# The future of recycling flexible plastic packaging in the UK

## Flexible Plastic Fund
## FlexCollect Project
## Final report and blueprint


Produced on behalf of the Flexible Plastic Fund

suez

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# About this report

This report details the outcome of a project undertaken by SUEZ recycling and recovery UK (SUEZ), in partnership with RECOUP, WRAP and Ecosurety, on behalf of the Flexible Plastic Fund (FPF), Defra, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge delivered by Innovate UK, and Zero Waste Scotland.

Taking place over three and a half years, the project sought to better understand how to introduce a kerbside service for flexible plastic packaging for UK households by trialling the collection and recycling of the material with ten pilot local authorities, encompassing a representative range of demographics and collection service types. The intention of the project and its outcomes was to help both industry and government prepare for policy change, by establishing how flexible plastic packaging can be effectively collected, sorted and recycled in the UK.

This report follows an earlier, interim report published in 2024[1] by SUEZ on behalf of the Flexible Plastic Fund. A summary of the findings of the interim report is detailed in the results section of this report.

[1] https://www.suez.co.uk/-/media/suez-uk/files/publication/suez-flexcollectproject-interimreport-2023-executivesummary.pdf

# Executive summary

This report and blueprint marks the conclusion of the Flexible Plastic Fund's project which over the past three and a half years sought to understand how flexible plastic packaging can be collected and recycled at scale across the UK.

With an estimated 1.7 million tonnes placed on the market each year in the UK, kerbside collection and recycling is key to ensuring more circular outcomes for this form of packaging. Recent reforms to UK and devolved authority policy now mandate kerbside collections from April 2027, with packaging extended producer responsibility payments providing the funding mechanism for councils to roll out this service.

To deliver the project, a team was established by the Flexible Plastic Fund (FPF) and Ecosurety consisting of SUEZ recycling and recovery UK, RECOUP and WRAP. The intention was to trial the kerbside collection of flexible plastic packaging across ten pilot local authorities, the handling of the collected materials by these authorities or their contractors, and then to trial the ease and capacity of different end market options for recycling the collected materials.

The results and guidance outlined in this report form a comprehensive dataset and blueprint for authorities and industry to implement flexible plastic packaging collections.

This project was funded by both industry and government, with contributions from the Flexible Plastic Fund, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge delivered by Innovate UK, Defra, RECOUP, WRAP, Ecosurety and Zero Waste Scotland.

The Fund was established in May 2021 by five founding partners: Mars UK, Mondelēz International, Nestlé, PepsiCo and Unilever. It has subsequently grown with partners now including Abel and Cole, Eat Real, Ella's Kitchen, Kiddylicious, Koninklijke Douwe Egberts, KP Snacks, Lotus Bakeries, McCain Foods, Natural Balance Foods, Ocado Retail, pladis, Proper Snacks, The Collective and Vitaflo.

Ten FlexCollect pilot local authorities were recruited, intentionally covering a range of demographic profiles and collection service types.

## Figure one • Summary of FlexCollect pilot authorities

| Pilot local authority | Pilot and expansion profile (households) | Demographic profile | Service type | Material collected | Collection method |
|---|---|---|---|---|---|
| **Cheltenham** | 2,154 – September 2022<br>3,154 – September 2024 | Urban, low deprivation | Fortnightly, source segregated | All flexibles | Clear/blue printed collection bags, co-collected with plastics and metals in a Romaquip vehicle |
| **South Gloucestershire** | 1,995 – October 2022<br>24,621 – May 2024 | Suburban, low deprivation | Weekly, source segregated | PE and PP only | Clear/blue printed collection bags, co-collected with plastics and cans in a Romaquip vehicle |
| **Maldon** | 7,179 – January 2023<br>12,100 – August 2024 | Rural, low deprivation | Fortnightly, twin stream, glass separate | All flexibles | Purple printed collection bags, collected on separate 3.5 tonne cage vehicle |
| **Newcastle City** | 7,232 – June 2023<br>34,806 – October 2024 | Urban, high deprivation | Fortnightly, twin stream glass separate | PE and PP only | Blue printed bags co-collected alongside plastics, metals and fibre in blue wheeled bin via split back refuse collection vehicle (RCV) |
| **Somerset** | 3,614 – June 2023<br>26,393 – October 2024 | Rural, medium deprivation | Weekly, source segregated | PE and PP only | Blue printed collection bags, co-collected with plastics and metals in a Romaquip vehicle |
| **Reading** | 4,100 – September 2023<br>10,281 – August 2024 | Urban, low deprivation | Fortnightly, comingled (bring bank glass) | PE and PP only | Blue printed bags co-collected alongside plastics, metals and fibre in red wheeled bin via single compartment refuse collection vehicle (RCV) |

| Pilot local authority | Pilot and expansion profile (households) | Demographic profile | Service type | Material collected | Collection method |
|---|---|---|---|---|---|
| **North and East Herts** | 2,174 – November 2023<br>10,289 – September 2024 | Suburban, low deprivation | Fortnightly, twin stream, paper separate in a box | PE and PP only | Blue printed collection bags, co-collected first in paper box, and later with glass, cardboard, plastic, and metals in grey wheeled bin via split back refuse collection vehicle (RCV) |
| **North West Leicestershire** | 6,731 – March 2024<br>13,152 – September 2024 | Rural, medium deprivation | Fortnightly, source segregated | All flexibles | Purple printed collection bags, co-collected with paper in Kerbsider vehicles |
| **Bracknell Forest** | 10,302 – March 2024 | Suburban, low deprivation | Fortnightly, comingled (bring bank glass) | PE and PP only | Blue printed collection bags, co-collected alongside plastics, metals and fibre in blue wheeled bin via single compartment refuse collection vehicle (RCV) |
| **Warwick** | 14,247 – October 2024 (service was made available to the remaining 48,000 at the same time – these households did not contribute to data collection) | Suburban, low deprivation | Fortnightly, comingled | PE and PP only | Co-collected loose with plastics, metals, fibre and glass in recycling bin, via single compartment refuse collection vehicle (RCV) |

# Key findings

## Collections

The project clearly identified that flexible plastic packaging can be incorporated into all collection service types with relative ease through the use of collection bags, or loose in dry mixed recycling collections when appropriate sorting infrastructure is available.

Provision of a dedicated collection bag for flexible plastic packaging, placed inside or next to an existing recycling container works across all vehicle types, without the need for additional crew or shorter rounds.

The use of bags successfully isolates material and enables effective picking by materials recycling facility operators, whatever their infrastructure. A consistent approach to data collection was implemented across pilot authorities, with the summary results presented here in figure two.

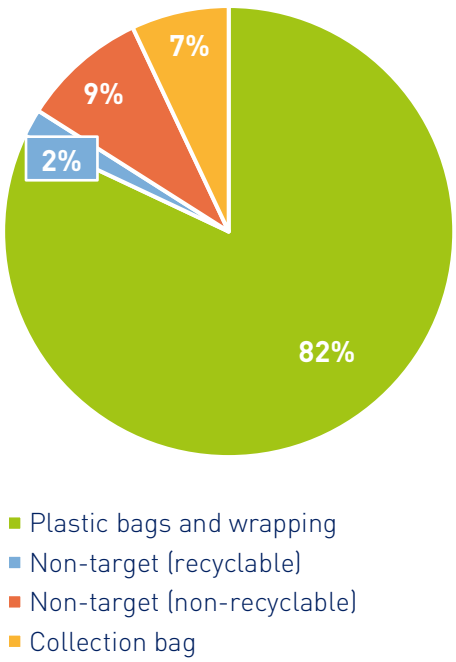
**Figure two • Weight per household per category (normalised per week) and bags per household per cycle (not normalised for collection frequency)**

| Parameter | Weight per household (g) | Bags per household |
|---|---|---|
| Co-mingled | 44 | 0.27 |
| Twin stream | 42 | 0.29 |
| Source segregated | 78 | 0.35 |
| Weekly collections | 86 | 0.32 |
| Fortnightly collections | 46 | 0.3 |

Using the various FlexCollect datasets in combination with ONS demographic data, it has been possible to correlate different ONS groupings with householder behaviour, enabling the calculation of more accurate and place based estimated tonnages likely to be collected for recycling when policy is implemented from April 2027. These calculations estimate that just over 150,000 tonnes of flexible plastic packaging can be expected to be collected from households in 2027, increasing quickly year on year to an estimated 200,000 tonnes per year by 2030.

Material composition was analysed across each pilot authority. Results were consistent across the project, with the composition being largely target material presented clean, dry, and free of food residues.

**Figure three • Overall material composition**



## Service

By default, all authorities can expect a 40-micron collection bag to be a suitable method of collection if the survival bag option is selected and when presented alongside other dry mixed recyclables in an existing container. This thickness of bag will be suitable for picking at materials recycling facilities, and able to withstand vehicle compaction and mechanical sorting processes. It is not recommended to ask residents to self-supply bags. When tested, this led to overall lower levels of participation and weight per household, unsuitable bag selection (such as refuse sacks) and greater quantities of untied bags (which risk the material contaminating other recyclable streams).

Those who operate source segregated collections may be able to reduce bag purchase costs by providing an 18-20 micron collection bag. It is unlikely the loose collection of flexible plastic packaging will be possible with source segregated packaging streams due to the risk of wind blown material.

All residents should be supplied with collection bags and accompanying communications material at the onset of the service. Ongoing supply of bags to residents is important to ensure participation remains high. Delivery on request will be the most convenient option for residents but may come at a higher cost. Stock locations and resident collection could be considered as an alternative.

Some authorities may be able to introduce loose or fully comingled collections, especially those who collect paper and card separately, but this will depend on careful planning with their materials recycling facility provider.

## Handling and sorting

Many sorting facility operators may be able to accommodate collection bags with little or no change, just additional picking resource. For some facilities, small modifications such as additional bays, conveyors or extraction systems may be necessary. More extensive modifications will be necessary to accommodate loose flexible plastic packaging, with approaches likely to be bespoke to individual materials recycling facilities.

Data from the Sherbourne Recycling material recycling facility suggests that fully comingled processing of flexible plastic packaging, loose with other dry mixed recyclables, is possible with investment in sorting infrastructure, but sorting efficiencies are likely to be lower.

Separation of flexible plastic packaging from fully comingled streams which include paper and card is likely to be more challenging than separation where the comingled streams do not include these fibres. It is possible that the market will shift towards loose collection of material with investments and upgrades to current facilities.

## Recycling end markets

The outcome from the recycling end market trials undertaken demonstrates that flexible plastic packaging can be recycled in the UK with high recovery rates, typically exceeding 80%.
The material is suitable in mechanical recycling applications for the manufacture of coloured (jazz) pellets for flexible polyethylene and rigid polypropylene applications. Up to 100% of the collected materials were proven suitable for inclusion in plastic lumber products. Although no commercial scale chemical recycling facility was available during the trial period to process the collected materials, trials of small quantities indicated that the collected materials were generally suitable for a variety of chemical recycling technologies producing different grades of recycled oil-based products. Further sorting may be required to meet the feedstock specification of certain recyclers.

At present, there is insufficient domestic end market capacity to meet expected demand for treatment from 2027 onwards. Several mechanical and chemical recycling facilities are in development or planned, which, when combined with potential spare European capacity, would go a significant way to meet the full demand requirement.

## Costs

Collection costs are dependent on the approach to collection. Whilst loose flexible plastic packaging in comingled collections are not likely to bring about any costs for authorities, the supply of dedicated collection bags will incur an additional upfront and ongoing cost.

Sorting costs for collection bags will, as a minimum, include a dedicated operative to remove bags from the processing line across all operational hours, combined, in some instances, with sorting equipment modifications. Sorting equipment modifications for bags will depend on the particular material recycling facility set up, with costs expected to range between £10,000 and £150,000. Pricing for fully comingled material recycling facility modifications will depend on existing infrastructure, with costs expected to range between several hundred thousand to several million pounds.

Recycling end market gate fees for the project ranged between £80 and £1,000 per tonne, with the most commonly paid gate fee being £650 per tonne. However, it is worth noting that the plastics market has been particularly unstable during the scale-up of the project. Certainty of feedstock and further investment may bring reductions in gate fees.

To provide some context, costs have been modelled per household for an example local authority consisting of 75,000 households.

Figure four • Service costs per household

| Activity | Cost per household per year |
|---|---|
| Collection | £3.14 (£1.96 in year two) |
| Sorting (picking) | £0.81 |
| Sorting (materials recycling facility modifications) | £0.06 |
| End markets | £2.55 |
| **Total cost per household** | **£6.56** |

These figures are based on a number of assumptions which are outlined in the costs section of the report.

Costs have also been modelled per tonne and per stock keeping unit. The costs per tonne are as shown here in figure five.

Figure five • Service costs per tonne

| Activity | Cost per tonne |
|---|---|
| Collection and sorting | £1,021 |
| End markets | £650 |
| **Total cost per tonne** | **£1,671** |

Approximately 215 billion stock keeping units (SKU) are placed on the market each year in the UK. The cost per stock keeping unit, based on the service cost of £1,671 per tonne, equates to £0.00119 (or 0.12p per SKU).

The outcome of the Flexible Plastic Fund FlexCollect project demonstrates that flexible plastic packaging can be effectively and practically incorporated into existing collection systems and infrastructure, with minimal disruption to authorities or operators.

Recycling end markets exist in the UK and are able to achieve high rates of recovery. However, at present, a capacity gap exists for expected demand. If those facilities in development complete and become operational, and if those facilities planned are developed, then this, when combined with spare European capacity, may go a significant way towards meeting demand.

# Introduction

Flexible plastic packaging, from plastic bags to crisp packets, confectionery wrapping and food pouches, represents a key challenge to recycling in the UK. An estimated 1.7 million tonnes of flexible plastic packaging are placed on the market in the UK each year, with 990,000 tonnes of this representing consumer packaging in scope of packaging Extended Producer Responsibility.

In 2023, 25,000 tonnes was collected for recycling, representing an 8% collection rate. According to RECOUP, only 14% of local authorities offer a kerbside service for film, with 29% of those who do collect it only accepting carrier bags[2].

Recent reforms of UK and devolved authority policy and legislation, detailed below, will pave the way for the collection and recycling of flexible plastic packaging. The insights and experiences from the FlexCollect project seek to optimise the approach and provide recommendations and best practice guidance for local authorities, waste management contractors, end markets, packaging producers and government.

## UK policy and legislation

The intention of the FlexCollect project was to help industry and government prepare for policy change, by understanding how a flexible plastic packaging service would work across all parts of the value chain. Policy change linked to flexible plastic packaging is outlined here.

### Extended producer responsibility for packaging (pEPR)

Packaging extended producer responsibility covers the UK and is intended to fund the efficient and effective net cost of managing the collection, transport, sorting, reprocessing and disposal of packaging waste, including flexible plastic packaging. The statutory instrument for extended producer responsibility came into force as of 01 January 2025, and PackUK[3], the scheme administrator responsible for the delivery of the scheme, was formally established in January 2025.

In November 2024, local authorities received notification of their estimated extended producer responsibility payments for the 2025/26 year, with a total of nearly £1.4 billion in funding identified in the first payment year. The payments will be funded through extended producer responsibility fees for producers, calculated through recyclability modulation, based on the recycling performance of packaging placed on the market, with more difficult to recycle materials/formats facing higher fees.

[2] www.recoup.org/research-and-reports/uk-household-plastic-packaging-collection-survey-2023-data-summary

[3] https://www.gov.uk/government/organisations/packuk

Illustrative base fees have been published[4] to provide an overview of costs for producers, with the latest iteration detailing a range between £320 and £520 per tonne for plastic placed on the market. The Recyclability Assessment Methodology[5] (RAM) enables producers to assess recyclability of their packaging to inform the level of fee modulation payable. All packaging placed on the market from 01 January 2025 is required to be assessed in line with the Recyclability Assessment Methodology.

## Simpler Recycling (England)

Simpler Recycling policy ensures that a consistent set of materials are collected for recycling at the kerbside across households and businesses in England, including flexible plastic packaging.

From 31 March 2026, the new default requirement for most households will be four containers: residual waste, food waste (mixed with garden if appropriate), paper and card, and all other dry recyclable materials (plastic, metals, and glass). The timeline varies for different core materials, with local authorities and all businesses required to introduce a kerbside collection for flexible plastic packaging by 31 March 2027.

Simpler Recycling only applies in England, but each devolved administration has its own policies and guidance, including for the collection of flexible plastic packaging.

## Welsh Government collections regulations

The Collections Blueprint 2025 sets out the Welsh Government's recommended approach for local authorities to manage waste sustainably. It emphasises source-separated kerbside collections for dry recyclables and food waste, aiming to maximise re-use, recycling, and composting. The blueprint supports the Well-being of Future Generations (Wales) Act 2015 by promoting environmental sustainability and resource efficiency.

## Scottish Government collections regulations

The Waste (Scotland) Regulations require that any and all organisations in Scotland present the following materials for recycling: glass, metal, plastic, paper, cardboard and, for households and most businesses, food waste.

## Northern Irish Government collections regulations

Northern Ireland Waste Collection Regulations 2025 –The Department of Agriculture, Environment and Rural Affairs (DAERA) is implementing new waste collection measures to improve recycling rates and reduce landfill dependency including enhanced dry recycling collections, with multi-stream sorting to improve material quality and support local reprocessing and defined recycling for businesses, with a core set of materials required for separation and collection.

[4] https://www.gov.uk/government/publications/extended-producer-responsibility-for-packaging-illustrative-base-fees/extended-producer-responsibility-for-packaging-illustrative-base-fees#second-release-of-illustrative-base-fees-for-2025-to-2026

[5] https://www.gov.uk/government/publications/recycling-assessment-methodology-background-and-definitions/recycling-assessment-methodology-stages-of-recyclability-and-definitions

## Plastic Packaging Tax (PPT)

Introduced in April 2022, HMRC requires a tax to be paid on plastic packaging manufactured in or imported into the UK to be sold on the UK market, which contains less than 30% recycled content. The tax was introduced at £200 per tonne in 2022, but has increased annually with inflation and currently sits at £223.69 per tonne.

The tax aims to create a demand for recycled material, supporting the market for recycling of plastic waste.

## Emissions Trading Scheme (ETS)

The UK Emissions Trading Scheme (ETS) has been in operation since 2021. In 2023, the UK ETS Authority confirmed its intention to include waste incineration and energy from waste in the scheme from 2028. The scheme will apply only to fossil emissions, including those generated from incinerating plastic packaging waste. Flexible plastic packaging (FPP) typically constitutes 5-10% of a typical household residual waste bin by weight.

It is expected that the policy will drive up the cost of disposal for residual waste producers, thus incentivising the decarbonisation of the residual waste stream through more plastics wastes being collected and recycled.

# Objectives of the trial

SUEZ was asked by the project sponsors to design a trial to deliver the following objectives:

- Determine the amount of material put out for recycling per household per year.
- Determine the likely participation rates across a range of different local authority types, considering collection service types and socio-demographic factors.
- Determine how to effectively communicate to households the types of flexible plastic packaging that can be collected and recycled.
- Determine options for the co-collection of flexible plastic packaging with other packaging formats and material types.
- Use the weight of collected items to determine likely volumes arising from different household types and to identify socio-economic factors that may impact on collection and set out rates.
- Collect sufficient materials for sorting and recycling trials, both mechanical and chemical, to provide evidence of the opportunities and challenges that may arise when collections are rolled out nationally. Provide information on costs for collecting, sorting and recycling to inform the modulation of packaging cost profiles and the design of an efficient and effective extended producer responsibility system.

The trial design was an expanding cascade model, starting experimentally at an approximate 5% of households within a local authority area before incrementally expanding participation, using learnings from each stage to inform the next.

The original three-year project timeline was designed to integrate and overlap with the then proposed commencement of packaging extended producer responsibility policy in October 2024. The one-year delay announced in summer 2023 led to considerable uncertainty among local authority participants, with most considering putting their expansion plans on hold due to the funding uncertainty. To overcome this uncertainty, a six-month project and funding extension was agreed by the Flexible Plastic Fund, providing a bridge in funding to the revised April 2025 start date. Further, the Flexible Plastic Fund agreed to bridge any additional trial costs above the packaging extended producer responsibility payments for flexible plastic packaging collections and management to March 2026 for some participants.

# Project partner roles and responsibilities

### Flexible Plastic Fund

Majority project funder, contributing approximately two thirds of the funding.

### SUEZ recycling and recovery UK

Project delivery, including recruitment of pilot collection authorities, operational planning, development and continuous support with collection authorities, partners, stakeholders and steering group, project management, and data collection and analysis.

### RECOUP

Material composition testing and end markets research and support.

### WRAP

Design and management of householder communications, data collection and validation, and local authority benchmarking.

### Ecosurety

Managing Flexible Plastic Fund funding, coordinating the Innovate UK project and funding, external project communications, and authorisation and payments to pilot authorities for services delivered.

### Defra, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge Fund, delivered by Innovate UK

Project funders.

### FlexCollect stakeholder panel (including Defra, Zero Waste Scotland, CIWM, ESA, LARAC and others from across the sector)

Review project progress and provide expertise, feedback and guidance to the project team.

## Pilot waste collection authorities and their contractors

The ten pilot areas worked with SUEZ, RECOUP and WRAP to design and deliver their respective kerbside collections trials for the collection and management of flexible plastic packaging, to offer insights on trial data using their skills and knowledge, and to provide peer support to other authorities both during and after the project.

### Pilot waste collection authorities

- Cheltenham Borough Council
- South Gloucestershire Council
- Maldon District Council
- Newcastle City Council
- Somerset Council
- Reading Borough Council
- North and East Hertfordshire Council
- North West Leicestershire District Council
- Bracknell Forest Council
- Warwick District Council

### Waste collection and disposal contractors supporting the local authority pilots

- SUEZ recycling and recovery UK – South Gloucestershire, Maldon, Somerset, Bracknell
- Green Recycling – Maldon
- J&B Recycling – Newcastle
- FCC Environment – Reading, North and East Hertfordshire, Bracknell
- Pearce Recycling – North and East Hertfordshire

## Brands supporting the Flexible Plastic Fund


# Steering Committee

The group met 10 times and consisted of:

- Ecosurety
- Department for Environment, Food and Rural Affairs
- Industry Council for Packaging and the Environment
- RECOUP
- SUEZ recycling and recovery UK
- The Flexible Plastic Fund
- The National Association of Waste Disposal Officers
- UK Research and Innovation
- WRAP
- Zero Waste Scotland

# Stakeholder Panel

A panel of key stakeholders was formed and key updates and results were shared, enabling learnings to be cascaded to relevant groups and advise to be provided. The panel was made up of all Steering Committee members plus:

- British Plastics Federation
- Chartered Institution of Wastes Management
- Devolved administration representatives
- Environmental Services Association
- Recyclers
- Retailers
- The Circular Economy for Flexible Packaging
- The Local Authority Recycling Advisory Committee
- The Recycling Association
- The UK Plastics Pact

In addition to the listed organisations and people above, the project would like to recognise a plethora of other organisations and individuals who have supported and positively contributed to the design and delivery of this project.

# Methodology

The FlexCollect project aimed to accommodate a representative range of demographics and service types to create an evidence base that would be relevant to most waste collection authorities for guidance.

## Recruitment

The project set out to recruit nine local authority partners across two cohorts:

- The first, the pioneers, would include four local authorities and would focus on an experimental approach to learning. The four authorities would operate for three years, expanding each year.
- The second, the industrialisers, would include five additional local authorities expanding once over a two-year period, launching with higher numbers of households and benefitting from the learnings of the pioneers.

SUEZ recruited widely across the UK for pilot authorities. To kick off the recruitment process, the project team issued an announcement which was picked up across trade and government press. Following this, SUEZ contacted industry and local authority bodies to leverage existing communications channels to generate awareness and interest. A recruitment webinar, hosted in January 2023 provided further context and information to potentially interested authorities.

In total, 65 local authorities contacted SUEZ expressing an interest in participating in the project. Each authority was taken through a review process, comprising of:

- An assessment of their demographic profiles (socio demographic makeup, rurality, and, to a lesser extent, geographical location), their current dry recycling collection methodology, and the potential to expand a trial in accordance with expected expansion timescales and targets.
- Benchmarking using a combination of SUEZ and WRAP demographic profiling.
- Dialogue with their operational partners (in-house or contracted) on collection and sorting of material collected and their ability to support a pilot.
- Discussions around the expected cost of delivery and expansion.

In a number of instances, trials did not proceed for a variety of reasons. The most common reason was perceived inability to handle the material through existing infrastructure (transfer station/materials recycling facility), including the perception that material was too complicated for mechanical sorting, too voluminous for storage, or potentially too detrimental to the quality of other material streams.

The project has sought to address these concerns in full, with details to follow in the results section. Other reasons included a focus on other projects (e.g. the addition of pots tubs and trays, contamination), or general perception that legislation would not pass.

A shortlist of waste collection authorities which covered an acceptable range of geographies and socioeconomic conditions was then agreed by project partners.

Nine FlexCollect pilot local authorities were successfully recruited, with a tenth added later in the project to address a key knowledge gap – fully comingled collections. The ten FlexCollect pilot authorities are detailed in the next section of this report.

# Project set up

Following on from the successful appointment of local authority partners, each trial went through a detailed planning and set up phase. Each local authority was contracted to deliver their components of the trial and to receive payments and support for agreed delivery. A bespoke project plan and budget was established with each authority, encompassing initial launch and planned expansion.

The set-up process established how the pilot service would work within the local authority area, considering the type of material collected.

Households were asked to present one of two sets of material:

- All flexible plastic packaging (three of the ten trials) or;
- Flexible plastic packaging comprised of PE and PP polymer types only (the remaining seven trials).

The intention of this approach was to establish whether consumers would be able to effectively distinguish between packaging material types. At the time these assessments were undertaken, it was unknown as to which packaging types would be included in Simpler Recycling, and a key outcome of the project was to understand the technical capabilities of recycling end markets. In both instances, householder communications sought to identify packaging types (plastic bags, confectionary wrappers, etc) using simple and commonly known language and groupings. Compositional analysis was used to check compliance with the material specification through the project.

Further consideration was given to the following:

- Approach to collection – how the material would be collected at the kerbside. Whether the material would be collected fully comingled or in a bespoke ‘survival’ bag, whether it would be mingled with other materials in other containers or stand alone at the kerbside, and where the material would be stored on the vehicle.
- Approach to sorting – how the material would be effectively processed at the depot, transfer station or materials recycling facility to segregate from other material streams.

## The role of collection bags

All of the original nine pilot authorities launched collection services using plastic bags to collect flexible plastic packaging. This aided participation assessments and composition testing and provided flexibility in the first pilots. In the early stages of the project, from conversations with local authorities and contractors, it quickly became apparent that the majority of materials recycling facilities were not capable of handling flexible plastic packaging placed loosely with other comingled materials. The use of bags was therefore offered as an alternative solution, enabling flexible plastic packaging to be collected alongside other materials within a recycling box or bin.

The 'survival' bag was designed to be filled by residents and placed alongside other materials in existing recycling containers for collection. Each bag was specifically labelled for the trial, and most were blue for ease of recognition at the sorting stage. Where blue was not used, this has been particular to the pilot authority where similar blue bags were already in use.

The thickness of the bag was determined by the collection method, with thicker bags generally used in comingled collections where compaction was undertaken, or where the bags needed to withstand a lengthy or aggressive mechanical sorting process (trommels, glass breakers, etc).

## Data gathering

A consistent methodology for gathering data was established across the pilot authorities to create consistency of data generation whilst accommodating the resource and capabilities of the authorities. The goal was to achieve a level of standardisation which would be suitable for evaluating pilot performance, as well as to provide data to Defra to factor into packaging extended producer responsibility calculations. Participation data was collected across three collection cycles at a minimum of twice per year.

In the earlier stage of the project where pilot authorities were operating at approximately 5% of households, data was collected across all participating households. As the trials expanded, the data gathering involved representative subsets of the participating households in order to reduce the operational burden whilst maintaining the generation of necessary data. The subsets involved a minimum of 1,500 properties, in accordance with WRAP's Monitoring and Evaluation Guide, but in practice, the majority of sampling sequences included over 5,000 properties.

## Participation

A weekly set out rate monitoring system was established as a proxy for participation. To achieve this, bags were segregated and counted from the sample area over the collection cycle and compared to the number of households in the sample area. For example, if 2,000 bags were collected from 5,000 properties, each property passed would present 0.4 bags, and the proxy for participation would indicate a 40% participation rate for that cycle. Data was collected, and an average taken, over three consecutive collection cycles.

The proxy for participation normalised participation across different collection frequencies, allowing comparison between trials. For example, a household with an opportunity to present weekly and who presents once every two weeks, would be classed as participating in the same way as a two-weekly cycle household presenting each fortnight.

The limitation of this methodology is that it does not account for households presenting multiple bags per cycle. Similarly, WRAP's Monitoring and Evaluation Guide defines participation as presentation of material once within three collection cycles, therefore the data gathered can only be applied to a single collection cycle.

To mitigate these limitations, kerbside monitoring of participation was undertaken in partnership with Resource Futures across three collection cycles in South Gloucestershire, Somerset and Maldon. Kerbside monitoring was only possible in the areas where bags were presented external to comingled collection containers, so was not used as standard across the project.

## Weight

Bag weights were monitored at the same time as bag counts were undertaken. Calibrated scales were used to determine the total weight of the sample, which was then divided by the number of bags to work out an average bag weight.

The total weight was also divided among the total number of households within the sample to work out an average weight of material presented per household (participating or not).

## Contamination

The number of contaminated bags were also counted and put to one side at the same time bag counts were undertaken.

Operatives were asked to look for bags containing obvious non-conforming items, such as rigid plastics, fibre, metals or other types of waste. They were not expected to open bags and examine the different types of flexible plastic packaging.

Contaminated bags were included in the calculation of participation rate, but the weights were excluded from the average bag weight calculation. Presentation of bags containing contaminating items was determined to be participation in the service, however certain non-conforming items would disproportionately contribute towards the average weight of the bag.

Each project received a standardised procedure as well in person training for data collection, including what criteria the bags needed to meet in order to be rejected as contaminated. Contamination analysis is still inherently subjective, and reporting has been varied across the pilot areas.

Contamination within the bags was analysed by RECOUP as part of the compositional analysis for each local authority. This is detailed in the results section of the report.

## Volume

The volume of collected flexible plastic packaging was not measured consistently across the pilots due to variations in the approach to collection and compaction.

The volume of an individual collection bag when full (weighing approximately 300g) was measured as 15 litres, or 0.015m$^3$. Therefore, to make a 500kg bale, approximately 1,650 bags would be required. Uncompacted, this quantity of bags would take up approximately 25m$^3$, roughly equivalent to the capacity of a 35-yard skip.

In practice, the ability of collection bags to be compacted is significant. Many pilots are able to fit considerably more bags in a skip prior to baling, especially with the aid of heavy machinery such as loading shovels or grab cranes. Similarly, there have been no reported capacity issues in refuse collection vehicles or Romaquips, as bags are able to compact within both vehicles using standard systems. No vehicle or collection round changes were made for those pilots that were adding the new service to existing services.

## Demographics

Demographic data was required for the local authority selection process, as well as to determine representative sample sets. To aid local authority selection, a combination of SUEZ and WRAP local authority demographic profiles were used, ensuring even coverage across the pilots.

Publicly available household data from the Office of National Statistics (ONS) was used to build a demographic profile of the trial areas within local authority boundaries, enabling selection of a representative sample for data collection.

## Cost

A clear budgetary monitoring framework was established for each pilot local authority, allowing costs at each stage of the trial to be understood. Costs were broadly categorised into:

- Collections – launching the service to participating households (delivering bags), and the cost, where any were incurred, associated with collecting the bags from households.
- Sorting and baling – sorting the bags from other materials at the depot or materials recycling facility (pickers, equipment modifications, etc.) and the cost of baling the bags.
- End markets – cost associated with gate fees and haulage for the recycling end markets.

The cost of the collection bags was accounted for separately. Due to minimum order quantities and delivery timescales, SUEZ procured the collection bags for the pilots in several batches.

Costs for the trials covering 5% to 25% of households require operators to implement non-standard procedures at their sites and, as such, were expected to be higher per tonne or per household than a universal service. A detailed analysis of costs, with assumptions for a universal service, is included in the results section of this report.

# The FlexCollect pilot local authorities

The final set of ten local authority project partners is detailed below together with their headline demographics, collection system, target material and expansion timeline and profile.
Further details on the ten trials are detailed in their individual case studies in the report appendix.

Figure six (figure one duplicate) • Summary of FlexCollect pilot authorities

| Pilot local authority | Pilot and expansion profile (households) | Demographic profile | Service type | Material collected | Collection method |
|---|---|---|---|---|---|
| **Cheltenham** | 2,154 – September 2022<br>3,154 – September 2024 | Urban, low deprivation | Fortnightly, source segregated | All flexibles | Clear/blue printed collection bags, co-collected with plastics and metals in a Romaquip vehicle |
| **South Gloucestershire** | 1,995 – October 2022<br>24,621 – May 2024 | Suburban, low deprivation | Weekly, source segregated | PE and PP only | Clear/blue printed collection bags, co-collected with plastics and cans in a Romaquip vehicle |
| **Maldon** | 7,179 – January 2023<br>12,100 – August 2024 | Rural, low deprivation | Fortnightly, twin stream, glass separate | All flexibles | Purple printed collection bags, collected on separate 3.5 tonne cage vehicle |
| **Newcastle City** | 7,232 – June 2023<br>34,806 – October 2024 | Urban, high deprivation | Fortnightly, twin stream glass separate | PE and PP only | Blue printed bags co-collected alongside plastics, metals and fibre in blue wheeled bin via split back refuse collection vehicle (RCV) |
| **Somerset** | 3,614 – June 2023<br>26,393 – October 2024 | Rural, medium deprivation | Weekly, source segregated | PE and PP only | Blue printed collection bags, co-collected with plastics and metals in a Romaquip vehicle |
| **Reading** | 4,100 – September 2023<br>10,281 – August 2024 | Urban, low deprivation | Fortnightly, comingled (bring bank glass) | PE and PP only | Blue printed bags co-collected alongside plastics, metals and fibre in red wheeled bin via single compartment refuse collection vehicle (RCV) |

| Pilot local authority | Pilot and expansion profile (households) | Demographic profile | Service type | Material collected | Collection method |
|---|---|---|---|---|---|
| **North and East Herts** | 2,174 – November 2023<br>10,289 – September 2024 | Suburban, low deprivation | Fortnightly, twin stream, paper separate in a box | PE and PP only | Blue printed collection bags, co-collected first in paper box, and later with glass, cardboard, plastic, and metals in grey wheeled bin via split back |
| **North West Leicestershire** | 6,731 – March 2024<br>13,152 – September 2024 | Rural, medium deprivation | Fortnightly, source segregated | All flexibles | Purple printed collection bags, co-collected with paper in Kerbsider vehicles |
| **Bracknell Forest** | 10,302 – March 2024 | Suburban, low deprivation | Fortnightly, comingled (bring bank glass) | PE and PP only | Blue printed collection bags, co-collected alongside plastics, metals and fibre in blue wheeled bin via single compartment refuse collection vehicle (RCV) |
| **Warwick** | 14,247 – October 2024 (service was made available to the remaining 48,000 at the same time – these households did not contribute to data collection) | Suburban, low deprivation | Fortnightly, comingled | PE and PP only | Co-collected loose with plastics, metals, fibre and glass in recycling bin, via single compartment refuse collection vehicle (RCV) |

Warwick District Council joined the FlexCollect project at a later date, in partnership with Sherbourne Recycling, to address a key gap in project learnings: fully comingled collections and processing. The pilot has been partially funded by the Flexible Plastic Fund, Sherbourne Recycling and Warwick District Council.

# Communications

From March 2020 to October 2022, WRAP conducted three rounds of citizen testing to assess the clarity and effectiveness of various terminologies with householders. A clear preference emerged, along with key principles for effectively communicating positive recycling behaviour.

## Naming and communications research

When determining the best approach for engaging with citizens, the research highlights the importance of adhering to the following guiding principles:

- Use a lead message that emphasises the change/there is something new rather than a norming message.
- Ensure that the Recycle Now 'swoosh' plays a prominent and attention-grabbing role.
- Give preference to using images of packaging items over written lists.
- Present both 'yes please' and 'no/don't recycle' items together, rather than just 'yes' lists.
- Opt for communications with a solid green background with a contrasting solid colour font, as opposed to a white background.

The research also reveals an underlying trend where citizens express a desire for more information while simultaneously preferring less clutter and content to read. This aligns with established best practices in communication.

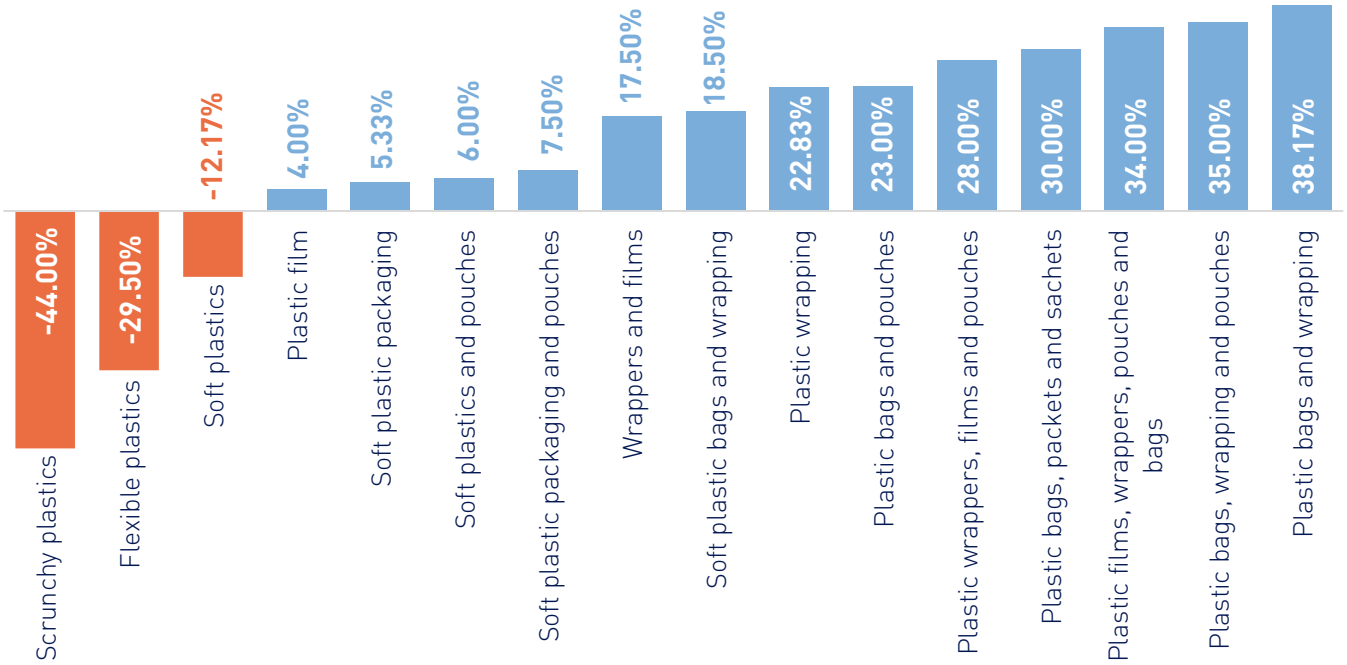
The results have been consistent across the three rounds of testing, highlighting a noticeable contrast between the characteristics of the most and least effective terminologies and the language employed within them. It is strongly recommended that the term 'plastic bags and wrapping' be consistently employed as the overarching terminology when communicating with the public about film and flexible materials. There is a statistical preference that this term not only resonates most effectively and serves as the clearest descriptor of the material to the public, but also aligns with the recommendations outlined in the communication insights.

Interestingly, terminologies commonly used within the market consistently ranked as the poorest performers throughout all three rounds of testing, with terms such as 'scrunchy plastics', 'flexible plastics' and 'soft plastics' occupying the bottom three positions in terms of performance scoring.

The full report and results of the citizen research can be found at: All wrapped up in terminology | WRAP[6].

6 https://www.wrap.ngo/resources/report/all-wrapped-terminology

Figure seven • Net performance results from all three rounds of citizen testing




# Communications plan

The development, monitoring and evaluation of householder communications for the kerbside trials was led by WRAP, using the highly recognised Recycle Now campaign, underpinned by tested behaviour change theory.

A communications plan was developed with a list of marketing activity to support the launch of the pilot kerbside trials and the communications to householders. The communications plan is informed by previous learnings and insights from previous flexible plastics research and local authority pilots focused on hard to capture materials.

The objectives of the communications plan are to:

- Ensure householders in the pilot areas are aware of the plastic bags and wrapping kerbside trials and are encouraged to participate.
- Help householders in the pilot areas understand what type of plastic bags and wrapping can and can't be collected as part of the kerbside trials.
- Provide communications support to the pilot local authorities to ensure effective roll out of the service.
- Ensure the communications (messages and assets) reflect and reinforce the aims of the pilot kerbside trials and what they seek to measure.
- Gain robust insights and evaluation of communications, including understanding why householders did/did not participate in the pilot kerbside trials.

The target audience was primarily the householders within the pilot areas, but also included the local authorities themselves.

The strategy and timescale was as follows:

- **Introduction flyer** to let householders know the kerbside trial is coming and that the trial will expand over time in their area. The flyer also provided a list of specific items of what can and can't be recycled and why the trial is being launched. This leaflet was sent four weeks prior to service launch.
- **Instruction leaflet** providing the same list of specific items of what can and can't be recycled, how to order more bags and frequently asked questions (FAQ) about the service. This leaflet was delivered with the collection bags. This flyer was sent two weeks prior to service launch.
- **Dedicated web pages** for each pilot local authority with specific items listed of what can and can't be recycled, more details about the service, how to order more bags, top tips on how to store and collect the material in the home and FAQ.
- **Nudge techniques** like contamination stickers to inform householders of wrong items in their collection bags. Other nudges included a follow up flyer thanking householders for using the new service and reminding those that haven't participated to start using the service. The follow up flyer was typically sent 4-6 weeks after the service launched.
- **Photography** to clearly explain items that can/and cannot be accepted and how to tie bags securely and present on the kerbside.
- **Information shared** with local authority call centre staff and recycling collection crews.
- **FAQs** – for use in the instruction leaflet, web pages and call centre staff training.

In order to communicate effectively with households, key messages included:

- Clear launch dates of when the kerbside plastic bags and wrapping recycling collection service was going to be rolled out.
- Specific types of plastic bags and wrapping that can be recycled and collected during the kerbside trial.
- Why it is important to recycle plastic bags and wrapping.
- What happens to plastic bags and wrapping when it is collected and recycled.
- How and when plastic bags and wrapping should be presented for collection at the kerbside.
- Tips on how to store plastic bags and wrapping at home prior to collection day, including bag tying for the appropriate local authorities.
- Adopting Recycle Now's proven behavioural change approach of social norming and unity messaging: *"Let's recycle better, together. For each other. For [location]"* and *"More and more people in [location] are recycling plastic bags and wrapping".*

# Doorstepping

The table shown in figure eight is a highlighted summary of the doorstepping findings, but full reports for each of the four pilot areas researched can be found on the WRAP website[7].

To evaluate the effectiveness of communications, service uptake, and overall satisfaction with the trial collections for plastic bags and wrapping, face-to-face doorstepping surveys were conducted across six pilot areas: South Gloucestershire (Phase 1 – bags provided), Newcastle, Cheltenham, Maldon, South Gloucestershire (Phase 2 – own bags), and Warwick.

These surveys were carried out approximately 5–7 weeks after service rollout, with a consistent methodology applied across all areas to ensure comparability of results.

A '1 in n' selection method was used to identify households across participating streets, aiming for a representative sample in terms of age, gender, and work status. Interview shifts were spread throughout the week and across different times of day. In each area, a minimum of 200 interviews were completed, with participation incentivised via a prize draw.

**Figure eight • High level results for doorstepping across the pilot authorities**

| | South Gloucestershire Bags provided | Newcastle | Cheltenham | Maldon | South Gloucestershire Own bags | Warwick |
|---|---|---|---|---|---|---|
| Aware of pilot | 95 | 89 | 76 | 68 | 85 | 58 |
| Received comms | 93 | 77 | 73 | 56 | 79 | 61 |
| Received bags | 95 | 91 | 43 | 75 | N/A | N/A |
| Received comms and bags | 91 | 76 | 41 | 54 | N/A | N/A |
| Recycling 1+ item in pilot | 81 | 65 | 42 | 42 | 64 | 85 |
| Recycling 1+ item in pilot (received comms and bags) | 85 | 74 | 93 | 71 | N/A | N/A |
| Very / fairly satisfied with pilot (those participating) | 96 | 95 | 96 | 89 | 98 | 91 |
| Service very / fairly well communicated (those receiving all comms) | 91 | 89 | 98 | 85 | 90 | 94 |

[7] https://www.wrap.ngo/resources/report/plastic-bags-and-wrapping-recycling-local-collections-pilot

## South Gloucestershire (Phase 1 – bags provided)

South Gloucestershire delivered one of the strongest performances across the trials. Residents reported high levels of awareness (95%) and receipt of both communications (93%) and collection bags (95%). Among those who received both, 85% reported recycling at least one item, and overall satisfaction with the trial was exceptionally high (96%). This phase demonstrated the value of clear, early communications and reliable bag distribution in supporting participation.

## Newcastle

In Newcastle, communications and bag distribution were also strong, with 89% of residents aware of the trial and 91% reporting receipt of bags.

Among those who received both bags and communications, participation reached 74%. Satisfaction was similarly high, with 95% of participants rating the service positively. However, the survey also highlighted that geography and demographics played a role—early rollout focused on more affluent areas, which may have boosted initial participation.

Later expansion into more cosmopolitan and student-heavy neighbourhoods saw a slight decline in engagement, underlining the importance of tailoring messaging and service design to different community contexts.

## Cheltenham

Cheltenham experienced distribution issues that significantly impacted performance. While 76% of respondents were aware of the trial, only 43% reported receiving bags and just 41% had received both communications and bags. Among this subgroup, participation was very high (93%), demonstrating the potential for strong engagement when materials are successfully delivered. However, the overall impact was limited by logistical challenges during rollout.

## Maldon

Maldon faced similar challenges, with only 56% of residents recalling the communications and 75% receiving bags. Only 54% of respondents reported receiving both. Despite this, those who received the materials were positive—71% reported recycling at least one item, and satisfaction levels were high (89%). The survey also revealed that some residents believed they could already recycle plastic bags and wrapping in their main kerbside service, pointing to a need for clearer messaging across general recycling service literature.

## South Gloucestershire (Phase 2 – own bags)

The second phase of the South Gloucestershire trial took a different approach, trialling the use of residents own bags (i.e. carrier bags and bread bags, etc).

While participants generally adapted well, a notable finding was that 76% of non-participating residents said they would be more likely to recycle these items if the council provided bags. Despite this, the trial achieved reasonable levels of participation, suggesting that good communications and service continuity can help compensate for the absence of a dedicated bag. However, feedback indicates that providing a bag still plays a valuable role in encouraging and sustaining behaviour change.


## Warwick

The Warwick trial represented more of a permanent service change than a time-limited pilot, with plastic bags and wrapping packaging added to the main comingled kerbside recycling stream.

Households collected on certain days of the week were provided with targeted communications and door stepped, those with collections on other days received communications through the local authority app and/or social medial. The results from those households given direct communications were striking: participation was strong, and the trial design appeared to convert previous contaminators into compliant recyclers, while also attracting other new recyclable material into the stream.

Despite lower overall recall of communications compared to earlier trials, the service change appears to have been well received. This suggests that embedding plastic bags and wrapping packaging into existing services—rather than treating it as a standalone collection—can yield sustained behaviour change, particularly when paired with appropriate messaging.

The addition of Warwick was to address a key knowledge gap, the collection of flexible plastic packaging comingled with other materials. To ensure consistency of variables, only material from those who received the three-flyer approach was analysed.

## Common issues and reasons for non-participation

Across all six trial areas, participants generally responded positively to the new kerbside collection service.

However, some recurring issues were identified (see figure nine). The most common problem was "Not enough bags / ran out of bags", followed by "Unclear what can be recycled", "Too much hassle / not convenient", "The bags split / tore", and "Didn't get any bags".

Although anything <10% is not seen as significant, it does highlight the importance of ensuring bag availability, bag quality and the need for clear information.

Figure nine: Problems experienced by those knowingly participating, by trial area

| Trial area (those knowingly participating) | Main reasons cited among those knowingly participating |
|---|---|
| South Gloucestershire – bags provided (167) | Uncertain what can be recycled (9%); bags not big enough (9%); bags not strong enough (7%); run out of bags (5%) |
| Newcastle (155) | Uncertain what can be recycled (7%) |
| Cheltenham (87) | Run out of bags (10%); bags not big enough (9%), bags not strong enough (9%); never received the bags (6%) |
| Maldon (92) | Bags not big enough (17%); bags not strong enough (14%); bags were not taken (12%) |
| South Gloucestershire – own bags (109) | Uncertain what can be recycled (8%); hassle finding the right bag (7%) |
| Warwick (155) | Uncertain what can be recycled (4%) |

Among those who did not participate, the most frequently cited barriers (see figure 10) were "Didn't receive a bag", followed by "Didn't receive any information" and "Not aware of the trial", indicating gaps in communication delivery and public understanding. Additional reasons included "Didn't want to take part" and "Too much hassle", reinforcing the need to demonstrate value and ease of participation through targeted messaging.

Figure 10: Reported reasons for non-participation, by trial area

| Trial area (those knowingly participating) | Main reasons cited among those knowingly participating |
|---|---|
| South Gloucestershire – bags provided (23) | NA – small base |
| Newcastle (33) | Didn't receive the bags (27%); too complicated (24%); not aware of the trial (12%); not enough time (12%) |
| Cheltenham (85) | Didn't receive the bags (56%); Not aware of the trial (33%) |
| Maldon (122) | Not aware of the trial (52%); didn't receive the bags (21%); not interested/don't care (15%); too busy (15%); too complicated (12%) |
| South Gloucestershire – own bags (55) | Not aware of the trial (44%); didn't have the right bag (13%); hassle to use your own bag (11%); council doesn't provide a bag (11%) |
| Warwick (55) | Lack of awareness (76%) |

The doorstepping surveys conducted provide strong evidence that effective communication and service delivery are critical to the success of kerbside collections for plastic bags and wrapping. Where residents received both the collection bags and clear information, awareness was high, participation levels were strong, and satisfaction with the service was consistently positive.

However, the findings also highlight that even small gaps in delivery – such as not receiving a bag or leaflet – can significantly reduce engagement. Among participants, practical issues such as running out of bags, confusion over what could be recycled, and the durability of the bags were common themes. For non-participants, the dominant reasons related to a lack of awareness, missing materials, or a lack of understanding about the trial itself.

