vague and are open to abuse for greenwashing purposes. Based on end-of-life analysis, the sustainability benefits of biodegradable plastics are either unclear or non-existent, while their potential harm is substantial. Adding to the problems, the separation of biodegradable plastics from commodity plastics is difficult, and biodegradable plastic contamination severely hampers mechanical recycling of plastic waste.



Best Practice Learning 3: Both the real and potential fates of materials matter

Recommendations

Future policy and investment decisions need to be guided by a hierarchy of fates for plastics, maximising value and sustainability of the entire supply chain.

The hierarchy of end-of-life plastics highlights:

- The need for specific targeted policy decisions, such as removing certain contaminations that damage recycling and provide no sustainability benefit.
- Areas where investment and large-scale collection can vastly improve the current situation, versus areas where legislation and restriction are the better tool for sustainable progress.

There is no singular solution to plastics recycling, but informed decisions based on end-of-life fates can create a robust and sustainable circular plastics economy. We have developed a tool to help individuals and organisations understand this complexity: our complete and open-source hierarchy of fates can be accessed [here](#).



Summary

What this means for future policy

This report illuminates the potential policy solutions to tackle the complexity of the current UK plastics recycling system. We argue that the One Bin system, underpinned by the hierarchy of fates for end-of-life plastics and integrated with micro-level understanding of household practices, offers a roadmap to standardise and simplify plastic recycling. Through a focus on best practice in relation to: (1) better understanding consumer practice; (2) standardisation and consistency across the supply chain; and (3) maximising value and sustainability of plastic materials via a hierarchy of fates, we have demonstrated where policy and investment can tackle the challenge of plastic waste.

We deliver this report at a crucial point in UK plastic policy with the introduction of the plastic packaging tax in 2022, both pEPR and DRS set to roll out over the next two years, alongside work to improve consistency in collections and a proposed ban on the export of plastic waste to non-OECD countries by 2027. Whilst the introduction and effort of such policies is welcome, we question if they will do enough. Furthermore, whether their fragmented, siloed and, in the case of pEPR, stagnated roll out, will be sufficient to deal with the scale of the challenge remains unclear.

DRS, for example, poses numerous challenges. The schemes are inconsistent – with England and Northern Ireland focused only on plastic bottles, whilst Wales and Scotland will also include glass, as part of different arrangements. DRS will remove a valuable ‘tried and tested’ waste stream from local authorities. These changes pose challenges for households who will now need to collect, store and move volumes of recycling to complete the return, as opposed to simply putting them in the recycling bin. The embedded carbon required to deliver the infrastructure - including reverse vending machines – is a further issue. DRS also fails to address the myriad of plastic packaging (e.g., pots, tubs and trays, and flexibles) which value is not being recovered from.

How each of these new policies will work together is also unclear. How will DRS interact with pEPR and the plastic packaging tax? Overlapping and unclear messaging regarding which businesses are included, what packaging is affected and in what circumstances, only continue to add to the complexity of the supply chain. Similarly, what impact will the move to consistency of collections and the requirement that local authorities should collect pots, tubs and trays by October 2023 and flexibles by 2026/27 have on this suite of policy changes?

Finally, and significantly, we question what will happen to the revenue generated through these new policies. Will it be ringfenced to develop the much-needed infrastructure to recycle and capture the value from the array of plastics the UK currently exports or sends to incineration? Simplified policies that draw on the best practices of this report are required to create a robust and sustainable circular plastics economy.

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Available at: sustainablefutures.manchester.ac.uk/onebin

For further information please contact: one.bin@manchester.ac.uk



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one.bin@manchester.ac.uk

Report designed by Poppy Robinson