# Results

## Summary of interim report findings

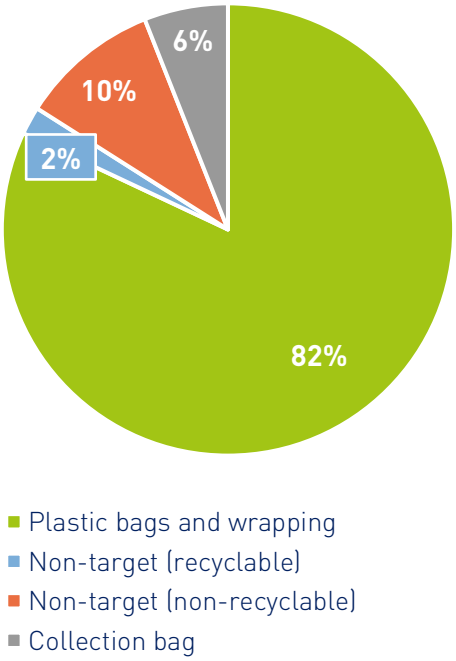
The interim report, published in January 2024 summarised the first 18 months of the FlexCollect project, detailing findings from trials in five pilot local authorities.

Interim report key findings were:

- Flexible plastic packaging could be seamlessly added to existing collection services with no reported capacity issues in refuse collection vehicles or Romaquips or similar style vehicles.
- Although voluminous when filled, the collection bags were able to withstand significant compaction and size reduction.
- The average weight of a collection bag was 291 grams.
- The average weight collected per household equated to 84 grams.
- Bags collected per household per week across all pilots equated to 0.29.
- Bags collected per household per week for weekly collections equated to 0.46.
- Bags collected per household per week for fortnightly collections equated to 0.17.
- Average participation based on kerbside monitoring was 60%.
- Average participation based on kerbside monitoring across weekly pilots was 64%.
- Average participation based on kerbside monitoring across fortnightly pilots was 47%.
- Satisfaction with the pilot service was high, at 89% among those surveyed.

The average composition of the material was as follows:

Figure 11 • Flexible plastic packaging composition – December 2023




This report builds upon the results from the interim report, benefitting from trials in an additional five pilot local authorities, as well as major expansions of participating households across the majority of those areas.

# Operational findings Collections

## Collection vehicles

FlexCollect trialled collections across a range of vehicles, including Romaquips, single and twin compartment refuse collection vehicles (RCVs), Kerbsiders and caged vehicles.
No capacity issues in vehicles were reported across any collection areas, with round sizes using Romaquip vehicles ranging from 250 to 800 properties, and rounds using RCVs in comingled or twin stream averaging around 1,000 properties (although some town or city centre areas operate rounds that exceed 1,800 properties, including flats).

Presentation approach and collection was determined by processing ability, with FlexCollect bags typically presented alongside the materials which they would be removed from, or in the compartment with the largest capacity. These are summarised here in figure 12.

Figure 12 • Pilot areas, presentation and vehicle type

| Pilot area | Presentation of bag | Collection alongside | Vehicle |
|---|---|---|---|
| Cheltenham | In existing recycling box | Plastics and metals | Romaquip |
| South Gloucestershire | In existing recycling box | Plastics and metals | Romaquip |
| Maldon | Next to glass box | Separate pass | Cage vehicle |
| Newcastle | Dry mixed recycling bin | Dry mixed recycling (excluding glass) | Split back RCV |
| Somerset | In existing recycling box | Plastics and metals | Romaquip |
| Reading | Dry mixed recycling bin | Dry mixed recycling | Single compartment RCV |
| North and East Hertfordshire | Dry mixed recycling bin | Dry mixed recycling (excluding paper) | Split back RCV |
| North West Leicestershire | In or next to existing recycling box | Paper | Kerbsider |
| Bracknell Forest | Dry mixed recycling bin | Dry mixed recycling | Single compartment RCV |

A separate pass was trialled in Maldon using a dedicated caged vehicle and a two-person crew. The trial area followed existing routes to avoid confusion for residents, should the collection approach change in the future. The crew was able to complete the route in half the time of the standard DMR vehicle, so it is anticipated that a separate pass could complete approximately two routes per day. As a result, the trial area was increased by 50%, leaving some capacity for the crew to complete the data collection and delivery of bags to residents. Maldon's separate pass was the only project area to incur significant collection costs (vehicle hire, fuel, and two-person crew), with most other pilot areas incorporating collections into existing rounds and crews at no additional cost. The only exception to this was Cheltenham who incurred a small cost at the kerbside, equating to an additional 15 seconds per property due to collecting and sorting the bags into the Romaquip compartment.

## Collection bags

Nine of the ten pilots used collection bags to collect flexible plastic packaging. Printed with clear messaging, the bags served as a prompt to residents, highlighting key details of the service, including accepted materials, where to get more bags, and the need to tie bags securely.

The project considered alternative approaches to supplied bags, including loose processing, and residents supplying their own bags. Collection bags were an effective tool, successfully isolating flexible plastic packaging from other materials streams in materials recycling facilities.

The bright colours enabled effective picking by materials recycling facility operators, and the visual reminder likely promoted participation among residents, while also acting as a communication method for types of packaging to be presented.

Despite the advantages, collection bags can present some challenges. They lend themselves to mis-use, through contamination or incorrect presentation (typically when left untied or single knotted). Similarly, initial distribution and top-up delivery can be a logistical challenge, placing strain on operational resources. Finally, there is risk of negative feedback, based on procuring significant quantities of plastic bags to collect flexible plastic packaging. This risk was discussed with the nine pilot authorities using collection bags, but only a handful of residents contacted their councils to raise concerns.

However, it is likely that the benefits outweigh these challenges, as collection bags reduce contamination of other material streams, and reduce losses of materials at the collection, sorting, and transportation stages.

A trial of self-supplied bags was undertaken in South Gloucestershire, evidencing lower participation rates and bringing challenges of identification for sorting at the materials recycling facility. This trial is detailed later in this results section.

## Thickness

Thickness of the collection bags depends on the downstream processes the bags need to withstand.

In source segregated collection areas, 18-20 micron bags are suitable for collection and limited processing, such as simple sort transfer stations. For example, in South Gloucestershire, the FlexCollect bags withstand collection at the kerbside in a Romaquip vehicle, bulking onto an articulated vehicle at the transfer station, and limited processing through the Avonmouth materials recycling facility. At the materials recycling facility, the plastics, metals and FlexCollect bags are loaded into a hopper before moving via conveyor to a picking cabin where the FlexCollect bags are removed.

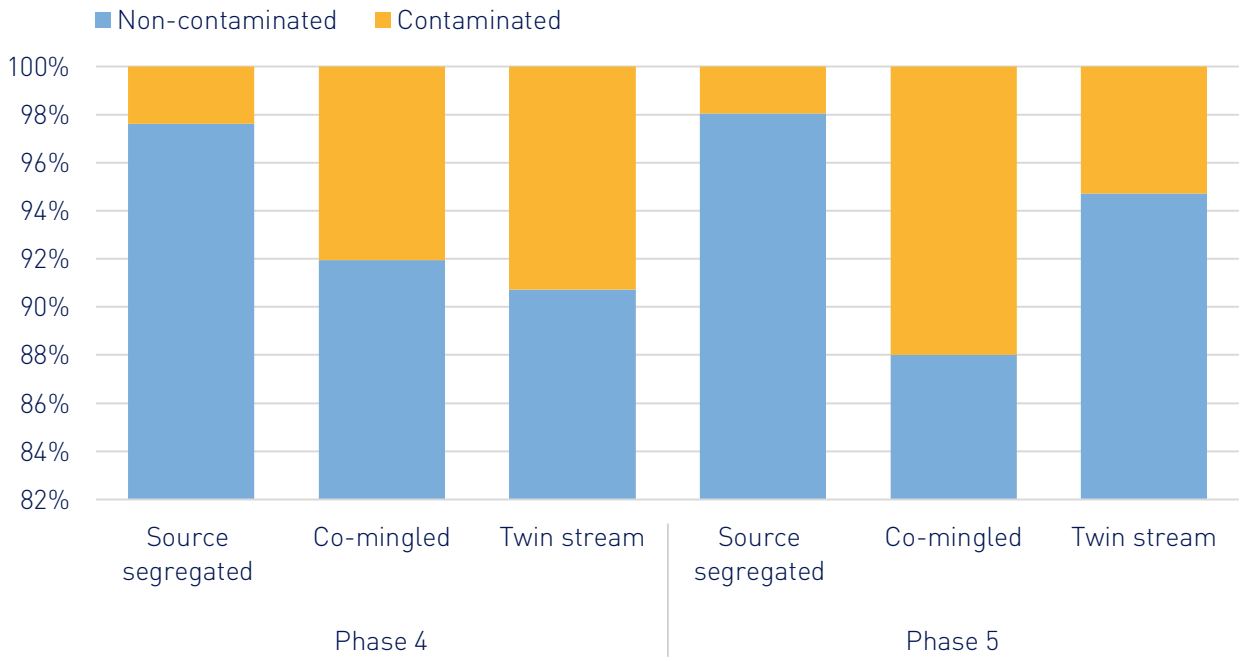
In comingled or twin stream collection areas, 40-micron bags are suitable for collection in an RCV with compaction, bulking at transfer stations and moving through mechanical sorting processes, including trommels, sizing screens and glass breakers, all of which risk bag tearing.

Initially, 50-micron bags were introduced in the comingled and twin stream areas. In a review to reduce environmental impact, weight and costs, the project tested the 40-micron bags at FCC's materials recycling facility in Reading. No negative impacts occurred, and, as a result, the project procured 40-micron bags for the expansions in the comingled and twin stream collection areas.

## Contaminated bags

Limited contamination of collection bags occurred across all trial areas, although in some instances levels were higher, such as in the urban centres of Reading and Newcastle. Whilst contamination in the form of a small number of plastic trays, bottles or non-target flexible plastic packaging items was expected, in some cases, householders would use the FlexCollect bags for all dry mixed recycling, placing these inside the recycling bin. Contaminated bags per trial area, as a percentage of total bags, is detailed in the graph below.

**Figure 13 • Contaminated bags by service type**




The data collected, although valuable, should be viewed in the context of the subjective nature of 'contamination' by collection and testing staff. Appropriate training was provided to minimise reporting variability between operatives completing the data collection.

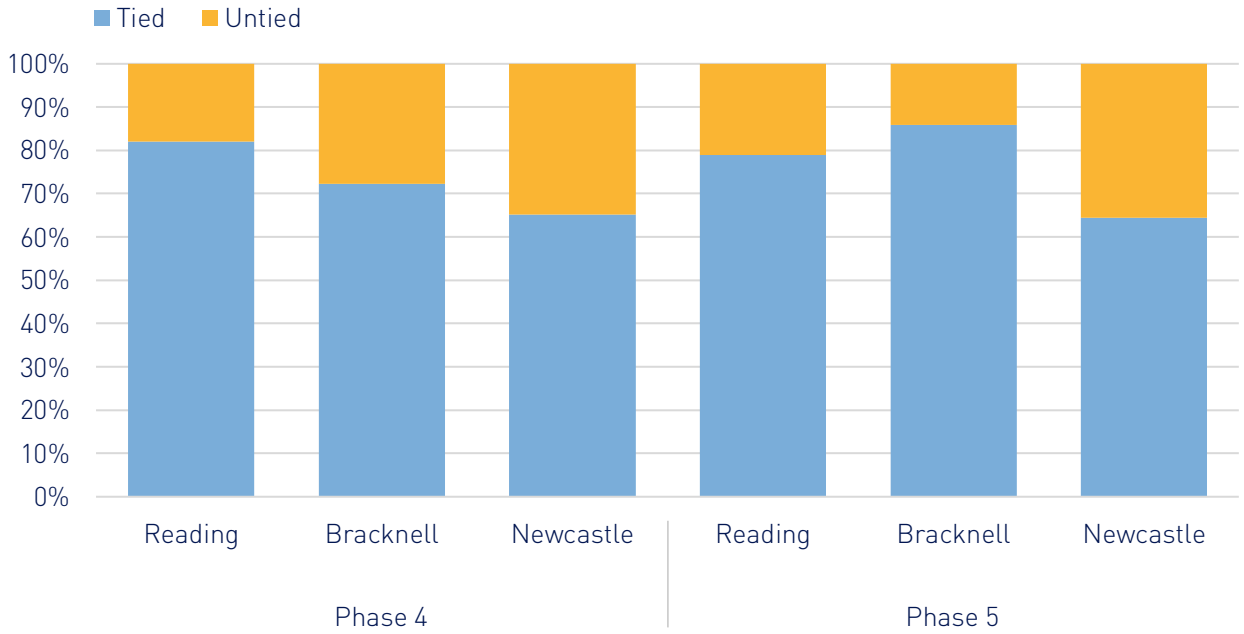
Despite some limited gaps in the data, there was a general decrease in instances of contamination over time. Some of this would have been a result of resident feedback mechanisms, such as contamination stickering by crews. In most trial areas, crews would sticker and reject heavily contaminated bags, requiring residents to remove contaminated material and present again at the following collection. Similarly, contaminated bags in wheeled bins can be harder to spot. For example, Newcastle's crews were not able to sticker and leave contaminated bags, yet a general decrease in instances was observed.

Contamination rates were also higher in the early stages of the service launch. The reduction seen may also have been a result of increased understanding over time, particularly as additional communications were received in the first two months.

## Untied bags

Requests to householders were made to tie the bags before presentation for collection to prevent material loss into the unbagged dry recycling and to minimise litter in windy conditions. Tied bags were more compliant in the material recycling facility sorting process, aiding separation and identification. Untied bags per trial area, as a percentage of total bags, is detailed below.

**Figure 14 • Untied bags by trial area**




The issue was first noted in the Reading trial, where filled bags needed to move a substantial way through the materials recycling facility process before being picked, including through a trommel.

Untied bags when they arrived at the picking cabin were noted as more empty of their contents than when they arrived. Not all areas experienced untied bags. In areas where the bag was presented in or next to a recycling box or other container, such as Cheltenham, South Gloucestershire, Maldon and North West Leicestershire, instances of untied bags was minimal.

Some of the pilot authorities took the approach of asking crews to tie bags before collecting, to avoid discouraging residents who are otherwise participating correctly, however in some areas this was deemed too time consuming. The contamination sticker was amended for those who required it, with the option to leave behind untied bags for the resident to tie securely for the next collection.

Finally, the project introduced a new bag design for the majority of project expansions, with increased emphasis on the securely tied messaging.

In all areas, the small size of the initial trial service kept disruption to a minimum, with no materials recycling facility operators reporting contamination issues in other streams. At authority wide expansion, there will be a proportional increase in contamination so authorities will need to consider the impact of this.

## Own bag trial

An 'own' or no provided bag trial launched with one collection route in South Gloucestershire in October 2024. Residents were asked to self-supply a bag of their choosing to present flexible plastic packaging with the aim of investigating participation compared to providing bags. A demographically similar route on the same housing estate was used as a baseline for comparing participation.

Coloured collection bags limit variables and provide a visual cue and communications tool, as well as facilitate efficient picking, however they have a cost to procure and require resources to distribute to residents. Although the initial outlay on collection bags will be a large upfront cost for authorities that choose to use them, in the context of cost per household, it could equate to as little as £2 per household per year. A full breakdown of cost is provided in the costs section of this report. Cost aside, certain stakeholders raise concerns about distributing significant quantities of plastic bags to collect flexible plastic packaging, especially considering relatively low participation rates in some areas.

The following figures outline the results of the trial in South Gloucestershire.

**Figure 15 • South Gloucestershire, own bag trial – bags collected per household passed**

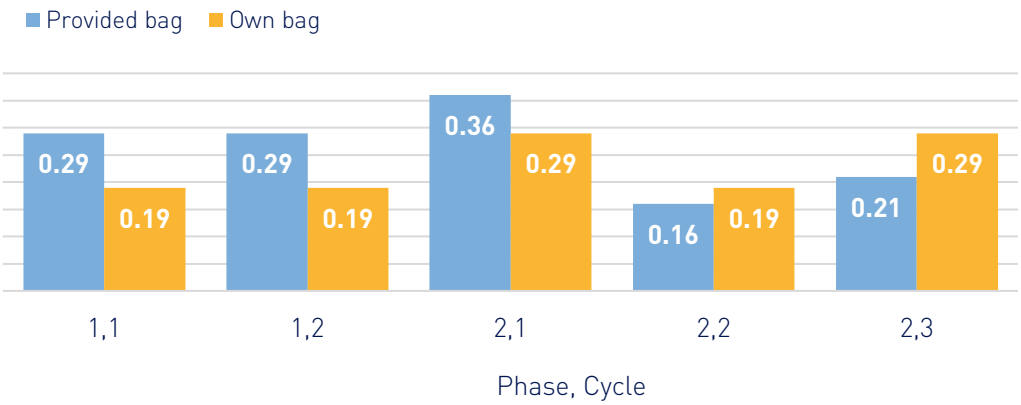



**Figure 16 • South Gloucestershire, own bag trial – average bag weight**

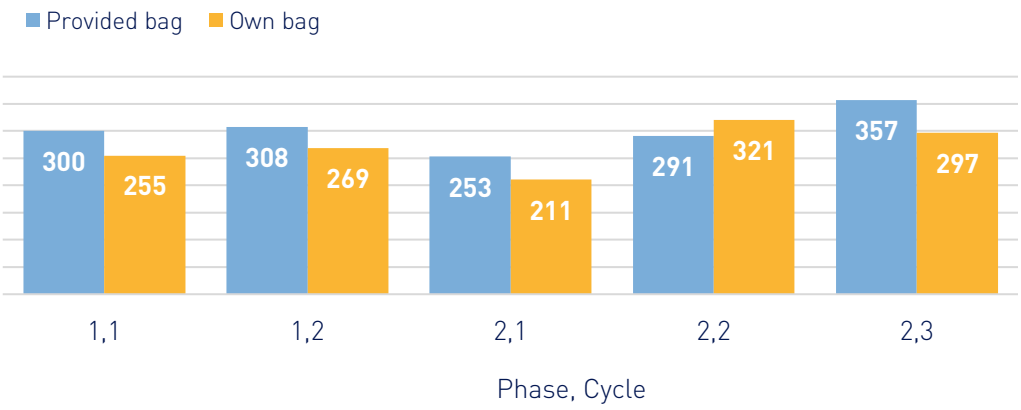
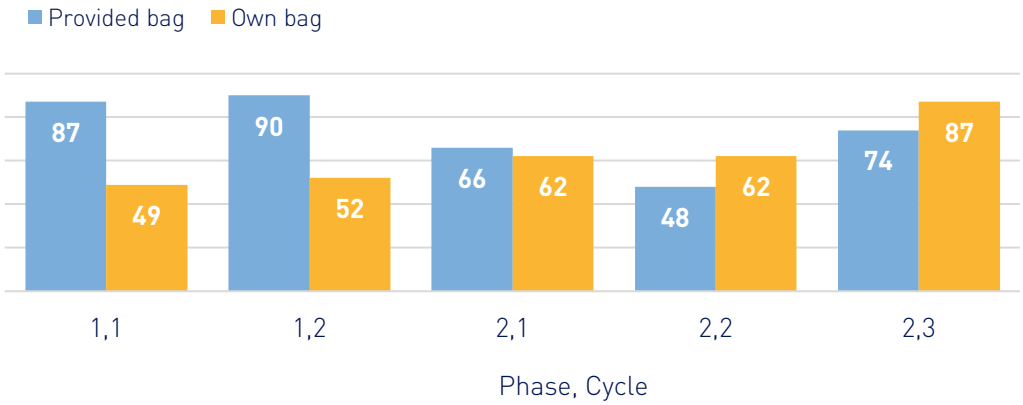


Figure 17 • South Gloucestershire, own bag trial – grams per household




In the first phase of monitoring, providing bags generated higher participation, bag weight and average weight per household. When the data collection was repeated, the opposite was true, although to a lesser extent. In the second phase of monitoring, the use of own bags saw average participation grow from 19% to 26%, whereas the provided bags dropped from 29% to 21%. Average bag weight remained stable for those using provided bags, at 300g, but grew for those using own bags, from 265g to 277g.

The results provisionally suggest that asking residents to supply their own bags could be a viable option for local authorities, although initial participation is likely to be higher where residents are immediately provided with the tools to participate. It is also worth noting that WRAP completed doorstep monitoring of the own bag trial, conducting interviews with residents to analyse their experience of the new service. Greater awareness and understanding, and therefore participation, could have been an unintended consequence of the research.

Use of own bags lent itself to numerous associated issues. Residents were asked to use securely tied carrier bags, bread bags or similar sized bags, but flexible plastic packaging was found to be presented in unsuitable or untied bags, including refuse sacks, snack packaging and fruit packaging. Many of these 'bags', alongside bag for life carrier bags, were presented untied, potentially leading to the contamination issues previously discussed – this could have been a result of a lack of 'handles' rather than communication or convenience issues. Further issues arose at the Avonmouth materials recycling facility, where SUEZ raised concerns that the bags were not actively picked by operatives as they were not easily identifiable on the picking line, and smaller bags were being missed.

For the reasons outlined, providing dedicated collection bags is recommended.

## Delivery of collection bags

Whilst it may seem obvious, successful delivery of collection bags is a determining factor in participation. Numerous approaches were taken across FlexCollect trials and expansions, with varying success. For the initial trial phases, all authorities opted to deliver the first batch of bags themselves (or via their collections contractor), most managing this using agency staffing (usually replacing loaders on routes) and overtime payments. It is evident from the doorstepping results presented in the communications section that delivery issues occurred in Cheltenham and Maldon, resulting in lower than anticipated participation. Certainty, engaged crew members and knowledge of the collection routes is therefore key to a successful bag delivery.

As the trials expanded, a mix of crew delivery and outsourced contractor deliveries took place, with outsourced supply leading to the smallest number of missed delivery complaints. Typically, these suppliers come with tracking devices in vans, and the management provide regular updates. These approaches were used in Reading and Newcastle, where it was not possible for the crews or council engagement teams to complete the deliveries alongside other work. Consideration had to be given to restricted parking and clean air zones.

For the crew deliveries, operatives were provided with maps and street lists, with some areas opting to create bespoke routing on in-cab devices. Missed deliveries were expected, but pilot authorities typically managed to keep these to a few percent. These instances are hard to quantify however, with residents typically only reporting issues on receipt of the nudge flyer.

# Sorting

Sorting is the process of separating the collected materials into streams ready for recycling. Like collections, local authorities can either outsource sorting operations to contractors or operate facilities in-house. The approach to sorting will depend on how the material is collected, whether the materials are co-collected, and in what combination. The process for removing flexible plastic packaging is no different. It depends on whether the material is presented in a collection bag or loose, and what the collection bag or loose material is co-collected with.

For materials collected source-separated, such as a separate pass vehicle or a separate compartment in a Romaquip, sorting costs are relatively low. However, collection costs are likely to be higher where operational efficiencies occur by co-collecting the bags with other materials. Costs will be reviewed in detail in the costs section of the report.

## Materials recycling facilities

The majority of FlexCollect pilot authorities send their fully or partially mingled material to a materials recycling facility for sorting. The exact set up of each facility varies slightly, but typically a materials recycling facility will use a combination of automated sorting machinery and manual interventions. The approach to removing flexible plastic packaging differs depending on how it is presented; loose, or in a collection bag.

## Collection bag sorting

The majority of materials recycling facility operators involved in FlexCollect manually sort collection bags from a partially or fully comingled stream.

These operators and the material mix are shown here in figure 18.

**Figure 18 • Co-collection of materials by pilot authority**

| Local authority pilot | Operator | Material mix (collection bag with) |
|---|---|---|
| South Gloucestershire | SUEZ | Plastics and metals |
| Newcastle | J&B Recycling | Paper, card, plastics and metals |
| Reading and Bracknell | FCC Environment | Paper, card, plastics and metals |
| North and East Hertfordshire | Pearce Recycling | Card, plastics, metals and glass |

In all cases, operators employed operatives to pick collection bags from the input material.

This usually takes place at the start of the materials recycling facility process in the 'pre-sort' cabin, as here there was likely to be the most space or capacity for picking the new material stream.

Additionally, removing the bagged flexible plastic packaging at the start of the process reduced the risk of split bags contaminating other streams further along the process.

The only exception to this was at FCC's materials recycling facility in Reading, where bags were removed in the fibre picking cabin, as there was insufficient space in the pre-sort cabin, which focused only on residue and contamination.

In this instance, bags were left to travel through the cabin and the trommel that followed before ending up on one of two fibre picking lines depending on the size or fill rate of the bag.

## Materials recycling facility modifications

Due to the lower numbers of households initially included in the pilots, all materials recycling facility operators were able to separate bags with minimal impact on operations. Once pilots scaled up, the ability of the operator to incorporate the bagged flexible plastic packaging into their process was varied, and modifications were needed in some areas to accommodate the volume of material.

At SUEZ's Avonmouth materials recycling facility, a vacuum extraction system was installed to move bags from the picking cabin to a storage container external to the building. The FlexCollect bags are collected with plastics and metals, a material stream that enters the materials recycling facility process at a different stage to the comingled material the materials recycling facility also accepts. This typically clean stream requires little clean-up so can bypass much of the mechanical sorting. The downside of this means there was no space to pick material into an existing bay or container.

Although a picking cabin is present for the plastics and metals, the chutes move residue onto conveyors which feed back into the process and are therefore unsuitable for bagged flexible plastic packaging. The solution was to retrofit a vacuum extraction system to an existing conveyor, allowing bags to be moved from the cabin to the externally located skip. Once full, the skip would be moved to the baler for baling.

At J&B's materials recycling facility in Hartlepool, the pre-sort line was extended to allow space for an additional skip to be placed underneath. The addition of a split chute meant that bags could be dropped into the existing chute and existing skip below the picking cabin. The glass bottles and jars which were previously picked here were instead placed into the new chute, diverting them into the newer skip. If bagged material was left to move through the materials recycling facility, it could end up in several different locations, necessitating early removal.

J&B, Hartlepool

At FCC's materials recycling facility in Reading, a temporary chute and separate baler were installed for flexible plastic packaging. The chute directed bags from the fibre cabin to a holding area below, where bags were stored in large two tonne sacks before being moved to baling.

FCC's current baler is integrated into the materials recycling facility and has no push on conveyor, so a separate baler was hired for the collection bags. Although small scale compared to the above, these challenges highlight space issues which are typical across many materials recycling facilities.

Similarly, the above two interventions are likely to remain successful if South Gloucestershire or Newcastle were to expand to all households.

The interventions in Reading are temporary in comparison, suitable for the 10% of potential households which receive the service across re3 (Reading, Bracknell and Wokingham) council areas. Discussions are ongoing between FCC and re3, external to the project, with regards to their future approach. This will likely involve a new bay for the bagged flexible plastic packaging, in addition to new conveyors.

Pearce Recycling utilised an existing temporary chute for the collection bags, dropping below into large sacks. These were then tipped on to the baler manually. Similar to FCC, these interventions suffice for the 10,000 trial properties across North and East Hertfordshire, but a more permanent solution will be necessary for wider rollout.


Pearce Recycling

## Fully comingled flexible plastic packaging collections

Local authorities who are able to introduce a full comingled collection service without a collection bag will be able to avoid costs for bags and bag delivery. On the other hand, sorting costs are likely to be higher where it is more onerous to remove loose material from a fully comingled input stream, particularly if the infrastructure is not already in place and fibres are included.

In the UK, as it has not been common for flexible plastic packaging to be collected there is a general lack of sorting infrastructure for these materials. For this reason, the majority of FlexCollect partner materials recycling facilities employed operatives to pick collection bags.

In understanding how materials might be collected, it is important to understand that most materials recycling facilities will use a mix of processes to separate material streams, including 2D and 3D separation, weight-based separation, magnetic properties, and near infrared (NIR) sorting technologies.

One particular complication is that paper and thin card will tend to present in a similar manner to flexible plastic packaging, making separation significantly more complicated. One approach to combat this could be to collect paper and card separately from other materials, to ensure more efficient and effective sorting.

However, application of this approach will still depend on the receiving materials recycling facility. Many materials recycling facilities mix material from their local authority customers into a single input stream, meaning a single authority may not benefit from segregating paper and card.

## Case study: Sherbourne Recycling and Warwick District Council

The only exception to the use of collection bags was Sherbourne Recycling, who operate a fully comingled materials recycling facility, including loose fibre and loose flexible plastic packaging. The modern and advanced materials recycling facility is a joint partnership between eight local authorities across the West Midlands, designed with mechanical processes suitable to separate flexible plastic packaging from a comingled stream. The intention of the site has always been to introduce flexible plastic packaging collections for the eight local authorities, however, ahead of this, a FlexCollect trial was launched in partnership with Sherbourne Recycling and Warwick District Council to investigate the participation and operational challenges associated with comingled collections. The materials recycling facility uses a combination of 2D and 3D separation, weight separation, artificial intelligence and robotics, and manual intervention to remove flexible plastic packaging.

### Approach

Warwick District Council launched their service to all households at the same time. Within this, 14,000 households received the same set of three flyers designed by WRAP. The comingled recycling from these properties was isolated at Sherbourne Recycling's materials recycling facility, and batch run through the process to isolate variables and understand the input composition compared to the flexible plastic packaging recovered.

The other 48,000 households were informed of the change in service through social media and the authority app. The trial collected the following datapoints:

- Input composition: sampling data to understand quantity of flexible plastic packaging going in, extrapolated up to the total input tonnage.
- Film product tonnage: the total weight of the film recovered through the materials recycling facility process, used to understand recovery.
- Film product purity: to analyse the composition of the film recovered and look for presence of other materials.
- Residue composition: sampling data to understand the quantity of film left in the residue, extrapolated up to the total residue tonnage, allowing a calculation of process loss.
- Purity of aluminium, paper, and other streams: to understand if film was present as a contaminant within other material streams.

### Results

The project has relied on a mixture of sample and tonnage data to understand collection rates and assess the materials recycling facility process. By their nature, samples only assess a small quantity of the waste material, and, although these samples can be scaled up, they are not a perfect way of assessing the new service. This is detailed below where there are greater calculated quantities of flexible plastic packaging in the residue than the calculated input tonnage.

The only way to be certain of how material has moved through the materials recycling facility process is to complete a full mass balance by sorting and weighing the input and output streams, including contamination, which would not have been practical for the 100 tonnes of waste delivered from the sample area each collection cycle.

### Input, film product and residue tonnage

A total of 18 samples were used to work out input percentage of flexible plastic packaging, resulting in an average input of 2.04%. Input grew with time, likely in relation to the communications campaign, particularly in the case of the third sample which took place after Christmas and followed the final 'nudge' flyer.

Flexible plastic packaging product from the materials recycling facility grew as the project progressed. This will be a result of the increasing input tonnage but also due to a change in approach to sorting the material. In the first phase, manual picking in the pre-sort cabin favoured higher value items, and defensively removed large films which may have potential to cause blockages further down the line. In the second and third samples, operatives were instructed to positively pick more flexible plastic packaging into the extraction systems. Based on the actual product tonnages and the calculated input tonnages, an average recovery of 68% occurred.

Flexible plastic packaging in the residue increased across the three samples in line with increased input tonnages (calculated) and product. The calculations for flexible plastic packaging residue highlight some of the pitfalls of sampling, as the calculated residue tonnage made up to 91-131% of the calculated input tonnage.

Using the sum of the flexible plastic packaging product tonnage and the calculated residue tonnage, average recovery works out at 37%. As a result, the estimated recovery works out at 37% or 68% depending on the two different methods of calculation.

### Purity

The trials also sought to understand the purity of the flexible plastic packaging product, as well as the impact the material would have on the purity of other streams, including paper, aluminium, carboard and steel. Of particular concern was the paper stream where the risk is that flexible plastic packaging and paper may behave similarly through the materials recycling facility due to their 2D shape.

For the film grade produced, a purity of 89% was achieved across the phases, with a total of 15 samples taken. This increases to an average of 90% when the outlying sample achieving only 75% purity is removed from the calculation. The most common contaminant within the samples were fibre grades, although residual and rigid plastics were also common. This is likely due to the 2D nature of other fibres. Post-consumer film grades are generally considered a low value product and will typically demand a gate fee. It is expected that these purity levels are acceptable, however details of the offtaker, their specification and gate fees were not disclosed due to commercial sensitivity of the materials recycling facility operator.

Sherborne materials recycling facility were able to maintain high levels of purity within their fibre grades, with an average of 0.74% film contamination.

The ability to minimise film contaminant within the paper stream is key for Sherbourne Recycling as they look to expand collections to all local authority customers.

Aluminium output was also analysed across seven samples due to risk that the eddy current separator (used to sort aluminium materials) would also collect aluminium lined pouches. Film percentage in this stream equated to 0.23% in the aluminium output stream, however, it is worth noting that pouches were not a target material in Warwick, and as such the film percentage maybe understated.

Steel cans saw 0.26% contamination and cardboard saw 3.36%. Only one sample was taken for each of these streams, so both are unlikely to be representative. Based on the percentage of flexible plastic packaging in the two metal streams it could be that the eddy current separators are not set up and operating with parameters that target aluminium lined pouches.

### Conclusions

The trial with Warwick District Council and Sherbourne Recycling was key to understanding sorting efficiencies for fully comingled material, including flexible plastic packaging and fibres. The results suggest a sorting efficiency of 37% or 68% (depending on the method of calculation), a result which has the potential to improve over time with tweaks to the automated sorting equipment and artificial intelligence learning. Although not able to be measured, the sorting efficiencies of picking survival bags is expected to exceed 90-95% in most facilities, as the instruction is simple, and the bags are easily identifiable.

## Case study: Green Recycling

Green Recycling, located in Maldon, Essex, operate a fully comingled materials recycling facility for their customers. The materials recycling facility uses a variety of technologies to segregate their input stream, including 2D and 3D sorting, magnets and eddy current separators, and a series of near infrared sorters to segregate streams such as wood and different plastics, including flexible plastics.

Most of Green Recycling's customers are commercial, therefore the composition of the films and flexibles segregated is likely to be different to post consumer flexible plastics.
The materials recycling facility began accepting Maldon's recycling in early 2024, although the separate pass collection carried on for the FlexCollect material. Maldon District Council have worked with Green Recycling and SUEZ to confirm a solution for the FlexCollect trial households' post-trial, and will be sending dry mixed recyclables to the materials recycling facility, fully comingled, for processing.

Learnings from the flexible plastic packaging material collected from these ex-trial households will be used to help Green Recycling in preparation for accepting flexible plastic packaging comingled from all Maldon Districts households, with the intention of the service being available to all households by 2026.

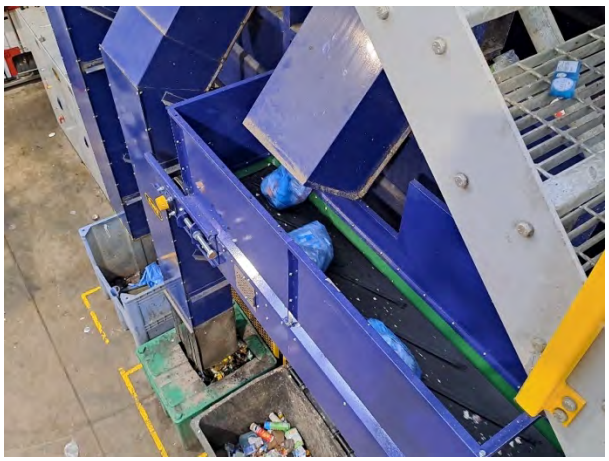
## Simple sort transfer stations

Similar to materials recycling facilities, simple sort transfer stations make use of a processing line to separate a reduced number of material streams, usually metals from plastics. The operation is typically smaller than a materials recycling facility process and is usually dedicated to the material collected in one authority area only.

Three FlexCollect trial areas operate simple sort transfer stations: Somerset, North West Leicestershire and Cheltenham. In all three cases, the process is to separate metals from the plastic, involving an overband magnet and an eddy current separator (ECS) to remove ferrous and non-ferrous metals, leaving behind a mixed plastic stream. Both Cheltenham and Somerset employ an operative or operatives to pick non-conforming waste, providing an opportunity for collection bags to be picked from this material stream.

In Somerset, modifications were needed to the processing line to accommodate collection bags. In the trial phase, bags were placed into one of the three existing contamination chutes, dropping into a 1,200L container. Due to the high volume of bags, the container was filling up every 2-3 minutes, requiring three operatives (in addition to the picker) to swap out containers and empty them into a bay on repeat, until the FlexCollect trial material had been processed. For the purpose of the 3,600-property trial, this was achievable over an hour of processing.

On expansion, a conveyor was retrofitted to one of the existing contamination chutes, directing the bags into a newly constructed bay, freeing up the three additional operatives, and enabling the site to run continuously without risk of blockage or downtime.



## Transfer stations and depots

Although not originally intended as sorting sites, transfer stations and depots have been used across the project to sort collection bags, usually involving manual picking on the floor.

For example, in the trial phase in South Gloucestershire, bags were picked from the plastics and metals mix using litter picking equipment. The process was time consuming, taking two plus hours to process material from 2,000 households.

To manage the potential health and safety risks of working in an operating area, the material was processed on Saturday mornings when all other site activities had ceased.

In North Herts, bags were manually removed from the paper, arriving compacted in a split back RCV. This process was also time consuming and involved an element of risk due to vehicle movements and site operation.

Whilst the above two operations quickly ceased following expansion of the trial, manual picking of bags from the paper stream continued in North West Leicestershire throughout the project.

The key difference here is that the Kerbsider vehicles do not compact the paper and collect from a smaller number of properties prior to returning to the depot, so the additional process took two operatives approximately 5-10 minutes per tip.

Based on the challenges of managing the health and safety risk to operatives from site operations, as well as the manual handling element, it is not proposed to recommend that bags are manually removed on the floor of a transfer station for a full-service delivery.

At the time of writing, North West Leicestershire is considering their future service rollout and whether flexible plastic packaging can be incorporated in an alternative way.

# Operational data gathering

The data gathered across nine of the local authority pilots is summarised below. Individual datasets for each of the pilot local authorities are detailed in the local authority case studies appendices of this report.

The data is presented in phases and cycles, where each phase represents three collection cycles. This allows the comparison of pilot local authorities at a similar stage in the trial development when they occur over different dates.

For example, phase 1 details the baseline (or first) data collection period for each pilot authority.

Phases 1-3 detail data collected in the initial phase of the trials, and phases 4-6 detail data collected in the expansion phase of the trials. All pilot authorities collected data in at least two phases in the initial trial and two phases in the expansion, with some collecting more data due to an earlier launch date.

## Weight per trial household

Figure 19 takes into consideration all households within the trial area, not just those who are actively participating. The total tonnage collected each cycle has been divided among the participating households to give a grams per week per household figure.

A range between 16g and 142g occurred in the initial trial phase, with variability due to the demographic make-up of local authorities and phase of trial development. The expansion saw a range between 11g and 108g per household.

An overall average has not been calculated due to the varied demographics of pilot local authorities. Instead, averages have been presented for service type and collection frequency.

Figure 19 • Average weight per trial household per week (g)

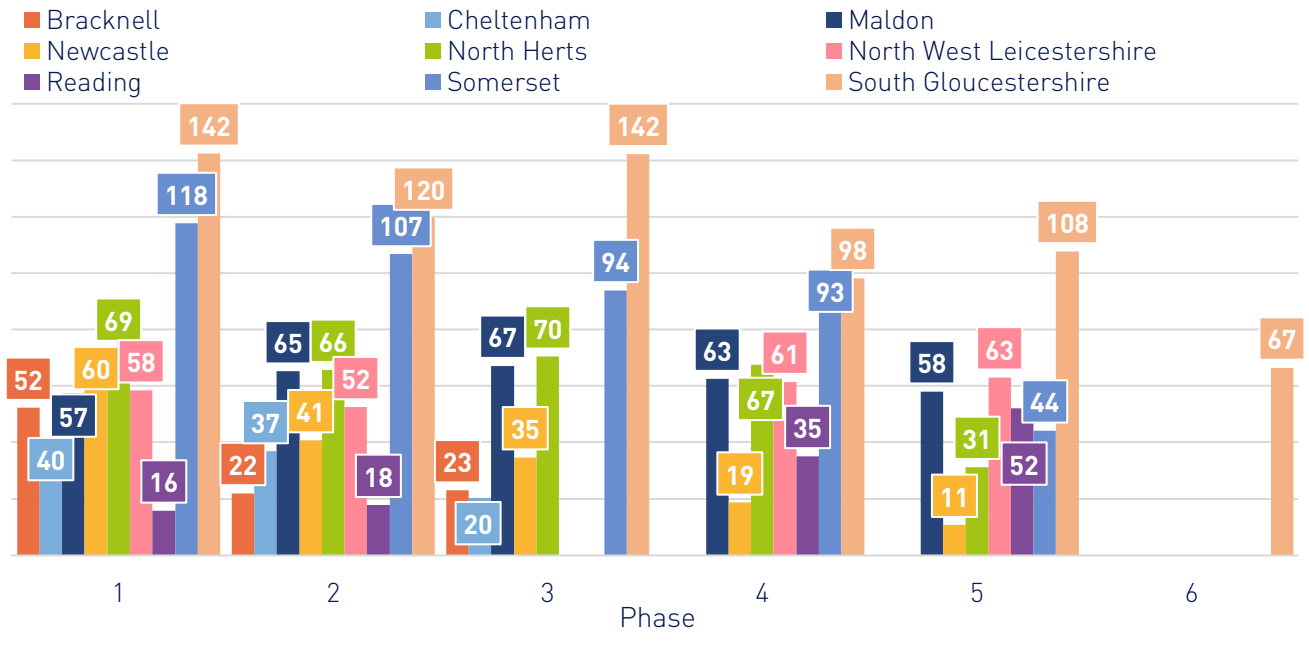


Figure 20 • Average weight per trial household by collection type, normalised over one week

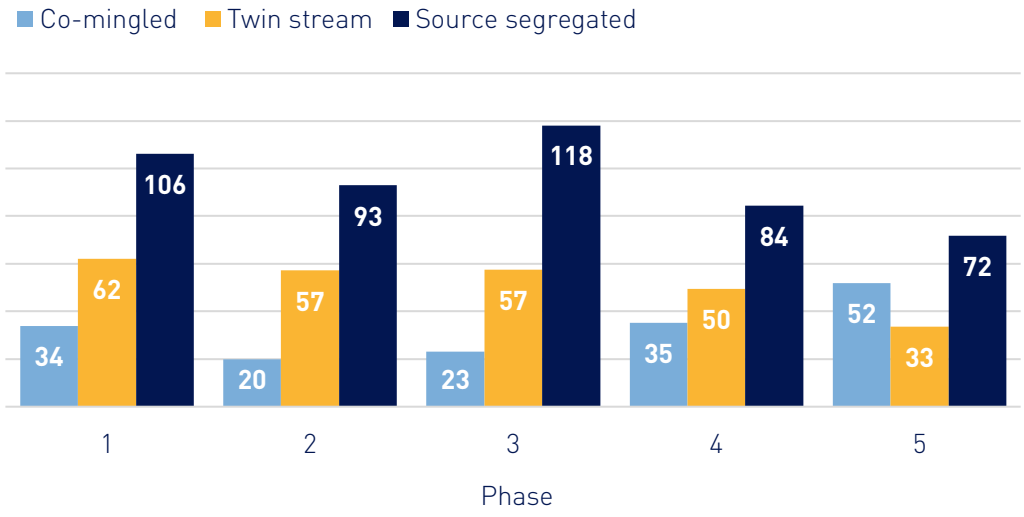
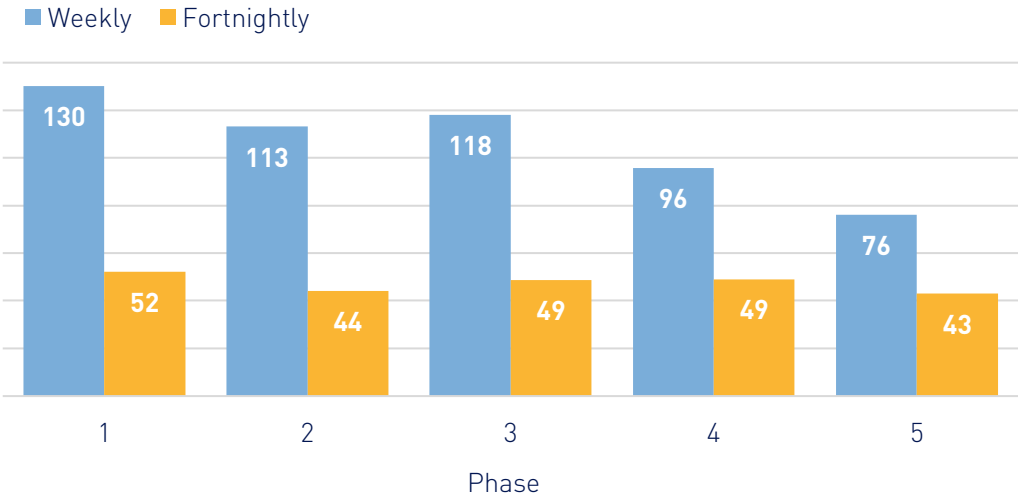



Figure 21 • Average weight per trial household by collection frequency, normalised to one week




The results highlight that weekly collection cycles generate greater than twice the amount of material compared to fortnightly collection cycles. For those who are able to do so, implementing weekly collections is recommended for increasing collection rates.

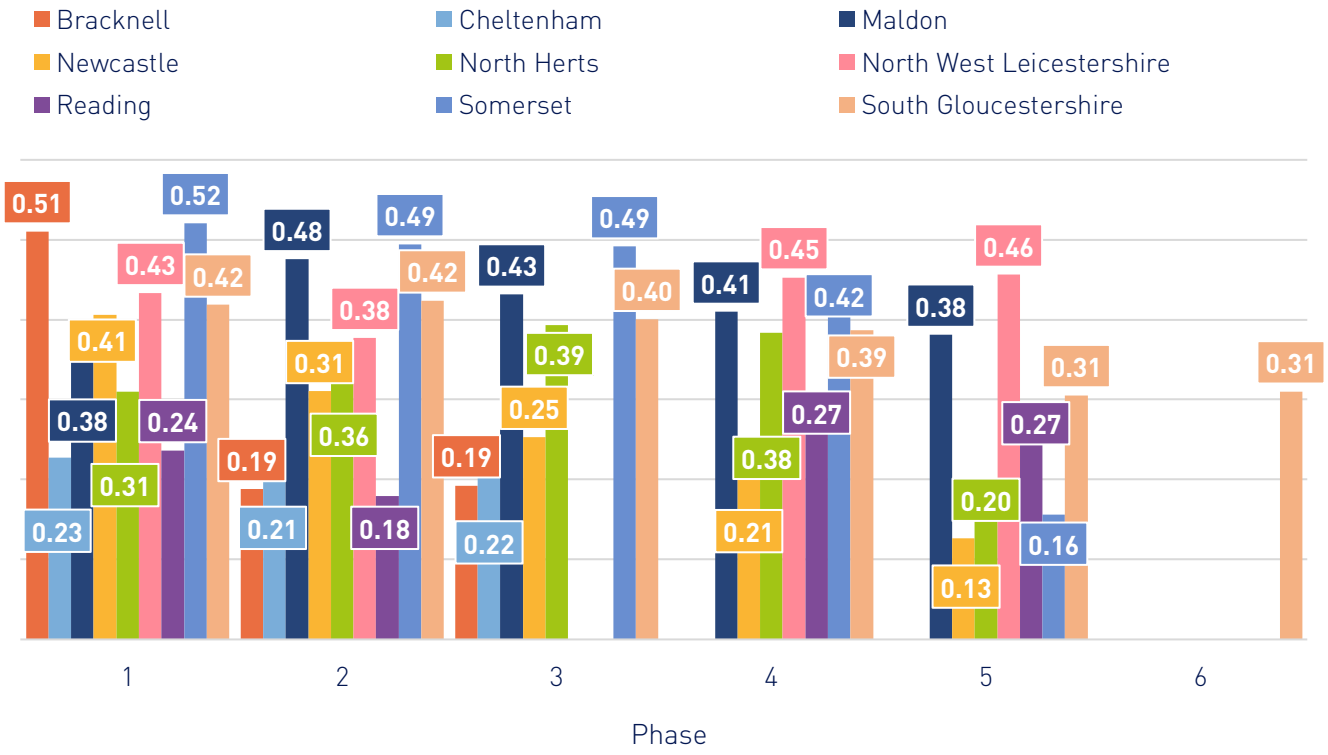
Source segregated collections generate more grams per household per week compared to twin stream or comingled areas.

For the majority of the project, twin stream outperformed comingled, with the exception of the final phase of data collection. A likely explanation is that residents receiving a source segregated collection are more familiar with practice of segregation of individual material streams within the home.

## Participation rates

As outlined in the previously described methodology, the average number of bags presented per property passed on the collection route is used as a proxy for participation in the service. For example, if 5 bags are collected from 10 properties, there is a 50% participation rate over the collection cycle.

Figure 22 • Average number of bags per collection cycle (not normalised) per household per phase



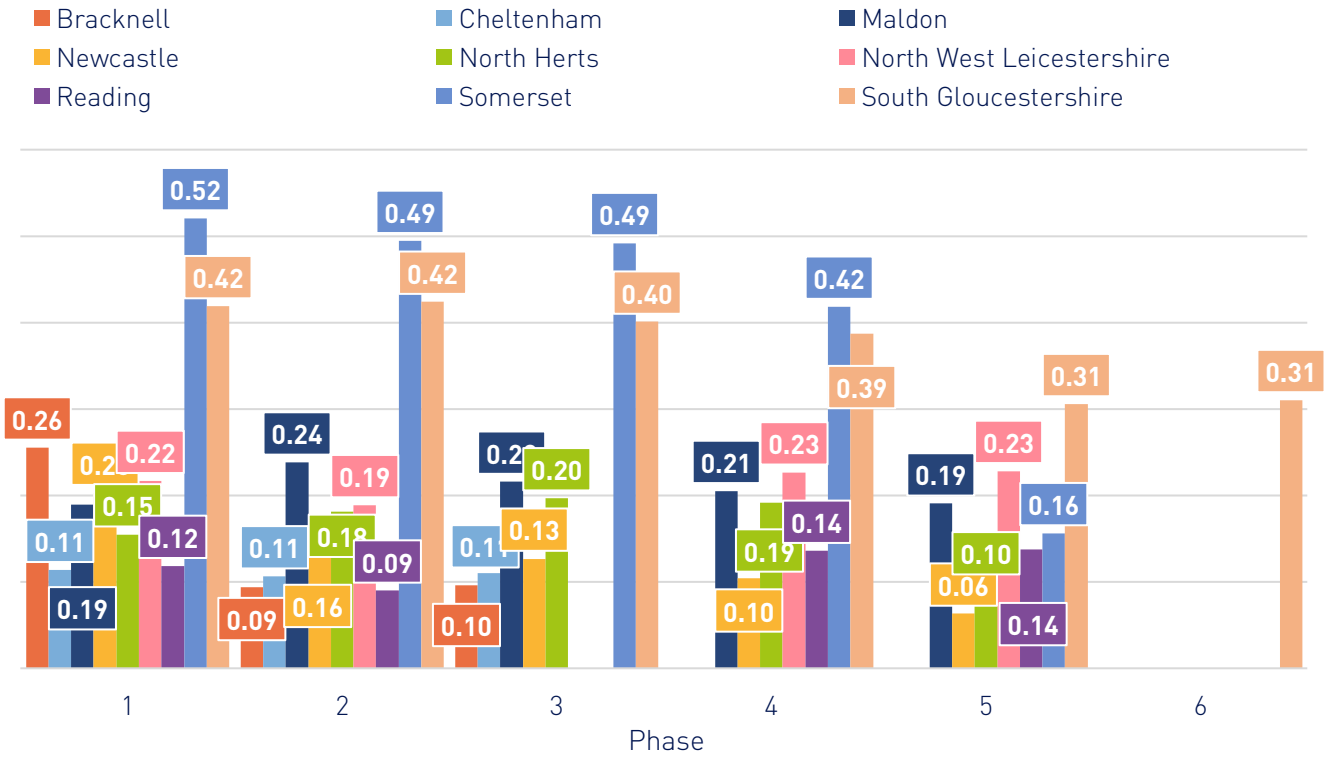

Participation rates range between 0.18 and 0.52 bags per property passed, with higher levels of participation observed consistently in South Gloucestershire, Somerset, Maldon, and North West Leicestershire.

The differences between pilot authorities' participation rates reduces in the later phases of the trials, partially due to the majority of authorities seeing a reduction in participation over time.

This reduction could be where households run out of bags and do not know where to order more, or because it is more complicated to communicate effectively to a larger trial area during the expansion phases.

As collection cycles vary between weekly and fortnightly across the pilot authorities, participation rates have been normalised over a weekly period for easier comparison. As evidenced in figure 23, the range in normalised participation increases to 0.9 to 0.53 bags per household, further evidencing the relationship between weekly collection services and participation.

Figure 23. Average number of bags per household, normalised over one week




Both South Gloucestershire and Somerset collect recycling on a weekly basis, generating higher participation rates for all but the fifth phase where Somerset's participation rate falls in line with those collecting on a fortnightly basis. This further evidences the harvesting rate of weekly collection services compared to fortnightly services.

Figure 24 • Average number of bags per property per cycle by collection type

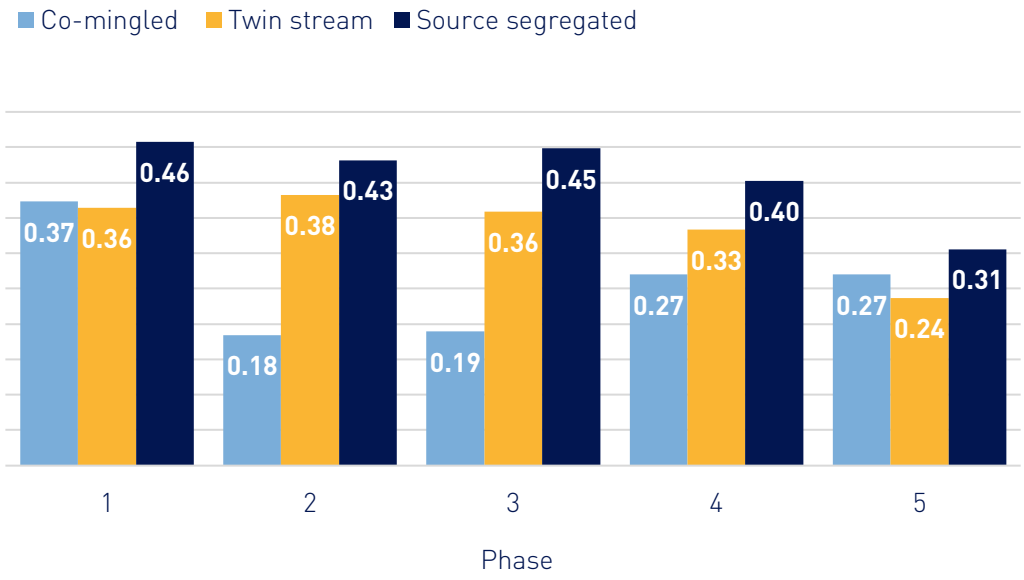
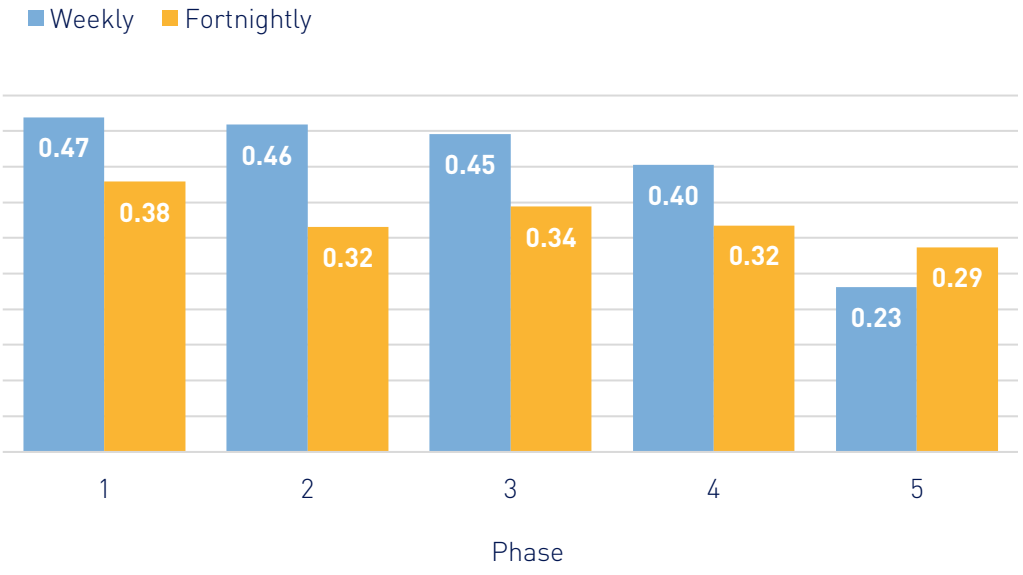



Figure 25 • Average number of bags per property per cycle by collection frequency




The participation data has also been represented by collection type and collection frequency, using the participation per cycle (not per week) as the source. Whilst source segregated and weekly collections clearly evidence higher participation rates, this tails off in the latter phases of the project but, with continued communications and bag supply, would be expected to continue to show higher participation.

## Drivers of recycling

Using the ONS demographics, the average weight per household per week, and the average participation rate for each of the pilot authorities, it was possible to draw correlations between the different 2021 ONS supergroup classifications of the trial areas and participation rates in the project.

There is a positive correlation in both high levels of participation and high grams per household among Retired professionals and Suburbanites and peri-urbanites supergroups. These ONS groups are commonplace in the pilot authorities with higher levels of participation, including:

- South Gloucestershire, making up 50% of households
- Somerset, making up 68% of households
- Maldon, making up 84% of households
- North West Leicestershire, making up 73% of households

There is also a correlation between both low levels of participation and low grams per household among all other supergroups. These groups are common in the pilot authorities with lower levels of participation, including Reading, Bracknell and Newcastle. The definition of each supergroup[8] is available online.


[8] https://data.geods.ac.uk/dataset/output-area-classification-2021/resource/33fd0618-b594-4451-9705-9f1e9dae2c66 – licence for use at https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

## Average bag weight

Average bag weight varies across the trials, ranging from 219g (Somerset) to 550g (Reading). The overall average is 312g.

This average has grown since the interim report, suggesting residents are making better use of the space in the bags.

Bag weight will be influenced by the frequency of collection where more frequent collections are expected to deliver lower weights than those collected less frequently. On a normalised basis however, weekly collections harvest significantly more material than fortnightly collections. This is evidenced in figure 27.

Figure 26 • Average bag weight per phase per pilot authority

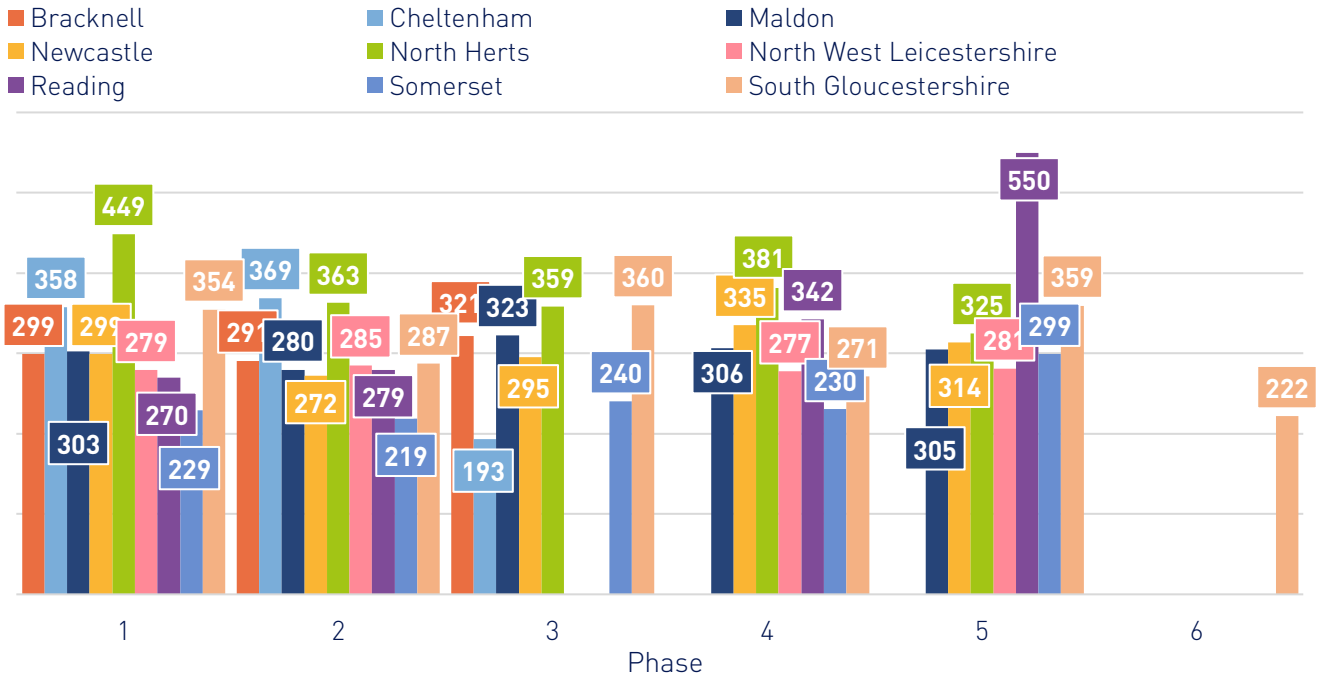
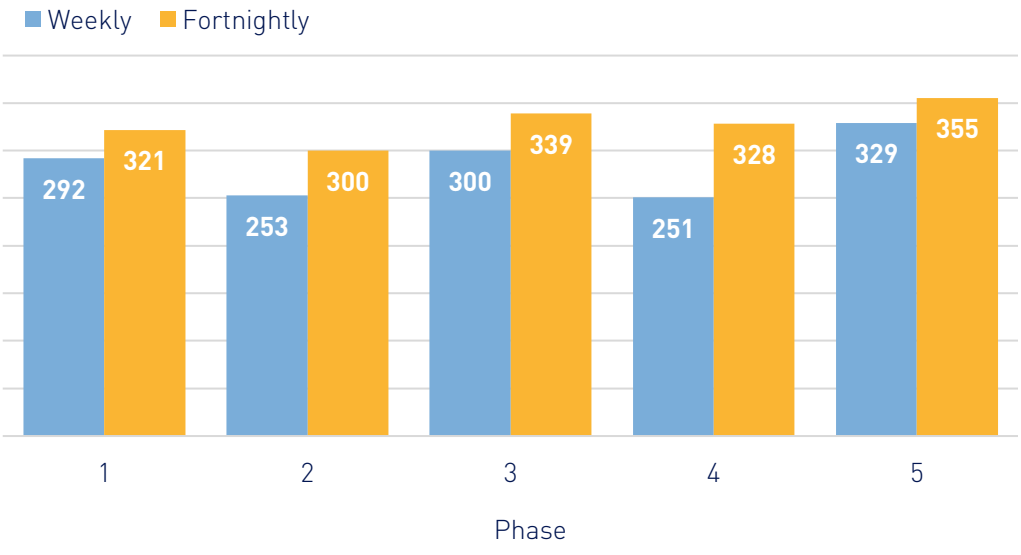



Figure 27 • Average bag weight by collection frequency



## Data gathering summary

The data gathered is summarised below. The averages are drawn only from the expansion datasets (Phases 4-6) as these are made up of representative population samples.

### Figure 28 • Grams per household per category per week

| | |
|---|---|
| Comingled | 44g |
| Twin stream | 42g |
| Source segregated | 78g |
| Weekly collections | 86g |
| Fortnightly collections | 46g |

### Figure 29 • Bags per household per cycle (not normalised for collection frequency)

| | |
|---|---|
| Comingled | 0.27 |
| Twin stream | 0.29 |
| Source segregated | 0.35 |
| Weekly collections | 0.32 |
| Fortnightly collections | 0.3 |

### Figure 30 • Average bag weight per collection cycle

| | |
|---|---|
| Comingled | 446g |
| Twin stream | 328g |
| Source segregated | 286g |
| Weekly collections | 290g |
| Fortnightly collections | 342g |

Overall averages have not been calculated as the number generated would be too generalised for effective use.

# Material composition analysis

Material composition analyses were carried out on each pilot authority trial to understand two key points:

1. Whether residents were able to distinguish different types of flexible plastic packaging to recycle effectively. The results of this were able to inform consumer communications to improve the quality and quantity of the material collected.
2. To understand the composition of the feedstock material for recycling end markets.

The analyses also provided an understanding of consumer behaviour habits in terms of material presentation.

Two analyses were completed for each of the pilot local authorities involved, with the timings and quantity assessment designed to obtain a representative and statistically robust sample.

The first sample was taken approximately four weeks post service launch in order to let consumers become accustomed with the service. The second analysis was competed about six months after the scheme became established and aimed to assess how consumer behaviour may have changed over time.

The datapoints gathered were as follows:

- Overall composition – weight and number of items
- Detailed composition – nine categories plus the collection bag
- Polymer composition
- Ink coverage – clear, 1-80% coloured and 80-100% coloured
- Bag weights – including minimum, maximum and average

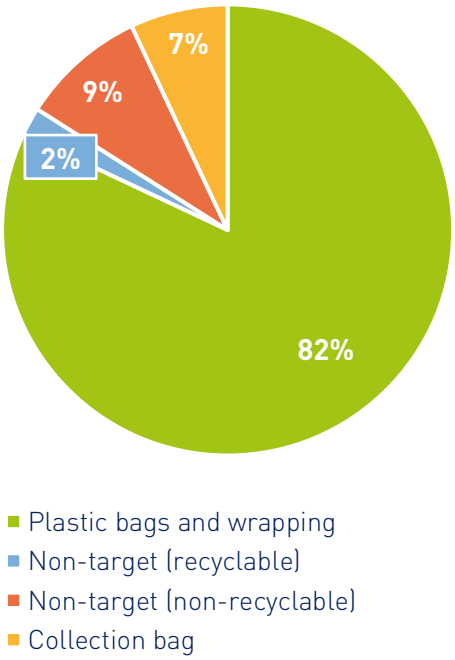
The total quantity of material analysed across all eighteen analyses was:

- 1,981 bags
- 575kg flexible plastic packaging
- 135,201 items

## Composition by weight

The overall composition summary from the analyses uses data from sixteen of eighteen analyses due to a slight refinement of the material categories following the first two analyses. The overall composition is presented in figure 31.

Figure 31 • Overall material composition by weight




The overriding observation across all of the analyses is that the material is largely target material and is clean and dry. 89% of material collected was target material, comprising 82% flexible plastic packaging and 7% collection bag (polyethylene).

A relatively small quantity of non-target recyclable plastic was present (2%), consisting of rigid plastic packaging (bottles, pots, tubs and trays), paper and card, and a small quantity of steel and aluminium cans.

A total of 9% was non-target, non-recyclable items.

Visual inspections of the material suggest even lower levels of non-recyclable material, with expected figures falling within the 4-5% range. The slightly higher percentage is likely due to water or moisture content present within the bags, typically where they are stored outside overnight. Remaining weight after all other categories have been weighed is the non-recyclable category, consequently including the weight of moisture or loss via evaporation when items are removed.

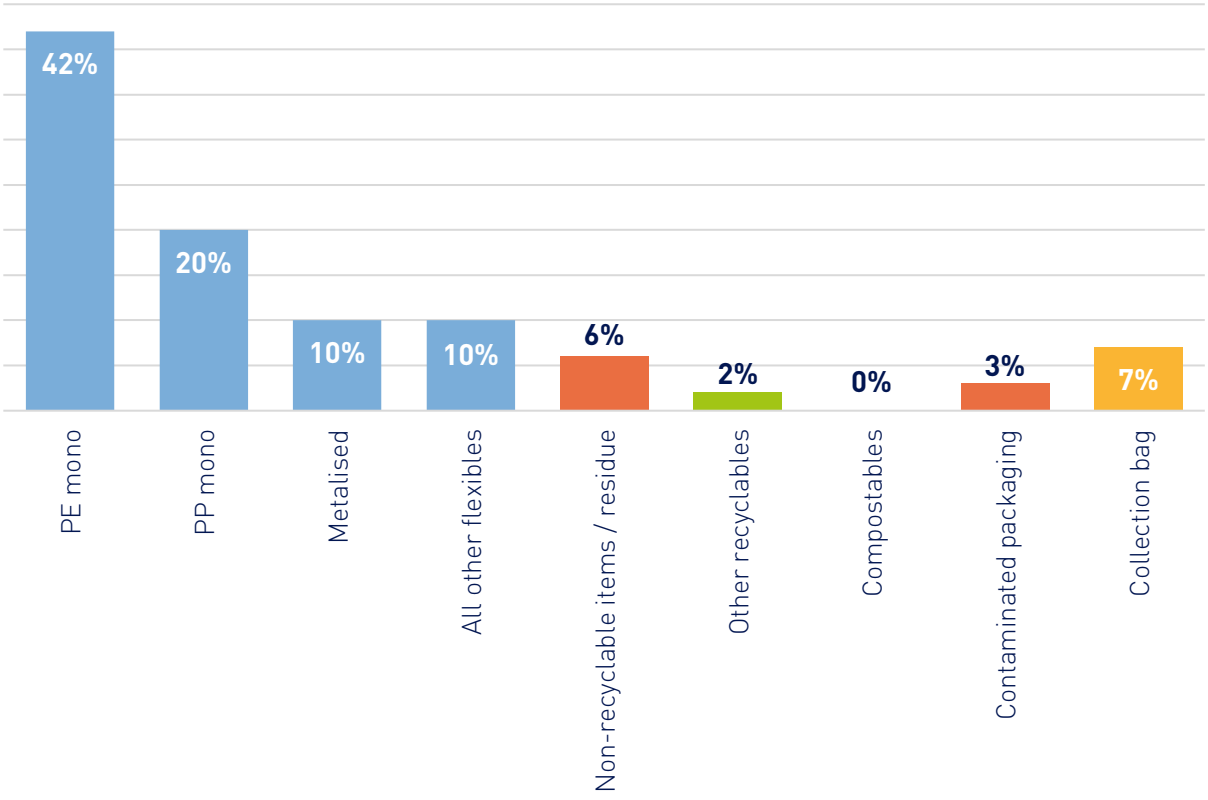
The non-recyclable category consists of non-target non-recyclable (6%) and contaminated and compostable packaging (3%). Another point to note is that this category can be disproportionally impacted by heavier items. Flexible plastic packaging is typically very low in weight, especially in comparison to a single steel can.

## Detailed composition by weight

The overall detailed composition for the sixteen analyses is as follows.

- 82% plastic bags and wrapping:
  - 62% mono polyethylene (PE) or polypropylene (PP) packaging (42% and 20% respectively)
  - 10% metalised packaging
  - 10% all other flexible plastic packaging, including non-metalised laminates
- 2% non-target recyclable items
- 7% collection bags
- 9% non-target non-recyclable items:
  - 6% non-target items and residue, such as wet paper, toothpaste tubs with toothpaste still in them and thick foils that contain drinks
  - 3% contaminated packaging, mainly with food residue
  - < 0.1% compostable packaging

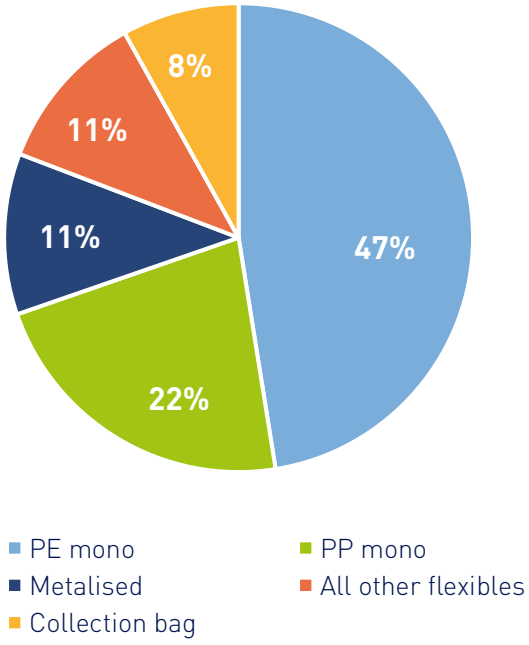
Figure 32 • Detailed composition by weight



## Detailed composition by polymer

The composition of the plastic packaging mainly consisted of mono non-metalised PE and PP (69%), with PE being the most prominent polymer type (47%), followed by PP (22%) and the PE collection bags (8%). The remaining material consisted of metalised material (11%), which is used as foils in pet food pouches and crisp packets etc., with 11% all other flexibles, including non-metalised laminates.

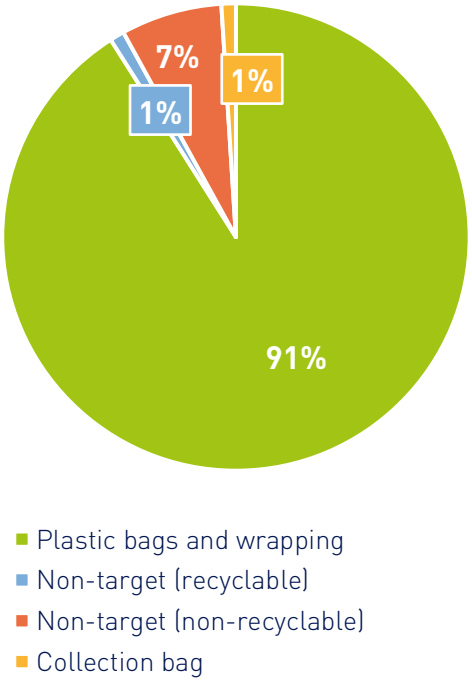
Figure 33 • Detailed composition by polymer




## Composition by number of items

When looking at the number of items, 92% of items were target material, highlighting the disproportionate weight difference of the non-target items.

Figure 34 • Composition by number items




The number of items for each of the main categories from the total 124,748 items in the material composition analysis is:

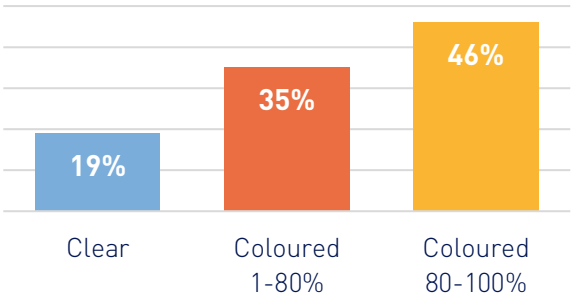
- Plastic bags and wrapping – 113,295
- Non-target recyclable plastic – 1,166
- Non-target non-recyclable – 8,476
- Collection bag – 1,811

This data also backs up the estimate that the 9% 'non-target non-recyclable' fraction in the analysis by weight was influenced by moisture in the material.

## Ink coverage

Flexible plastic packaging provides an opportunity for branding, so is commonly printed with a range of ink colours. A total of 19% had no, or next to no, ink coverage, with 81% having at least some level of coloured material. 35% had an estimated 1-80% coloured coverage and 46% had 80-100% estimated coverage.

Figure 35 • Overall ink coverage




The level of ink coverage varied between whether the polymer was PE or PP. In the heavily inked 80-100% coloured range, 50% was PE, whilst PP was significantly lower at 38%. However, it was the opposite result in the 1-80% coloured range where 30% of PE was noticeably lower than 44% for PP. 20% of the PE and 18% of the PP were clear.

Figure 36 • Ink coverage for polyethylene items

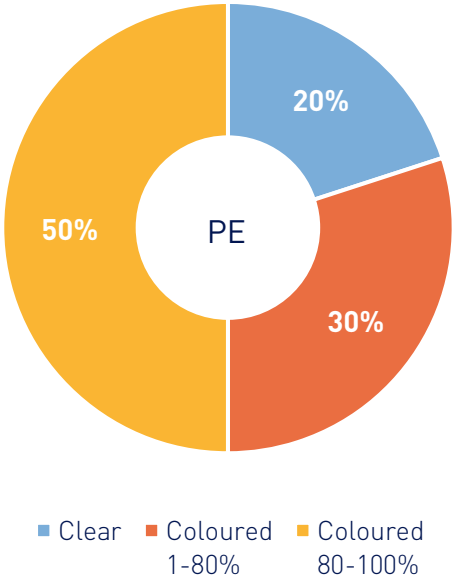
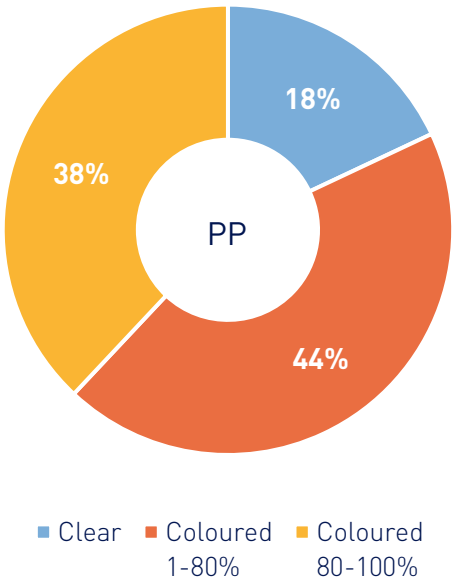



Figure 37 • Ink coverage for polypropelene items



# Overall composition by pilot authority

The overall composition of the material collected by pilot authority trial varies. The results are presented below but are further analysed in the local authority case studies in the appendix.

Figure 38 • Cheltenham Borough Council

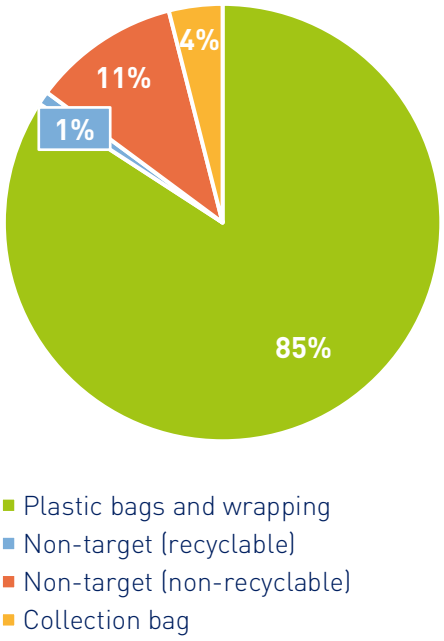



Figure 39 • South Gloucestershire Council

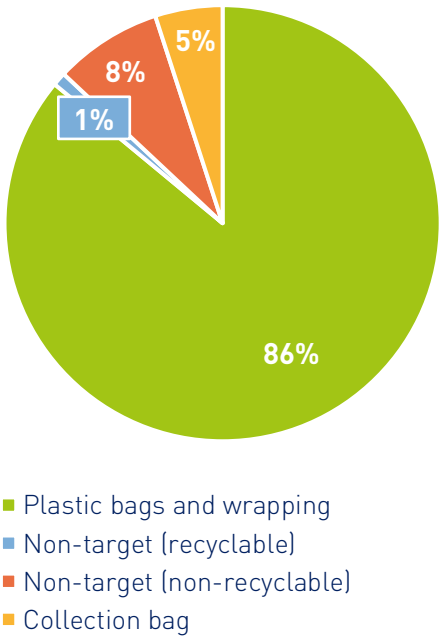



Figure 40 • Maldon District Council

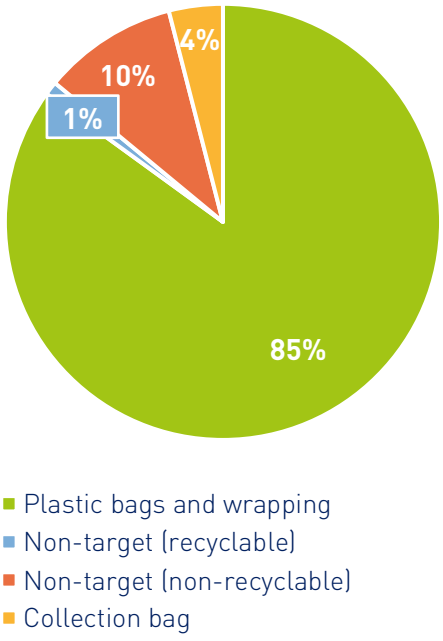
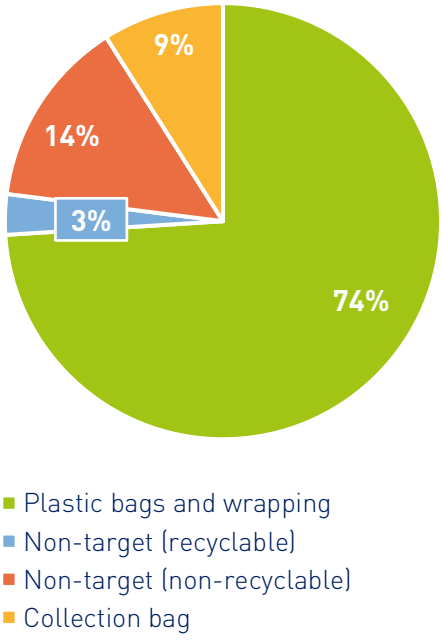
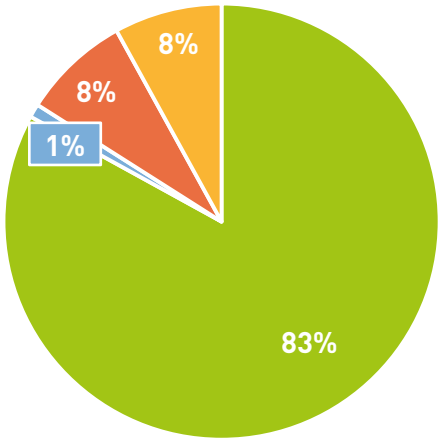



Figure 41 • Newcastle City Council

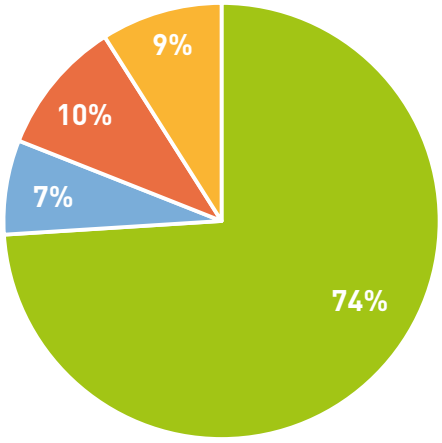


## Figure 42 • Somerset Council



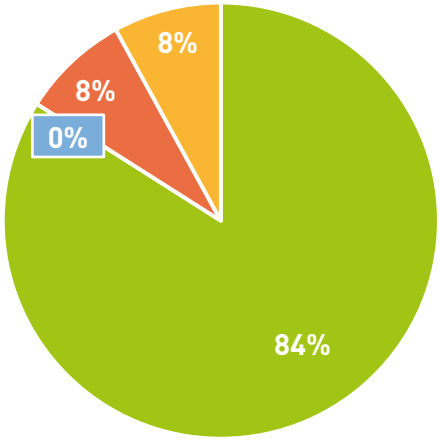

- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

## Figure 43 • Reading Borough Council



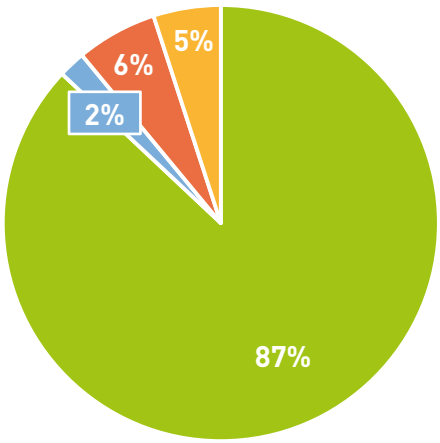

- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

## Figure 44 • North Herts Council



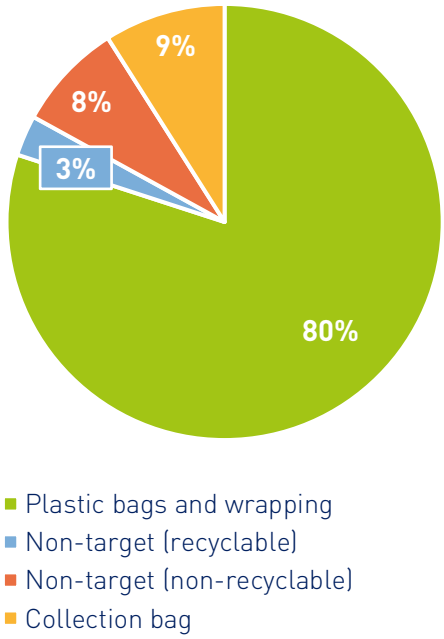

- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

## Figure 45 • North West Leicestershire District Council




- Plastic bags and wrapping
- Non-target (recyclable)
- Non-target (non-recyclable)
- Collection bag

Figure 46 • Bracknell Forest Council




The range for each category is as follows:

- Plastic Bags and Wrapping – 87% (North West Leicestershire District Council) to 74% (Newcastle City Council and Reading Borough Council).
- Non-Target (Recyclable) – 1-3% with Newcastle City Council and Reading Borough Council both having 3%.
- Non-Target (Non-Recyclable) – 7% (North West Leicestershire District Council) to 14% (Newcastle City Council).
- Collection bag – 4% (Cheltenham Borough Council and Maldon District Council) to 9% (Bracknell Forest Council, Newcastle City Council and Reading Borough Council).

The collection bag weight made up a larger proportion of the composition for pilot authorities who used a 27g weight bag rather than the lighter 12g bag.

## Material presentation

The composition work also provides detail on householder behaviour with regards to how material is collected and presented for recycling. Different approaches to presentation have the potential to impact how the flexible plastic packaging is processed at a materials recycling facility or end market destination.

One key example was the presentation of flexible plastic packaging in several smaller bags within the collection bag. This behaviour has the potential to change the way the flexible plastic packaging behaves in the materials recycling facility. Similarly, the presentation of folded crisp packets, which, although unlikely to cause any significant sorting impacts, is an interesting example of householder behaviour.


HAND COOK

# Recycling end markets

Recycling end markets are an essential part of the Flexible Plastic Fund FlexCollect project, as understanding the technical capability, capacity, and commercial viability of end market options is key to any future recycling system for flexible plastic packaging.

The transition from limited collections of flexible plastic packaging and matching current finite capacity for end market treatment is complex. The transition needs to be carefully managed to provide confidence to consumers that their efforts to collect their flexible plastic packaging for recycling are worthwhile, and to ensure that the waste management systems and resources needed to handle and process the material have a clear and commercially viable purpose.

End markets are defined as material sorting and reprocessing to produce a washed flake or pellet, or chemical recycling output, that can be used as a raw material to manufacture new products or materials to be used in structural plastic products, such as plastic lumber. These could involve:

- Material sorting of flexible plastic packaging from other materials and plastic packaging
- Sorting various flexible plastic packaging formats (e.g. mono-material vs laminates)
- Intermediate processes like washing and flaking
- Producing the final product such as extruded pellets or base chemicals

The end markets delivery activities have been split into two broad delivery areas; an end markets research report, and the recycling trials themselves.

## Recycling market synopsis

Before the recycling trials are discussed, it is important to give context to the recycling market for plastics, a market that, for a number of macroeconomic reasons, is under increasing pressure both domestically and internationally. To set the scene, RECOUP have provided the following synopsis surrounding the current state of the market:

> *The challenges around the commercial viability and decline in plastic recycling in the UK are well known. There have been many notable closures with some large operators having a new strategy to exit mechanical recycling operations in the UK. This has and will continue to impact the recycling of flexible plastic packaging, but there are solutions.*

*UK plastic packaging recyclers have been significantly impacted by the increase in energy and logistics costs in recent years, but the main commercial challenge is from imported plastic packaging. This is partly due to over production in non-EU countries of virgin polymers and packaging falsely claiming to contain recycled content.*

*The UK Plastic Packaging Tax has generated demand for recycled content in plastic packaging but is not at a financial level that offsets the base UK cost of production (such as labour and energy costs) and as such demand is often being met by lower cost imported recycled material rather than UK produced recycled plastic. Inaccurate or fraudulent claims of recycled content from imported packaging have increased but the scale of the problem is unknown. With around half of the plastic packaging the UK places onto the market from imported packaging, this is a market viability problem.*

*UK facilities simply can't compete on a level playing field commercial basis with material produced by countries with an entirely different cost base and greater access to feedstock material.*

*These overseas lower cost base influences can include:*

- *Low collection, sorting and reprocessing labour and energy costs which can also make use of an informal collection sector versus relatively expensive formal collection and sorting systems in Europe and the UK.*
- *Weaker health and safety standards with potentially hard to validate ethical and environmental practices.*
- *Lower costs of compliance with waste, environmental and labour laws.*
- *Access to government subsidies in some countries.*

*Much of what we see in the UK is mirrored in Europe, with industry bodies warning of a crisis after a wave of recycling facility closures across Europe. This included plastic waste exports from the EU increasing by 36% in 2024 compared to 2022, signalling a shift away from in-region recycling. Further recycling plant closures doubled in 2024 compared to 2023* [9]*.*

*There are solutions, particularly in relation to flexible plastic packaging.*

*One key area is reform of the Packaging Recovery Note (PRN), which is a commercial support for plastic reprocessors and exporters. The scheme provides evidence in the form of a certificate that packaging waste has been recycled and provides 'price support' to pull material through the recycling system.*

*The PRN is a market-based system based on supply and demand. At times the PRN price is at a relatively buoyant price of £300+ per tonne and there are clear financial incentives to recycle the material, but when the PRN price is low, for example, less than £50 per tonne, there is less incentive to do so, and the material is more likely to be sent to landfill, incineration or export markets.*

*The PRN function needs be to a commercially supportive funding stream to give inherent value to the material and provide more stable and material 'price support' to help pull material through the recycling system. Flexible plastic packaging is a good example where this commercial support should assist the necessary commercialisation and industrialisation in the value chain.*

[9] https://www.plasticsrecyclers.eu/news/crisis-in-eu-plastic-recycling-demands-immediate-action/

# End markets research report

To provide a firm foundation and framework to operate within, RECOUP and SUEZ worked collaboratively to research and produce a report to understand both the technical and commercial considerations of recycling flexible plastic packaging collected from the kerbside. This process included researching existing material sorting facilities, reprocessors and chemical recyclers that can, or potentially could recycle the collected material. This was done to provide an understanding of two key areas:

1. Technical capabilities to process the various polymer and packaging format types in this material
2. Commercial considerations for processing the material

The facilities were broadly split into two primary activities – mechanical recycling and chemical recycling, with activities further split into four categories:

- Plastic lumber, boards, or sheet
- Flexible plastic packaging products
- Wash, shred and extrude
- Other, including chemical recycling

Products from these processes vary but typically include both flexible and rigid products. In the context of flexible products, post-consumer flexible plastic packaging may be used in the manufacture of carrier bags, sacks, stretch and shrink film, and films used in the agricultural and building sector.

Rigid products include compression moulding (plastic lumber) and injection moulding (products and consumables such as buckets, crates, transport, and horticultural products).

The full report is detailed in the appendix of this report.

# Recycling trials

Usually, local authorities or their sorting materials recycling facility contractor would be responsible for the recycling and/or disposal of collected materials. This process typically involves short term contracts and market-based pricing, however, longer-term contracts and arrangements are in place.

A key aim of the project was to understand the technical capabilities and commercial considerations of a variety of end market options. As the materials are relatively new to the UK recycling market, and the trial volumes were low compared to those when full roll out of services is in place, it often meant paying in excess of the market rate for recycling or sending small batches of a few kilograms to a few tonnes, for testing. To do this, the FlexCollect project retained control of all material collected across the nine pilot areas (excluding Warwick) for comprehensive tests and trials.

Before a recycling trial took place, facilities were evaluated based on several considerations:

- Feedstock requirements – whether all the collected flexible plastic packaging was a target material, or if only certain polymer types were targeted. What the tolerances for other materials or contaminants were.
- Capability – whether the facility was able to process the material in its current format (baled survival bags).
- Willingness – the recyclers willingness to share learnings with the project.
- Quantities they would be able to process – ranging from a few kilograms for the laboratory scale tests, to hundreds of tonnes, to demonstrate scale.
- Processes that need to take place before and after the material is processed to manufacture an end product – such as whether a pre-sort of material was required, or whether pellets produced would need to be blended with higher quality pellets to produce a product suitable for market.
- The product or material produced that can be used to manufacture a new product – pellets, flakes, oil etc. and their composition.
- Gate fees to cover the processing costs – particularly where the facility does not usually process post-consumer flexible plastic packaging. These costs may include cleaning the facility before and after processing to ensure material is separate from their normal feedstock.

To complete an effective trial, it was important to try to replicate, as far as practical, normal day-to-day operating conditions. Once again, the gate fees charged reflected the material was being trialled, and these commercial conditions would be expected to change when economies of scale are created.

Facilities benefitted from participation in FlexCollect trials by supporting and informing their future strategy about processing post-consumer material. The trials enabled them to test their current operations to process post-consumer flexible plastic packaging and investigate opportunities, as well as any shortfalls, in their current process. Facilities were also able to understand commercial considerations, such as whether a gate fee would be required to supplement the costs, as well as what the gate fee would likely be. Facilities would need to consider the operational cost of processing (energy, water, etc), material yield losses, the cost to dispose of material not recycled, and the value of the end product produced.

Trials took place with both established recyclers, as well as those who are looking to build their capability to process material in the future. The facilities were mainly based in the UK and have been split into mechanical and chemical recyclers.

## Mechanical recycling

Mechanical recycling of plastics refers to the processing of plastic waste into secondary raw material or products without significantly changing the chemical or molecular structure of the material. For flexible plastic packaging the process typically involves using automated sorting equipment, such as optical sorters (infrared technologies) to sort plastic by polymer type. The following mechanical recycling trials took place:

- Amcor (formally Berry BPI), a flexible plastic packaging manufacturer and recycler.
- Chestnut Polymers, a company that produces plastic lumber products.
- Fiberight, a facility designed to segregate mixed streams and prepare materials for recycling at other facilities. Fiberight went into administration in 2024.
- Jayplas, a specialist plastic recycler, and recycled plastic packaging manufacturer.
- Meplas, a mechanical recycler who shreds, washes and extrudes polyethylene (PE) and polypropylene (PP) to produce a pellet
- Plastecowood, a company that produces plastic lumber products.
- ReVentas, a company that is developing a dissolution technology to remove odours, colours, and contaminants to produce a clear pellet.
- Stirling Polymers, who shred, sort and extrude material to produce a PE pellet.

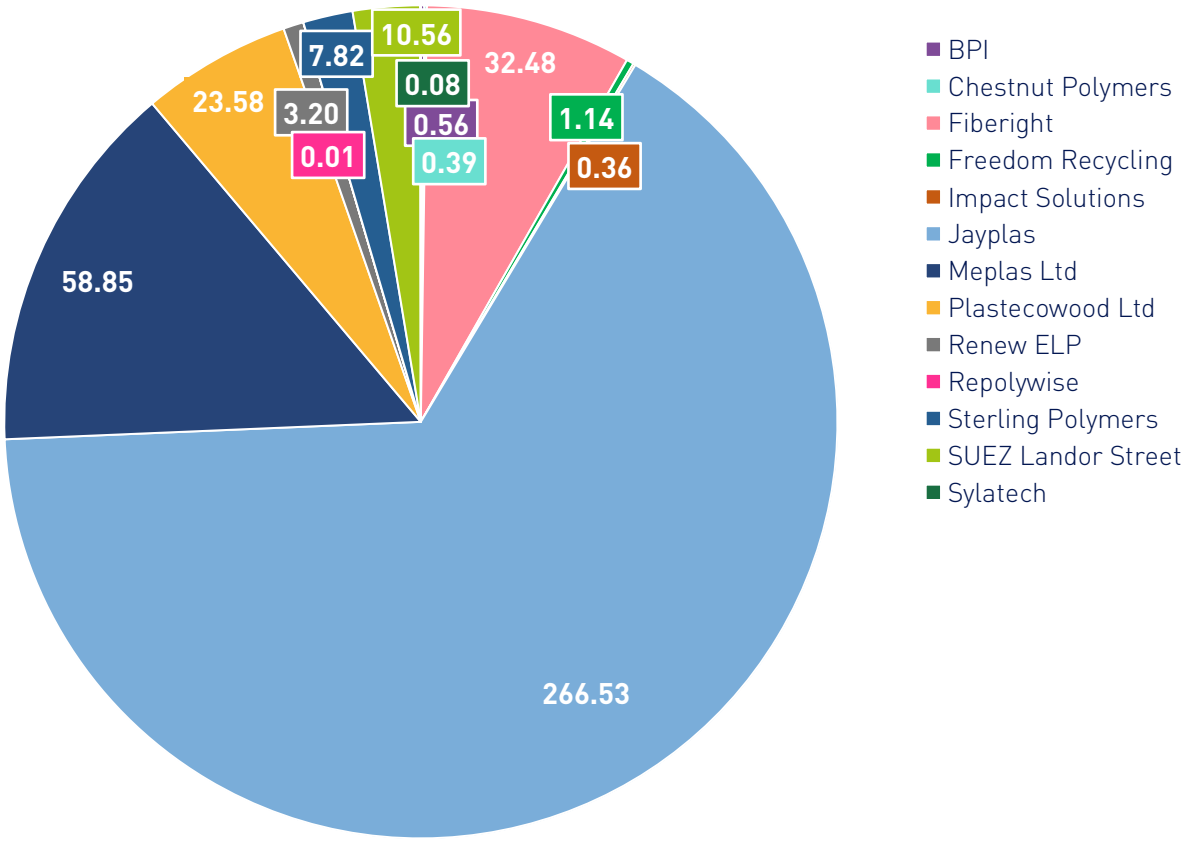
## Chemical recycling

Chemical recycling refers to several different technologies that convert sorted plastic waste into their original or similar molecular building blocks, using a thermal or chemical process. The process typically produces a 'recycled' oil which is suitable for use as a virgin oil replacement in the manufacture of plastics. A key advantage of chemical recycling is that the oil produced is potentially suitable for higher grade usage, such as in the manufacture of new food contact grade flexible packaging, something which is more complicated for mechanically recycled plastics due to Food Standards Agency (FSA) regulations. The following chemical trials took place:

- A series of smaller trials took place using laboratory-based analysis and small pilot plants to demonstrate the capability of various technologies to recycle the material, usually using quantities between 2.5-20kg. These included:
  - Remarkable Energy
  - Repolywise
  - Sylatec
- Material was also tested for compatibility with chemical recycling technologies at the Circular Economy Lab in the Circular Economy and Recycling Innovation Centre (CERIC) at Teesside University's Net Zero Industry Innovation Centre (NZIIC).

The split between the various facilities is shown in figure 47.

Figure 47 • Recycling end markets for FlexCollect material (tonnes recycled)




The project was in discussion with a number of other established facilities, such as Eurokey, Impact Recycling, Ecoo (Belgium), Prodelix (Portugal) and Plastic Energy (Spain). For a variety of reasons, trials were not able to take place.

Further trials are planned, including with ReNew ELP, a subsidiary of Mura Technology and Mura's first commercial scale HydroPRS™ advanced recycling site, located in Teesside. The project sent several batches of material for testing but at the time of writing, material is awaiting processing. Similarly, the project is in the process of sending 20 tonnes to Attero, a Dutch waste management company and recycler, specialising in producing a mixed PE/PP pellet.

The trial is scheduled to take place in late August. Further updates will be provided once these trials are complete.

To find out more about these facilities and others which were considered, please refer to the RECOUP Flexible Plastic Packaging Recycling End Markets report, which was produced to provide a foundation and framework to operate within for recycling end markets. This can be viewed in the appendices here.

# Results

The majority of trials that took place were successful. The main outcome from the trials was that post-consumer flexible plastic packaging can be successfully recycled in the UK.

The material can be used as a valuable resource, meeting the correct feedstock quality in most cases, making it suitable for a variety of treatment processes. The material can be used in the following ways:

- To manufacture jazz pellets to use as a feedstock for manufacturers of PE flexibles and PP rigid products, using various blends with fillers, additives, or higher quality (high melt flow index) PE and PP material depending on the blend and specification of the end product.
  - The PE pellet has various applications, such as refuse sacks, plastic bags, damp proof linings or agricultural or construction films.
  - The PP pellets are also suitable for a variety of applications including buckets, crates, car parts or horticultural products.
- To manufacture plastic lumber products, typically blending the material with other feedstocks, with additives and UV stabilisers.
  - Successful trials took place containing 50-80% FlexCollect material.
- For a variety of chemical recycling technologies producing different grades of virgin oil replacement at pilot or lab scale.

These findings are all subject to the material meeting the required feedstock specification.

Further detail about the process, results, end market product, feedstock specification and technical considerations are provided in the three summary case studies below. The full case studies are available in the appendix of the report.

## Case study: Jayplas

Jayplas is one of the UKs largest independent specialist plastic recyclers and recycled plastic packaging manufacturers who sort and reprocess rigid and flexible plastic packaging. At two of their facilities they have focussed capacity on flexible plastic packaging to sort, wash, pelletise and recycle flexibles from commercial, retailer front of store and kerbside sources.

A total of 267 tonnes (at the time of writing) was sent to Jayplas' Smethwick site for processing. The site uses a range of near infrared (NIR) sorting machines to target PE and PP into different streams for further processing. The material is then delivered to Jayplas' Loughborough site where it is washed separately before being extruded to produce a recycled jazz (coloured) PE or PP pellet.

The PE from the process goes back into film products, with some material being used at Jayplas' in-house bag manufacturing plant. The PP from the process is sold to be used in the manufacture of rigid products. Any contaminants or materials too small for recycling (fines) are sent for energy recovery.

The material yield in many cases exceeded 80% recovered. These recovery rates are in line, if not better than, other mixed plastic streams, demonstrating that flexible plastic packaging can be successfully recycled in the UK through mechanical process.


*Sorted PE film*


*Sorted PP film*

## Case study: Meplas

Meplas specialise in the processing of PE and PP packaging films, washing and pelletising the polymers, with resulting product marketed as a recycled feedstock for manufactures of PE and PP blow film and injection grade products.

A total of 59 tonnes was sent to Meplas' facility, where bales were first split open and shredded, before being processed through two wash tanks. Any sinking material (usually contaminants) or organic material is removed through the wash process. Material is then dried to remove excess moisture before material is fed into a baler.

Meplas specialise in recycling segregated PE and PP streams. Although the FlexCollect material contained high levels of both, the mixed feedstock is not ideal with regards to final product application. When blended with other material, it can be used to support commercially viable products, with the most effective option being to blend with PP film for injection moulding of rigid items.

Material from the FlexCollect trial was sent to a third-party pelletiser in the UK, where pellets were used in car part manufacturing by blending with a higher purity PP stream to create a pellet suitable for existing injection moulding applications. Meplas will be producing their own pellets from the FlexCollect material, with sample pellets made available to UK manufacturers.

## Case study: Plastecowood

Plastecowood repurpose plastic packaging waste, transforming it into Smartwood™, a durable product suitable for outdoor plastic wood application including furniture, signs, pallets, planters and play equipment.

A total of 24 tonnes was sent to Plastecowood for recycling. Plastecowood's process uses 100% of the material in the production of plastic lumber. The FlexCollect material was blended with equal quantities of mixed HDPE re-grind material and black masterbatch (concentrated pigment) to produce 27kg planks which are suitable for a variety of products.

Plastecowood anticipated that the blend can be adjusted depending on the quality of feedstock, noting that if the quantity of FlexCollect material is too high, it may reduce the visual appearance and strength of the final product.

Plastecowood's optimal commercial agreement is a buy back agreement, where the supplier provides the feedstock and purchases the final product at a competitive price.

# Material sorting – unlocking end markets

Consumer flexible plastic packaging comes in a variety of formats and polymer types. This diversity means that often multiple material sorting and reprocessing stages are required at offtaker facilities to effectively recycle material and produce an end product that has value.

Effective material sorting is a key operational requirement to meet the feedstock specification for certain recyclers. The availability of this sorting infrastructure is currently a considerable barrier to commercial viability for reprocessing flexible plastic packaging in the UK. Material sorting of flexible plastic packaging can involve:

- Targeting PE or PP only, for recyclers who require one or the other
- Targeting PE and PP together, with other flexible plastic packaging types removed, for mechanical recyclers who produce a mixed Polyolefin (PE and PP) pellet, or chemical recyclers who require low levels of contaminants
- Removing metalised packaging, including one or both of foiled pouches and aluminium coated (vapour deposited) packaging (e.g. crisp packets). Pouches are typically non-target for all recyclers due to their composite make up, making them harder to recycle, and the presence of metals, complicating any chemical recycling process. Whilst aluminium coated packaging such as crisp packets does not normally cause facilities any issues, many will still have a maximum percentage of metal they can accept, and a high quantity of these items may exceed that threshold.

Early indications from discussions with chemical recyclers suggest that recyclers may pay for feedstock if it is supplied to meet a certain specification. This could include removing pouches, metals or other contaminants, and pelletising or densifying the material to produce a homogonous feedstock.

Although no pricing has been agreed or shared to date, this pre-treatment process will still require a gate fee which may negate any revenues.

## Case study: Tomra sorting trials

SUEZ engaged with Tomra to understand the capabilities of their Autosort Speedair near infrared sorting equipment in sorting flexible plastic packaging. A trial was undertaken at their test site in Germany using approximately 20kg of material collected from households. Bags were split and the input composition calculated.

The results saw recovery of 86% of the PE input with a purity level of 97%. For the PP, 60% was recovered with a purity of 93%.

# Material quantities – storage and scale

The initial trials only involved a small number of households, meaning only small quantities of material were available for end market trials. For this reason, recycling end markets have been the focus of the latter part of the FPF FlexCollect project, with minimal information available in the interim report.

As the pilot authorities expanded their services, the quantities increased, however, building sufficient material for trials still took several weeks to several months. The majority of trials in the latter stages required a full load (20 tonnes) or more to optimise logistics, and reprocessing operations and costs.

Local authorities and operators should consider the following:

- Space requirements and the amount of time required to store the material. An additional bay or storage area is required, although it is likely to fill at a slower rate than other materials.
- Baling of the material is a must to reduce the volume and storage requirements, as well as for logistics and end markets. A 35 yard skip can produce as little as 1 bale depending on manipulation and compaction with a loading shovel or 360 grab crane.
- Indoor storage is recommended to keep material dry, but it is not essential for all recyclers. Throughout the project, some material became saturated with water and was deemed unrecyclable, although this was likely due to the length of time the material was stored externally.
- Material can be wrapped if it is going to be stored outside. Wrapping will protect the material from weathering and vermin.

# Recycling costs

Despite the limited processing of material that has taken place, there have been some clear indications from the trials that took place about the commercial requirements to process and scale up flexible plastic packaging recycling in the UK.

As outlined in the RECOUP position piece, the plastics market has been particularly unstable in the scale-up period of the project. The ability for recyclers to claim the Packaging Recovery Note (PRN) is key, and a stable price which can be relied on as a price support mechanism is essential to make processing of flexible plastic packaging commercially viable.

Gate fees to process material range from £80 to over £1,000 per tonne, fluctuating depending on the volumes of materials presented, the uniqueness of the trial to the recycler, the recycling markets, price of the PRN and virgin plastic packaging, as well as other facility specific factors. The prices range, depending on the type of activity:

- Plastic lumber, boards or sheet
- Flexible plastic packaging products
- Wash, shred and extrude
- Other including chemical recycling

Further detail is provided in the costs section of this report.

# Costs

The following section will explore in detail full service costs for flexible plastic packaging based on costs incurred during the project, from collection to sorting and recycling in the value chain.

To determine and track costs, a bespoke budget was drafted with each of the pilot local authorities. This involved mapping out the preferred route the flexible plastic packaging would make from collection, through sorting to the point at which it would be collected for reprocessing. Each budget varied due to local conditions, and depending on the approach to collection and the provider of downstream services, including sorting at materials recycling facilities, and sometimes transfer through transfer stations. Costs actually incurred were then monitored against the original budgets and have been used to inform this section of the report.

## Service costs

To determine service costs, the original budgets made a number of assumptions around collections and sorting, split by service type. The individual costs or total funds allocated to each trial are confidential and will not be shared individually.

## Collections

Collections costs were largely dependent on the approach to collecting flexible plastic packaging, whether it was presented bagged or comingled. As previously outlined, the introduction of flexible plastic packaging collections in both bagged or loose methods, had no adverse impacts on the collection service.

Therefore, it is expected that the actual collection of material will not increase collection costs for local authorities beyond the supply and distribution of bags where applicable.

Two exceptions to this occurred within the project. Cheltenham Borough Council charged back to the project an increase in time at the kerbside, equating to an additional 15 seconds per property. Somerset, another source segregated area, reported that crews were having to compress the plastics and cans compartment more frequently due to the increase in volume. However, these concerns faded after the first two collections, when we expect that residents who had a backlog of flexible plastic packaging in anticipation of the trial had cleared their stock.

The other exception was in Maldon where a separate pass collection was tested using a cage vehicle and a two-person crew. The costs for this included the two-person crew, the hire of a vehicle and the fuel used. In Maldon, the cage vehicle was deployed to approximately 1.5 routes (or 1,500 properties per day) but could reasonably be expected to complete two full collection routes per day. This would increase fleet and staffing requirements by 50% (although a cage vehicle would be considerably cheaper than a RCV). In urban areas, the separate pass may be able to achieve more with the increased route density, but there will a limit to what can be reasonably achieved by one crew on any given day.

## Collection bags

Where a supplied bag solution is chosen the supply and distribution of the collection bags will contribute to additional collection costs. Where collection bags are not used, it is not expected that there will be any additional costs at the kerbside. The cost of collection bags varies depending on the thickness, order quantity and country of manufacture.

Bags are typically priced per 1,000 bags, and for the size used across the FlexCollect trials, costs varied between:

- 18-20 micron bags: £22-£40 per 1,000
- 40-micron bags: £50-£80 per 1,000
- 50-micron bags: £54-£90 per 1,000

For a local authority with 75,000 households, the costs for the initial batch of bags would be as shown in figure 48.

The other collection bag cost to consider will be for ongoing supply of the bags. Once the initial supply has run out, residents will need to request or collect additional bags. These costs are more complicated to estimate, impacted by the size of bags supplied, collection frequency and demographics. In the initial trial phase of the project, kerbside monitoring was carried out across three locations (South Gloucestershire, Somerset and Maldon) finding that in the weekly collection areas, the average participating household set out 1.1 bags per week, decreasing to 0.8 per week in the fortnightly areas. A rounded assumption of one bag per participating household per week has been used for the calculations shown in figure 49 for a local authority of 75,000 households. No additional bins or containers were required among householders in any trial area.

### Figure 48 • Collection bag upfront costs

| | 20 micron low cost | 20 micron high cost | 40 micron low cost | 40 micron high cost | 50 micron low cost | 50 micron high cost |
|---|---|---|---|---|---|---|
| Price per 1,000 | £22 | £40 | £49 | £80 | £59 | £90 |
| Initial batch | £66,000 | £120,000 | £147,000 | £240,000 | £177,000 | £270,000 |
| Price per household | £0.88 | £1.60 | £1.96 | £3.20 | £2.36 | £3.60 |

### Figure 49 • Collection bag re-order costs by participation rate

| | | Participation rate | | | | |
|---|---|---|---|---|---|---|
| | Price per 1,000 | 20% | 30% | 40% | 50% | 60% |
| 20 micron low usage | £22 | £17,160 | £25,740 | £34,320 | £42,900 | £51,480 |
| 20 micron high usage | £40 | £31,200 | £46,800 | £62,400 | £78,000 | £93,600 |
| 40 micron low usage | £49 | £38,220 | £57,330 | £76,440 | £95,550 | £114,660 |
| 40 micron high usage | £80 | £62,400 | £93,600 | £124,800 | £156,000 | £187,200 |
| 50 micron low usage | £59 | £46,020 | £69,030 | £92,040 | £115,050 | £138,060 |
| 50 micron high usage | £90 | £70,200 | £105,300 | £140,400 | £175,500 | £210,600 |

## Collection bag delivery

The cost of the initial delivery of bags to all households depended on whether the service was resourced in-house or through an external supplier. In two project areas, external suppliers were used to deliver bags and flyers to households, with an average cost of £1.15 per household. The cost for a local authority with 75,000 households would be £86,250 using this method. It's worth noting however that the largest instance of this within the FlexCollect project was a delivery to 27,000 properties. Economies of scale may apply to larger numbers and reduce the ultimate cost.

The alternative approach of using in-house resource is considerably more cost effective, but relies on capacity among existing staff, or backfilling loaders or drivers with agency cover (as it is recommended that those with knowledge of the routes complete the deliveries). These costs will vary considerably dependent on wages and available vehicles, but an assumption has been provided below:

**Figure 50 • Collection bag batch delivery costs**

| | |
|---|---|
| Households | 75,000 |
| Households per day | 1,000 |
| Crew | 2 |
| Hourly wage | £20 |
| Days delivering (10hr) | 75 |
| Cost | £30,000 |

Authorities will also need to consider the cost of top-up deliveries to households. These costs will also be largely dependent on capacity of operational staff and the delivery mechanisms already in place.

For example, it may be straightforward for a local authority with source segregated collections who already deploy teams each week to deliver recycling boxes to increase capacity, compared to an authority with comingled collections, where wheeled bin deliveries are typically a lot less frequent than deliveries of recycling boxes or sacks.

In most cases, the FlexCollect project reimbursed costs at the rate which local authorities were charged by contractors for bin or box deliveries. These costs ranged from £1.75 per delivery to £6.65. Assuming a delivery rate of 1.3 deliveries per year per household (40 bags delivered lasting 40 weeks), this would equate to the annual costs shown in figure 51.

In areas where local authorities managed their own deliveries, these costs may be reduced. For example, it may be possible for one operative to manage deliveries across a set number of hours each week. However, deliveries are likely to be sporadic and uneven across the year as households will run out of bags at different rates.

Figure 51 • Collection bag re-delivery costs

| Cost per delivery | Participation rate | | | | |
|---|---|---|---|---|---|
| | 20% | 30% | 40% | 50% | 60% |
| £1.75 | £34,125 | £51,188 | £68,250 | £85,313 | £102,375 |
| £2.00 | £39,000 | £58,500 | £78,000 | £97,500 | £117,000 |
| £3.00 | £58,500 | £87,750 | £117,000 | £146,250 | £175,500 |
| £4.00 | £78,000 | £117,000 | £156,000 | £195,000 | £234,000 |
| £5.00 | £97,500 | £146,250 | £195,000 | £243,750 | £292,500 |
| £6.65 | £129,675 | £194,513 | £259,350 | £324,188 | £389,025 |

## Sorting

Sorting costs are also highly dependent on the approach to collections, specifically whether flexible plastic packaging is comingled and loose, or enclosed in survival bags. The costs will also be largely dependent on existing infrastructure.

### Collection bags

Costs to sort collection bags will broadly fall into two categories: operative or picking costs, and sorting line modifications.

FlexCollect's material recycling facility partners have been able to effectively remove flexible plastic packaging from the mixed input stream using a dedicated picker. In general, materials recycling facilities have a single input material stockpile, meaning that flexible plastic packaging collection bags may arrive on the processing line at any point during the operational hours. Operative costs will therefore be linked to the number of operational hours at the receiving materials recycling facility. Materials recycling facilities running one shift per day will likely see the need for an additional operative to pick bags. Assuming an hourly cost of £20/hour per operative, and a five-day operating schedule, sorting costs could equate to those shown in figure 52.

Figure 52 • Materials recycling facility operative costs

| Shifts per day | Hourly cost | Daily cost | Monthly cost | Annual cost |
|---|---|---|---|---|
| 1x 9 hour | £20 | £180 | £3,900 | £46,800 |
| 2x 9 hour | £20 | £360 | £7,800 | £93,600 |
| 3x 8 hour | £20 | £480 | £10,400 | £124,800 |

Throughout the trials, dedicated pickers were underutilised where not all households in a given authority area are involved in the trial. However, as trials have used only full collection routes, it is not expected that the density of flexible plastic packaging collection bags will change, just that there will be more presented across the whole input stream across a given time. In high participation areas however, it may be necessary for more than one picker to be deployed. Similarly, it may be necessary for a pair of pickers if a processing line belt is wider than what can be reached by an operative positioned on one side.

These additional costs will either be incurred directly or will be presented as increases in sorting gate fees.

## Materials recycling facility modifications

The intention of the modifications actually made was to create space for the new material stream, moving it into a separate bay where it can be stored before baling. Whilst some materials recycling facilities may be able to make room on their existing sorting line, many will need to invest in modifications to accommodate collection bags. It is anticipated that this level of investment will be significantly less than adapting a materials recycling facility to accommodate fully comingled material which includes loose flexible plastic packaging.

Small scale changes would include adding new conveyors and bays, or extending a picking line, such as those installed at J&B Recycling or SUEZ's Evercreech facility. These are expected to cost between £20,000 and £80,000.

Other operators may need to introduce more complex sorting systems, such as multiple conveyors, or an extraction system to move material to another part of the process or site, such as the vacuum extraction system installed at SUEZ's Avonmouth facility. These modification costs are likely to be £100,000 or more.

## Comingled processing

The cost of sorting comingled loose flexible plastic packaging with other materials is likely to be higher than manual picking due to greater infrastructure requirements, however it will depend on existing infrastructure as well as the mix of materials which flexible plastic packaging is collected alongside. Although sorting comingled material is expected to be more expensive than picking bags, there will be a bag supply and distribution cost saving.

Many technological solutions exist which are able to extract flexible plastic packaging from the various combinations of mixed streams, including wind sifters, robotic arms and near infrared optical sorters. The purpose of this report was not to identify a single technological recommendation but to look at what could be achieved across existing infrastructure. The mechanical options considered ranged in price from £100,000 to over half a million pounds. Installing this new equipment will need to be done in a combination of approaches depending on the existing infrastructure, meaning a retrofit could cost anywhere from several hundred thousand to several million pounds, depending on the final design outcomes. In other instances, such as with the Sherbourne materials recycling facility, no additional fixed infrastructure was required as sorting flexible plastic packaging loose was factored into the original design.

Two examples of materials recycling facilities segregating loose flexible plastic packaging are highlighted in the results section of the report, including the Sherbourne Recycling facility.

In instances where fibres (paper and card) are collected in a stream separate from those with flexible plastic packaging materials, it will be more straightforward and cheaper to remove loose flexible plastic packaging from the remaining mingled stream, possibly making use of existing mechanical sorting within materials recycling facilities. The addition of flexible plastic packaging could result in increased contamination of other streams and this needs to be considered if loose collection of flexible plastic packaging is proposed.

### Material handling costs

Consumables such as electricity, fuel and baler wire, as well as wear and tear are covered under material handling costs. Costs incurred via the FlexCollect pilots ranged from £20-40 per tonne. Some transfer stations may need physical amendments, such as a bigger storage bay, to manage the volume of the bags of flexible plastic packaging stored prior to baling, as this can be significant.

### Transport

The cost of transporting recyclable materials between sites is expected to increase in line with new materials being collected for recycling and then needing to be transported. The actual costs vary, depending on compaction and distance travelled. As outlined, collection routes were not impacted.

An example would be in one trial area where haulage between the transfer station and materials recycling facility was priced at £35 per tonne.

## End markets

As well as assessing what is technically possible, the project aimed to understand the commercial considerations of recycling flexible plastic packaging. As tonnages during the trials were small, the costs experienced in end market management are likely to be higher than those expected for full roll out services with more significant tonnages. Costs quoted for recycling end markets during the FlexCollect trial ranged from £80 to £1,000 per tonne. Some recyclers took material free of charge for the benefit of learning via the project. Treatment costs outside of the trial are more likely to range between £80 and £800 per tonne at this stage.

Due to a lack of information, or available and operating chemical recyclers, during the trial period it has not been possible to differentiate costs between recycling technologies. It is also worth noting that in this early stage of end market development, costs per tonne are likely to be higher than in an established marketplace.

For the purpose of modelling costs, the modal cost of £650 per tonne has been used. This gate fee was the most commonly incurred during the trials, with more than 250 tonnes recycled at this cost.

The average price incurred across the project was submitted to Defra and is understood to be used in the modulation calculation for plastics.

# Overall system costs

The above assumptions have been used to work out the system costs based on tonnes, cost per household and cost per stock keeping unit.

## Cost per household

An average local authority can expect to pay the following per property in year one:

Figure 53 • Cost of service per household

| Activity | Cost per household |
|---|---|
| Collection | £3.14 (£1.96 in year two) |
| Sorting (picking) | £0.81 |
| Sorting (materials recycling facility modifications) | £0.06 |
| End markets | £2.55 |
| **Total cost per household** | **£6.56** |

These costs are based on the following parameters and assumptions:

- A local authority with 75,000 households
- Participation at 30%
- 40-micron bags used to collect flexible plastic packaging
- Bags delivered on request free of charge at a cost of £2 per delivery
- End market gate fees cost £650 per tonne
- Year two collection costs reduce as a batch delivery of bags is not required (bags delivered only on request)
- A modification cost of £50,000 at the in-house processing line, depreciated over 10 years

There are several opportunities for cost savings. The majority of local authorities operate twin stream or comingled collections where a 40-micron bag will be required. For those operating source segregated collections, a saving can be generated. The collection cost will reduce to £1.96 per property in year one and £1.54 in year two.

If an authority introduces stock locations where residents can collect bags, rather than delivery on request, further cost savings can be realised. The service, including the purchase of bags, would cost £2.54 per household in year one and £0.76 in year two. For those collecting with 20-micron bags, these costs would reduce to £1.36 in year one and £0.34 in year two.

The cost of £0.81 per household assumes an in-house processing system where the local authority is the only customer. For local authorities feeding into large materials recycling facilities with multiple customers, the cost of picking should be spread across all customers and therefore costs should generally be lower.

Materials recycling facility modifications are complicated to combine into an average cost as there many very specific variables impacting the outcome, including current infrastructure and technology deployed, and the number of customers supplying the materials recycling facility. These costs are likely to be incurred once and then the cost depreciated over time and/or tonnes processed. More extensive interventions will be needed at larger materials recycling facilities, but these will have more customers, likely making costs less over similar depreciation periods.

## Cost per tonne

The service cost per tonne has been calculated based on the £6.56 per household and includes all costs, including collection (bags), sorting and end markets. The cost per tonne for a local authority of 75,000 households is as follows:

Figure 54 • Service costs per tonne

| Activity | Cost per tonne |
|---|---|
| Collection and sorting | £1,021 |
| End markets | £650 |
| **Total cost per tonne** | **£1,671** |

## Cost per stock keeping unit

A stock keeping unit (SKU) is a unique number and scannable bar code printed on individual products and used by retailers to keep track of inventory.

Approximately 215 billion SKUs are placed on the market each year. If in the first year of service, 152,000 tonnes of flexible plastic packaging are collected for recycling, and the cost to collect and recycle is £1,671 per tonne, the cost per SKU equates to £0.00119 (or 0.12p per SKU) to recycle.

This figure does not include a saving from avoided energy-from-waste or landfill treatment costs.

# Industrialisation blueprint

The following section details a blueprint for the kerbside collection of flexible plastic packaging from UK households. The work explores material placed on the market, expected collection tonnages based on the data gathered across the project, and details recommendations for local authorities and industry when designing or adapting their collection service.

## Placed on market

Municipal residual waste analysis indicates that 8% is plastic film. Additional testing and sampling show that 58% of the 8% is flexible plastic packaging in scope for pEPR payments. This equates to 990ktpa from UK household sources.

**Figure 55 • Total film placed on the market**

| | |
|---|---|
| Total municipal residual waste | 21,357,361 |
| Total film | 1,708,589 |
| Total in scope film | 990,982 |

## Anticipated collection tonnages

Using various datasets including ONS demographics, the average weight per household per week, and the average participation rate for each of the pilot authorities, it was possible to correlate the different ONS groupings with the householder behaviour enabling the contribution of flexible plastic packaging per person per year for every local authority in England, Wales, Scotland and Northern Ireland to be estimated. This then allowed us to estimate the tonnage expected to be collected for recycling when policy is implemented from March 2027.

Assumptions: The growth in anticipated tonnages of flexible plastic packaging collected for recycling is based on two factors. First, the population growth is factored in using ONS growth predictions and second, the participation is increased over time.

If an authority has a modelled low participation rate (sub 50%) based on their demographic, the participation is increased by 5% year on year. Once 50% participation is achieved for an authority, the growth slows to 2% per year up to a cap of 65%.

## Figure 56 • Collection tonnages for flexible plastic packaging per region

| | East Midlands | Eastern | London | North East | North West | South East | South West | West Midlands | Yorkshire and Humber | Wales | Scotland | Northern Ireland | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2027** | 10,294 | 11,216 | 6,426 | 6,418 | 14,913 | 15,328 | 12,774 | 10,895 | 11,540 | 7,970 | 33,235 | 11,473 | **152,482** |
| **2028** | 11,920 | 13,049 | 8,445 | 7,315 | 17,239 | 17,909 | 14,735 | 12,714 | 13,308 | 9,159 | 33,567 | 11,504 | **170,866** |
| **2029** | 13,561 | 14,894 | 10,477 | 8,215 | 19,578 | 20,504 | 16,714 | 14,551 | 15,085 | 10,355 | 33,903 | 11,528 | **189,366** |
| **2030** | 15,190 | 16,681 | 12,522 | 9,117 | 21,867 | 23,112 | 18,709 | 16,382 | 16,871 | 11,498 | 34,242 | 11,544 | **207,734** |
| **2031** | 16,373 | 18,137 | 14,579 | 9,617 | 23,653 | 25,475 | 20,093 | 17,887 | 18,124 | 12,243 | 34,584 | 11,556 | **222,321** |
| **2032** | 17,296 | 19,390 | 16,651 | 10,031 | 25,071 | 27,216 | 21,136 | 19,123 | 19,091 | 12,889 | 34,930 | 11,565 | **234,390** |
| **2033** | 18,080 | 20,299 | 18,593 | 10,401 | 26,141 | 28,483 | 22,007 | 20,180 | 19,842 | 13,484 | 35,279 | 11,571 | **244,360** |
| **2034** | 18,817 | 21,125 | 20,175 | 10,770 | 27,139 | 29,649 | 22,883 | 20,999 | 20,596 | 14,090 | 35,632 | 11,574 | **253,448** |
| **2035** | 19,550 | 21,927 | 21,533 | 11,140 | 28,141 | 30,782 | 23,763 | 21,823 | 21,353 | 14,702 | 35,988 | 11,575 | **262,277** |
| **2036** | 20,276 | 22,726 | 22,806 | 11,428 | 29,148 | 31,890 | 24,633 | 22,648 | 22,112 | 15,291 | 36,348 | 11,573 | **270,878** |
| **2037** | 20,849 | 23,415 | 23,847 | 11,606 | 29,939 | 32,876 | 25,304 | 23,349 | 22,749 | 15,689 | 36,712 | 11,570 | **277,905** |
| **2038** | 21,225 | 23,840 | 24,758 | 11,670 | 30,407 | 33,474 | 25,643 | 23,859 | 23,061 | 15,917 | 37,079 | 11,564 | **282,497** |
| **2039** | 21,417 | 24,070 | 25,607 | 11,682 | 30,567 | 33,817 | 25,806 | 24,118 | 23,187 | 16,083 | 37,450 | 11,558 | **285,362** |
| **2040** | 21,537 | 24,190 | 26,256 | 11,694 | 30,655 | 33,965 | 25,911 | 24,226 | 23,244 | 16,244 | 37,824 | 11,551 | **287,300** |

# Operational considerations and recommendations

Considerations for local authorities and their contractors will be split into short to medium timescales and long timescales, with the former focused on bagged collections and the latter on fully comingled collections.

## Short to medium term recommendations

It is expected that in the short to medium term, sorting infrastructure will not have the capability to process fully or partially mingled material which includes flexible plastic packaging, therefore collection bags may well be prevalent among most local authorities. There will be some exceptions to this, such as those who send material to purposefully designed advanced materials recycling facilities, such as Sherbourne Recycling, or those who operate a service which keeps fibre separate from plastics, metals and glass.

### Comingled and twin stream collections

For those operating a comingled service, residents should present collection bags alongside material in the dry mixed recycling bin. In the case of a twin stream service, the collection bag should be presented in the larger plastic, metals and other material (usually glass) container (bin). There have been no recorded impacts on collection across any of the projects collecting flexible plastic packaging this way.

Residents should be provided with a 40-micron collection bag to ensure it remains intact throughout the process. 20-micron bags were tested and were not able to withstand the materials recycling facility (MRF) process at FCC in Reading. 30 or 35-micron bags may be sufficient but appropriate testing is recommended.

### Source segregated collections

For those operating a source segregated collection, it is recommended that residents present collection bags alongside plastics and metals, where there is sufficient volume. It is not recommended that a separate compartment is used unless there is some level of compaction available. There is a high risk that a separate compartment would reach its capacity even at moderate levels of participation (~40%). Where weekly recycling collections are undertaken these should be mirrored for flexible plastic packaging as evidence has shown higher capture rates for weekly collections.

Residents should be provided with an 18-20 micron collection bag. This thickness is sufficient to withstand light compaction in a Romaquip (or similar), as well as a basic materials recycling facility process at a simple sort transfer station.

### Sorting

Sorting collection bags from a fully or partially mingled stream is a proven and straightforward process, requiring a dedicated picker across all operational hours at the receiving materials recycling facility when picking is required for flexible plastic packaging.

Where participation rates are high, or belts are too wide for one picker, then a second operative may be needed. Sorting efficiencies for bagged collections are likely to exceed 90%, with process loss occurring due to bags splitting or residents leaving bags untied.

Short term modifications may be needed to make room for the collection bags, such as additional bays, conveyors or extraction systems. Many materials recycling facilities should be able to accommodate the material with little to no change, where there is sufficient space at the front end of the process.

There is flexibility in where an operator choses the interception point, as 40-micron bags are strong enough to withstand screening equipment and trommels, but it is recommended to minimise risk and remove the bags as early as possible in the process train.

### Delivery of bags

Receipt of bags is obviously a key determining factor in ensuring participation. Ensuring that the distribution and delivery is undertaken in a manner such that all households receive their bags when specified is essential.

Supply of top-up bags is necessary to ensure participation remains high. Delivering these on request will be the most convenient option for residents but may well come at a higher cost. Stock locations where residents collect bags can be considered, however these were not tested as part of the trials.

### Procurement of bags

It is evident that a large number of bags will be required in 2027 to support collection services for flexible plastic packaging. The manufacture of bags is an important end market for the PE content collected from householders, therefore providing a circular route for this material.

Whilst overseas manufacture is likely to result in cheaper bags, those procuring bags should consider circularity and life cycle when purchasing, making efforts to source bags from the UK which contain post-consumer content. Some manufacturers who also recycle post-consumer flexible plastic packaging may offer a discount on the gate fee based on purchase of bags.

Timescales from point of purchase to receipt of bags are important to consider. Quoted times ranged from 6 to 24 weeks. Supply chain interruptions may impact timescales, with bags used in the trials quoted a delivery time of 10 weeks, but taking 24 weeks to arrive.

## Long-term recommendations

It is anticipated that policy change associated with the Resources and Waste Strategy will generate a need for £10 billion of in investment within the UK. A part of this investment will be upgrades or redevelopment of materials recycling facilities to accommodate new materials.

The separation of bagged flexible plastic packaging is proven to be effective in all sorting facilities, however equipment to sort flexible plastic packaging comingled exists and is in use in some facilities.

It is likely that materials recycling facility operators will gradually incorporate equipment to sort loose flexible plastic packaging from other material streams over time.

Source segregated collections are unlikely to move away from bagged flexible plastic packaging collections even if the technology exists to segregate loose material. Risks around windblown material and litter are high for flexible plastic packaging, and this is especially the case in open topped recycling boxes.

Early indication from the Sherbourne Recycling and Warwick District Council trial suggests sorting efficiencies of around 37% or 67% depending on the method of calculation. These are likely to increase as flexible plastic packaging collections become the norm for all customers, and improvements are made to the mechanical and artificial intelligence led sorting process at the site.

# End market development

With all change there is a balance and challenge on speed and sequence of delivery. For flexible plastic packaging that challenge exists in feedstock needing treatment capacity and investment needing feedstock certainty. Our work in the FlexCollect project has clearly shown that treatment capacity does exist and that the materials collected can be recycled into useful products.

Works underway should prove that UK flexible plastic packaging can be treated in existing European capacity, which we understand does have some spare capacity to assist with the transition challenge.

As such, we know that flexible plastic packaging can be collected and recycled in the UK in existing capacity, and that there is insufficient end market capacity currently available to meet expected demand for treatment from 2027 onwards. There are a number of mechanical and chemical recycling facilities in development or planned for development that will add to existing domestic capacity and would go a significant way to meeting the full demand requirement. Adding likely European spare capacity shows potential, but treatment capacity may need work and planning.

As such, other projects outside of the FlexCollect project are being worked on that, if taken forward, will assist with planning the industrialisation of end markets and supporting post-collection sorting infrastructure.

# Project partners

## SUEZ recycling and recovery UK

SUEZ recycling and recovery UK employs over 6,800 people, operating across hundreds of sites, and handles in excess of 11 million tonnes of waste materials every year – a significant proportion of the UK's total waste. Through collection, treatment, recycling and logistics operations, it serves more than 30,000 business customers and millions of householders throughout the country.

Visit www.suez.co.uk to find out more.

## WRAP

WRAP is a global environmental action NGO transforming our broken product and food systems to create Circular Living. For the benefit of the climate, nature and people.
Our core purpose is to create a world with higher standards of living by using our precious resources more intelligently.
Our vision is a thriving, sustainable world where Circular Living is commonplace, and our mission is to embed this Circular Living in every boardroom and every home.
We examine sustainability challenges through the lens of people's day-to-day lives. We transform the systems that provide the products we consume.
We catalyse action from policy makers, businesses, NGOs and citizens to make it happen.

Find out more at www.wrap.ngo

## RECOUP

RECOUP is the UK's leading independent authority and trusted voice on plastics resource efficiency and recycling. As a registered charity, supported by our members, RECOUP aim to:

- Inspire collaboration by connecting the whole plastics value chain
- Lead the continued development of a plastic circular economy, resource efficiency, recycling and reuse
- Educate the public and businesses on all aspects of plastics recycling and resource efficiency

For more information, visit www.recoup.org

## Ecosurety

Ecosurety is the market-leading packaging compliance scheme committed to accelerating change towards an environmentally sustainable world.
It ensures its members comply with the EPR regulations and enables them to make sustainable packaging decisions via data and insights. Ecosurety supports efficient and transparent investment in circular economy projects through improved infrastructure, innovation and consumer awareness campaigns. B Corp certified since 2020, Ecosurety is committed to the balancing of profit with social and environmental performance.

## The Flexible Plastic Fund

The Flexible Plastic Fund is a collaborative fund giving value to flexible plastic films, so they are properly recycled.

Managed by market-leading producer responsibility compliance scheme Ecosurety, the Fund was established in May 2021 by five founding partners: Mars UK, Mondelēz International, Nestlé, PepsiCo and Unilever. Partners of the Fund now include Abel and Cole, Eat Real, Ella's Kitchen, Kiddylicious, Koninklijke Douwe Egberts, KP Snacks, Lotus Bakeries, McCain Foods, Natural Balance Foods, Ocado Retail, pladis, Proper Snacks, The Collective and Vitaflo.

The Fund explores how to support the recycling of flexible plastic packaging in two ways: through kerbside pilots and via retail collections. Launched in 2022, the Flexible Plastic Fund FlexCollect project is a series of pilots collecting flexible plastic packaging from households via kerbside collections in ten local authorities. The retail project supports the recycling of flexible plastic packaging collected by supermarkets. There will be full visibility on the recycling journey of flexible plastics collected by participating retailers through to their recyclers.

For more information, visit flexibleplasticfund.org.uk

## Brands supporting the Flexible Plastic Fund

## UK Research and Innovation

UK Research and Innovation (UKRI) is the largest public funder of research and innovation in the UK, with a budget of around £8bn. It is composed of seven disciplinary research councils, Innovate UK and Research England. We operate across the whole country and work with our many partners in higher education, research organisations businesses, government, and charities. Our vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally. Our mission is to convene, catalyse and invest in close collaboration with others to build a thriving, inclusive research and innovation system that connects discovery to prosperity and public good.

### About the Smart Sustainable Plastic Packaging Challenge

UKRI's Smart Sustainable Plastic Packaging Challenge, delivered by Innovate UK, aims to establish the UK as a leading innovator in smart and sustainable plastic packaging, driving cleaner growth across the supply chain, and delivering a significant reduction in plastic waste entering the environment by 2025. The Challenge brings together academia, the full plastic packaging value chain and other key stakeholders and supports the delivery of the 2025 UK Plastics Pact targets.

## Defra

We are responsible for improving and protecting the environment. We aim to grow a green economy and sustain thriving rural communities. We also support our world-leading food, farming and fishing industries.

Our broad remit means we play a major role in people's day-to-day life, from the food we eat, and the air we breathe, to the water we drink.

We are here to make our air purer, our water cleaner, our land greener and our food more sustainable.

Our mission is to restore and enhance the environment for the next generation, leaving it in a better state than we found it.

For more information, visit www.gov.uk/government/organisations/department-for-environment-food-rural-affairs

## Zero Waste Scotland

Zero Waste Scotland is a not-for-profit environmental organisation funded by the Scottish Government.

We exist to lead Scotland to use products and resources more responsibly, focusing on where we can have the greatest effect on reducing climate change together through responsible consumption, responsible production and maximising value through waste.

For more information, visit www.zerowastescotland.org.uk

APPENDIX

# PILOT LOCAL AUTHORITY CASE STUDIES

The following section details the ten pilot local authority case studies.

Each provides an overview of the trial collection service, as well as the data gathered on participation, weight and composition.

## Cheltenham Borough Council

| | |
|---|---|
| Demographic profile | Urban with low deprivation |
| Total number of households | 53,000 |
| Service type | Fortnightly, source segregated (Romaquips) |
| Contractor | Ubico (collections and sorting) |
| Launch | October 2022 |
| Households | 2,154 |
| Expansion | September 2023 |
| Expansion households | 3,154 |
| Material type | All flexibles |

### Initial trial overview

Residents were supplied with clear collection bags and asked to present flexible plastic packaging alongside their recycling in an existing recycling box. The bags were collected by the crews in the top compartment of the Romaquip vehicle, together with plastics and metals. Other compartments were also trialled, including the paper compartment (using hessian sacks to divide from the paper) and locker compartment. Both these were found to have limited capacity for the flexible plastic packaging, although a combination approach of the paper compartment followed by the plastic and metals compartment reduced the sorting task at the depot.

At the depot, the mixed plastics, metals and bagged flexible plastic packaging was tipped into a separate bay, and then batch processed to remove the bags. Cheltenham operate a simple sort processing line, using a magnet and eddy current separator (ECS), to remove the metals. The trial bags were removed manually over the processing line, and stored externally in a skip until sufficient quantity was generated for baling.

Bags were initially distributed to residents by crew members working overtime on a Saturday morning. Two packs of 20 bags were provided to each household, along with the instruction flyer. Replenishment of bags was managed on request by the council website, with crews responsible for delivery.

### Expansion overview

Cheltenham underwent a small expansion in September 2023, expanding to 3,156 households. The expansion was limited due to budgetary constraints and limited sorting capacity. Instead, the expansion aimed to test the capacity of the Romaquip vehicles by expanding to the full collection route. The initial trial launched with two distinct housing estates and the part rounds collecting from them, limiting the geographic spread of the project. At the time, it was unknown what impact the service would have on capacity of vehicles and this approach limited risks.

For the expansion, blue bags were used to aid the sorting process, again distributed by collection crews. At the same time, the decision was made to redistribute communications and bags to the existing trial households due to low participation levels as a result of assumed bag delivery issues outlined in the doorstepping results.

## Challenges

### Material quality and storage

A lack of storage space on site, combined with low levels of participation meant material was stored outside for periods of weeks, exposed to the elements, prior to baling. Baled material was subject to further external storage whilst quantity was built up prior to recycling. As a result, four tonnes of material was deemed not suitable for recycling and was subsequently sent to energy recovery.

### Delivery issues

The doorstepping research in Cheltenham highlighted delivery issues with the flyer and bags, which likely resulted in the low levels of participation experienced in the initial trial phase. Subsequent launches stressed the need for careful oversight when using in-house resource, and postage became the preferred option for the information and nudge flyers, which did not accompany bag deliveries.

### Sorting

Cheltenham's ability to expand was partially limited by processing capacity on site. During the trial, the council was undergoing a service review, considering options for updating their processing line and collection vehicles ahead of policy change, with the results of the trial contributing towards decision making.

# Participation data

Figure 57 • Bags collected per household passed per cycle

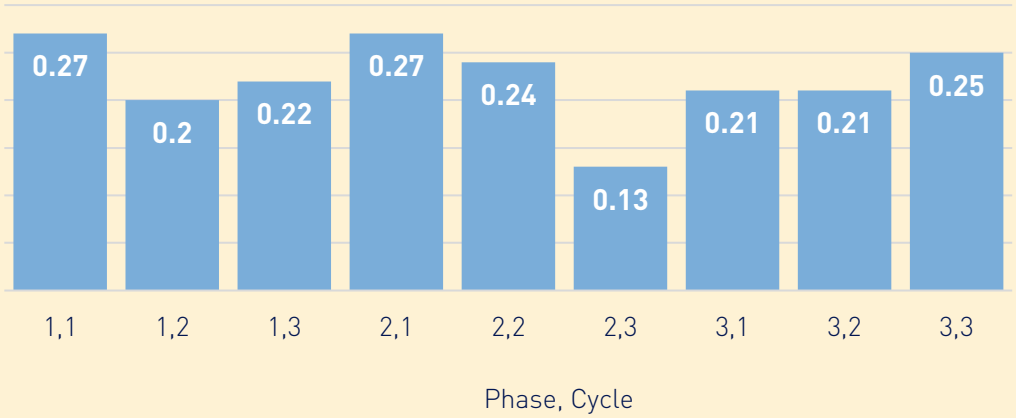



Figure 58 • Average weight per household per week (g)

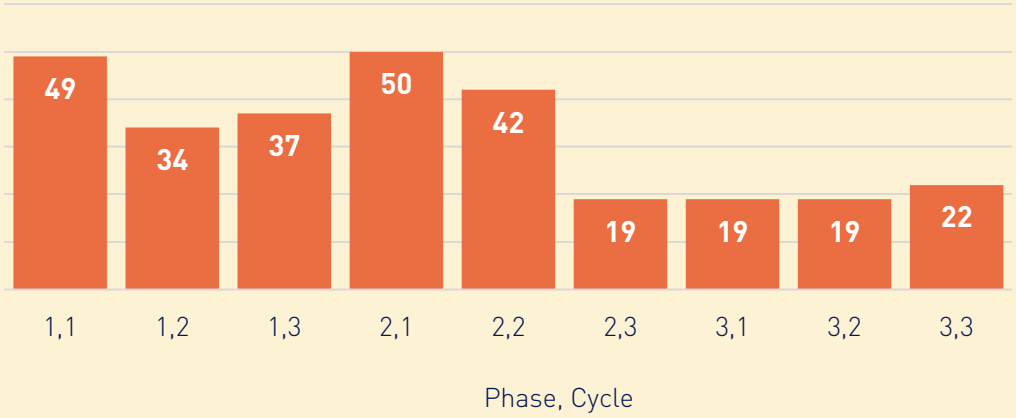
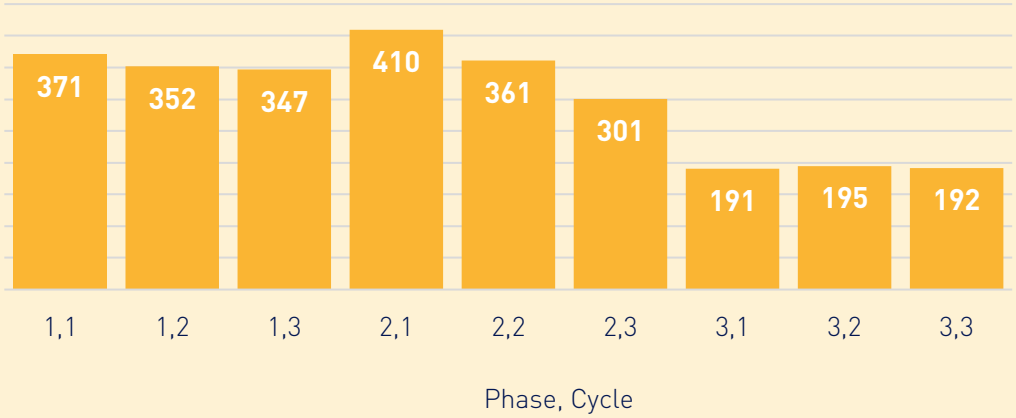
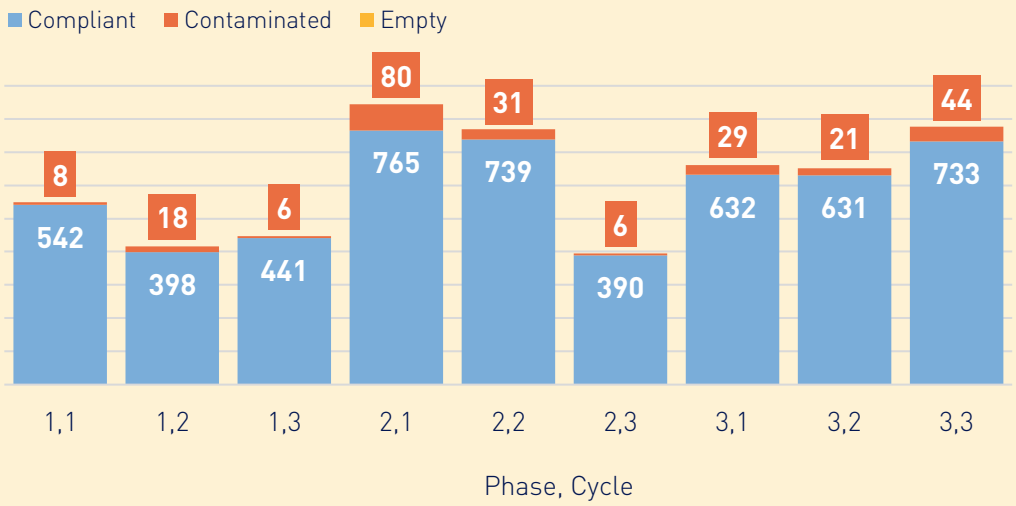


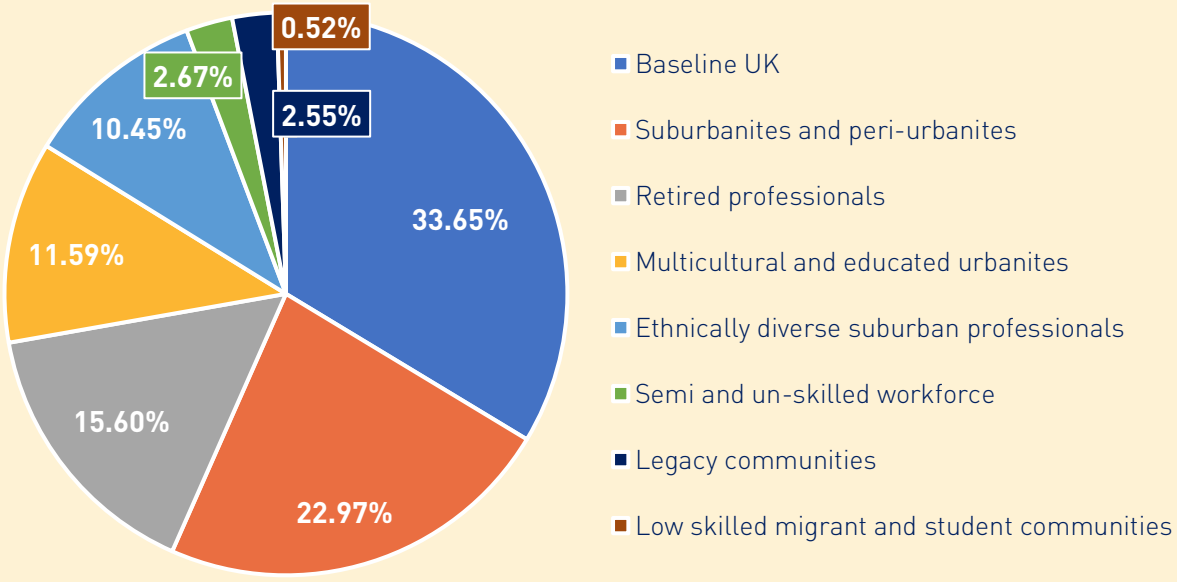

Figure 59 • Average bag weight per phase (g)



## Figure 60 • Total number of compliant, contaminated and empty bags




## Figure 61 • Cheltenham Borough demographic profile



## Analysis

Participation in the service remained relatively consistent in Cheltenham across the three phases of data collected, peaking at 23% and dropping to a low of 21%.

However, over time, a reduction in tonnage occurred, taking the average presentation per household from 40g to 20g over the 15 months when participation was monitored. The average bag weight dropped from an above average 358g per bag at the outset of the project, to 193g per bag, the lowest recorded within the project.

These results could suggest that after the initial engagement, residents' attitude and effort may falter, leading to decreased capture of material. The significant drop off in weights was unique to Cheltenham, therefore in the absence of additional datasets, and considering issues experienced with bag and communications deliveries, it has not been possible to draw any concrete conclusions from the data.

## Material composition

Despite low levels of participation, residents demonstrated good understanding of target materials, as evidenced by a contamination rate of 10% in the first compositional analysis of material collected. Very little change occurred in target materials in the seven months between the two samples, with contamination only growing by 1%. The makeup of the non-target items changed, with an increase in non-recyclable contamination and reduction in non-target recyclable items such as pots, tubs and trays. Cheltenham's 20-micron collection bag contributed 4% to the target recyclable items, taking the overall average to 90%.

Figure 62 • Material composition – December 2022

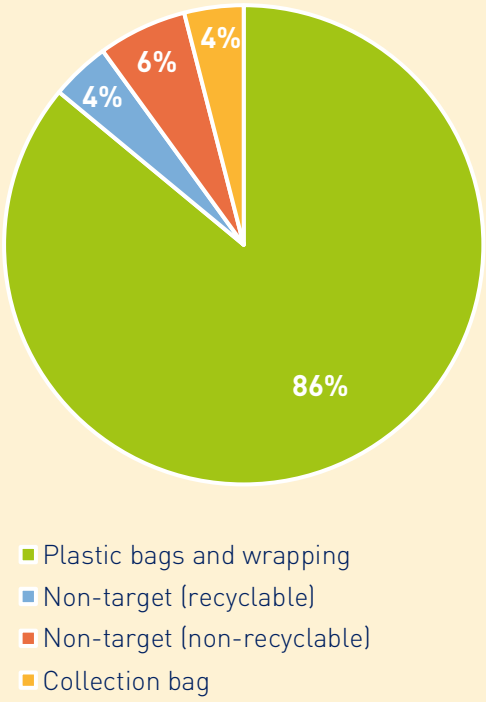
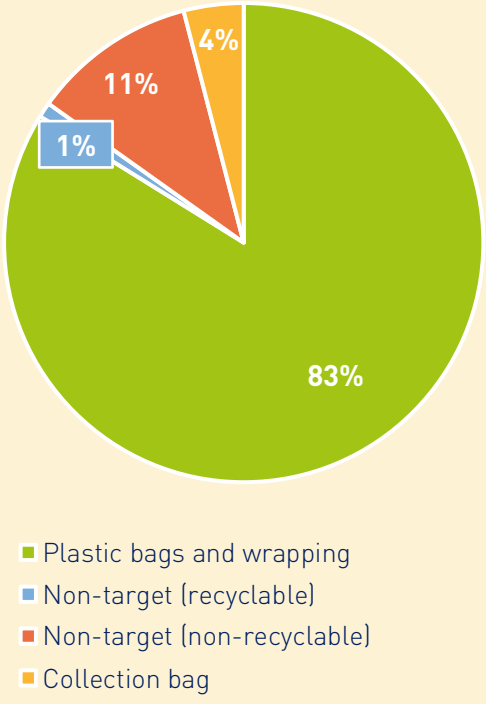



Figure 63 • Material composition – July 2023



## South Gloucestershire Council

| | |
|---|---|
| Demographic profile | Suburban with low deprivation |
| Total number of households | 118,000 |
| Service type | Weekly, source segregated (Romaquips) |
| Contractor | SUEZ (collections and sorting) |
| Launch | October 2022 |
| Households | 1,995 |
| Expansion | May 2024 |
| Expansion households | 24,621 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

### Initial trial overview

Residents were supplied with clear collection bags and asked to present flexible plastic packaging alongside their recycling in an existing recycling box. The bags were collected by the crews in the top compartment of the Romaquip vehicle, together with plastics and metals.

At the depot, the mixed plastics, metals and bagged flexible plastic packaging were tipped into a separate bay. There is no processing line at the depot, so the bags were removed manually by operatives using litter picking equipment.

Bags were initially distributed to residents by crew members, with agency back filling the crew positions. Two packs of 20 bags were provided to each household, along with the instruction flyer. Replenishment of bags was managed on request via the council website, with a combination of crews and surplus operational staff responsible for delivery on an ad hoc basis.

### Expansion overview

After operating for just over 18 months, South Gloucestershire became the first pilot authority to expand their collection service, taking the new total to 24,621 properties in May 2024. The expansion involved seven crews across all five collection days, totalling thirty-five collection routes across two depots. Blue bags were also used in South Gloucestershire for the expansion, again to aid the sorting process. The bags were distributed over two weeks using two crews, with agency backfill on the routes.

The sorting process was changed on expansion. Plastics, metals, and flexible plastic packaging bags were bulked at the two depots onto articulated lorries and delivered to SUEZ's Avonmouth materials recycling facility for sorting. With the support of the Flexible Plastic Fund, SUEZ installed a vacuum extraction system on their processing line, allowing bags to be picked into the vacuum system where they are extracted to an external storage container. When full, the material is baled and stored. Further detail on the sorting is provided in the results section.

# Challenges

## Sorting

In the initial trial phase, the manual processing approach presented a challenge relying on Saturday overtime where sorting during the core operational hours was not possible due to vehicle movements on site. It would not have been possible to scale up this approach to sortation.

At the Avonmouth materials recycling facility, the equipment install was necessary to overcome space constraints on the processing line, where no existing chute could be re-allocated for the collection bags.

## Collection bag colour

In the initial trial phase, the clear collection bags were complicated to sort from plastics and metals. Based on the feedback from the operational teams, as well as discussions with other materials recycling facility operators, subsequent batches of bags were coloured to aid sorting.

# Participation data

Figure 64 • Bags collected per household passed per cycle

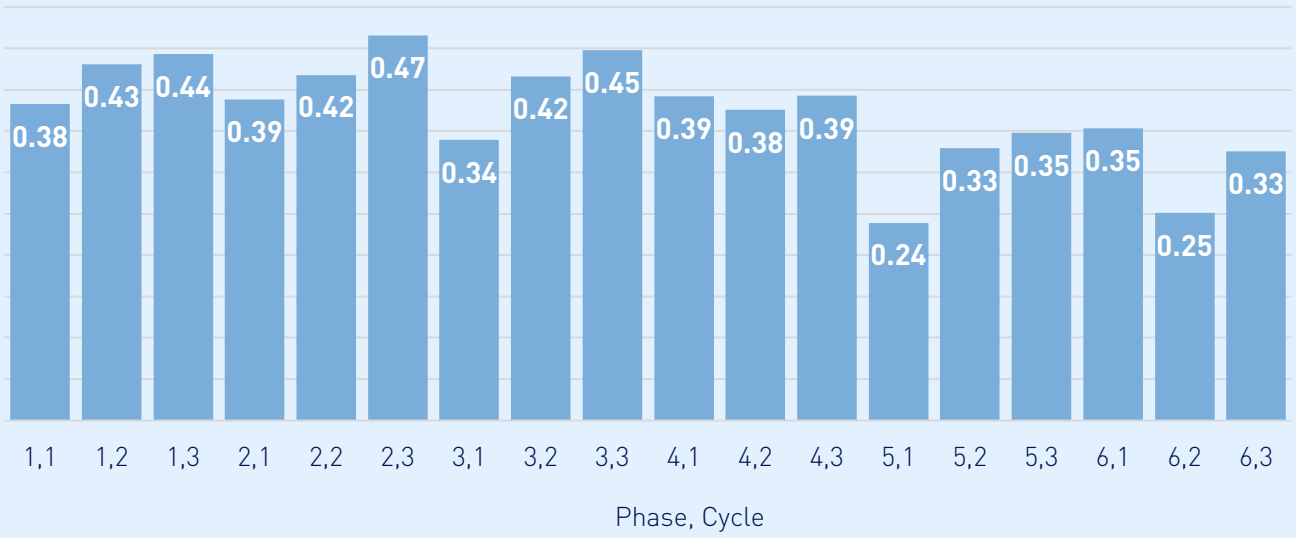



Figure 65 • Average weight per household per week (g)

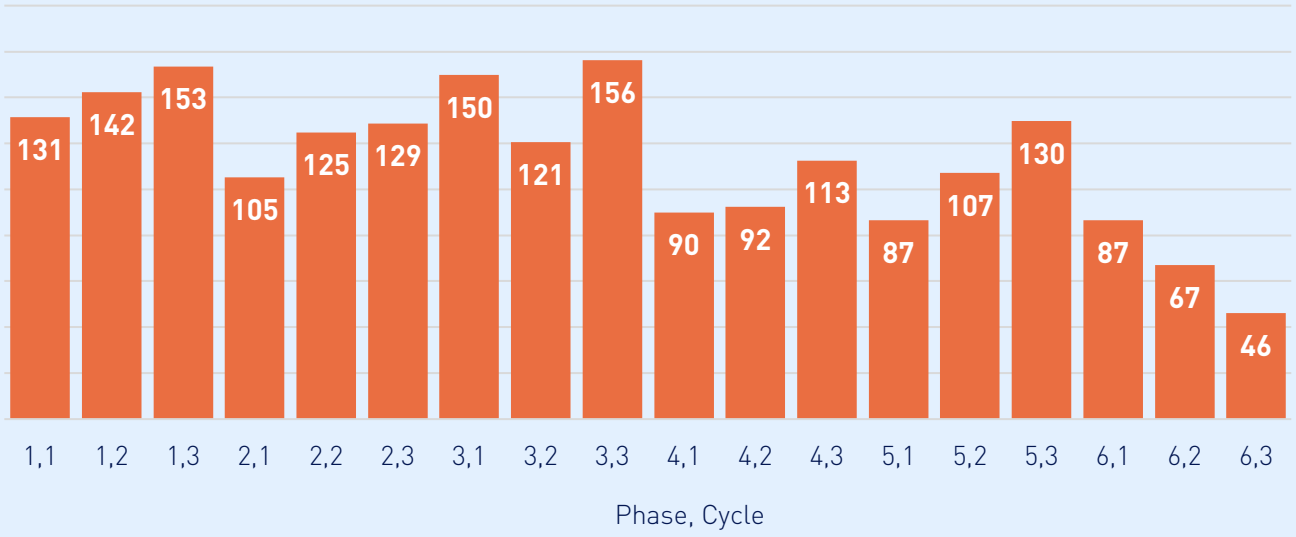
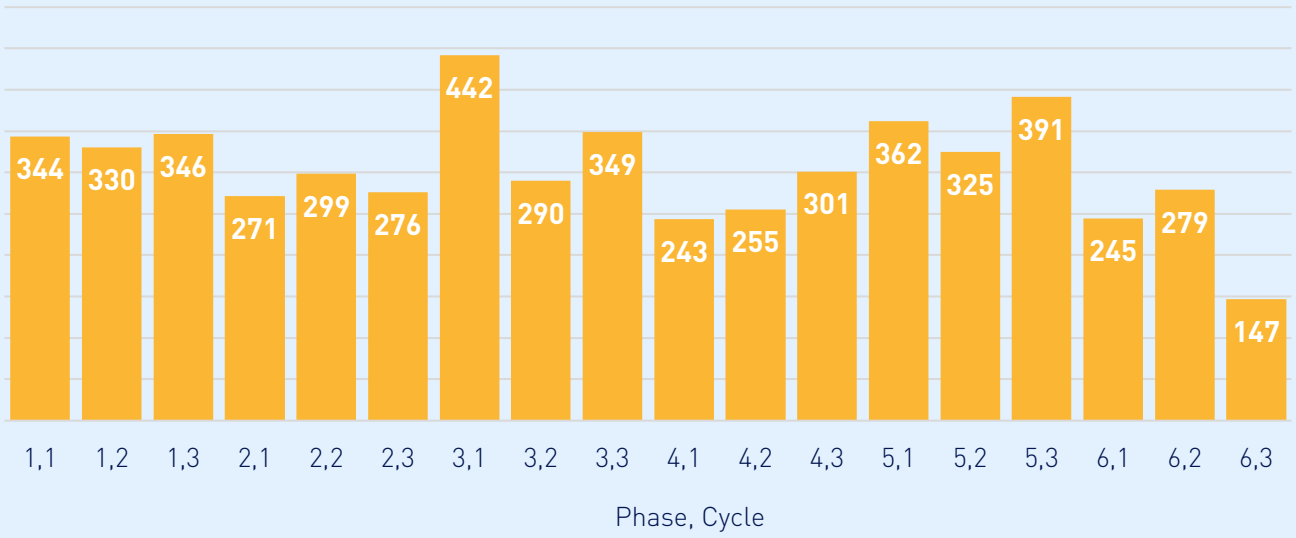
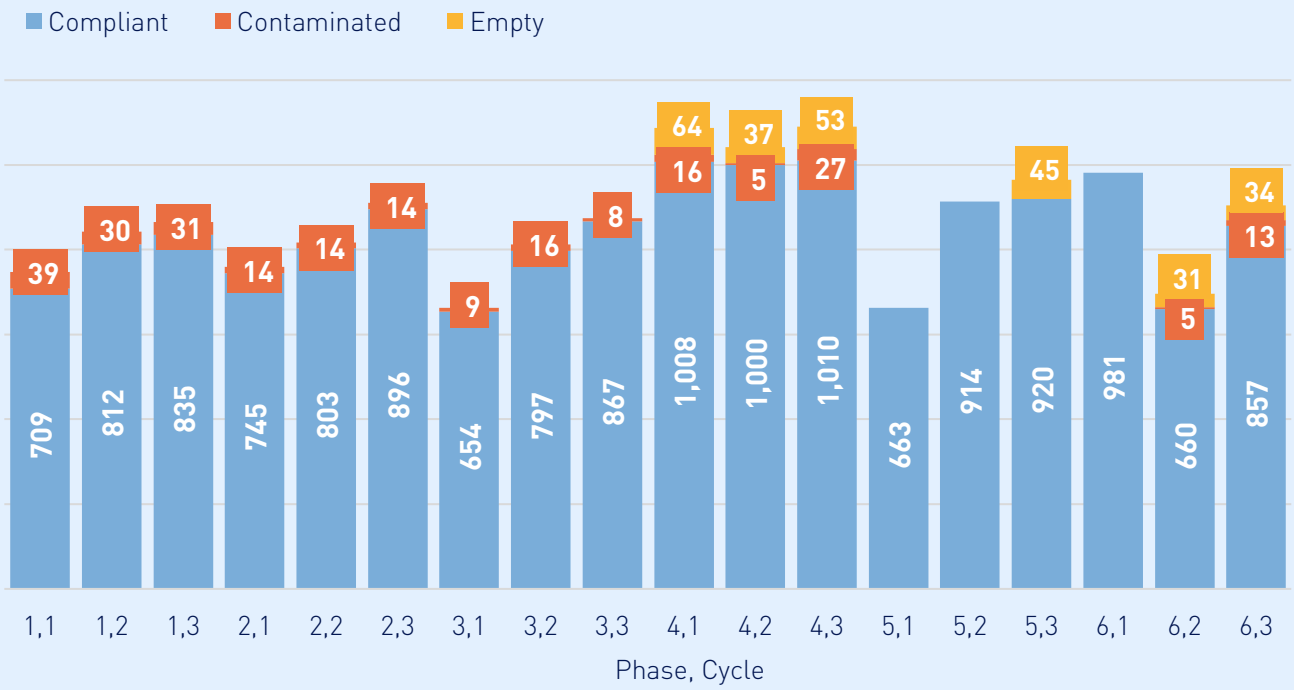


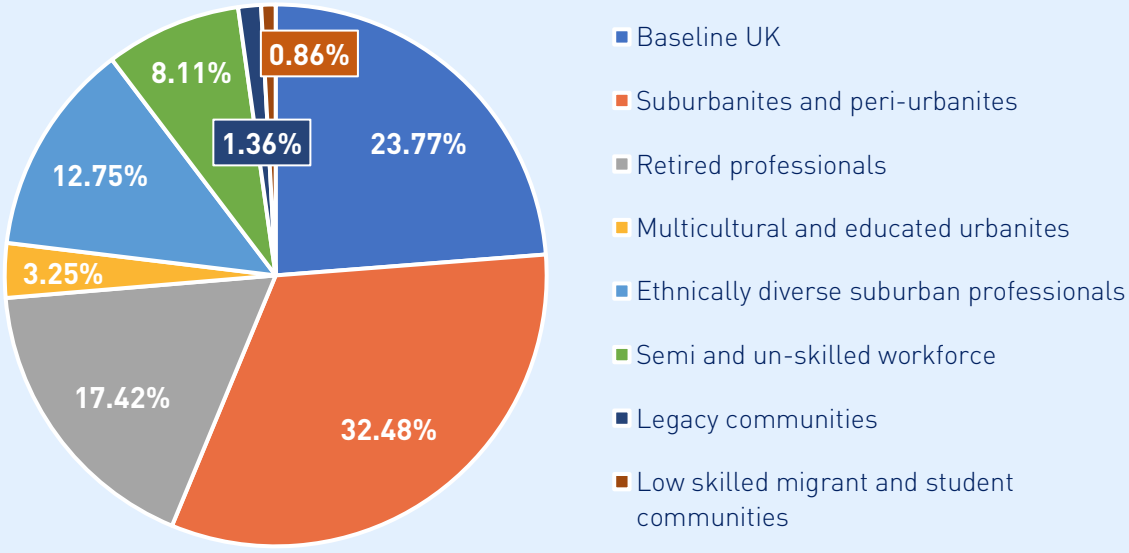

Figure 66 • Average bag weight per phase (g)



## Figure 67 • Total number of compliant, contaminated and empty bags




## Figure 68 • South Gloucestershire demographic profile



## Analysis

South Gloucestershire Council were among the first to launch a service in 2022, as well as the first to expand their trial in 2024, meaning they have most datapoints available for analysis. Participation across the three pilot phases remained consistent at 40-42%. A drop off in weight (bag weight, average per household) occurred in phase two, but increased again by phase three.

A key reason for these high participation rates was the high number of Retired professional and Suburbanites and peri-urbanites demographic groups in the pilot area. Furthermore, doorstep engagement, both WRAPs doorstepping surveys as well as early engagement organised by the authority, across all households in the trial likely generated interest and kept engagement high.

The expansion sample generated a starting average of 39% participation, falling to 31% in the second and third periods of monitoring. The tonnage and resulting averages per household varied across these phases, with the second phase generating the highest average per household at 108g, decreasing to 67g in expansion phase three.

The expansion sample contains a broader range of properties, better encompassing South Gloucestershire's wider demographics, likely resulting in the participation drop. Additional doorstepping was carried out on the expansion properties, however given the size of the expansion compared to the initial trial, it would not have been possible to reach all properties, therefore limiting impact.

## Own bag trial

In September 2024, a small trial was launched to explore participation and the challenges which arose when residents were asked to use their own bags to present flexible plastic packaging. Provided bags will be a costly initial outlay for local authorities, and evidence from these trials suggest that there could be more than 50% of residents not participating. Use of own bags avoids this initial outlay, but poses risks for processing through lack of visibility, use of unsuitable bags and lower participation rates. Further detail on the pros and cons of different bag approaches are provided in the results section of this report.

One collection route in the Bradley Stoke area of Bristol was selected to participate, receiving the same set of three flyers. Instead of providing collection bags, residents were asked to use an appropriate bag of their choosing, with the flyers providing key examples such as carrier bags or bread bags.

It was not possible to find a single representative route in South Gloucestershire, so a demographically comparable route, also from Bradley Stoke, was used to benchmark the participation and weight data gathered. The results are presented in figures 69 and 70.

In the first phase of monitoring, all metrics were higher among households provided with bags, proving that provision of a dedicated bag is a driver of engagement with the new service.

In the second phase of monitoring the opposite was true, with provided bag participation decreasing from 29% to 21%, whilst own bag grew from 19% to 26%. This was a similar story for average weight per household. The second phase of monitoring occurred only four months after the launch so it is expected that residents would not yet have run out of bags.

Although the results suggest that asking residents to use their own bags will see participation grow over time, the results are complicated by two sets of doorstep engagement which took place in the period between data collection. WRAP completed an additional set of doorstep surveys to understand the challenges associated with using own bags, and the authority engaged with residents over the early stages of the trial to encourage participation. Both are likely to have increased participation making comparison complicated.

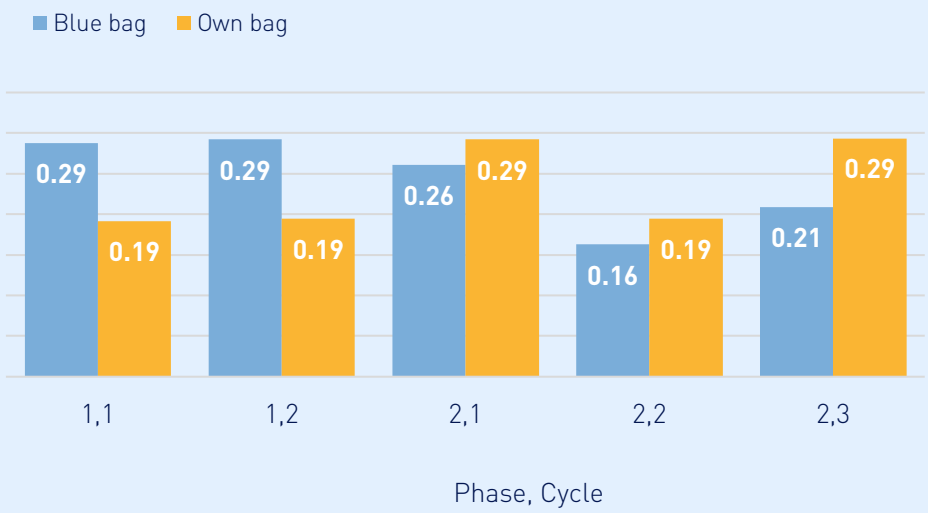
Regardless of the above, numerous issues occurred surrounding presentation of own bags. Although flyers specifically asked residents to use bags which could be tied securely, and to avoid refuse sacks, a large number of residents used black or white refuse sacks, or presented in bags which were either too small, or could not be tied securely.

One reason could be the introduction of the plastic bag charge in 2015 where many supermarkets moved away from vest handled bags which are easy to tie securely, opting in favour for 'bags for life' with punched out handles, paper bags, or reusable bags.

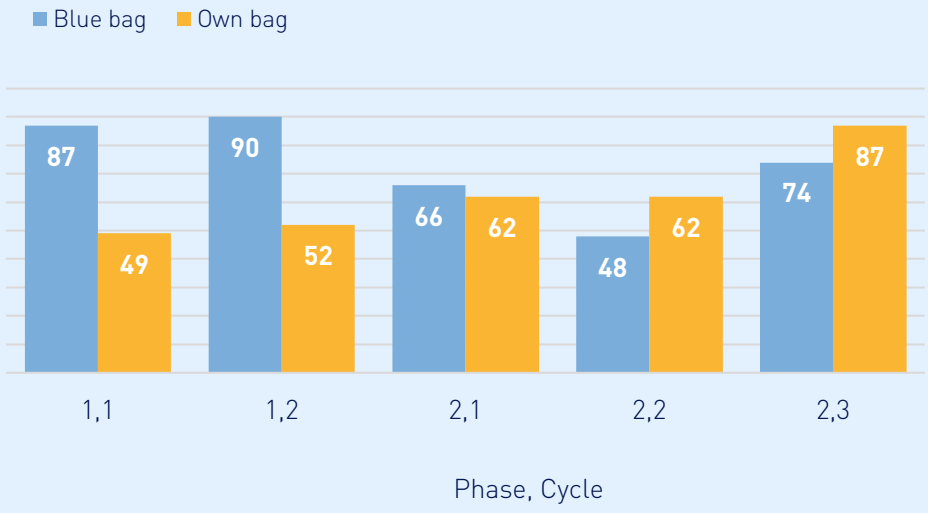
Further issues occurred at the SUEZ Avonmouth materials recycling facility, where own bags were not easily distinguished among the input material. Either they were too small and surrounded or covered by other materials, mistakenly identified as residue, or had spilled their contents before arrival.

Although results suggest that engagement can increase overtime, providing bags is very much the recommendation for local authorities.

## Figure 69 • Own bags vs collection bags – bags collected per household passed per cycle




## Figure 70 • Own bags vs collection bags – average weight per household per week (g)



## Flats trial

A small trial was also launched with 246 flats to understand participation and the challenges associated with communal collections. The approach was consistent with the standard blue bag trial area, using the same three flyer and bag delivery approach.

Unlike kerbside properties, communal properties in South Gloucestershire are serviced fortnightly. And although they present materials source segregated, the materials are presented in lidded communal bins, collected by an RCV. The results from the monitoring of flats are shown in figures 71 and 72.

The results show a reduction in overall participation from 36% to 28%. However, this is largely driven by a reduction in contaminated bags between the two phases. Reassuringly, the number of uncontaminated bags, as well as weight, remained consistent. Although, the set-out rates observed are considerably lower than those seen across wider communities in South Gloucestershire.

Unlike kerbside properties, residents in flats are unlikely to have the same level of ownership of bins, especially considering contamination issues are unlikely to be linked to individual flats.

Figure 71 • Flats trial – Bags collected per household passed per cycle

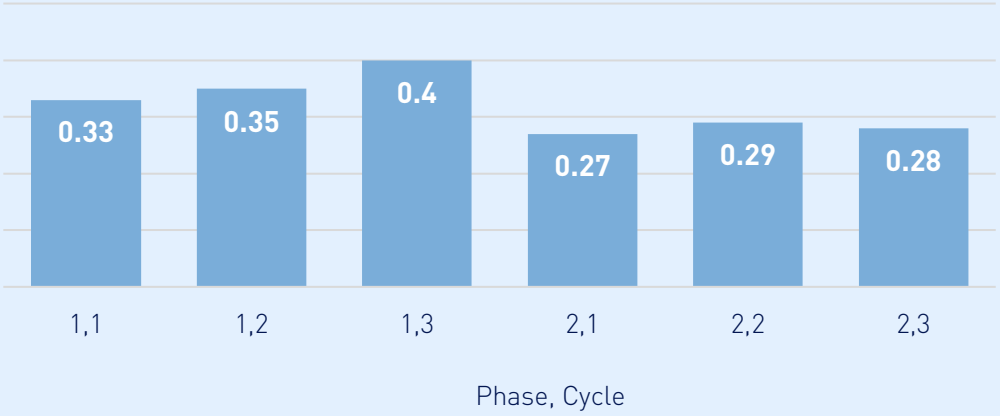
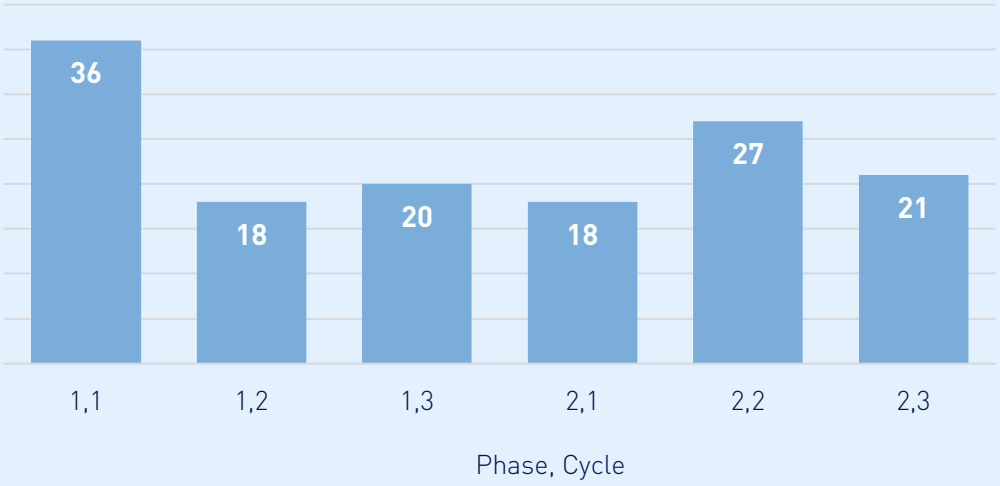



Figure 72 • Flats trial – Average weight per household per week (g)



## Material composition

A minor change occurred in the six months between compositional analyses in South Gloucestershire, demonstrating a slight reduction in contamination by both non-recyclable and non-target recyclable items. The collection bag used in South Gloucestershire is slightly thicker than the one used in Somerset or Maldon, at 20-micron, due to a change in supplier mid-project. The PE bag contributes 5% to the target materials collected for recycling.

Figure 73 • Material composition – December 2022

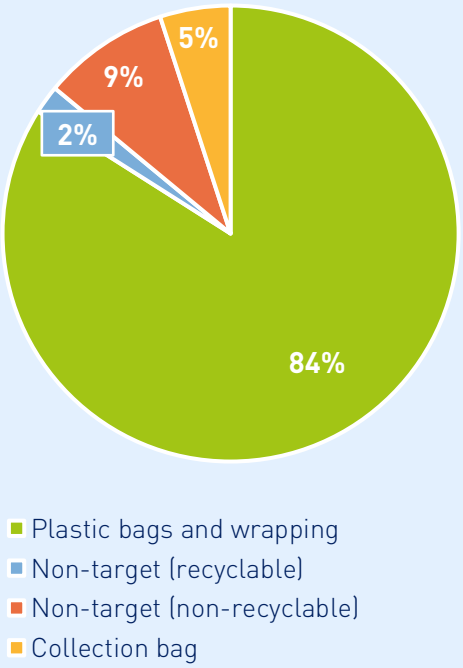
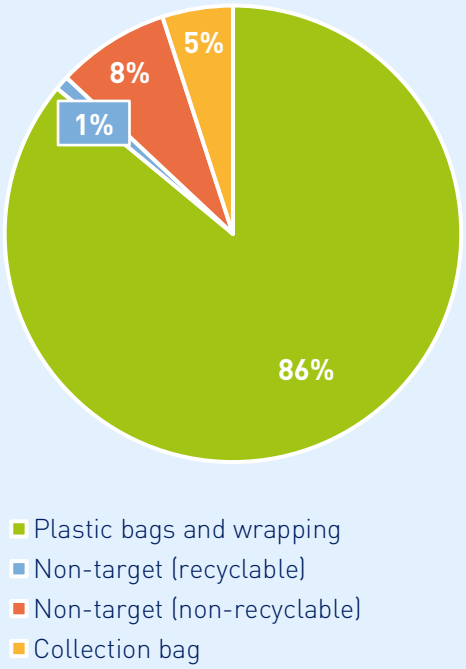



Figure 74 • Material composition – June 2023



## Local authority experience

*“ Being one of the ‘pioneer’ local authorities in the trial has been a fully funded opportunity for South Gloucestershire Council to be prepared for the government deadline for kerbside collections of flexible plastics.*

*It has helped us to understand the challenges of resident engagement, collections, transfer station operations and reprocessing while being well supported by the knowledge, resources and the latest industry news made available to us throughout the trial. With SUEZ finding outlets for the material collected during the trial and encouraging more materials recycling facilities to explore how best to sort the plastic, there is growing expertise in tackling the challenges of sustainable waste management which will benefit all authorities.*

*Our SUEZ project manager for the trial led an excellent model of collaboration with every voice heard and decisions agreed together, ensuring we thoroughly considered all aspects of flexible plastic collections. In turn, we are delighted that our experience and feedback can support other local authorities with what can seem a daunting service change.*

*Our residents have been overwhelmingly supportive of this new service, with growing demand from households not yet included.*

South Gloucestershire Council Cabinet member for Communities and Local Place, Councillor Sean Rhodes said:

*“ This has been a rewarding journey, and we feel confident in our next steps to roll out flexible plastic collections to all households ahead of the March 2027 deadline, including flats where communal recycling is always more challenging. Removing flexible plastics from residual waste will create space in residents’ black bins. This in turn will facilitate our move to three-weekly residual waste collections in May 2026.*

# Maldon District Council

| | |
|---|---|
| Demographic profile | Rural with low deprivation |
| Total number of households | 28,000 |
| Service type | Fortnightly, twin stream (glass separate, RCV) |
| Contractor | SUEZ (collections) and Green Recycling (sorting) |
| Launch | January 2023 |
| Households | 7,179 |
| Expansion | May 2024 |
| Expansion households | 12,100 |
| Material type | All flexibles |

## Initial trial overview

Residents were supplied with purple collection bags to collect flexible plastic packaging. A separate pass collection was tested in Maldon using a crew of two and a caged tipper vehicle. Maldon collect dry recyclables excluding glass in a single use pink bag, with glass in a recycling box. Flexible plastic packaging was presented on the same day as other recycling to ensure recycling messaging was consistent with other materials.

On arrival at the materials recycling facility, purple bags were stored before baling. Maldon switched materials recycling facility provider during the project period, however the approach remained similar. On arrival at the new contractor's (Green Recycling) materials recycling facility, materials were loaded into a compaction skip to ease space pressures on site. Once full, the material was baled.

Bags were initially distributed to residents by the crew responsible for the collection. Two packs of 20 bags were provided to each household, along with the instruction flyer. Replenishment of bags was managed on request via the council website, delivered by the separate pass crew on completion of the round.

## Expansion overview

Maldon underwent a small expansion in August 2024, using the same bag distribution and collection approach as the initial trial phase. The existing collection rounds were increased by approximately 50% to make better use of the crew who in the trial phase were typically finishing ahead of schedule. It is unlikely that the separate pass collection could collect from more than 1.5 collection routes, especially considering the rural nature of the Maldon district.

# Challenges

## Expansion

Maldon's ability to expand was limited by processing ability at the materials recycling facility.

Green Recycling's materials recycling facility makes use of bag shredders at the start of the process and, although the materials recycling facility has the ability to separate the plastic film and flexibles loose, it was not possible to isolate the trial material through the process meaning the material would have been mixed with Green Recycling's other film product.

This grade was high in PE, and there was risk that the post-consumer content of the FlexCollect bags would have impacted Green Recycling's ability to trade their material. Additionally, the project team required the FlexCollect material to be kept separate to test the end markets outlined in the recycling end markets section of this report.

## Delivery issues

Similar to Cheltenham, the doorstepping research highlighted delivery issues with the communications and collection bags. The baseline data collection in Maldon showed a modest participation of 38%. A decision was made to re-deliver bags to residents at the same time as the nudge flyer delivery. This resulted in a jump in participation to 48% in the weeks that followed.

# Participation data

Figure 75 • Bags collected per household passed per cycle

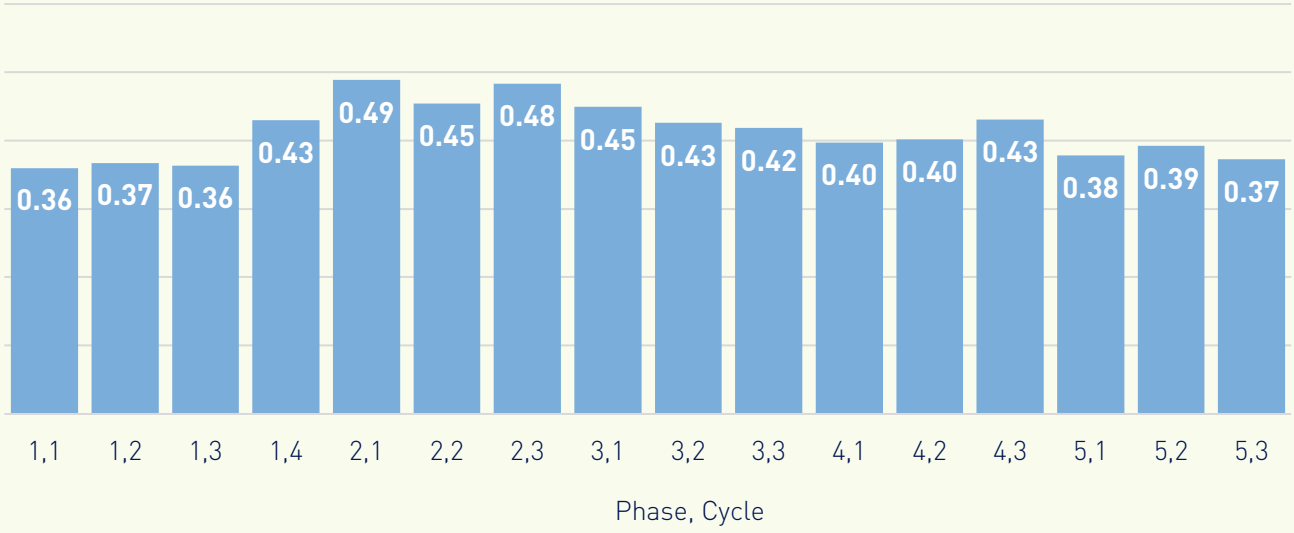



Figure 76 • Average weight per household per week (g)

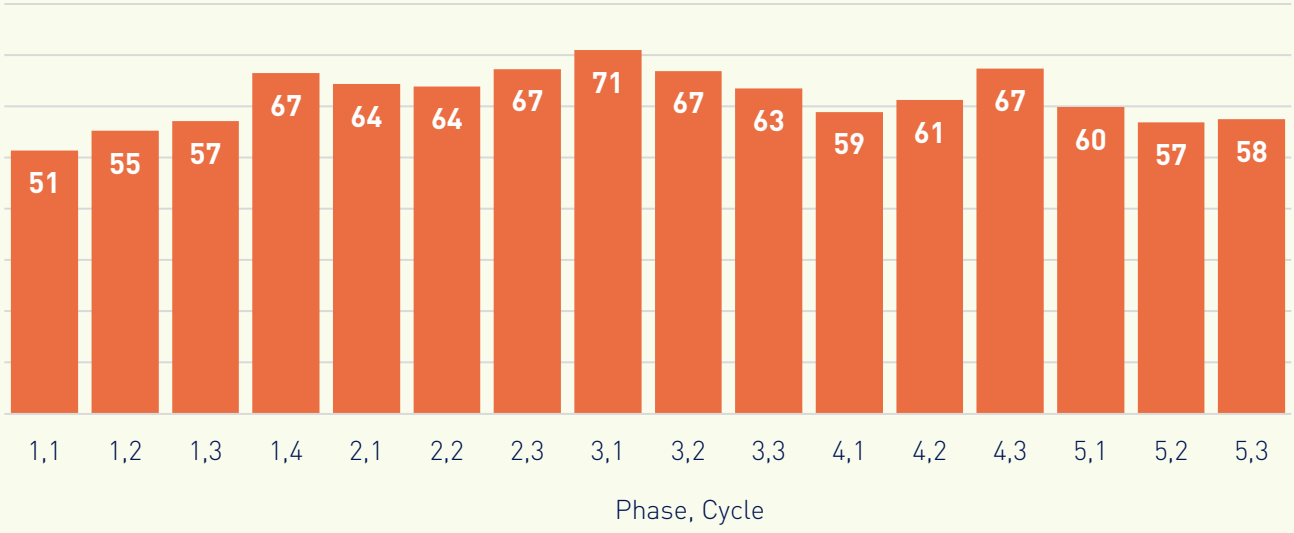
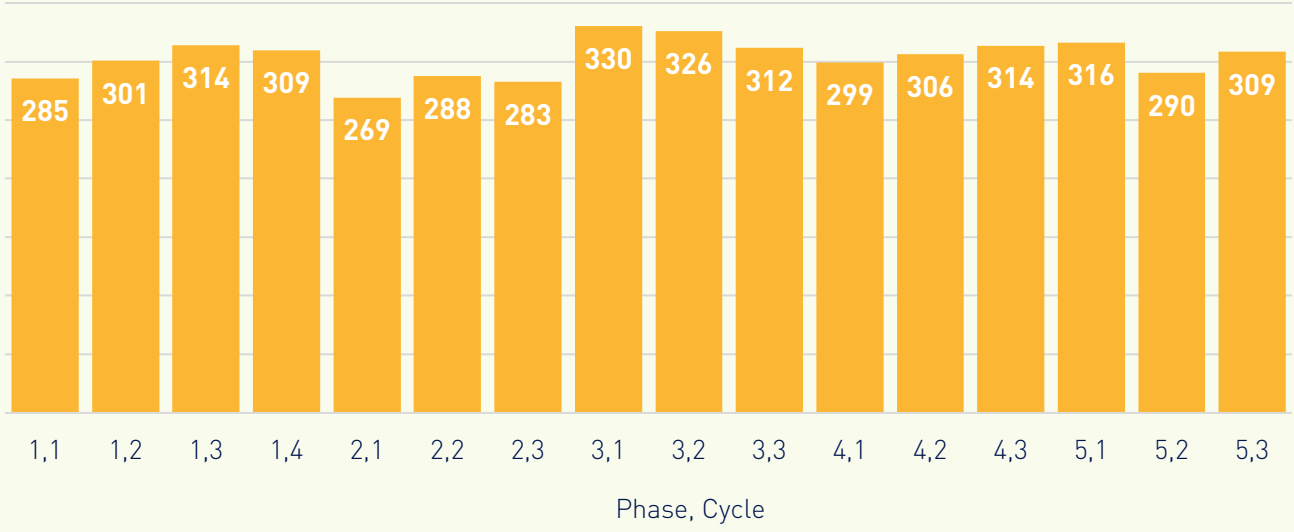
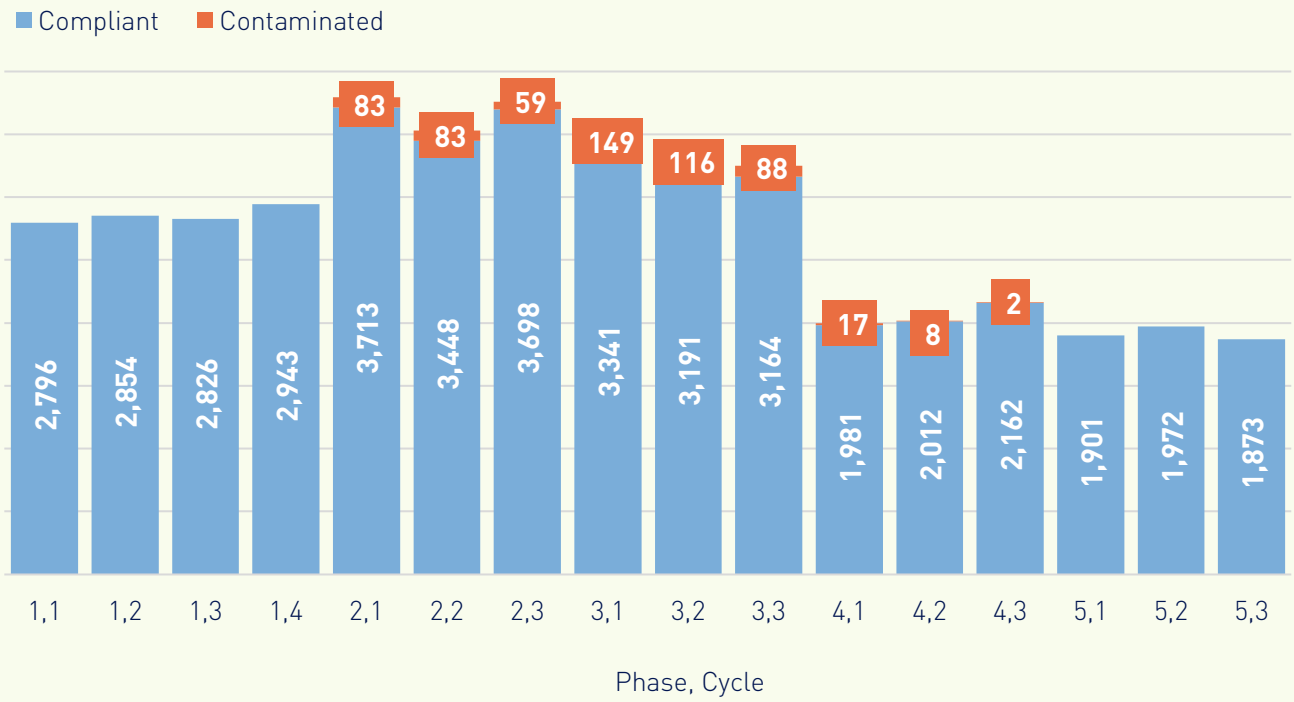


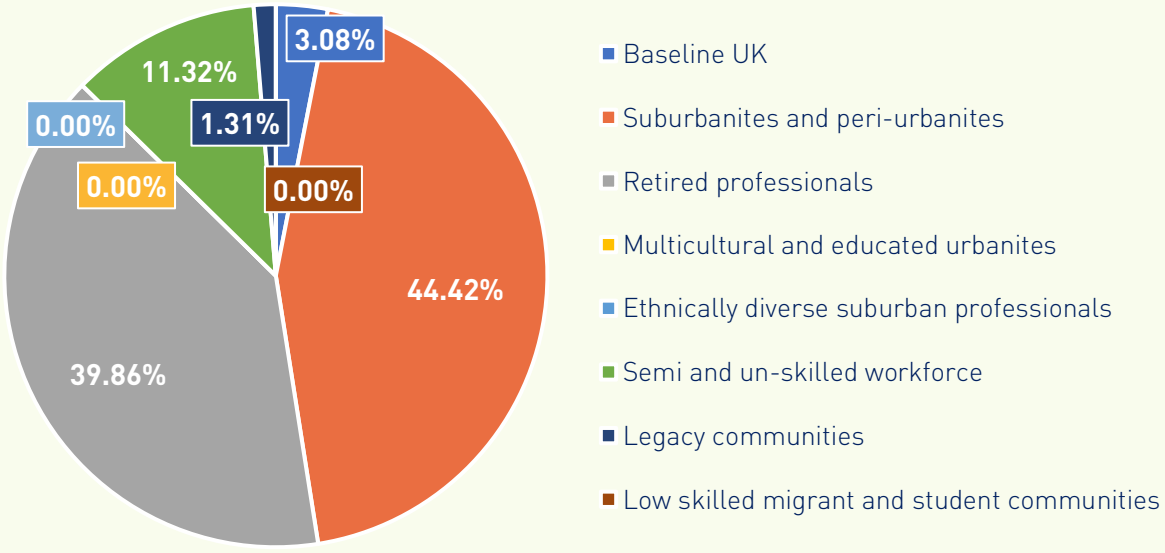

Figure 77 • Average bag weight per phase (g)



## Figure 78 • Total number of compliant, contaminated and empty bags




## Figure 79 • Maldon District demographic profile



## Analysis

Monitoring of the initial trial of 7,179 households took place across three phases.

The expansion sample encompassed just over 5,000 representative households and took place across two phases. The first phase of data collection saw an average of 0.38 bags per property passed, or 38% set out. On learning of the communications and bags delivery issues, a second batch drop was organised, and subsequent data collection saw a jump in participation to 48%. For the purpose of the following analysis, this second phase will be used as the baseline.

Almost all of Maldon's households fall within the Retired professionals and Suburbanites and Peri-Urbanites supergroups, both of which typically produce higher quantities of material per property. The pilot phase saw participation fall from the initial high of 48% to 43%, both remaining higher than average, likely as a result of these demographic groups.

On expansion, a representative sample of properties was identified, reducing the number of routes monitored to four. The expansion baseline recorded an average set out of 41%, which remained relatively stable six months later when the second phase of monitoring took place.

Without additional datasets, it is not possible to accurately estimate change over time, but given the drop off was relatively low, and considering the sample is representative of Maldon, it is reasonable to assume that Maldon District Council can expect a set out rate between 35-40%.

The average bag weight across the data phases, both initial trial and expansion, was relatively stable, ranging from 280-323 grams. Similarly, the amount produced per household per week was stable, averaging 66 grams in the pilot phase, decreasing only to 61 grams in the expansion phase. Scaled up, Maldon District Council can expect these harvesting rates to remain stable.

## Material composition

Only marginal change occurred in the 11 months between composition tests, with contamination growing by 1%. The 18-micron collection bag used in Maldon trial contributes 4% to the composition, which is consistent with a stable average bag weight, weighing 302g in the initial trial phase and 305g in the expansion.

Figure 80 • Material composition – June 2023

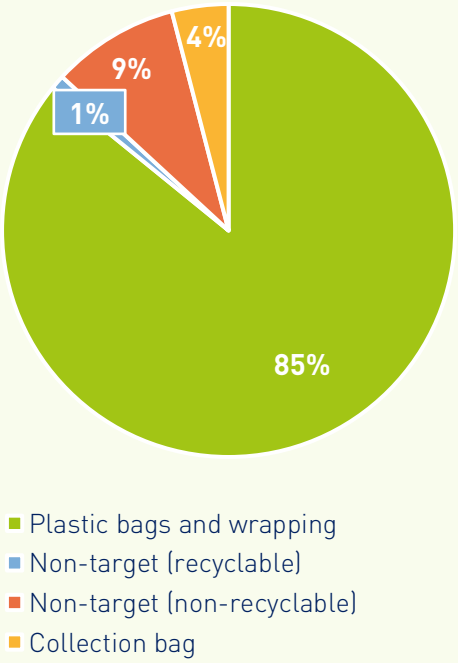
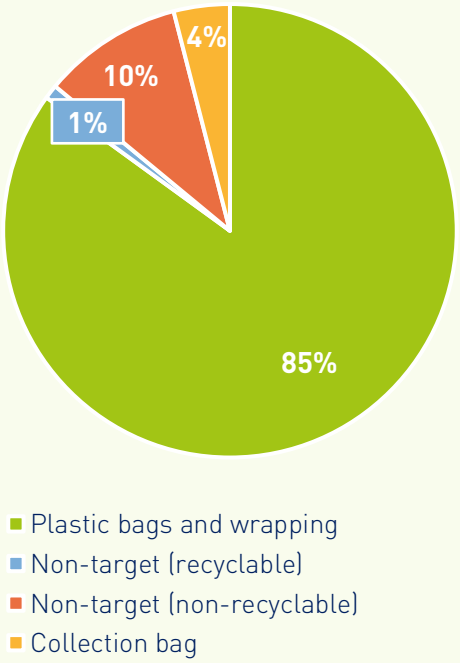



Figure 81 • Material composition – May 2024




## Local authority experience

Councillor Richard Siddall, Leader of Maldon District Council said:

*“We’re proud to have been among the first local authorities in the UK to take part in the FlexCollect trial, helping to shape the future of flexible plastic recycling. By working closely with our waste contractor, SUEZ, we ensured our crews were ready and equipped to support the collection of this material from day one.*

*The development of new recycling facilities meant we could process the trial bags alongside regular household recycling – an important step that now allows us to look at expanding the service to more residents later this year, and across the whole district by March 2026.*

*I’d like to thank all the staff involved in delivering this innovative trial for their hard work and commitment. We look forward to receiving the final report and understanding the full impact of the trial in due course.*

## Newcastle City Council

| | |
|---|---|
| Demographic profile | Urban with high deprivation |
| Total number of households | 123,000 |
| Service type | Fortnightly, twin stream (glass separate, RCV) |
| Contractor | J&B Recycling (sorting) |
| Launch | June 2023 |
| Households | 7,232 |
| Expansion | October 2024 |
| Expansion households | 34,806 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

### Initial trial overview

Residents were supplied with 50-micron blue collection bags and asked to present the tied bags alongside other materials in their recycling bin, underneath their glass caddy which sits in the top of the bin. The comingled FlexCollect bags, plastics, metals and fibre was collected by the collection crews in the large compartment of the split back RCV.

Newcastle's recycling is sorted at the J&B Recycling materials recycling facility in Hartlepool, however it is first bulked on to articulated lorries at one of two transfer stations in the city. For the purpose of the trial, a separate bay was allocated at the SUEZ operated transfer station, so the material could be isolated from the other recycling.

On arrival at J&B's facility, the trial material was processed over a picking line to first remove the FlexCollect bags, before remaining dry mixed recycling was put through the standard materials recycling facility process.

Bags were distributed to residents by crews during overtime. Only one pack of 20 was provided to each household, along with the instruction flyer. Replacement bags were ordered on the council website, with replenishment managed by the recycling engagement team. A second batch drop of 20 bags was delivered to residents six months following the project launch when orders began to creep up significantly.

### Expansion overview

Newcastle's trial expanded in October 2024, taking the new total to just shy of 35,000 properties. The approach to collection remained the same, however it was no longer possible to isolate material at the transfer station or remove bags prior to arriving at J&B's materials recycling facility. FlexCollect bags were incorporated into the day to day operations, bulked alongside the dry mixed recycling at the transfer stations, and then removed at the materials recycling facility's pre-sort cabin. The cabin was extended using funding from the project to facilitate this process.

For the expansion, a supplier was used to batch deliver the bags to the new residents due to limited capacity of the operational staff. The bags were delivered over a three-week period to the 27,000 new trial households across the city. Replacement bags were still ordered via the council website but held offsite and posted to residents from the bag supplier's warehouse.

## Challenges

### Presentation

Despite specific instruction to present bags inside the recycling bin underneath the glass caddy, numerous issues with presentation appeared. Residents commonly presented bags inside the glass caddy, on top of or next to the bin, and on rare occasions, tied to the handle of the bin. Whilst not a major issue, it does lead to additional manual handling by crews.

### Untied bags

Newcastle became the first area to present issues with untied bags. Despite flyers specifically asking for securely tied bags, residents frequently presented untied or single knotted bags.

### Bag distribution

Newcastle is a densely populated city, which presented a logistical challenge when delivering bags. Permitted streets, restricted zones and a city centre clean air zone made delivery more complicated for the delivery supplier. Furthermore, like many local authorities, Newcastle's crews and wider operational teams did not have the surplus capacity to manage delivery of the initial bags nor the top-up bags.

In areas where operational teams are accustomed to delivering replacement recycling containers (such as in South Gloucestershire or Cheltenham) and do so on a regular basis, it is more straightforward to latch onto these existing deliveries.

## Participation data

Figure 82 • Bags collected per household passed per cycle

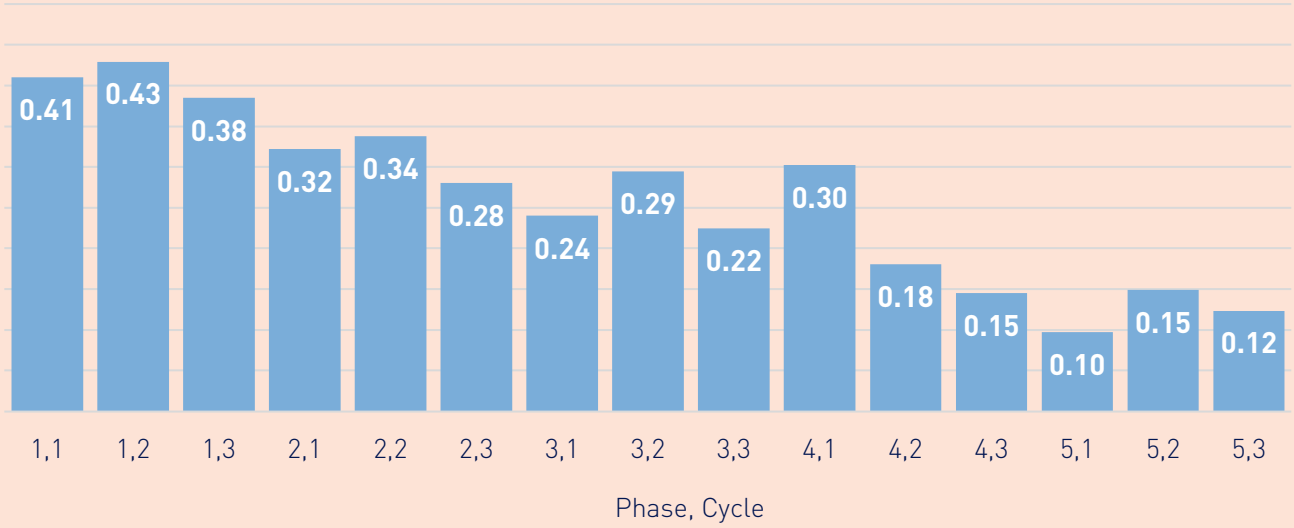



Figure 83 • Average weight per household per week (g)

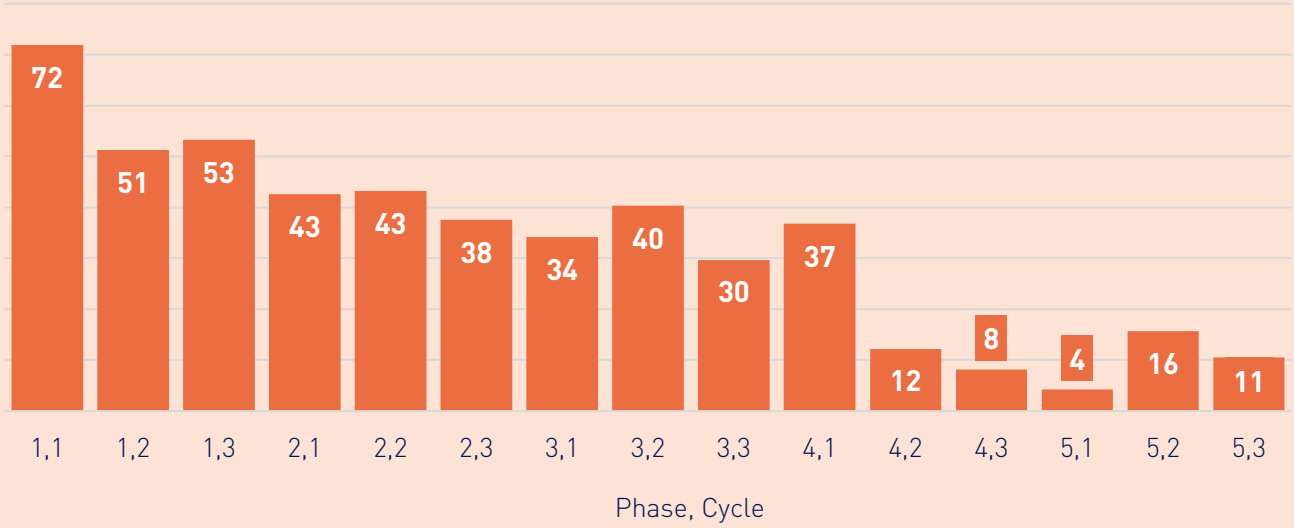
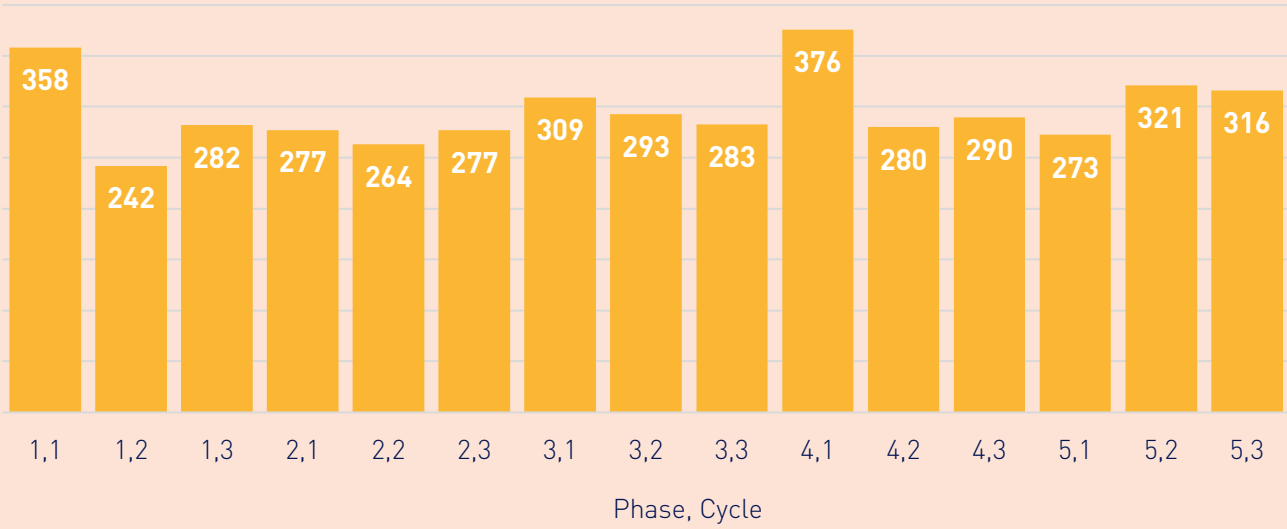
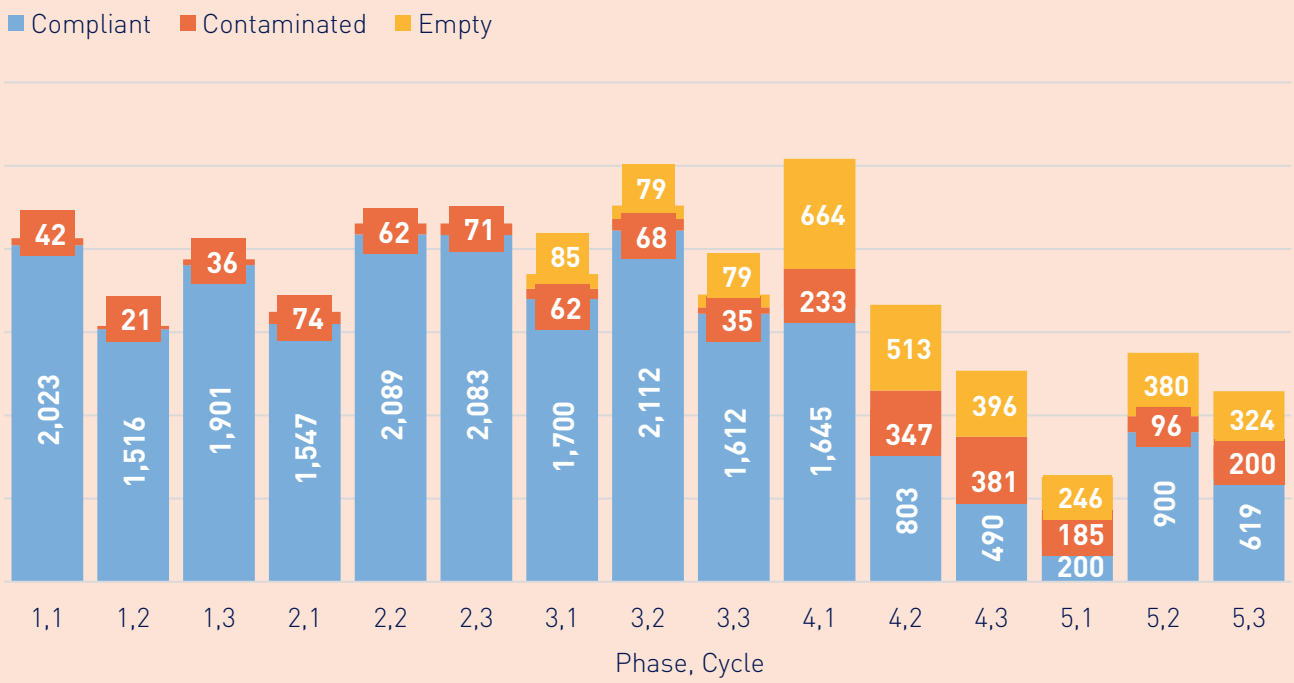


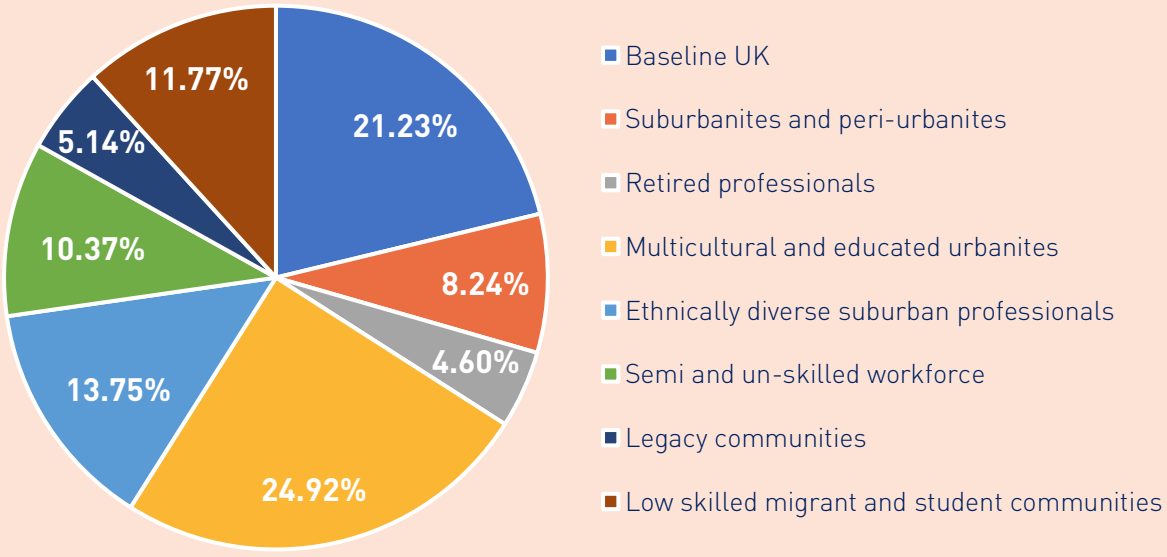

Figure 84 • Average bag weight per phase (g)



## Figure 85 • Total number of compliant, contaminated and empty bags




## Figure 86 • Newcastle City demographic profile



## Analysis

Although initially starting at 41%, participation in Newcastle declined in both the initial trial and expansion phase of the project.

The trial phase launched in an area of Newcastle that the council considered a better than average recycling area, hence the higher participation rate at the start of the project. The majority of properties in this phase are classified as ethnically diverse suburban professionals, a category that unusually isn't closely linked with high amounts of material. A second batch of bags was dropped to these residents after three months. The result of the batch delivery could have been an inflated participation rate compared to allowing residents to order bags themselves.

Part way through the initial trial phase, an additional two routes were added to improve efficiency in transport to the materials recycling facility, making use of all available space in the bulk load. These two routes added more properties linked to ONS supergroups with poor performance, potentially resulting in the drop experienced in the third phase of the pilot data collection.

The expansion phase data sample was made up of a representative sample of properties, featuring predominantly properties falling within the following categories: Baseline UK, multicultural and educated urbanites and ethnically diverse suburban professionals, all of which do not typically produce high amounts of material per household.

Regardless of the participation, the trial in Newcastle was key to understanding the urban and more deprived demographic, and the challenge of rolling out a collection service in a densely populated area. A key issue is that of untied and contaminated bags. Monitoring for these was introduced in the expansion phase after kerbside monitoring deemed it necessary. Large quantities of bags were arriving at the materials recycling facility empty or contaminated, potentially risking contamination in other material streams.

## Material composition

The two composition tests were completed one year apart. During that year a small reduction in contamination occurred. Newcastle's composition demonstrates higher levels of contamination than other areas. This is unsurprising given the demographics of the trial area. The collection bag used in Newcastle at the start of the project was 50-micron, reducing to 40-micron in the second phase, contributing an average of 9% towards the composition.

Figure 87 • Material composition – August 2023

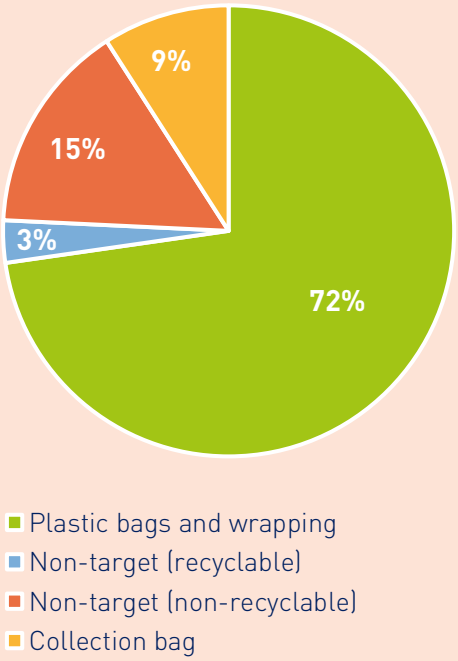
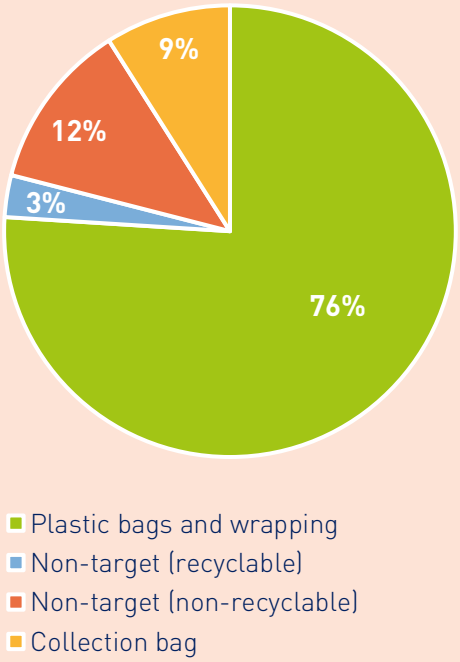



Figure 88 • Material composition – August 2024




## Local authority experience

Newcastle City Council said:

*"Newcastle City Council were delighted to join the FlexCollect project to help gain an understanding of how to collect flexible plastics from households ahead of it becoming a mandatory requirement in 2027. The project has been an excellent example of collaboration across the value chain, capably led by the SUEZ Delivery Manager, who has provided superb ongoing project support throughout, including keeping us updated on policy developments with Defra. Initially 5% of households were selected to be in the trial. In late 2024 this was expanded to 25% of the city's housing, resulting in 35,000 properties receiving the service.*

*Following the success of the trial, Newcastle have taken the decision to continue to use survival bags for the next DMR contract, which commences in October 2025 and will see all 140,000 households in the city receiving the service from 2027."*

## Somerset Council

| | |
|---|---|
| Demographic profile | Rural with medium deprivation |
| Total number of households | 250,000 |
| Service type | Weekly, source segregated (Romaquips) |
| Contractor | SUEZ (collections and sorting) |
| Launch | June 2023 |
| Households | 3,614 |
| Expansion | October 2024 |
| Expansion households | 24,393 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

### Initial trial overview

Residents were supplied with a blue 18-micron collection bag and asked to present flexible plastic packaging alongside their recycling in an existing recycling bin. The bags were collected by the crews in the top compartment of the Romaquip vehicle, together with plastics and metals. At the depot, the bags were removed over the processing line, dropping down a chute into a 1,200 litre container.

Bags were distributed to residents by crews during Saturday overtime. Two packs of bags were provided along with the instruction flyer. Replenishment was managed by the supervisors and requested via the council website.

### Expansion overview

The approach to collection, delivery and bag ordering was consistent for the expansion to 25,000 properties, with the addition of agency support for the bag delivery. With financial support from the project, modifications were made to the processing line to add a conveyor and bay to better segregate the bagged flexible plastic packaging.

# Challenges

## Sorting

Sorting was an operational challenge during the initial trial due to the high volume of the material and limited capacity of the existing chute.

Bags were dropped down a chute into 1,200 litre storage containers which filled up approximately every two minutes, necessitating four staff members: one to pick, and the others to swap out the container and move filled containers to the bay using a forklift.

With only 3,600 properties involved in the trial, this approach remained possible over the 60-90 minutes it took to process the material. The approach could not be scaled up for the expansion, requiring modifications to the site.

The new conveyor installed in September 2024 repurposed an existing chute, moving bags from the chute to a holding bay constructed in a different area of the building.

Further detail and images are provided in the sortation subsection of the results section of this report.

## Delivery issues

Timescale constraints meant that the information flyer could not be sent out to residents ahead of the expansion. The first flyer residents received was the instructional leaflet, delivered by crews and agency along with the bags. On receipt of the nudge flyer, posted in January 2024, a significant number of residents contacted the council claiming not to have received bags, evidencing an initial delivery issue. Although crews and agency staffing were provided with accurate maps and street listings, issues persisted, likely due to lack of knowledge of the area, and the very rural make-up of the trial area. Bags were delivered promptly to residents and their neighbours in response to requests.

# Participation data

Figure 89 • Bags collected per household passed per cycle

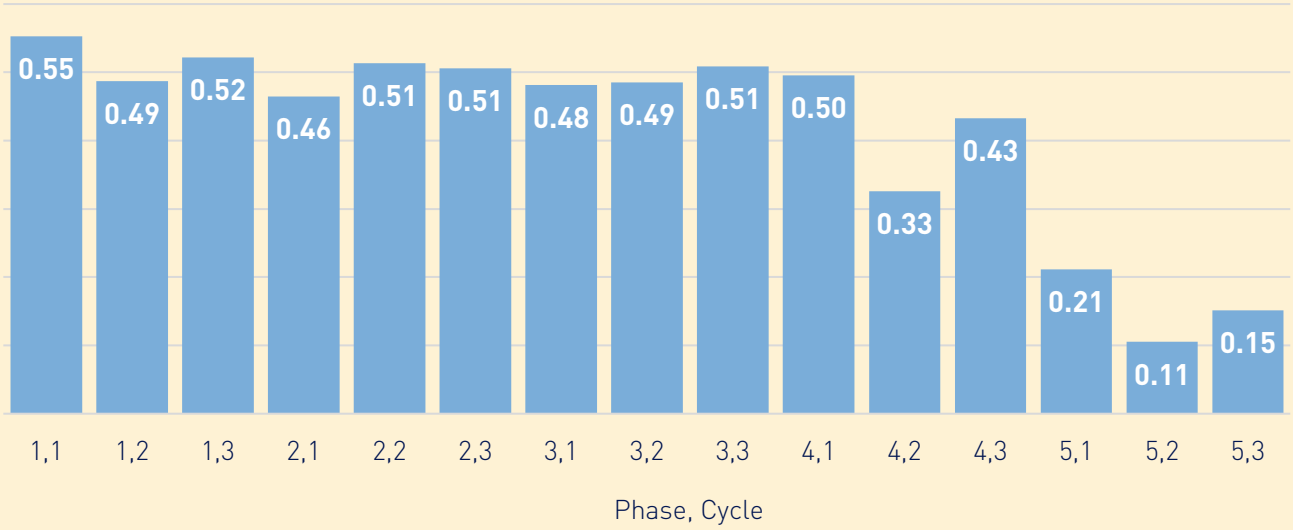



Figure 90 • Average weight per household per week (g)

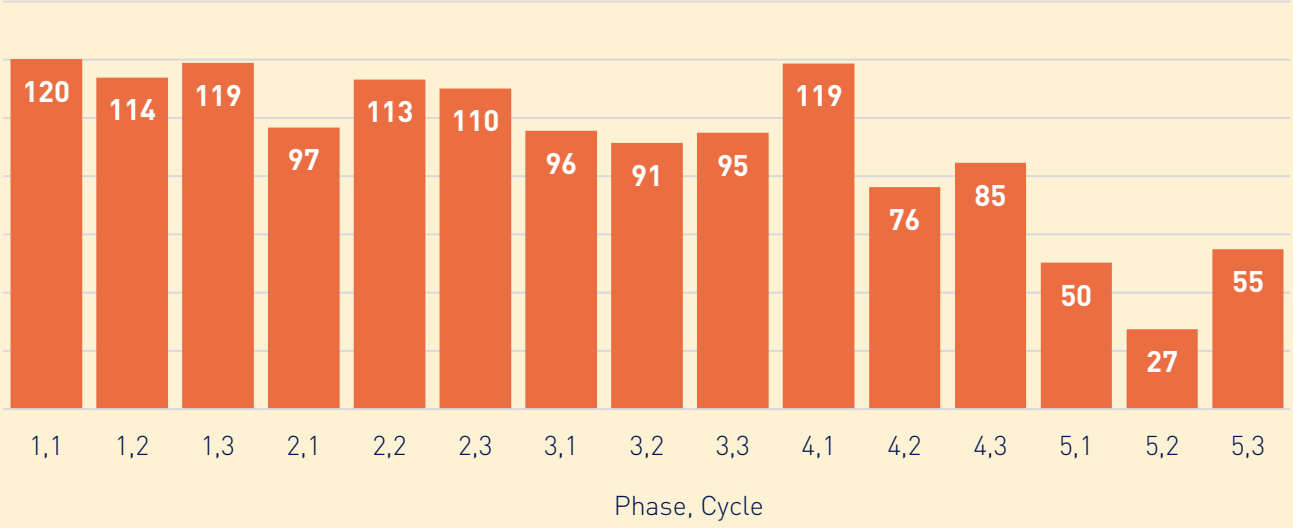
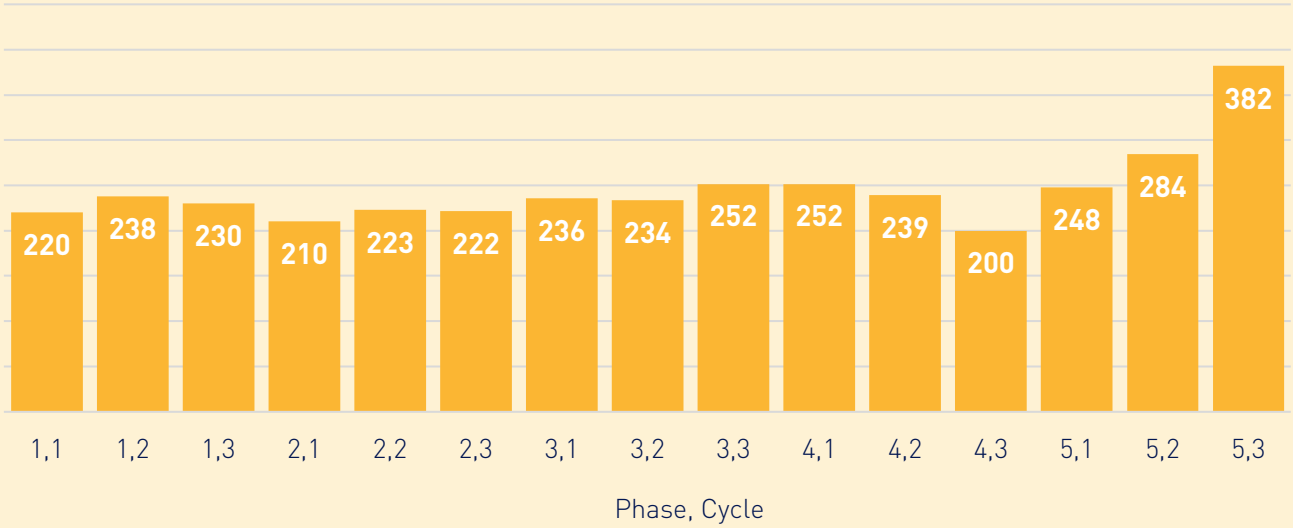
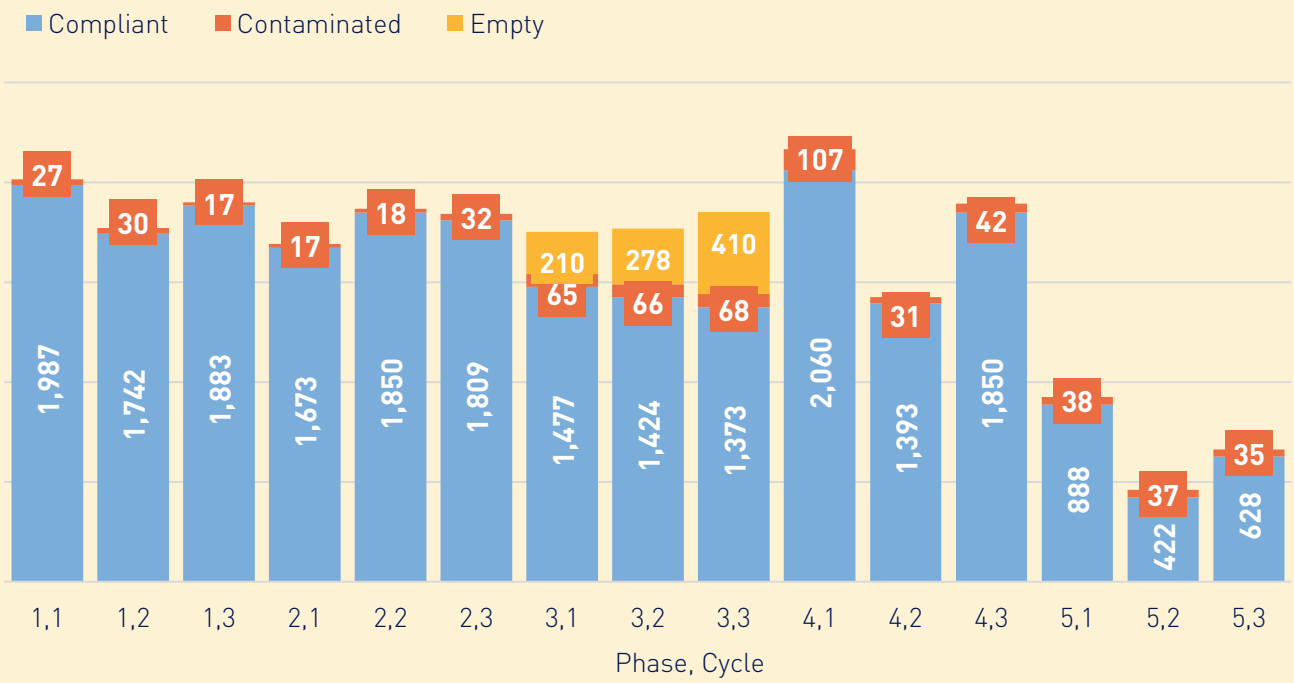


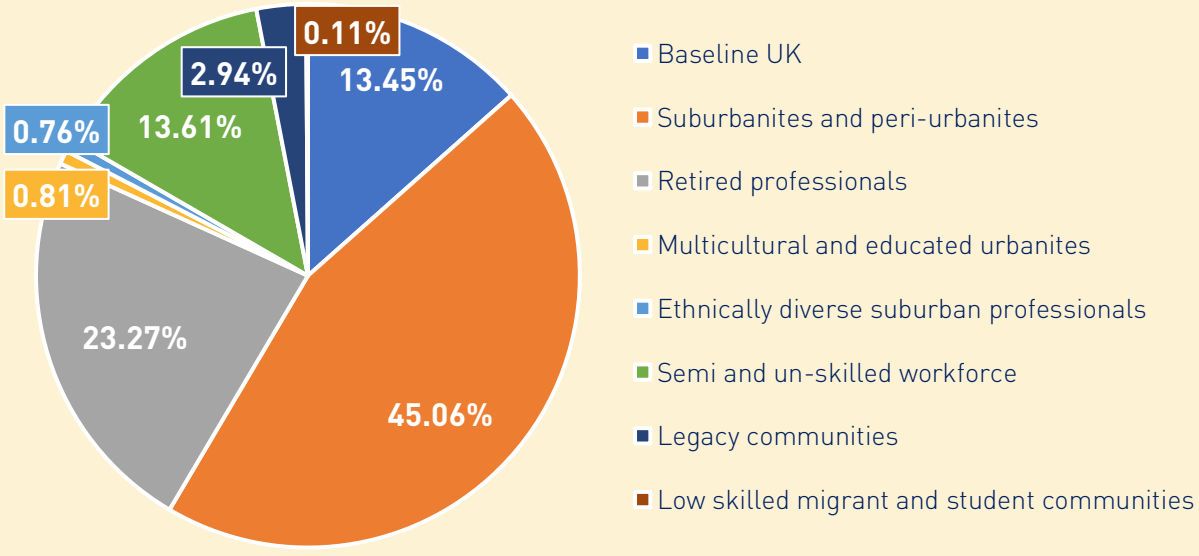

Figure 91 • Average bag weight per phase (g)



## Figure 92 • Total number of compliant, contaminated and empty bags




## Figure 93 • Somerset demographic profile



## Analysis

Participation in Somerset was consistently among the highest over the initial trial phases (1-3). This can be attributed to the demographics of the properties, with over 75% of falling within the Suburbanite and peri-urbanite and Retired professional categories. Over the three phases, the average weight per household fell gradually by 25g per week.

The expansion sample saw a starting participation of 42%, a drop from the phase one average of 50% but still higher than average. Again, the demographic make-up was 74% Suburbanite and peri-urbanite and Retired professional properties.

The expansion sample set saw a large drop off in participation by the time the second phase was completed four months later. Participation fell to 16%, resulting in an average of only 44g per property per week. As this pattern has been observed in other areas, it is likely the result of residents running out of bags and not ordering more, highlighting the importance of effective communication.

The expansion sample is largely representative of wider communities in Somerset, suggesting these participation rates would be sustained without further promotion of the service, and without an additional delivery of bags.

Across the three pilot phases of data collection and first expansion phase, the average bag weight was consistently among the lowest, averaging 230g, nearly 70g lower than the overall average. This is likely a result of Somerset's weekly collection service, favouring more frequent presentation, suggesting Somerset, among other authorities delivering a weekly service, may require greater stock of bags.

## Material composition

Contamination rates in the second composition sample were less than 50% than that of the first sample. Interestingly the target material was exactly the same, with the difference driven by a greater contribution by the bag itself. The same 18-micron bag has been used in Somerset across the entire trial. The increase in percentage by the bag itself was therefore driven by a reduction in average bag weight among the bags sampled.

Figure 94 • Material composition – July 2023

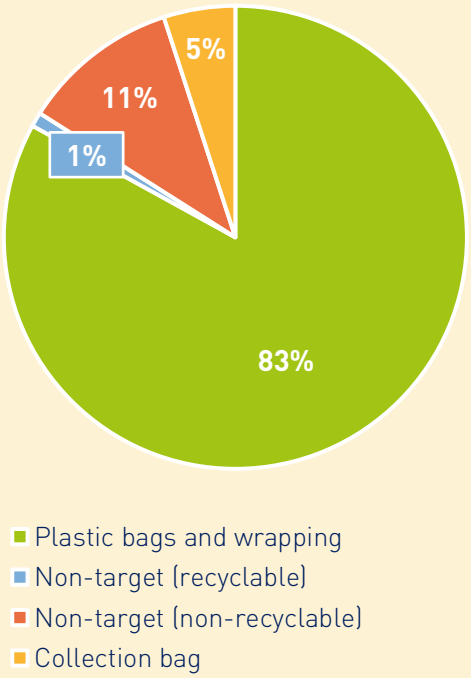
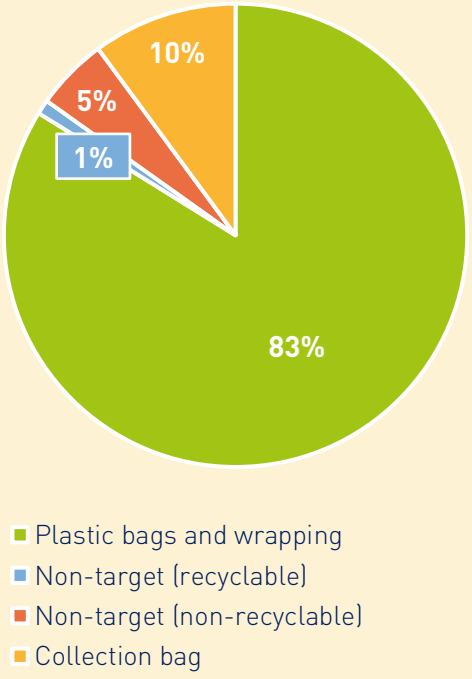



Figure 95 • Material composition – March 2025



## Reading Borough Council

| | |
|---|---|
| Demographic profile | Urban with low deprivation |
| Total number of households | 68,000 |
| Service type | Fortnightly, comingled (RCV, glass bring bank) |
| Contractor | FCC Environment (sorting) |
| Launch | September 2023 |
| Households | 4,100 |
| Expansion | August 2024 |
| Expansion households | 10,281 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

### Initial trial overview

Residents were supplied with blue 50-micron bags and asked to present the filled bags inside their comingled recycling bin. The bags were collected in the single compartment RCV and direct delivered to the Re3/FCC Environment materials recycling facility in Reading. The bags were fed into the materials recycling facility process and extracted in the fibre sorting cabin. Unlike J&B Recycling, FCC were not able to remove bags at the front end of the materials recycling facility process due to limited space in the pre-sort cabin.

The bags were left to pass through the cabin, through a trommel and into the fibre cabin.

Bags were first distributed by the council engagement team, with each resident receiving 40 bags. Replacement bags were ordered on the council website and posted by the engagement team.

### Expansion overview

The same approach to collection and sorting was used for the expansion in Reading, although the bag thickness was reduced to 40mu. SUEZ worked with Re3 and FCC to test the new bags prior to implementation, to ensure the thinner bags were able to withstand the materials recycling facility process.

A supplier was used to deliver the bags to the new residents in Reading, taking approximately 10 days. Replacement bags were still ordered on the council website, but, like Newcastle, were held off-site and posted to residents from the bag supplier's warehouse.

# Challenges

## Bag delivery

Similar to Newcastle, the capacity of the engagement team to manage both the initial distribution and requests for additional bags was limited.

Using an external supplier to manage these processes was more costly, but necessary to reduce the pressures on the council teams.

## Presentation issues

Reading residents also presented significant quantities of untied or contaminated bags, particularly in the initial trial phase, where an average of 50% of bags were presented untied (30%) or contaminated (20%) in the first phase of data collection.

Although manageable for the small number of households in the trial, misuse of bags has the potential to lead to contamination of other material streams or increased residue costs.

# Participation data

Figure 96 • Bags collected per household passed per cycle

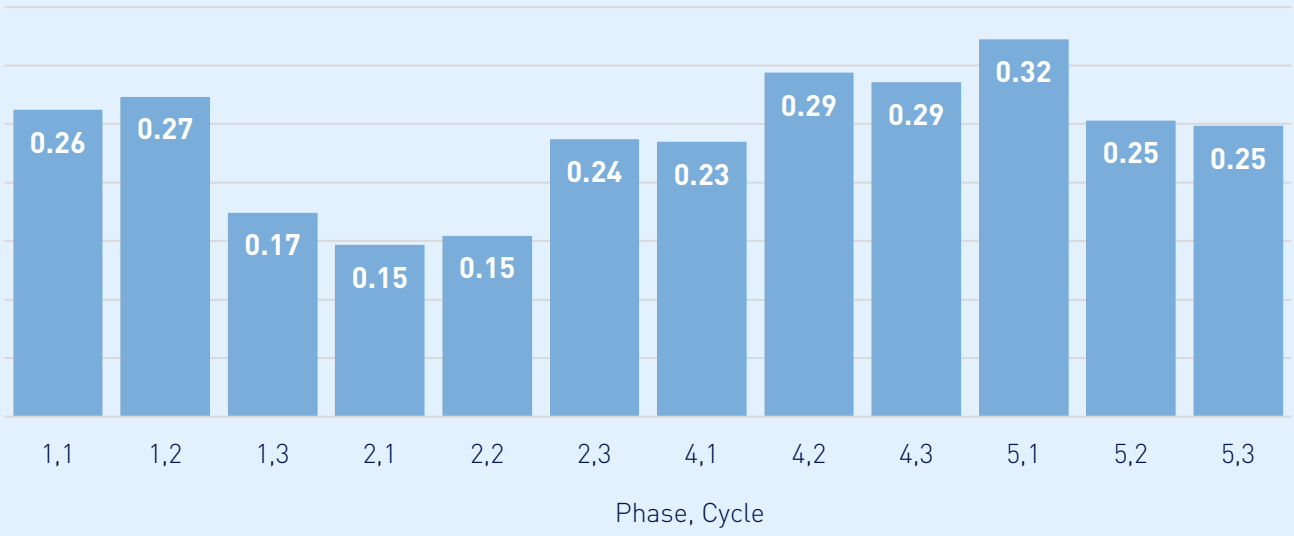



Figure 97 • Average weight per household per week (g)

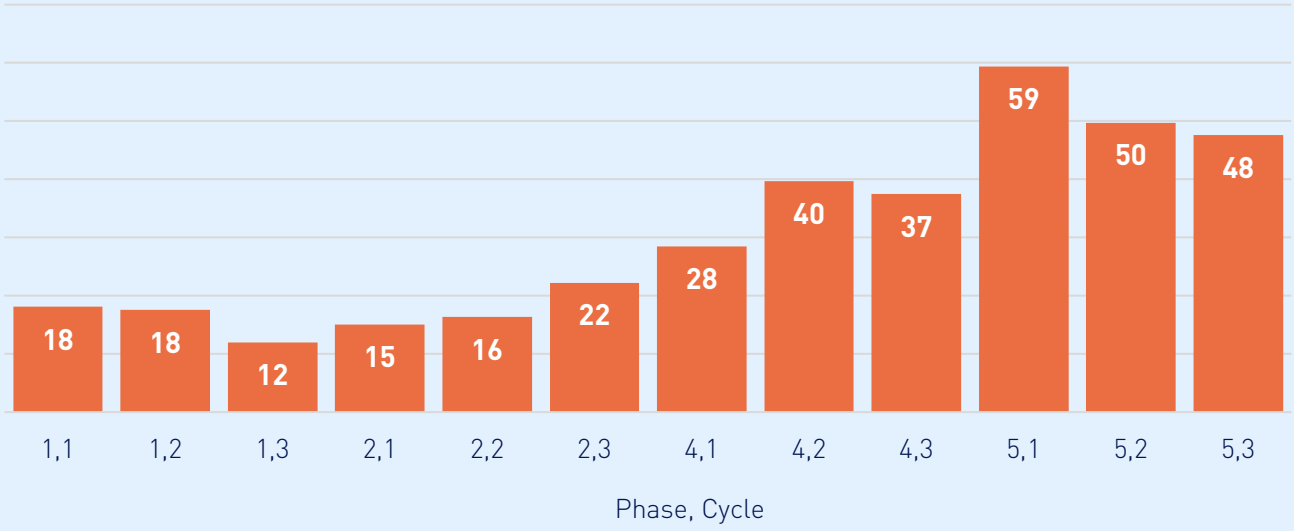
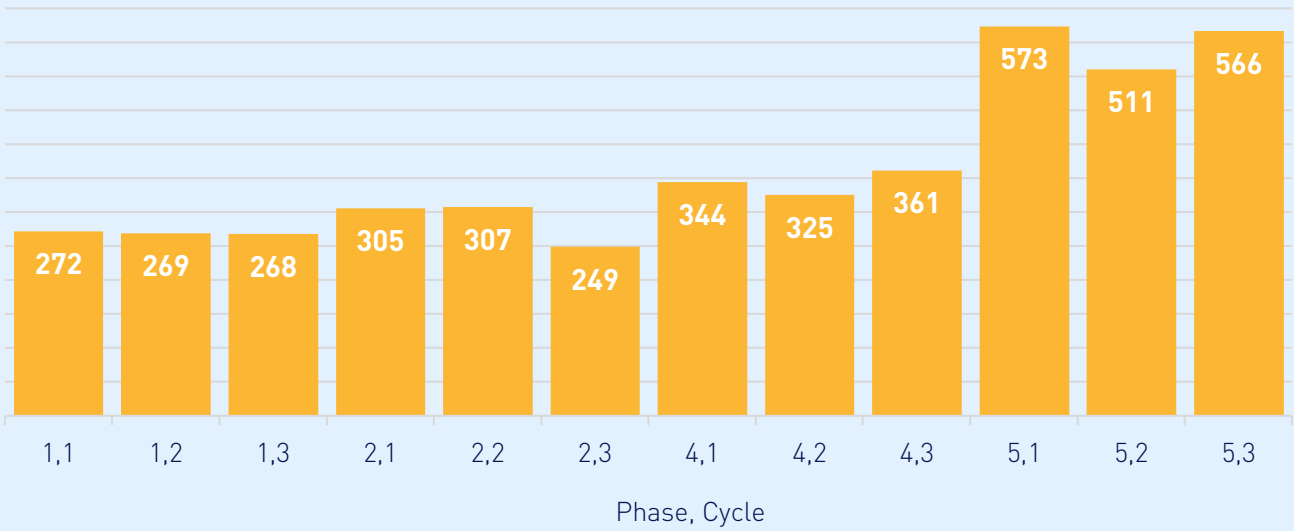
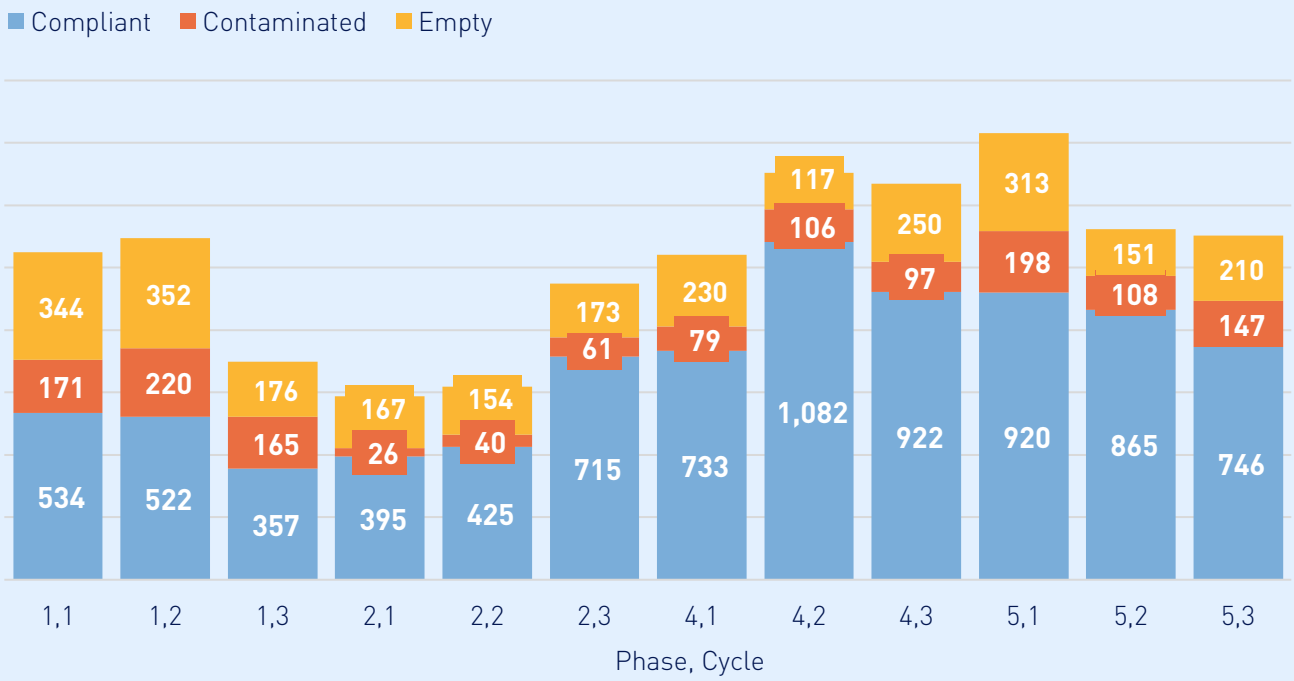


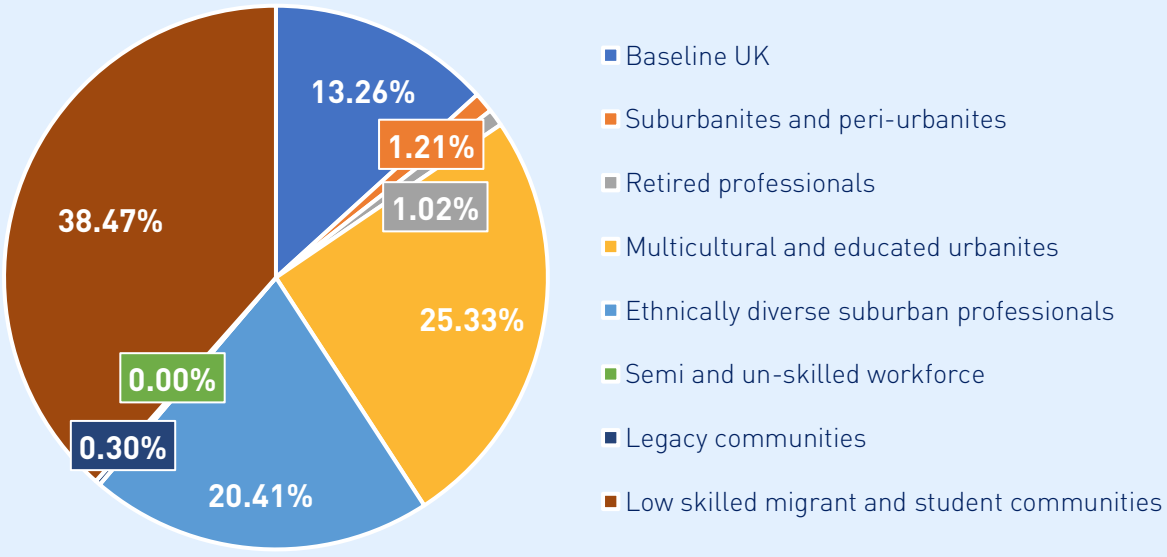

Figure 98 • Average bag weight per phase (g)



## Figure 99 • Total number of compliant, contaminated and empty bags




## Figure 100 • Reading Borough demographic profile



## Analysis

Participation in Reading's initial trial phase was less than that of the expansion phase. Reading's initial trial consisted of households in the town centre, comprising of demographic groups not linked with participation: Baseline UK and low skilled migrant and student communities. Students are of particular significance, as changing occupants will require additional communication until a service is established, especially in the case of a trial.

The expansion sample in Reading consisted of a more representative population considering Reading's wider demographics, and the broader range brought about a higher participation rate. That being said, populations of certain supergroups including Suburbanites and peri-urbanites and Retired professionals are low in Reading, which is the likely explanation for a lower than average participation.

In the final phase of data collection, Reading saw a significant increase in average bag weight, increasing to over half a kilogram.

These results were consistent across the three collection cycles in the data collection phase, meaning they are unlikely to be erroneous. The exact cause of this is unknown, but, in spite of a lower than average participation, it suggests those who are participating are making better use of their bags.

Untied and contaminated bags were also a notable problem in Reading, with up to 50% recorded in the first phase. The ratio between 'good' and untied or contaminated bags did decrease over time, demonstrating an improvement in behaviour. Whilst manageable at the trial level, when scaled up these results post a risk for the materials recycling facility operator FCC.

## Material composition

Reading saw a reduction in contamination between the two composition tests, with target material (excluding the collection bag) growing from 63% to 85%. A possible explanation is the changing demographics between the two phases, as outlined above. The 50-micron bag used in Reading contributed 8-10% to the composition by weight.

Figure 101 • Material composition – November 2023

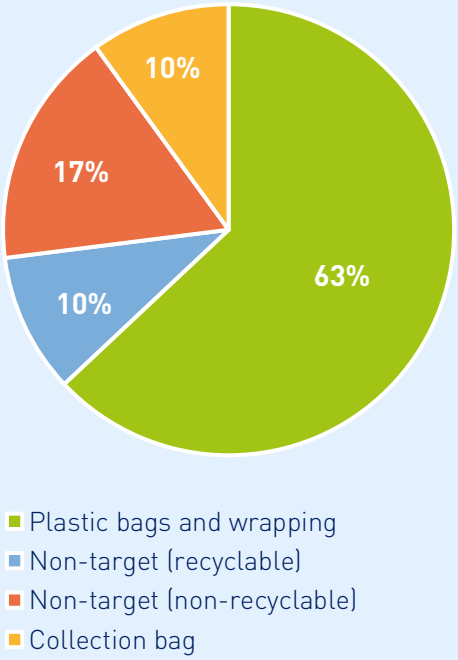
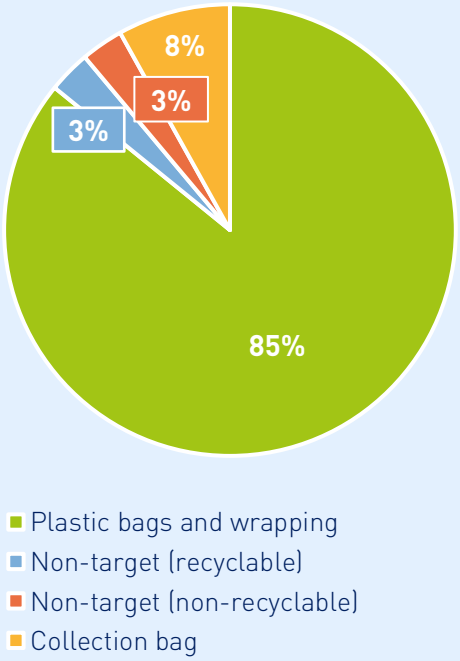



Figure 102 • Material composition – October 2024




## Local authority experience

Re3 partnership said:

*Working with FPF FlexCollect and participating in the national trial has been an extremely valuable and collaborative experience for the re3 Partnership. It helped us to deliver an innovative service change for 20,000 households across Bracknell Forest and Reading Borough Council which was supported by operational guidance, practical resources and expert advice.*

*The project has delivered significant learning for the re3 Partnership and demonstrated that with the right processes in place, clear communications and strong political and resident support, flexible plastics can be collected efficiently as part of a comingled kerbside recycling collection - something previously considered unfeasible for our authorities. The trial has also provided valuable data and operational insights that have informed our decision-making, particularly around Simpler Recycling compliance. We feel privileged to have had the opportunity to be part of this pioneering initiative and are excited to see how the trial helps shape the future of waste services nationally.*

# North and East Hertfordshire District Council

| | |
|---|---|
| Demographic profile | Suburban with low deprivation |
| Total number of households | 57,000 |
| Service type | Fortnightly, twin stream (paper separate, RCV) |
| Contractor | FCC Environment (collections) and Pearce Recycling (sorting) |
| Launch | November 2023 |
| Households | 2,174 |
| Expansion | September 2024 |
| Expansion households | 10,289 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

## Initial trial overview

Residents were supplied with 50-micron collection bags and asked to present bagged material in their paper box, next to their recycling bin. The bags were first co-collected with paper in a split back RCV, and direct delivered to Pearce Recycling's materials recycling facility in St Albans. The bags were separated manually by operatives in the paper bay at the materials recycling facility.

After approximately three months of collections, a trial took place to explore the possibility of co-collecting material in the dry mixed recycling bin and bag removal via the materials recycling facility processing line. Collection vehicles would not normally direct deliver to the materials recycling facility, instead tipping at a transfer station. Co-collection in the dry mixed recycling bin would reduce the time on the road and mimic 'normal' collections. After a successful trial, dry mixed recycling plus FlexCollect bags continued to be bulked separately at the transfer station and transported to the materials recycling facility for processing.

Bags were distributed to residents by Urbaser (now FCC) along with the instruction leaflet. Initially only one pack of bags was delivered, however, due to lower than anticipated participation rates, a second pack was delivered at the same time as the nudge flyer. The initial trial phase only involved properties from North Hertfordshire.

## Expansion overview

Bags continued to be collected in the dry mixed recycling bin for the expansion, which included additional households from North Hertfordshire, as well as properties from East Hertfordshire. The communications were adjusted, instructing households to present materials in their dry mixed recycling bin, to avoid manual handling at the kerbside by crews. The dry mixed recycling continued to be bulked and transferred to the materials recycling facility separately to reduce the operational burden when sorting.

Similar to the initial trial, bags were distributed by Urbaser (now FCC), with orders for additional bags managed via the council website and delivered by Urbaser.

# Challenges

## Bag and communications delivery

The initial delivery included only one pack of bags and the instruction flyer, with operatives delivering to the property boundary rather than letterbox or doorstep. This was likely a time saving measure, particularly where many households in the trial area have extended driveways.

When presentation monitoring took place across the first collection cycle, packs of bags and the flyers were found at property boundaries in many cases. Additionally, the first phase of data collection revealed a lower than expected participation rate of 31%.

To overcome these issues, a second drop of 20 bags took place at the same time as the nudge flyer, this time with flyers posted through letterboxes and bags left on doorsteps. Following these issues, delivery to doorsteps became the minimum standard for service launches or expansions.

# Participation data

Figure 103 • Bags collected per household passed per cycle

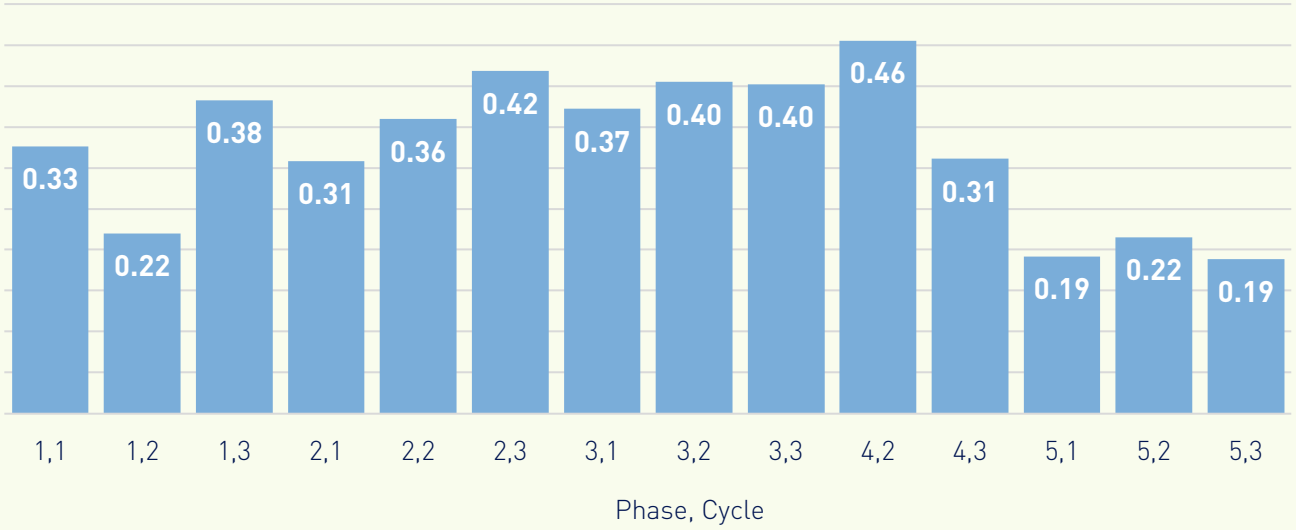



Figure 104 • Average weight per household per week (g)

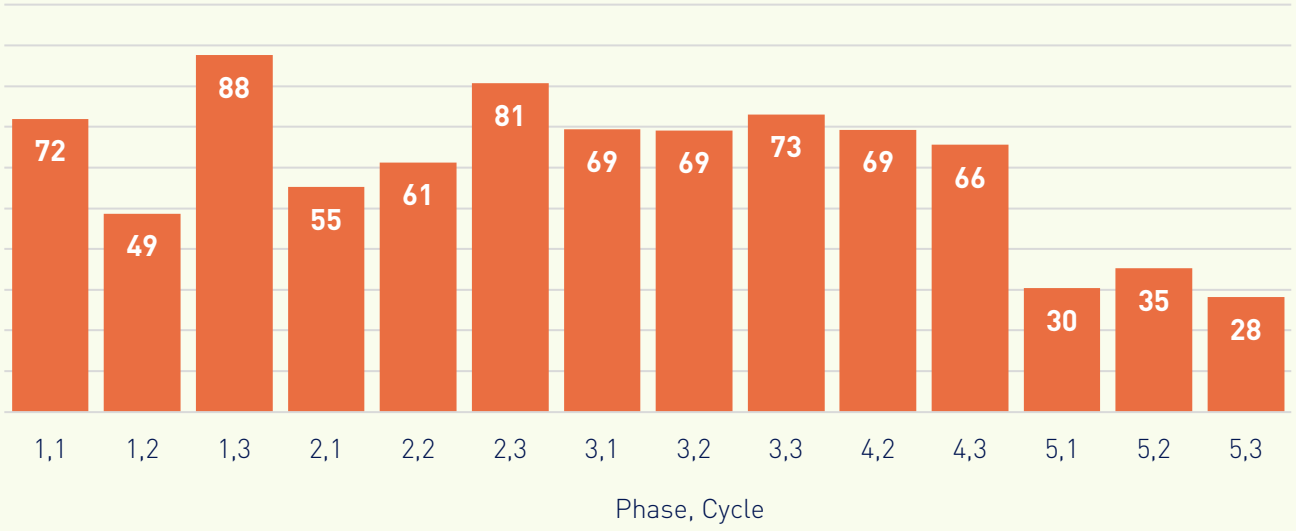
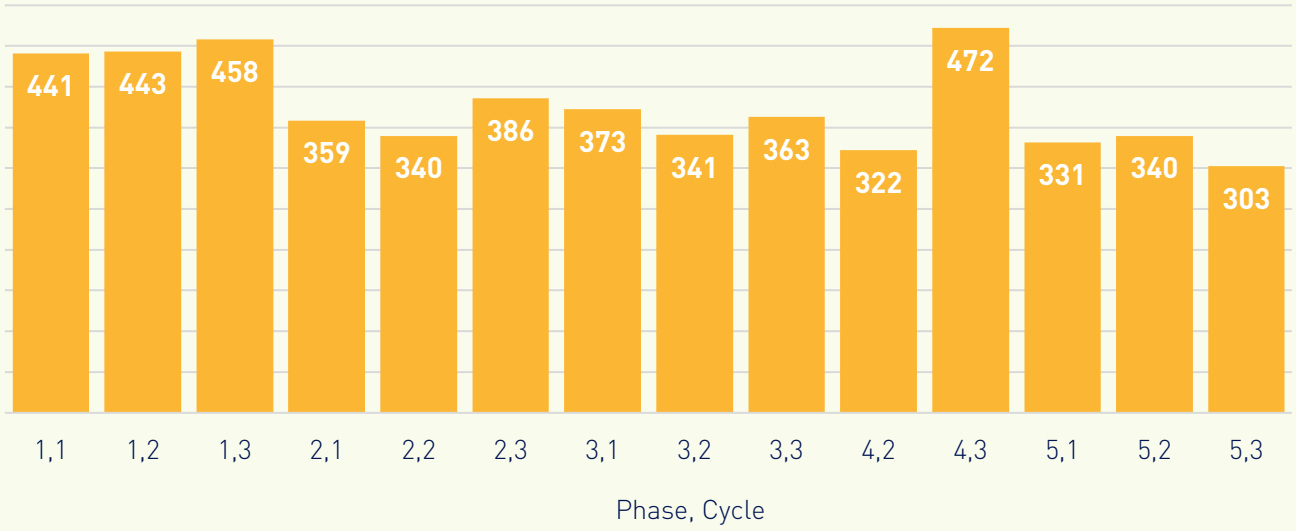
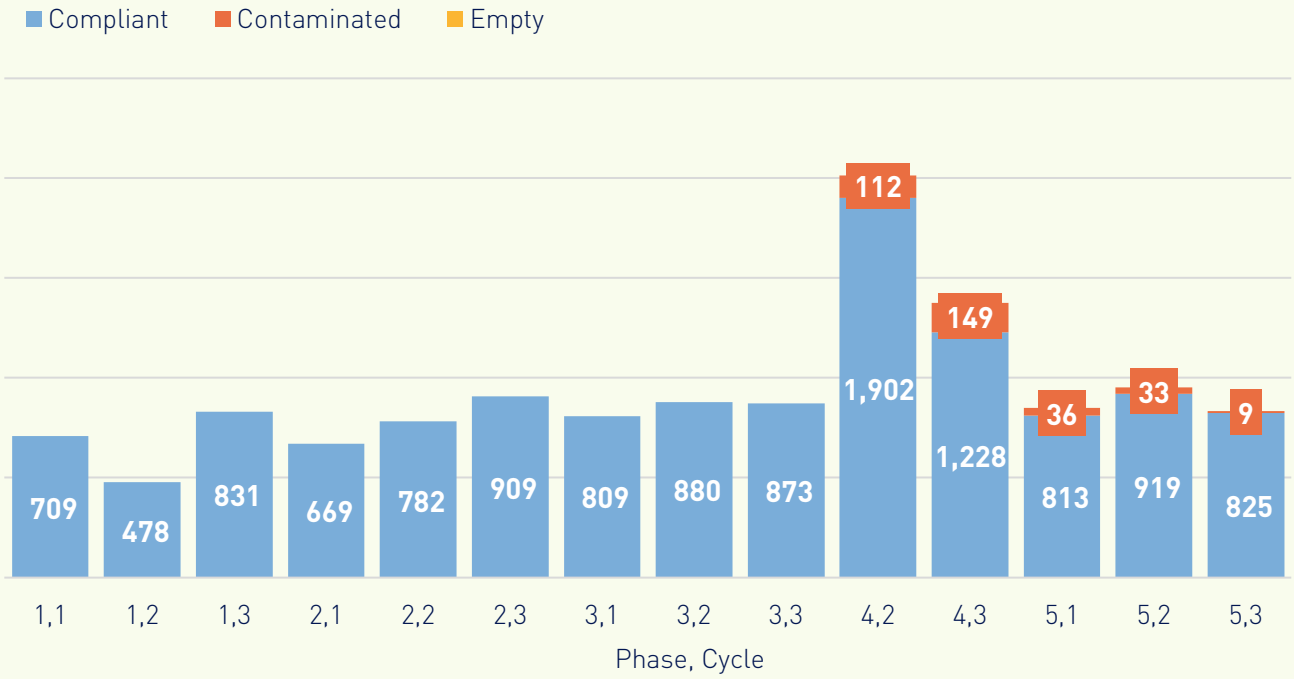


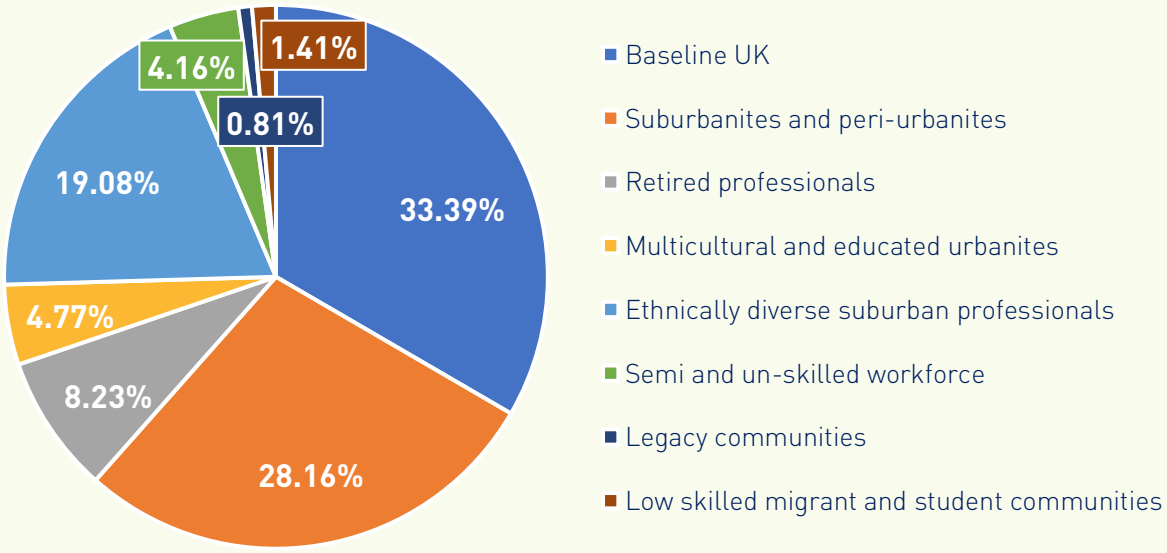

Figure 105 • Average bag weight per phase (g)



## Figure 106 • Total number of compliant, contaminated and empty bags




## Figure 107 • North Hertfordshire district demographic profile



## Analysis

Participation in North and East Herts grew gradually over the three pilot phases. The initial jump from 31% set out, to 36% in phase two, was likely due to the re-delivery of bags with the third, 'nudge' flyer, following the delivery issues mentioned above. This grew further by the final phase of monitoring for the trial, although to a lesser extent.

The initial trial phase of 2,174 properties consisted of the following ONS groups: Ethnically diverse suburban professionals (41%), Baseline UK (20%), suburbanites and peri-urbanites (20%), and retired professionals (13%) properties. The latter two groups both typically generate higher amounts of material per property, suggesting they were a significant contributor to the set-out rates observed.

Over the three phases of trial monitoring, the amount of material generated per household per week remained stable, with an increase or decrease in average bag weight accounting for the difference in set out. In fact, residents in North and East Herts presented bag weights which were consistently higher than all other pilot authorities. The heaviest bag weight was seen in phase one, at 449g.

Data gathering from the expanded phase moved to a representative sample of 4,422 properties. 85% of the sample population consisted of households form the top three performing supergroups.

The baselining for the expansion generated a set out of 38%, in line with the smaller initial trial phase. Interestingly, six months later when the repeat monitoring took place, there had been a considerable drop down to 20% set out. This could be a result of residents running out of bags and not being clear on where to order more. Without additional datasets, it is unclear whether North and East Herts would see any growth in participation. Given that drop off over time has been observed in other areas, it is likely that North and East Herts can expect an ongoing participation in this region, generating just over 30 grams per household per week.

## Material composition

Very little changed between the two composition tests in North Hertfordshire, with contamination and target material rates remaining largely similar. The 50-micron bag contributed to 8-9% of the composition.

Figure 108 • Material composition – May 2024

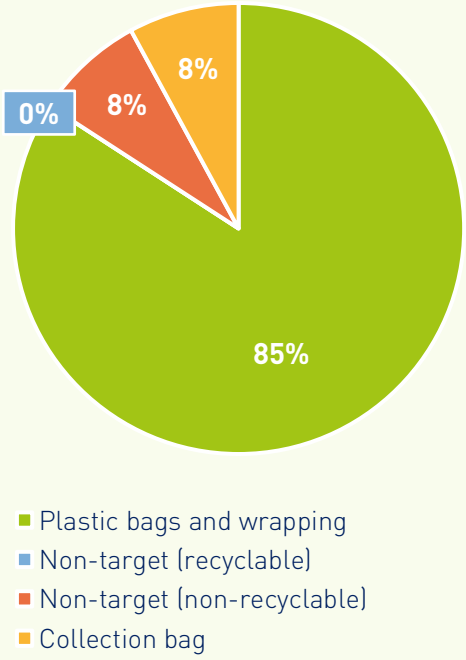
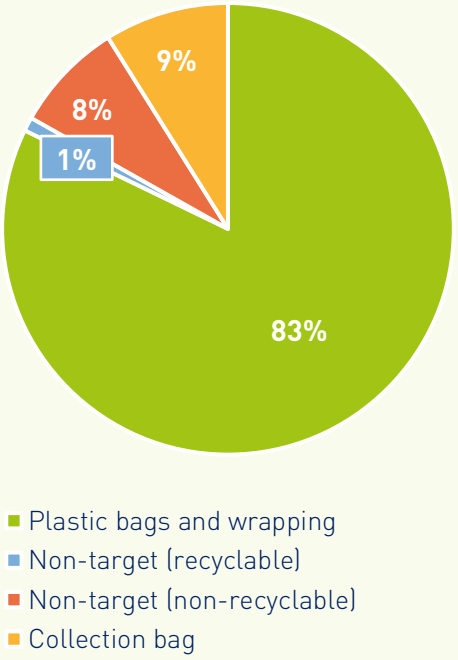



Figure 109 • Material composition – December 2024



## Local authority experience

North Herts Council said:

*“ The shared waste service of East and North Herts were interested in collecting plastic bags and wrappings from kerbside properties ahead of the Simpler Recycling requirements before the 2027 deadline. Participating in the FlexCollect trial provided us with an opportunity to trial “soft plastics” collections with some residents, allowing us to identify what worked and what didn’t and how willing residents were to participate and recycle this material from home.*

*We began with a pilot involving 2,000 households in Knebworth, this was done in partnership with our collection contractor and materials recycling facility provider. The pilot was successful, leading to an expansion to an additional 8,000 households 10 months later. The access to the experiences and combined learning of wider project participants significantly aided our decision-making for district-wide collections. The SUEZ Delivery Manager was actively involved throughout, even joining staff in door-knocking to engage with residents.*

*Early experiences indicated that the delivery of collection bags and leaflets needed re-working. Utilising local networks and social media proved more effective than blanket communications, which were costly. Notably, we had the heaviest bags in the trial, and low contamination levels.*

*As a result of our participation in the FlexCollect project, East and North Herts will roll out a district-wide collection of plastic bags and wrappings, along with the implementation of a three weekly collection service in August 2025.*

# North West Leicestershire District Council

| | |
|---|---|
| Demographic profile | Rural with medium deprivation |
| Total number of households | 45,000 |
| Service type | Source segregated (Kerbsider vehicles) |
| Contractor | In-house |
| Launch | March 2024 |
| Households | 6,731 |
| Expansion | September 2024 |
| Expansion households | 13,152 |
| Material type | All flexibles |

## Initial trial overview

Residents were provided with 18-micron purple collection bags and asked to present material alongside their recycling containers and bags. The council use a combination of Kerbsider vehicles and RCVs to collect different material streams over the course of the collection day. The FlexCollect bags were collected on the Kerbsider vehicle in the paper compartment, as this was the only compartment with sufficient space.

On return to the depot, operated by the council, bags were picked from the paper by operatives. Unlike RCVs, Kerbsiders do not compact material, so this process was straightforward and quick. Additional bay walls were provided by the project to split the paper bay into two bays, providing space for the new material stream.

Bags were initially delivered to residents by operational staff. Requests for additional bags were managed through the council website and were delivered by the crews responsible for collection.

## Expansion overview

The same approach to collection, processing and initial bag delivery took place for the expansion to 13,000 properties in North West Leicestershire. Bag orders moved from crew management to a dedicated delivery operative in the expansion phase, when order numbers became too great for crews to manage.

## Challenges

### Delivery issues

Bags and flyers were initially delivered incorrectly to a small number of residents not selected to be part of the trial.

To avoid confusion, the service was not withdrawn from these households, and operations on site were adjusted to sort the bags when they arrived. On expansion, this route was included in full.

### Storage on site

Due to the small footprint of the council depot, there is limited space for sorting and storing the FlexCollect material. To accommodate the material, the paper bay was split using concrete dividers. This approach posed risks to paper tonnages, particularly during busy periods, but was deemed the bay with most capacity due to diminishing paper tonnages. Similarly, once baled, there is limited space to store the flexible plastic packaging, with 10 tonnes being the maximum storage capacity. Volatility and uncertainty in the plastic market had the potential to complicate offtake. However, at the point of writing, no issues had been experienced.

## Participation data

Figure 110 • Bags collected per household passed per cycle

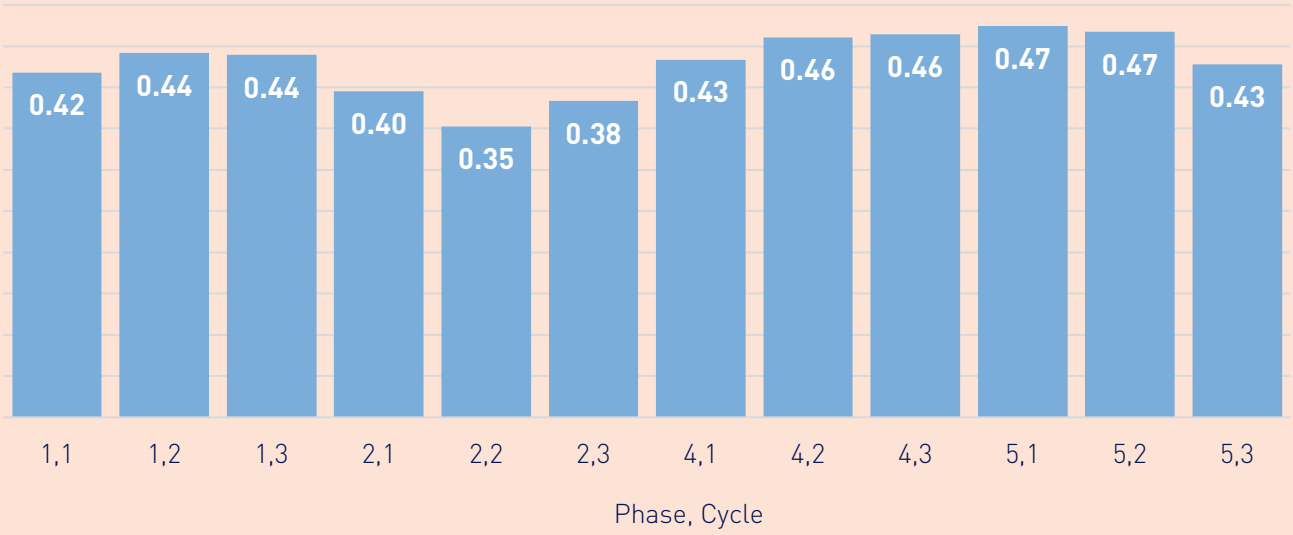



Figure 111 • Average weight per household per week (g)

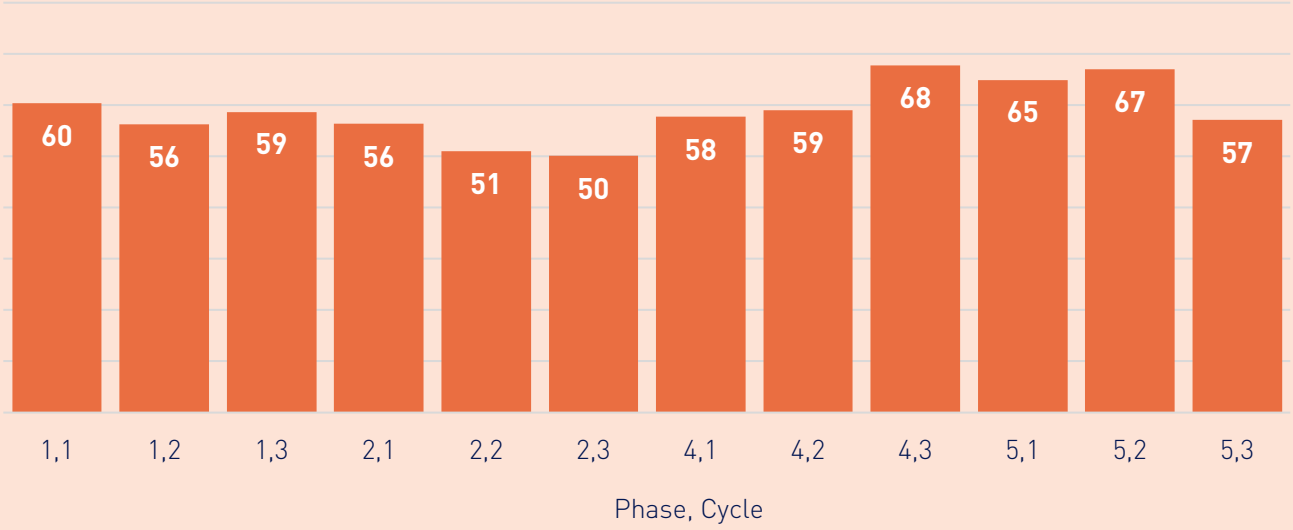



Figure 112 • Average bag weight per phase (g)

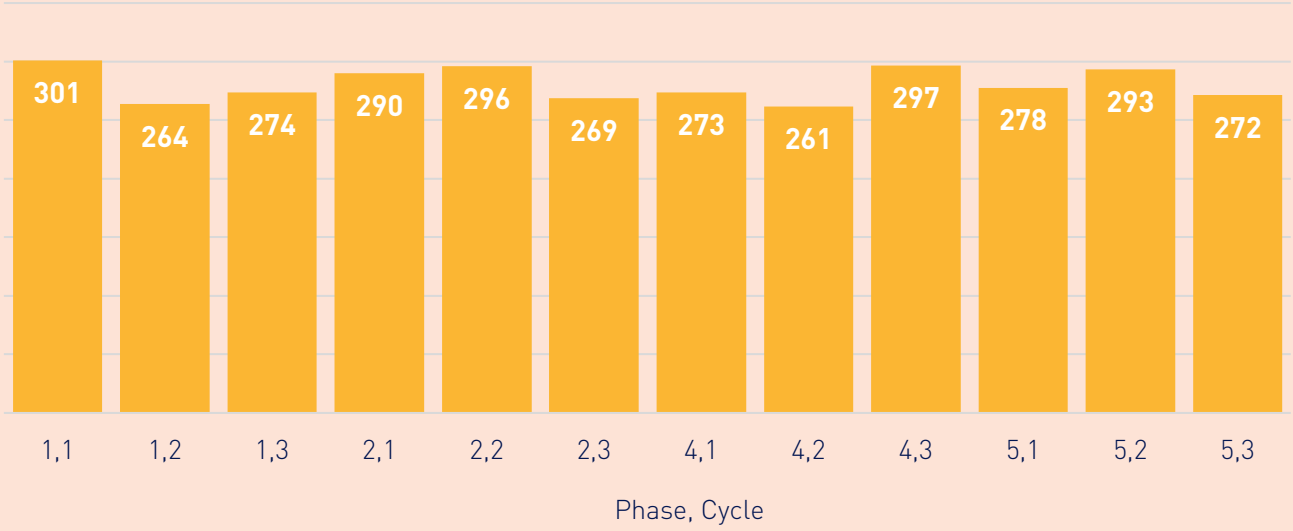


Figure 113 • Total number of compliant, contaminated and empty bags

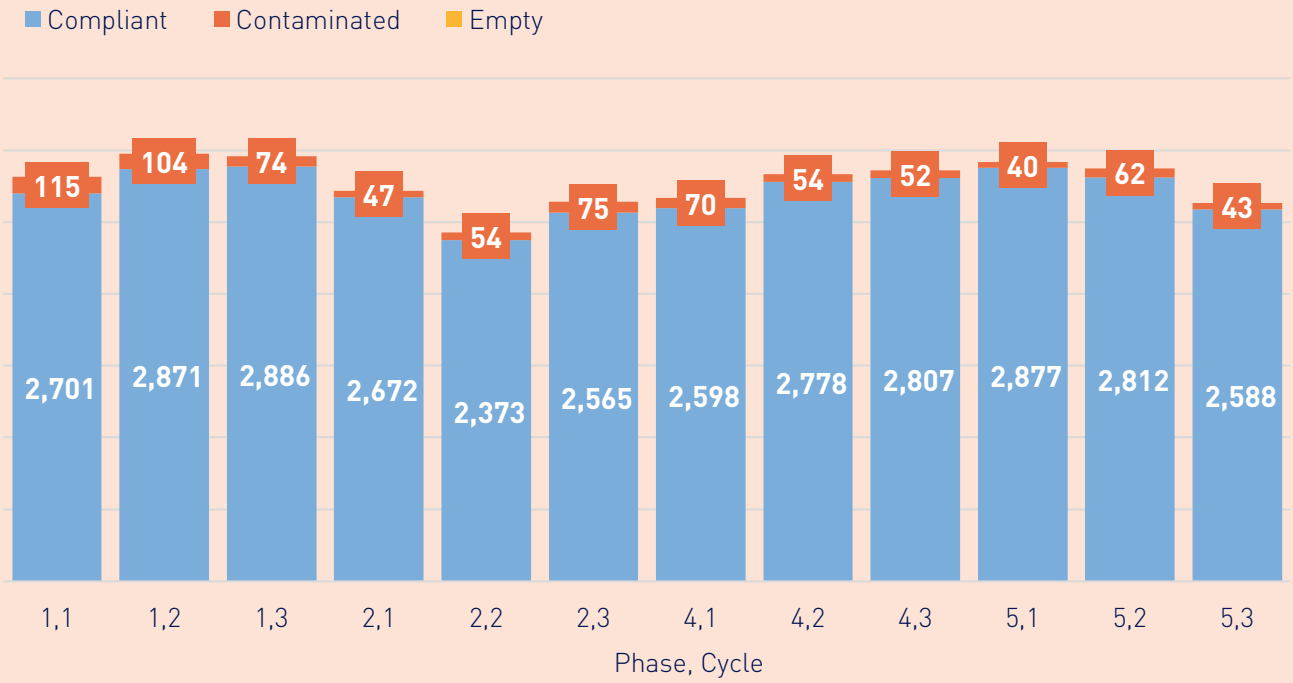
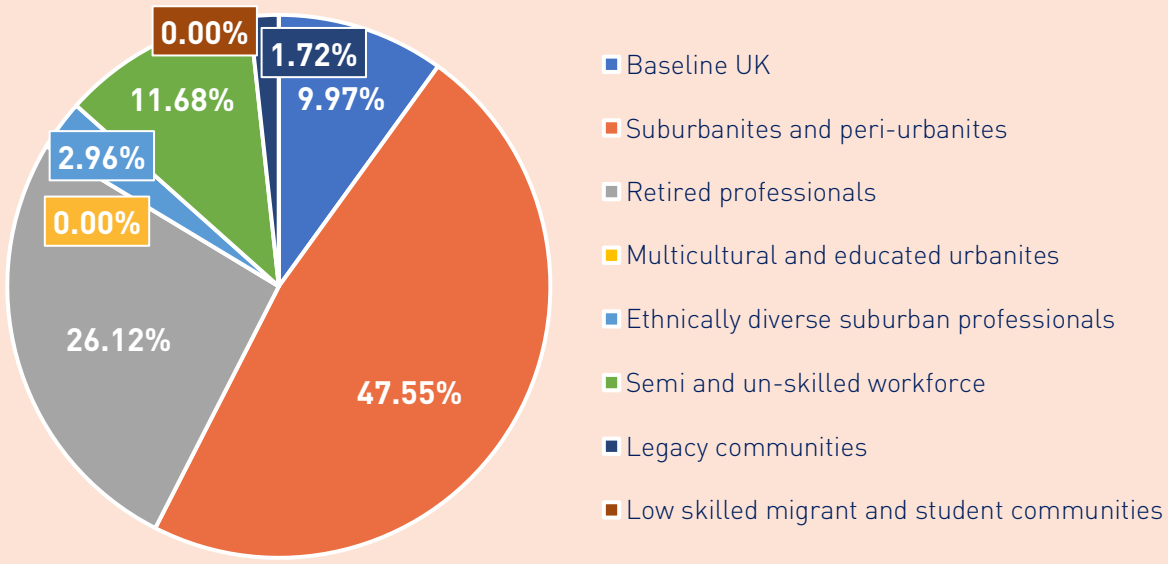



Figure 114 • North West Leicestershire district demographic profile



## Analysis

The North West Leicestershire trial launched with an above average participation rate of 43%. This dropped slightly in the six months between phases one and two to 38%. Across the first two phases, all trial households were monitored, whereas, in the expansion phases three and four, a sample of properties were identified, including three existing routes and three new routes.

The demographic make-up of the initial trial phase consisted of predominantly properties which have a lower link to participation, including Baseline UK properties (33.28%) and semi and un-skilled workforce (20.89), although there were still a high number of suburbanites and peri urbanites (21.17%). The expansion sample was designed to be more representative of North West Leicestershire's demographic make-up, consisting of a majority of Suburbanites and peri urbanites (42%) and Retired professionals (32%), two of the supergroups most linked to participation.

The average participation for the initial trial phase was 40%, growing to 46% in the expansion phase. This is likely due to the change in demographic make-up outlined above. That being said, the initial trial phase performance was higher than anticipated in North West Leicestershire, given that the majority of properties were categorised into supergroups with low correlation with participation. Given that North West Leicestershire's wider demographic make-up is closely linked to that of the expansion phase, the authority should expect consistent levels of participation upon expansion to all households.

## Material composition

Very little changes occurred between the two composition tests in North West Leicestershire. The 18-micron bag contributed 5% towards the composition of the material.

Figure 115 • Material composition – June 2024

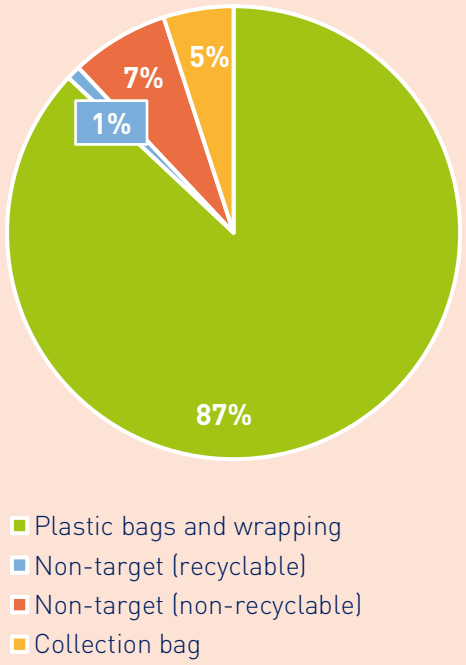
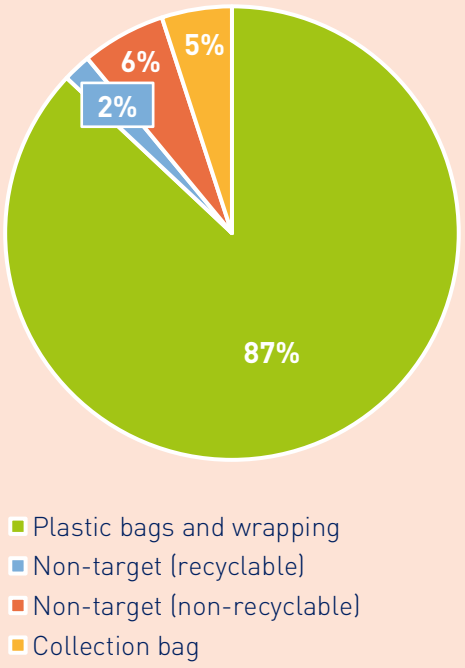



Figure 116 • Material composition – February 2025



## Local authority experience

North West Leicestershire District Council said:

*“ North West Leicestershire District Council operates source-segregated collections of dry recyclables from the kerbside using collection vehicles with different compartments for each material. With no available spare compartments on the vehicles, the challenge was to identify the most appropriate method to incorporate the collection of plastics bags and wrapping alongside the other materials.*

*After an appraisal of different options, we decided it would be feasible to put the plastics bags and wrapping in the same compartment on the vehicle used for paper. This was due to available capacity as paper tonnages have slightly decreased year-on-year since the advent of digital media. Also, the risk of contamination to both materials was deemed low, as the purple bags provided to residents to use for the plastics bags and wrappings wouldn't become caught against the paper causing the bags to rip and split. An operative is used at our waste transfer station to pull the purple bags out of the paper when it is tipped, placing the purple bags in a separate bay. Subsequently, there's been no issue with either material experiencing reportable contamination.*

*The interaction between residents and the service has been excellent. Households have provided feedback regarding how much they value the service and they've been surprised at the volume of material they're able to recycle. The council has been very pleased with the participation rates, tonnages, and quality of material collected. One challenge will be the ongoing development of the end markets for the material. However, we have experienced during the course of the trial the market availability for the material has improved, we hope this increases further due to the requirement that all councils in England will need to collect the material from March 2027.*

*The service is currently provided to over 13,000 households of the 50,000 households in the district. Therefore, the learning and experience from the trial will be fundamental when rolling out the collections to the rest of the district. We also hope our learning and experience which will appear in the FlexCollect blueprint will be informative for other councils not yet collecting the material.*

## Bracknell Forest Council

| | |
|---|---|
| Demographic profile | Suburban with low deprivation |
| Total number of households | 50,000 |
| Service type | Fortnightly, comingled (RCV, glass bring bank) |
| Contractor | SUEZ (collections) and FCC (sorting) |
| Launch | March 2024 |
| Households | 10,302 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

### Initial trial overview

Bracknell was the last of the original nine local authorities to launch a trial service. Using the successful learnings from the other eight pilot authorities (in particular Reading, who like Bracknell, is part of the re3 partnership), Bracknell Forest Council agreed to launch at an 'expanded' number of households.

Residents were supplied with 50-micron blue collection bags and asked to present filled bags in their existing blue comingled recycling bin. The comingled dry mixed recycling and FlexCollect bags were collected fortnightly by the crews using single compartment RCVs, with material sorted by FCC in Reading. Unlike Reading, material was tipped at a transfer station operated by FCC, before being bulk hauled to the materials recycling facility. Similar to Reading, the material was removed over the processing line in the fibre cabin.

Bags were initially delivered to residents by SUEZ crew members over two Saturdays. In total, five crews and vans were used. Top-up requests were also managed by SUEZ as part of the bin delivery service, with orders received and raised via the council website.

### Challenges

#### Material transfer

Bracknell's dry mixed recycling is delivered to the materials recycling facility via a transfer station. Although the service is only offered to approximately 20% of households in Bracknell, bags have the potential to arrive at the materials recycling facility in all loads due to bulking at the transfer station. Although every attempt is made to isolate material at the transfer station, this necessitated a full time operative at the materials recycling facility.

## Participation data

Figure 117 • Bags collected per household passed per cycle

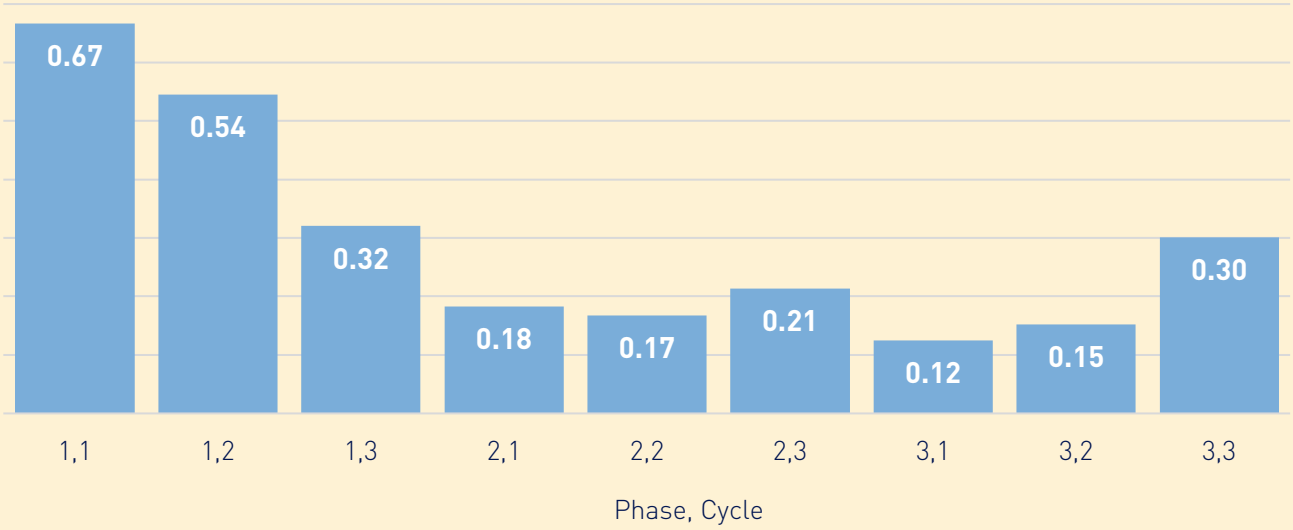



Figure 118 • Average weight per household per week (g)

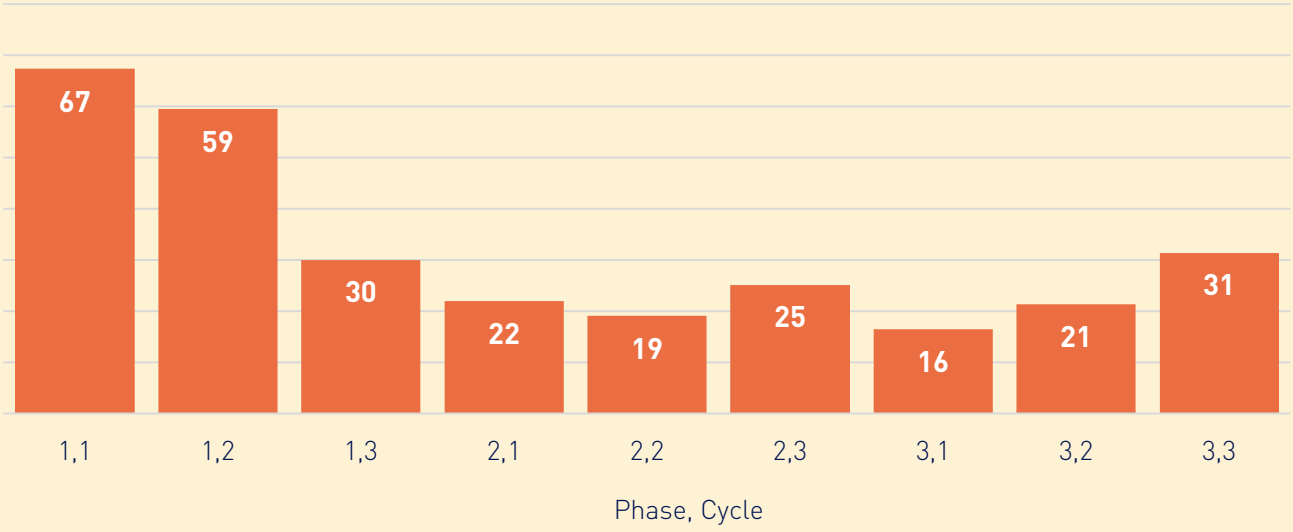
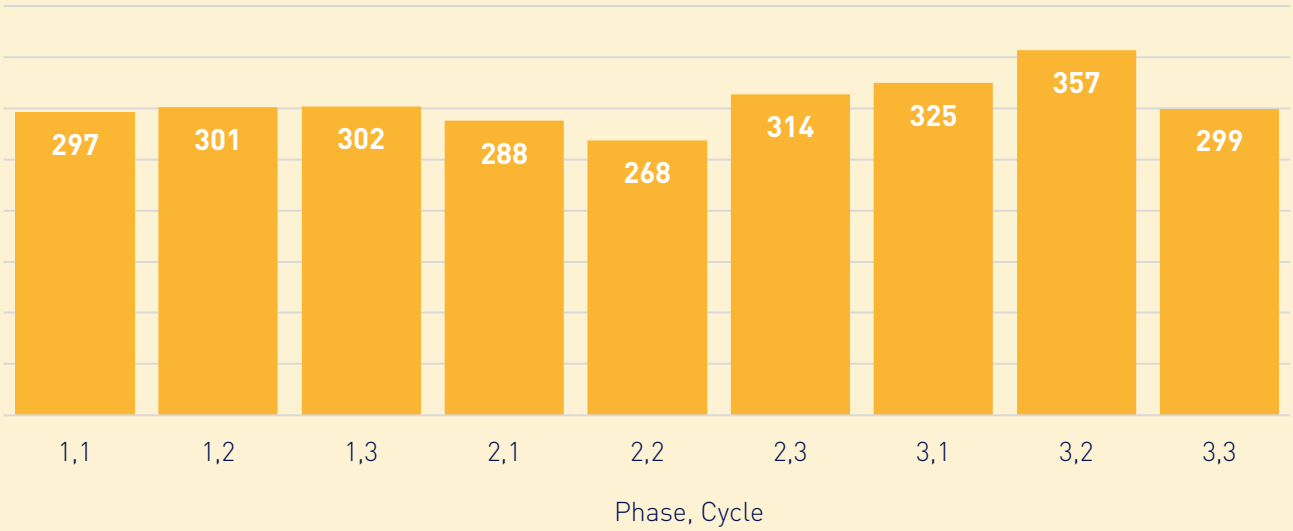
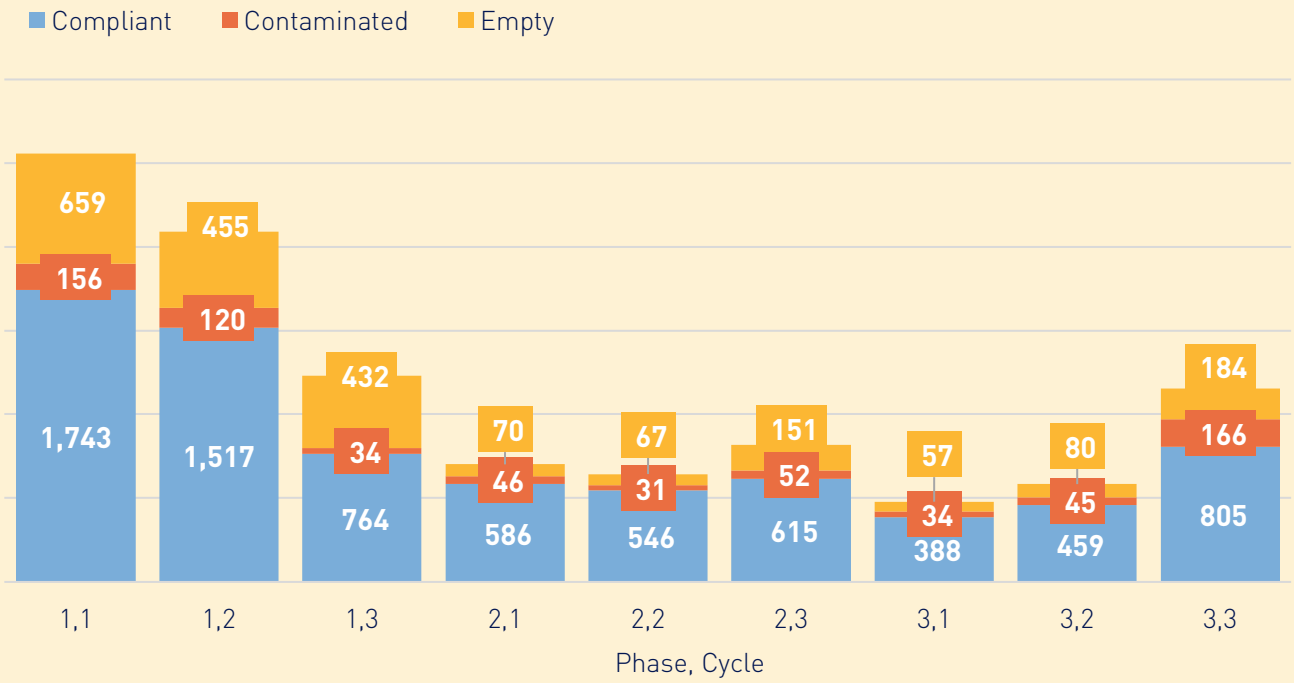


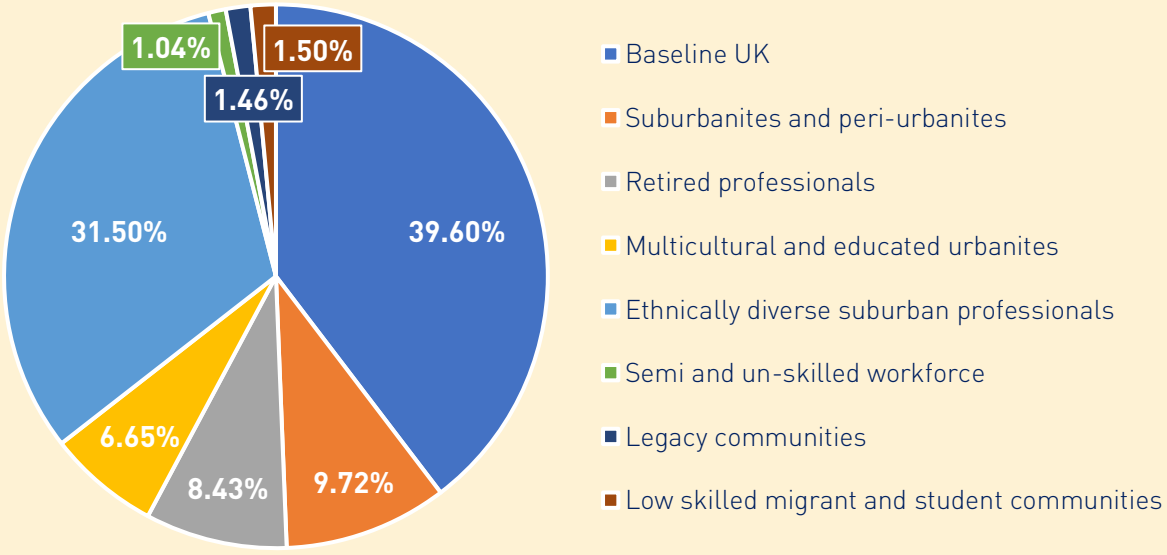

Figure 119 • Average bag weight per phase (g)



## Figure 120 • Total number of compliant, contaminated and empty bags




## Figure 121 • Bracknell Forest demographic profile



## Analysis

Bracknell saw the highest average starting participation rate over the collection cycle, equating to 67% set out over the fortnight.

The three collection cycles which made up phase one showed a great degree of variability in set out, so a fourth cycle of monitoring was arranged to ensure no error had occurred. The additional datapoint sat within the upper end of the range, so the original three cycles were counted. On the other hand, the starting average bag weight was the lowest recorded for any phase one at 226g. For example, back calculating the total tonnage collected over the phase one monitoring using an average bag weight of 300g would result in an average participation/set out of 38%. Bracknell also saw the highest fall in participation, from 67% to 22% in phase two, followed by marginal growth to 24% in phase three.

Bracknell was the first authority to launch an 'expanded' service, and early results from here were key to understanding what may happen as the other trials expanded. The second phase of monitoring was completed eight months after the service launched, falling in line with the expected usage of one bag per week per household. It's reasonable to assume that the drop off in participation could have been the result of households running out of bags. This is especially the case given the lower average bag weight seen across phases one and two. Re-orders in Bracknell equate to around 200 per month, a small number considering the 10,000 households involved in the trial.

The demographics of the trial area and indeed Bracknell Forest as a whole, consisting of 40% Baseline UK 32% ethnically diverse suburban professionals, likely decreased participation.

Given that phase three monitoring saw a participation rate of 24% three months after phase two was completed, it is expected that these levels will remain consistent across wider Bracknell populations. Participation drop off after bag supply runs out is a key issue which needs to be effectively addressed in order to sustain engagement.

## Material composition

No changes were recorded between the two composition tests in Bracknell.
The 50-micron collection bag accounted for 9-10% of the composition.

Figure 122 • Material composition – July 2024

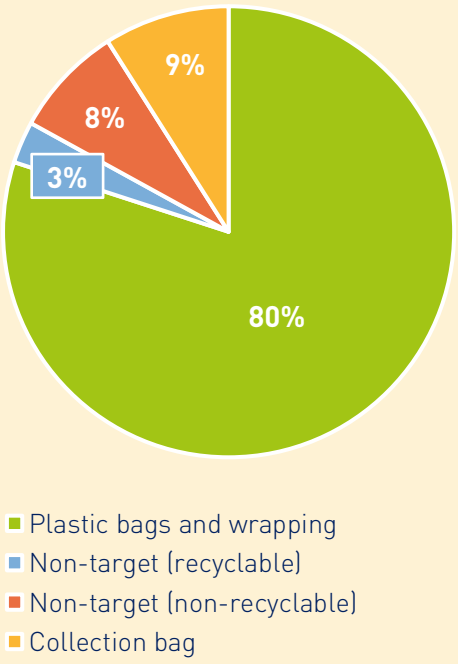
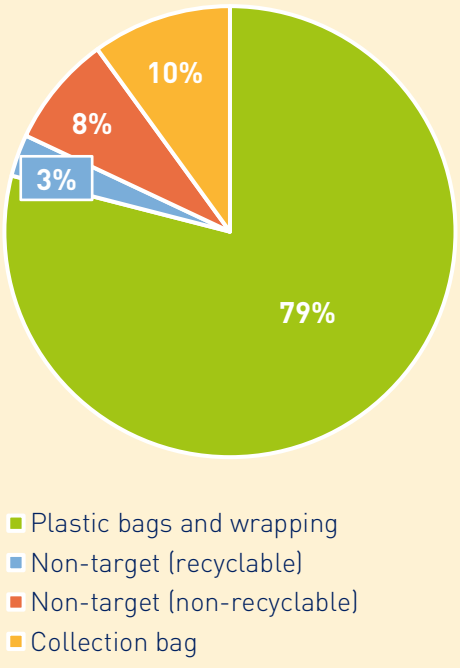



Figure 123 • Material composition – November 2024




# Warwick District Council

| | |
|---|---|
| Demographic profile | Rural with low deprivation |
| Total number of households | 62,000 |
| Service type | Comingled (RCV) |
| Contractor | Biffa (collections) and Sherbourne Recycling (sorting) |
| Launch | October 2024 |
| Households | 14,247 |
| Total service households | 62,000 |
| Material type | Polyethylene (PE) and polypropylene (PP) |

## Background

Warwick District Council is one of eight local authorities to jointly own the Sherbourne Recycling materials recycling facility in Coventry. Opened in 2023, Sherbourne's materials recycling facility is designed to accept fully comingled recycling, including flexible plastic packaging. All eight local authorities will soon be able to offer a fully comingled service to their residents. Ahead of this, Sherbourne Recycling and Warwick District Council approached the FlexCollect team about launching a trial service in Warwick, to benefit from learnings and data gathered to date, and to offer their ability for fully comingled processing – an important approach that had yet to be tested within the FlexCollect project.

## Service overview

Approximately 14,000 households across Warwick district were chosen to participate in the project. The households were representative of wider populations within Warwick. The same three flyer approach was used to communicate the service launch, with the content detailing how to participate in the fully comingled collection.

At the materials recycling facility, material from these properties was isolated and batch run through the process to generate the required datapoints, including, film tonnage and purity, in-feed and residual sampling and purity of other material streams.

At the same time, Warwick launched the service with the remainder of their households (approximately 45,000), using a variety of communications channels including press, app-based communications and social media, but excluding flyers. The flyer approach for the 'FlexCollect' sample allowed consistency in approach, limiting variables. The alternate approach to communications could also be evaluated in comparison to the three-flyer approach through the in-feed sampling, but was not explored as part of this project.

## Challenges

### Data collection

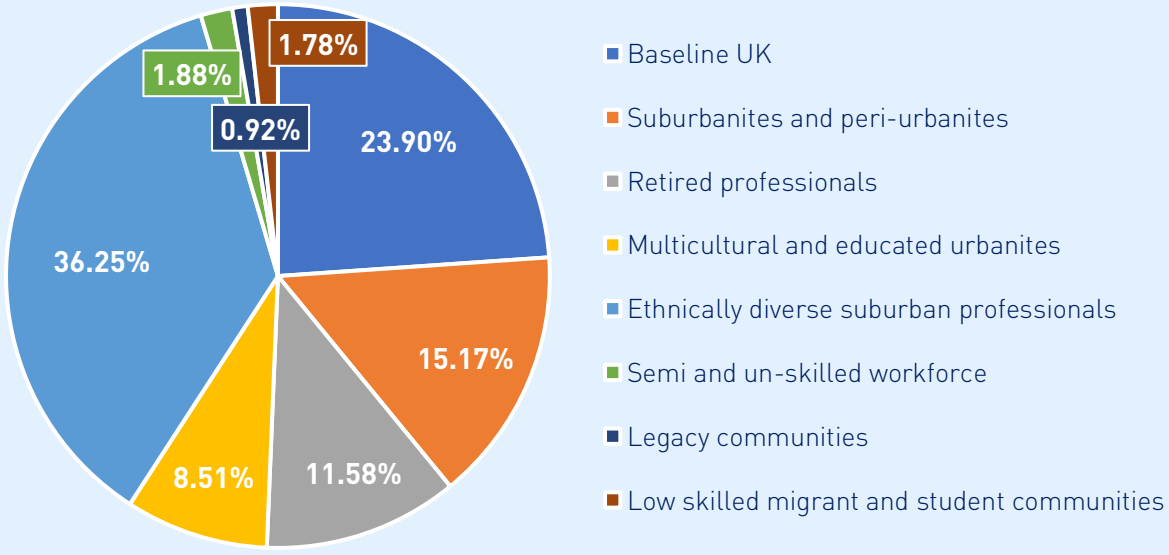
In Warwick, the data collection relied on input sampling to build a picture of how much material was being presented. Compared to other trial areas, where all FlexCollect bags within a sample could be counted, it was not possible to conduct a mass balance of all flexible plastic packaging within the dry mixed recycling. In-feed sampling only represents a very small snapshot of the material, yet is time consuming to complete, especially compared to a bag count.

## Results

The Warwick District Council trial was added at a later date to address a key knowledge gap in the project, that of comingled processing of loose flexible plastic packaging. The result are analysed in the results section of the report.

## Demographic profile

Figure 124 • Warwick District demographic profile



## Material composition

The approach to composition sampling was different in Warwick. As material was not presented in a bag, the approach analysed the film composition of the overall materials recycling facility input sampling. For this reason, there is no non-target material in the input composition. The output composition involved analysing a sample of the material that had been separated into the film bay as a product by the materials recycling facility process.

For the above reasons, it is not possible to directly compare the samples to any other pilot authorities, however it is evident that higher quantities of polyethylene material are collected for recycling in Warwick district. As this is evident in both the input sampling and the output sampling, it cannot be concluded that this is a result of the materials recycling facility process. The residents in Warwick received the same set of communications and therefore target item list as the other nine trials.

Figure 125 • Material composition – Input sampling

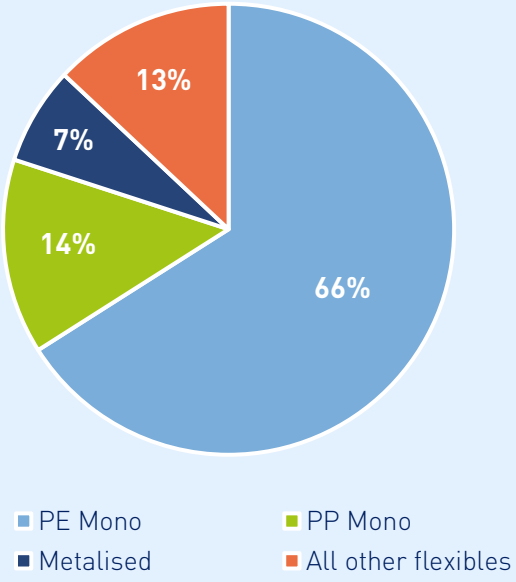
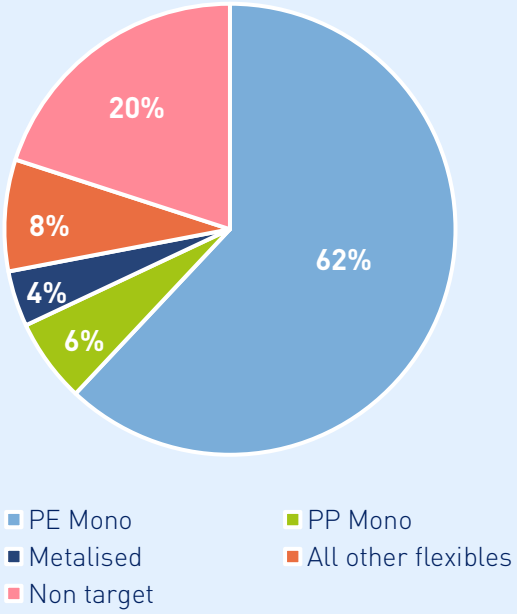



Figure 126 • Material composition – Output sampling



APPENDIX

# RECYCLING END MARKET CASE STUDIES

# Jayplas

Jayplas is one of the UKs largest independent specialist plastic recyclers, converters, and recycled plastic packaging manufacturers. They sort and reprocess rigid and flexible plastic packaging, and have focussed capacity on flexible plastic packaging at two facilities to sort, wash, pelletise and recycle flexible plastics from commercial, retailer front of store and kerbside sources.

## Fully automated sorting facility in Smethwick

The facility sorts flexible plastic packaging to produce a range of recycled flexible packaging products. They produce polyethylene (PE) film bales in natural or coloured, polypropylene (PP) film bales packaging in coloured, and multi-layered bales. End market examples for the bales include recycled packaging products, such as bags and refuse sacks, and PP labels. The capacity of the facility is up to 80,000 tonnes per year.

## PE and PP film recycling and production in Loughborough

Jayplas operates two wash lines in Loughborough to produce recycled natural and coloured pellets in PE and PP, both used in the manufacture of new products. End products for the PE pellets include flexible packaging products such as collation shrink (e.g. film surrounding a 6 pack of bottles), pallet wrap, bags for life and online retailer packaging. End markets for the recycled PP pellets include transport trays and flexible labels. The capacity of the site is up to 50,000 tonnes per year.

Jayplas also operates other material sorting and rigid plastic packaging reprocessing facilities:

- Plastics recovery facility in Alfreton – automated sorting of post-consumer mixed rigid plastics, sorting by HDPE, PP, PET and by colour.
- Rigid recycling and production facility in Corby – a hot wash facility for recycled PET flake for food grade bottle to bottle recycling, and PET food contact products.
- HDPE and PP food grade pellet production facility in North Thoresby – production of end products such as milk bottles, personal healthcare and household cleaning products.
- Bag for life manufacture in Worksop – using up to 100% recycled content.
- New £45 million facility in Wales opening in 2025 – with a capacity of up to 150,000 tonnes per year, the facility will sort and recycled flexible and rigid plastic.

## Feedstock requirements

Jayplas's feedstock requirements for flexible plastic packaging are:

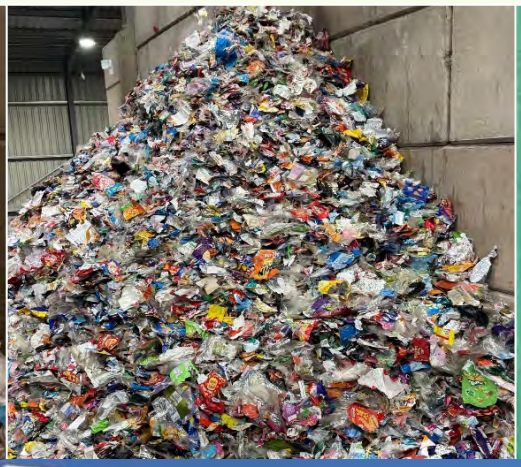
- Household or household-like flexible plastic packaging, such as from kerbside or front of store sources
- Food contamination must be minimised
- Material must be provided baled, including bales of collection bags
- No pre-sort is required

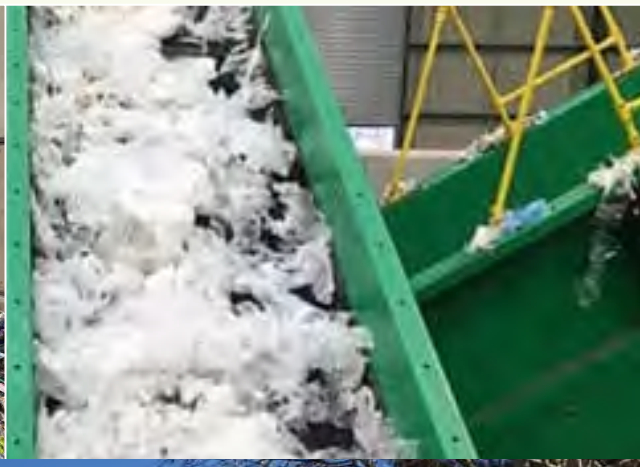
## FlexCollect trial results

The FlexCollect material was first sent to Jayplas' Smethwick site where it underwent sorting via near infrared (NIR) to sort by polymer, targeting both PE and PP streams. The material was then transferred to their Loughborough site where it was washed and extruded into coloured PE and PP pellet.

The PE from the process was used in the manufacture of film products, and the PP in the manufacture of rigid products. Contamination or fines from the process were sent for energy recovery.

Material yield from the process often exceeded 80%, with pellets produced suitable for a variety of products.





## Plastecowood

Plastecowood have been operating for ten years, processing and designing sustainable outdoor plastic wood products.

UK based and owned, their manufacturing facility in North Wales repurposes plastic packaging waste, transforming it into their durable and practical Smartwood™ product. An alternative to traditional timber, benefits include durability, ease of use and maintenance, and reduced slip hazard.

Products include outdoor furniture, storage and shelters, fencing, planters and play equipment.

More information about their process and products can be found at www.plastecowood.com.

### Feedstock requirements

Plastecowood have the following feedstock requirements:

- Household or household-like flexible and rigid plastic packaging
- Material should be dry with minimal food contamination
- Material must be supplied baled

### FlexCollect trial results

A total of 24 tonnes was sent to Plastecowood for recycling. Plastecowood's process used 100% of the material in the production of plastic lumber. The FlexCollect material was blended with equal quantities of mixed PE regrind material and black masterbatch (concentrated pigment) to produce 27kg planks which are suitable for a variety of products. Plastecowood anticipated that the blend could be adjusted depending on the quality of feedstock, noting that if the quantity of FlexCollect material were too high, it may reduce the visual appearance and strength of the final product.

### Commercial considerations

Plastecowood's optimal commercial agreement is a customer buy back agreement, where the supplier provides the feedstock and purchases the final products at a competitive price.

Feedstock is a blend of post-consumer plastic packaging and coloured recycled HDPE regrind from commercial sources.

## Meplas

Meplas Ltd is a UK-based recycling company that specialises in the processing of low density polyethylene (LDPE) and PP plastic packaging films. The company handles plastic from UK sources, sorting and processing it through a customised washing facility. Following this, material undergoes extrusion and pelletising, with resulting pellets marketed as feedstock for UK manufacturers of PE and PP blow and injection grade products.

The company's main focus is single-stream packaging films, targeting 99% purity in either PE or PP content. Meplas employ various methodologies to clean and blend materials to achieve purity levels and throughput necessary for processing into a commercially viable feedstock. In their shredding and washing operations, the materials are prepared for pelletising, allowing them to be utilised in diverse manufacturing process, including:

- Packaging films, bin bags, water proofing membrane and sheeting cover
- Transportation buckets for building products or household buckets
- Gardening tools and furniture, including chairs, pavement grids and garden edging
- Automative industry used for bumpers and instrument panels
- Retail coat hangers

More information about their process and products can be found at www.meplas.co.uk.

### Feedstock requirements

Meplas have the following feedstock requirements:

- Packaging films ranging from food packaging waste, post industrial factory packaging waste and post-consumer materials recycling facility recovered soft films
- Ideally dry with minimal food contamination
- Material should be supplied baled

MEPLAS

## FlexCollect trial results

A total of 59 tonnes was sent to Meplas for processing. The bales were first opened and shredded, before passing through two wash tanks, where sinking fractions and organic contaminants are removed. The material was then dried before being baled.

Although high in PE and PP, the mixed nature of the material complicates the processing and end market application. When blended with other materials, it can be used to support commercially viable products. Meplas recommend blending with higher quality PP materials to enhance the durability and usability of the material, thus expanding end market applications.

Washed, shredded flake material was sent to a third-party pelletiser in the UK, where the pellets produced were used in car part manufacturing by combining with a higher purity PP pellet. Meplas aim to produce their own pellets from the FlexCollect material in the future.

APPENDIX

# FLEXIBLE PLASTIC PACKAGING RECYCLING END MARKETS REPORT

# FPF FlexCollect Project

# Flexible Plastic Packaging Recycling End Markets

July 2025

RECOUP

Leading a more circular plastics value chain

This research has been compiled by RECOUP for the Flexible Plastic Fund's (FPF) FlexCollect project.

RECOUP is the UK's leading independent authority and trusted voice on plastics resource efficiency and recycling. As a registered charity, supported by our members, RECOUP aims to:

- ✓ **Inspire** collaboration by connecting the whole plastics value chain
- ✓ **Lead** the continued development of a plastic circular economy, resource efficiency, recycling and re-use
- ✓ **Educate** the public and businesses on all aspects of plastics recycling and resource efficiency

The content and analysis contained in this report is based on the information received. While every effort has been made to ensure the accuracy of the contents of this publication, RECOUP cannot accept responsibility or liability for any errors or omissions. Opinions expressed by external contributors may not reflect RECOUP positions. Recommendations provided herein are offered for the purpose of guidance only and should not be considered legal advice.

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## Background

The government reform of the packaging Extended Producer Responsibility system (pEPR) and the Simpler Recycling legislation will create a requirement for flexible plastic packaging to be collected from households and businesses in the UK by 31 March 2027.

To lay the foundations and inform effective evidence-based pathways to recycle these materials, the Flexible Plastic Fund (FPF) FlexCollect project was launched in May 2022. It is the most extensive pilot for household collection and recycling of flexible plastic packaging ever undertaken in the UK.

The project is a collaboration between leading industry and government partners, led by a project consortium including SUEZ recycling and recovery UK, WRAP, RECOUP and Ecosurety, with funding contributions from the Flexible Plastic Fund, Defra, UK Research and Innovation's Smart Sustainable Plastic Packaging Challenge delivered by Innovate UK, and Zero Waste Scotland.

The FPF was established in May 2021 by five founding partners: Mars UK, Mondelēz International, Nestlé, PepsiCo and Unilever. Partners of the Fund now also include Abel and Cole, Eat Real, Ella's Kitchen, Kiddylicious, Koninklijke Douwe Egberts, KP Snacks, Lotus Bakeries, McCain Foods, Natural Balance Foods, Ocado Retail, pladis, Proper Snacks, The Collective and Vitaflo.

Working with a number of pilot local authorities, the project undertook a series of innovative trials to explore how to collect and recycle household flexible plastic packaging at scale. This was to help understand how to incorporate these materials into existing collection services across different systems and demographics; how to effectively sort the material into the required fractions and specifications, and to rial recycling end markets.

The outcomes of the project will help local authorities, industry and government understand how a flexible plastic packaging collection service can be implemented across a range of collection systems, population densities and socio-demographics, including collection methods, waste and recycling operations and householder interaction with the services provided. It also informs recycling end markets, and how to address technical and commercial challenges that could inform intelligent design for future end markets systems.

At the beginning of the project RECOUP and SUEZ worked collaboratively to produce a report to scope and refine the facilities that could process or trial processing the material. This provided a foundation and framework for exploring sorting and recycling options for the collected material.

This was done to understand two key areas:

1) Technical capabilities to process the various polymer and packaging format types in this material to agreed specifications; and
2) Commercial considerations for processing the material.

To do this effectively, specific questions were researched for each facility:

- ✓ Material feedstock requirements / specifications.
- ✓ External pre-treatment processes required to meet those specifications – e.g. sorting requirements or material washing.
- ✓ Brief overview of operations, technologies and processes used.
- ✓ Material outputs produced – products and / or technical material specifications.
- ✓ Production capacity and any plans for expansion.

- ✓ Commercial information relating to the processing of material including gate fee to accept material / value of the products produced / material processing costs (against using standard feedstock).
- ✓ Willingness to accept material for a recycling trial and quantity that can be accepted

## Report Context & Approach

The report documented the findings of the research and was used as a working document by the project team.

To be as transparent as possible about the approach, not include outdated information and to protect commercially sensitive information, the report has been adapted for circulation outside the project team. The approach has been to split it into three sections:

1) Provide context to the original end markets research by outlining the current situation for recycling post-consumer flexible plastic packaging, which includes tonnages placed on the market (POM) and tonnages collected for recycling.
2) Recommendations for interventions to drive recycling end market demand and create the investable conditions to develop the necessary infrastructure.
3) Include the facilities that were researched, removing commercially sensitive information, and categorise the facilities by trial partners; and other sites considered, including those that went into administration during the duration of the project; and some of the offtake markets that were considered that could use the material in new products.

## 1) Current Situation for Post Consumer Flexible Plastic Packaging Recycling in the UK

Flexible plastic packaging is a complex plastic packaging format with different polymers, inks and laminates, including metalised packaging. Looking at the overall environmental credentials of packaging, it is recognised there are benefits in using flexible plastic packaging rather than rigid formats due to using less plastic, reduced carbon impact and better performance in some cases.

Flexible plastic packaging is collected from just 14% of local authority kerbside collection schemes [1]. This is supplemented by what is collected from supermarket 'front of store' schemes which have been implemented since 2021 by most of the major food retailers, although there is no standardised service provision or citizen messaging. Material from some front of store systems is also mixed with back of store commercial films prior to transport to a reprocessor.

Relatively low quantities of post-consumer flexible plastic packaging are currently collected, and they do not generally contribute significantly towards achieving packaging recycling targets. However, with the requirement to collect from all UK households and businesses from April 2027, the quantities tonnages will increase significantly. Local authorities and waste management providers will need to react to this requirement in a very short timescale.

[1] 2024 RECOUP UK Household Plastic Packaging Collection Survey

## Placed on the Market

When looking at future recycling capacity requirements, assessing what is placed on the market (POM) – knowing what flexible plastic packaging is used by the consumer – is an important factor to understand the scale of the challenge.

It is currently unclear how much post-consumer flexible plastic packaging is POM. One estimate for 2022 is **336kt** [2]. Based on the Office of National Statistics (ONS) data from January-October 2023 from the Office for Budget Responsibility (OBR) forecast November 2023 on consumer spending, it was estimated this figure would reduce to 320kt in 2023, before increasing between 0.5% and 2.15% each year until 2028. Using the same report, it is estimated that an additional quantity is from material categorised in an 'other' fraction (i.e. packaging components not assigned as 'bottles', 'pots, tubs and trays' and 'films'), and assigning a proportion of this to flexible plastic packaging, it is estimated around **350kt** is POM.

More recently, informal industry estimates are significantly higher than this, at around **450kt,** so a range of **350kt-450kt** has been used as best estimate.

## Collected for Recycling

Currently 14% (49) of the 361 local authorities in the UK collects post-consumer flexible plastic packaging as a target material for recycling [3] and an estimated 25kt of this material is collected for recycling [4]. Collection quantities are mainly from kerbside schemes, although it is estimated that a combination of bespoke collection schemes including retailer front-of-store, and recycling non-target material that ends up in mixed plastic bales from MRFs – accounts for some of this quantity.

When all households have a kerbside collection scheme that includes flexible plastic packaging from 2027 onwards, an estimated **180kt** will be collected for recycling based on extrapolating current best available data. Tonnages may vary depending on the effectiveness of communications campaigns, and will increase during the first few years as the scheme becomes established and citizens get used to the new service.

In 2027, if there are comprehensive resident communication campaigns and messages to announce new services, it is expected collection rates have the potential to achieve 40% in line with plastics pots, tubs and trays.

Placing a 40% collection rate against the 350kt-450kt POM would produce **140kt-180kt range**, with a mid-point of **160kt**.

## Material Flows and Yield

There is an estimated **50-60%** yield from sorting and reprocessing post-consumer flexible plastic packaging [5]. As an example, if the 40-50% material yield loss can be broadly split into 20% from primary material sorting and 20-30% from reprocessing, there would be an estimated material yield of **80%** after the primary sorting process. This would create **112kt-144kt** of material output, with a

[2] Valpak *Packflow 2023* report
[3] 2024 RECOUP UK Household Plastics Collection Survey
[4] 2024 RECOUP UK Household Plastics Collection Survey
[5] Valpak *Packflow 2023* report and RECOUP sources

mid-point of **128kt**. It should be noted that due to the diversity of the technology and processes used in mechanical, chemical and physical recycling, these material yields are highly variable and to be viewed as indicative.

If flexible plastic packaging reflects the nominal ~50% overall plastic packaging exported for recycling, an estimated **56kt-90kt** of available capacity will be needed to recycle this material in the UK, with a mid-point of **64kt**.

Although recycled materials are a resource and are traded on a global level, exporting material for recycling should only be utilised where a UK option is not feasible. It would be prudent to aim to recycle as much as possible in the UK for both resource security and transparency, but also to develop the infrastructure and retain the associated environmental and commercial benefits in the UK, which otherwise would be realised elsewhere.

It isn't possible to estimate recycling capacities available to process post-consumer flexible plastic packaging now and in 2027 with reasonable confidence levels. This is mainly due to variable feedstock composition levels, which can change regularly based on commercial market conditions and dynamics, and material availability.

The majority of facilities which currently process flexible plastic packaging focus on clean and clear commercial polyethylene (PE) flexible plastic packaging. These facilities have been in place since the 1990s and are driven by the value of material and market demand. There are some facilities that process small quantities of post-consumer flexible plastic packaging from time to time, if the right commercial incentives are provided.

Furthermore, if facilities were to accept post-consumer material, their capacity might also vary depending on whether they target PE only, PE and polypropylene (PP), or mono material, laminates or metalised material (e.g. either heavier foiled material such in pet food pouches and aluminium coated vapour deposited packaging in packaging sauch as crisp packets, or both).

Looking at the recycling infrastructure in the UK, capacities to process flexible plastic packaging have been aggregated from publicly available information on websites and press releases, and by communicating directly with operators. Factoring in the variables outlined above, and based on dialogue with many UK recyclers, the estimated capacity to recycle post-consumer flexible plastic packaging is **25kt-50kt**.

This creates a recycling capacity gap of **31kt-65kt** in the UK.

This could be filled in two ways, or a combination of both:

1) Greater commercial incentives to utilise capacity at existing facilities.
2) Duplicating key facilities in the UK to double or ideally triple the current available capacity.

There would be financial demands for both:

- Option 1 could be delivered without any new facilities becoming operational, but there would need to be strong commercial incentives in place that could include producer costs, gate fees, and guaranteed offtake markets.

- Option 2 would require capex incentives and systemic change to drive commercially investable conditions which are not currently in place in the UK.

## 2) Recommendations for Intervention

There is significant momentum building to prepare for the 31 March 2027 date to collect flexible plastic packaging from households and businesses. However, as context to the commercial considerations outline above, post-consumer flexible plastic packaging is the most complex format of plastic packaging to recycle, which is why recycling has not been implemented at scale to date, and commercial and technological enablers are needed.

The timing of this project coincides with additional challenges around the commercial viability of plastic packaging recycling in the UK. This includes high energy prices and reduced demand created by cheap virgin plastic imports. There have been a number of notable closures, with some large operators enacting a new strategy to exit mechanical recycling operations in the UK. These have included facilities that were set up to recycle post-consumer flexible plastic packaging. Interventions are needed to support a shrinking, uncompetitive recycling infrastructure in the UK.

Reprocessing plastic packaging has many environmental and financial benefits – it means we're dealing with our own waste, it reduces our carbon impact and it develops skilled 'green' jobs. It directly contributes towards the UK's legally binding target to reach net-zero greenhouse gas emissions by 2050 [6].

Current reprocessing capabilities for post-consumer flexible plastic packaging are similar to where the UK was with creating plastic bottle recycling infrastructure around 30 years ago. There are many elements to building an effective recycling infrastructure, these include:

- ✓ **Informed packaging design**, aiming for the best possible environmental outcome in the packaging life cycle whilst prioritising performance in the recycling systems whenever possible.
- ✓ **Achieving quality material** from collection schemes through effective consumer communications and behaviour change programmes.
- ✓ **Optimising recovery and material sorting and clean-up operations** in materials recycling facility, plastics recycling facility and specialist film operations utilising the capability to sort separate flexible plastic format streams.
- ✓ **Building the sorting structure** to create the raw materials to supply recycling end markets.

Whereas these are high level aims and indicators, there are key environmental principles and enablers that could provide a platform to build a competitive UK reprocessing infrastructure, creating the investable conditions needed to grow the sector: [7] [8]:

[6] https://commonslibrary.parliament.uk/research-briefings/cbp-9888/#:~:text=Net%20zero%20targets,the%20period%20from%202038%2D2042
[7] BPF Plastic Recycling Roadmap 2024
[8] RECOUP – Considerations and Recommendations for a More Effective Plastic Packaging Tax (October 2024)

- ✓ Policy change, including the inclusion of waste incineration and Energy from Waste facilities in the UK Emissions Trading Scheme, the drive to net zero and recycling legislation, bringing about systemic changes that reduce the amount of plastic in residual waste.
- ✓ Ensure packaging EPR payments to local authorities provide appropriate funding for them to collect and sort flexible plastic packaging from other materials and plastic packaging formats, with consideration given to secondary sorting to meet specific feedstock requirements for reprocessors.
- ✓ Material is only exported for recycling where this is the best environmental outcome and not for economic reasons, at the expense of developing domestic infrastructure, when the material can and should be treated in the UK.
- ✓ Plastic packaging waste should be permitted for export to OECD countries, including EU Member States, only where the infrastructure is in place to handle it, and there is evidence that the route the material takes meets circular outcomes.
- ✓ Effective use of digital waste tracking and enforcement needs to be in place for plastic packaging that is exported for recycling, to ensure the material is traceable and audit trails are documented to cover the full journey of the material.
- ✓ Fit for purpose enforcement against material that is exported illegally, either by exceeding contamination levels, by being sent to a non-recycling end destination or that is outside of any legal structure and regulation. Effective enforcement is essential to enable long-lasting and meaningful change.
- ✓ Biodegradable and compostable polymers are only used where there is a clear benefit and where there is no risk of contaminating recycling streams.

The reprocessing sector – those creating raw materials to be used in new products – need commercial support to operate and build the required infrastructure.

Creating and scaling the investable conditions is essential to changing the trajectory for reprocessors that process or could process post-consumer flexible plastic packaging in the UK. Specific support can include:

✓ **Urgent changes after the review of the Packaging Recovery Note (PRN) system**

Prior to the implementation of packaging EPR the PRN (Packaging Recovery Note) system was the producer responsibility system to ensure producers pay towards the management of their packaging after it's been used. PRNs and PERNs (Packaging Export Recovery Note) are produced by reprocessors and purchased, mainly through compliance schemes, for every tonne of material that is recycled. The funding that is raised through this system is then attributed to a number of categories: infrastructure and capacity; funding collection; reduction in price and developing new markets; cost of complying with the regulations; retrained for future investment and developing communication strategies.

The system was set up when the commercial dynamics and collection infrastructure for plastic packaging, where it existed, focused on plastic bottles. The planned introduction of post-consumer flexible plastic packaging to UK kerbside schemes further adds to the complexity and a consultation about changes to the PRN system will take place in autumn 2027.

In terms of developing capability to reprocess post-consumer flexible plastic packaging in the UK key changes to the PRN system should be to:

1. Remove the incentive to export plastic packaging for recycling. At present, material recycled in the UK is measured at the point that the recycling has taken place, once any contamination or non-target material has been removed and material yield losses in the recycling processes have taken place.

   Material that is exported using Packaging Export Recovery Notes (PERN) includes the weight of any contamination or non-target material that may be lost in the recycling processes that take place overseas, prior to reaching any end-of-waste status. Removing the economic variable between PRNs and PERNs based on the point the note is claimed will make UK recycling more economically attractive to recyclers. Research is needed that would enable PERN values to be adjusted so they are reflective of the assumed material yield losses.

2. Provide a more stable, commercially supportive and modulated PRN for plastic packaging formats where targeted funding is needed the most. This would mean there wouldn't be one price for the PRN, instead it would be split between specific spend categories and it would be variable to focus the PRN funds on where price support is needed the most to act as a commercial driver to pull material through the recycling system. Flexible plastic packaging would be the priority format.

✓ **Use of material verification schemes to stop false claims of recycled content**

As of April 2025, the Plastic Packaging Tax (PPT) is applied at a cost of £223.69 per tonne for plastic packaging placed on the UK market that does not contain minimum 30% recycled content. However, an unintended consequence of the PPT is happening right now. The tax was set up as an 'environmental tax', but there have been many examples where packaging claims to meet 30% recycled content to avoid paying the tax – with some examples either not being technically possible or using the term 'pre-consumer' material that might not actually include any recycled content.

Claims of recycled content are not being sufficiently verified or enforced, particularly for packaging (filled and unfilled) that is imported into the UK. This lack of enforcement is increasingly making UK recyclers commercially unviable, due to having to compete with cheap imports of virgin packaging and packaging with recycled content from countries with a significantly lower cost base and greater access to material.

Mandated use of material verification schemes, either through certification or third-party schemes meeting specific requirements, should be used to evidence recycled content claims are accurate, and where they are not, ensure the material is not used to claim recycled content. In the short term, voluntary verification of material should be pursued wherever possible. However, this must be a workable system for all and reducing unnecessary burdens to business should be a priority.

✓ **Fast and accurate approvals of recycled content in food contact packaging**

Enabling applications for technologies to include recycled content in food contact packaging applications would unlock many high value recycling end markets. The Food Standards Agency (FSA) has been confirmed as the Competent Authority for Great Britain, and the focus is on the FSA progressing to undertake audits for companies supplying packaging into the EU under regulation 2022/1616. Due diligence needs to be applied, and approvals need to be technically accurate, but expediting this process would enable a faster transition to including significantly more recycled contact in plastic packaging and build on the approvals that are granted, contributing to creating the investable conditions in the UK.

✓ **Implement workable mass balance allowance to provide evidence of chemically recycled material for the purposes of the Plastic Packaging Tax**

Ensuring chemically recycled material can be counted as recycled content is essential to create the investable conditions for chemical recycling and use of chemically recycled content in food contact packaging applications. The government confirmed it intends to implement a Mass Balance Allowance (MBA) to provide evidence for use of chemically recycled plastic from April 2027. As of the time of writing this report, HMRC are in the process of releasing proposed policy papers for feedback, with feedback accepted at various points, with feedback for the last two papers accepted until 15 September 2025.

✓ **Provide tax relief or subsidies to reprocessors who process post-consumer flexible plastic packaging**

In recent years plastic packaging reprocessors in the UK have been commercially impacted by increased energy, logistics, equipment and labour costs. Their main commercial challenge is from imported plastic packaging, partly due to over production in non-EU countries of virgin polymers and packaging claiming recycled content, which could be an accurate claim or not. Any potential for financial support through tax relief or subsidies should be considered urgently to keep businesses operating in tough economic conditions, although this would need to be carefully designed to ensure any potential financial benefits are used appropriately.

✓ **Develop attractive and skilled careers and retain talent**

The reprocessing sector needs to build on the expertise it has to generate skilled roles that can attract and retain the highest possible level of expertise and abilities. Recycling generates interest and appeals to many, to retain talent this appeal needs to be backed up by commercially robust organisations operating in a thriving sector. Continuing to provide Innovate UK funding is a significant enabler to meet this challenge.

✓ **Continue to provide funding to Innovate UK**

There are many examples of recycling solutions that wouldn't be in place, or potential that couldn't be realised in the future without Innovate UK funding. A key grant funding stream was through the Smart Sustainable Plastic Packaging (SSPP) fund. The challenge now is to build and scale up the innovative facilities and technology that have been developed.

## 3) Recycling End Markets Research

End markets are defined as material sorting and reprocessing to produce a washed flake or pellet, or chemical recycling output, that can be used as a raw material to manufacture new products. These could involve:

- Material sorting of flexible plastic packaging from other materials and plastic packaging
- Sorting various flexible plastic packaging formats (e.g. mono-material vs laminates)
- Intermediate processes like washing and flaking
- Producing a final product

Outputs from these facilities can go into a variety of products:

- Flexible products –bags and sacks, stretch and shrink films, and films to be used in the agricultural and building sectors.

- Rigid products – compression moulding (plastic lumber etc.) and injection moulding (wide range of products from consumables like buckets to transport and horticulture products).

Facilities were selected to run trials using a number of considerations:

- ✓ Feedstock requirements, and capability and willingness to process the material.
- ✓ Quantities able to be processed.
- ✓ Processes that need to take place before and after the material is processed in order to manufacture a recycling end product.
- ✓ The raw material produced that can be used to manufacture a new product.
- ✓ Gate fees to cover processing costs, particularly if the facility does not usually process post-consumer flexible plastic packaging. These costs might also include cleaning the facility before and after processing to ensure the material is separate from the normal feedstock.

To complete an effective trial, it was important to try to replicate, as much as practical, normal day-to-day operating conditions. Due to the composition of the material and its current low level of processing in the UK, the gate fees charged reflected that the material was being trialled, and commercial adjustments would likely occur if economies of scale were created with the material being processed on a day-to-day basis.

The reasons facilities took part in trials were to:

- ✓ Test their current operations to process post-consumer flexible plastic packaging.
- ✓ Understand the commercial considerations i.e. whether a gate fee is charged and how much that is. These include operational costs, material yield losses and the cost to dispose of material not recycled, and the value of the end product.
- ✓ Inform their future strategy about processing the material.

The facilities have been presented as: who we did trials with; who we weren't able to do trials with; and facilities that closed during the duration of the project.

Information about the facilities include:

- ✓ Website
- ✓ Location
- ✓ Capacity
- ✓ Technology category

It should be noted that the information about each facility was researched between March and July 2022 (so is therefore not current) and was in the public domain.

The facilities were categorised into three broad areas:

- Material sorting
- Mechanical recycling
- Chemical recycling

The mechanical recycling facilities sub-categorised as:

- Plastic lumber / board / sheet
- Washing, shredding and extruding (including flexible plastic packaging products)
- Other

The outcomes of the recycling end markets trials are included in the FPF FlexCollect final report.

There were a number of reprocessors who produce their own products, such as Berry, Jayplas and Cedo, amd there was also a number of potential offtake markets that could potentially use post-consumer flexible plastic packaging as a feedstock for their products.

These included:

- ✓ Cromwell Polythene – manufacturing, sourcing, and distribution of products aimed at fostering the preservation, capture, and containment of resources, waste, and recyclables throughout the UK.
- ✓ James Halstead – flooring products that are used in schools, hospitals, transport, public, commercial and residential buildings around the world.
- ✓ Mabrebur – asphalt producers with roads in 30 countries across the world.

## Recycling Trials

The trial partners that recycled the material during the project are as follows.

www.chestnutpolymers.com/
Location: Unit 12 Woodford Court, Leslie Road, Winsford, Cheshire, CW7 2RB
Capacity: Pilot site
Technology: Mechanical recycling – plastic lumber / board / sheet

www.attero.nl/en/
Location: Various in the Netherlands
Capacity: Unknown
Technology: Mechanical recycling – material sorting, washing and extruding

www.bpirecycling.co.uk
Location: Heanor Gate Industrial Estate, Heanor, Derbyshire, DE75 7RG
Capacity: 20kt
Technology: Mechanical recycling – material sorting, washing and extruding

No active website
Address: Unit 1 Westfield Industrial Estate, Waunarlwydd, Swansea SA5 4SF
Capacity: 10kt
Technology: Material sorting and shredding
*Went into administration in July 2024*

www.jayplas.com
Locations:

- Head office and manufacture of rPET – Unit 15, Saxon Way East, Oakley Hay Industrial Estate, Corby, NN18 9EX
- Film processing – flexible plastic packaging sorting – Dartmouth Road, Smethwick, Birmingham, B66 1AS
- LDPE Film Washplant – PCR rLDPE pellet, and rPP pellet from front of store collected soft packaging – Summerpool Road, Loughborough, LE11 5RH
- Film processing, recycling and extrusion – manufacture of rLDPE, rHDPE and rPP pellets – Cotton Way, Derby Road Industrial Estate, Loughborough, LE11 5FJ

- Plastics Recovery Facility – High View Road, Berristow Lane, South Normanton, Alfreton, DE55 2DT
- rHDPE and rPP food grade PCR pellet manufacture – Autby House, Autby Drive, North Thoresby, Grimsby, DN36 5SB
- Bag for Life manufacture – Highgrounds Road, Worksop, S80 3AT

Capacity: 80kt for material sorting at Smethwick; 50kt for manufacturing PE pellets at Loughborough.
Technology:

- Material sorting
- Mechanical recycling – washing, shredding and extruding

MEPLAS

www.meplas.co.uk
Location: Prospect House, Howden Road, Holm-on-Spalding-Moor, York, YO43 4BT
Capacity: unknown
Technology: Mechanical recycling – washing, shredding and extruding

PLASTECO WOOD

www.plastecowood.com
Location: Rhyl, UK
Capacity: Up to 20kt
Technology: Mechanical recycling – plastic lumber / board / sheet

Remarkable Energy

Location: Unit 1 Listonshiels, Balerno, Midlothian, EH14 7JL
Capacity: Pilot site
Technology: Chemical recycling – Thermal Catalytic Technology (TCT)

ReNew ELP

https://renewelp.co.uk/
Location: Wilton, Redcar, Teesside

Capacity: 20kt
Technology: Chemical recycling – HydroPRS™ technology (Hydrothermal Plastic Recycling System) developed by Mura

Repolywise
Plastics, waste-to-new

www.repolywise.com
Location: Centre For Innovation and Enterprise, Oxford University Begbroke Science Park, Woodstock Road, Begbroke, Oxfordshire, OX5 1PF
Capacity: Lab scale pilot
Technology: Chemical recycling – "atomic scissors" catalytic hydrocracking process, one-step degradation from waste plastic to propane

ReVentas

https://reventas.co.uk/
Location: Fraser Rd, Kirkton Campus, Livingston EH54 7BU
Capacity: 10kt
Technology: Dissolution (not categorised as chemical or mechanical recycling)

## Sterling Polymers Ltd

https://mbapolymers.com/ (no website available for Sterling Polymers – part of MBA Polymers)
Location: Windermere Road, Hartlepool, TS25 1NX
Capacity: Unknown
Technology: Mechanical recycling - material sorting, shredding and extruding

SYLATECH

https://sylatech.com/
Location: Kirkdale Road, Kirkbymoorside, North Yorkshire, YO62 6PX,
Capacity: Pilot site
Technology: Chemical recycling – Microwave Assisted Pyrolysis (MAP)

### Other Facilities Considered

Other facilities were identified that could process or potentially process the material, however, recycling trials didn't take place for a variety of reasons. These were:

https://brightgreenplastics.com/
Location: Newton Lane, Allerton Bywater, Castleford, WF10 2AL
Capacity: 40kt (rigids only)
Technology: Mechanical recycling – sorting, washing and extrusion

https://plaswood.eco/
Location: College Rd, Dumfries DG2 0BU
Capacity: Unknown
Technology: Plastic lumber/board/sheet

Location: Hohenrainstrasse 12A, 4133 Pratteln, Switzerland
Capacity: Pilot plant
Technology: Chemical recycling – Pyrolysis

https://capitalvalleyplastics.com/
Location: Cwmavon Works, Cwmavon, nr Pontypool, Gwent, NP4 8UW
Capacity: Unknown
Technology: Mechanical recycling – shred and extrusion

www.cedo.com/en/
Location: De Asselen Kuil 15, 6161 RD Geleen, Netherlands
Capacity: 80kt
Technology: Sorting, washing and extrusion

www.centriforce.com/
Location: 14-16 Derby Road, Liverpool, L20 8EE
Capacity: up to 20kt
Mechanical recycling – plastic lumber/board/sheet

https://circular11.com/
Location: Unit 3, Ambassador Industrial Estate, Airfield Road, Christchurch, BH23 3TG
Capacity: Demonstration facility
Technology: Mechanical recycling – plastic lumber/board/sheet

www.cleanplanet.com
Locations: 3 pilot plants, two in Asia and one in Greece, and a new site being developed in Teesside
Capacity: 24kt
Technology: Pyrolysis

www.gruener-punkt.de/en/systalenr-recyclate
Location: Am Eichgraben 10, 98673 Eisfeld, Germany
Capacity: 50kt
Technology: Mechanical recycling – sorting, washing and extrusion

www.ecoo.eu/en
Location: Europarklaan 1075, 3530 Houthalen-Helchteren, Belgium
Capacity: 32kt

Technology: Plastic board / lumber / sheet

www.enval.com
Location: Cuautla, Mexico (Enval acquired by Greenback Recycling Technologies Ltd)
Capacity: 2kt
Technology: Enval™ Pyrolytic technology to recycle mixed flexible plastics and recover aluminium from metalised films

www.eurokeyrecycling.com
Location: Linthorpe Way, Cransley Park, Kettering, NN14 1EZ
Capacity: Up to 70kt
Technology: Material sorting

www.futurepost.co.nz
Location: New Zealand
Capacity: Unknown
Technology: Mechanical recycling – plastic lumber / board / sheet

www.hahnplastics.com
Location: Swinton, Manchester
Capacity: 74kt across three sites in the UK, Germany and Canada
Technology: Mechanical recycling – plastic lumber / board / sheet

www.innoviafilms.com/
Location: Lowther R&D Centre, West Road, Wigton, Cumbria, CA7 9XX
Capacity: Looking into building a site to wash and extrude PE and PP
Technology: Mechanical recycling – sorting, washing and extrusion

K S Plastic
https://ksplastic.co.uk/
Location: Unit 1, Stowfield Business Park, Stowfield, Lydbrook, Gloucestershire, GL17 9NG
Capacity: 24kt
Technology: Sorting, shredding, washing and extrusion

impact recycling
https://impact-recycling.com/
Locations:

- 100 Inchinnan Road, Bellshill, Glasgow, ML4 4NT
- Unit 1, 5/5a Mill Hill, North West Industrial Estate, Peterlee, Co Durham, SR8 2HR

Capacity:

- Glasgow: 10kt (medical plastics)
- Peterlee: 35kt (will accept flexible plastic packaging when it's operational)
  Technology: Mechanical recycling – washing, shredding, separation (Baffled Oscillation Separation System (BOSS)), and extrusion

ITERO
www.itero-tech.com
Location: 79-81 Borough Road, London, SE1 1DN
Capacity: Pilot-scale R&D facility in UK and proposed new site in the Netherlands
Technology: Pyrolysis

www.mainetti.com
Location: Bedwell Road, Wrexham Industrial Estate, Wrexham, LL13 0TS
Capacity: 4kt
Technology: Mainetti recycle coat hangers and clear PE commercial films from retailers and use their Polyloop process to wash, dry and de-ink plastic films and extrude into pellet

## Limerick Polymers Production (LPP)

www.lpp.ie
Location: Galvone Industrial Estate, Roxboro Limerick, V94 XC61, Ireland
Capacity: Up to 70kt
Technology: Material sorting

https://plasticenergy.com/
Location: Almeria and Seville in Spain and proposed sites in France and Netherlands
Capacity: 5kt each at Almeria and Seville and 15kt each at proposed sites in France and Netherlands
Technology: Thermal Anaerobic Conversion Plastic2Plastic™ Pyrolysis

https://powergenerationmidlands.co.uk/
Location: Forge House, Stourport Road, Kidderminster, DY11 7QE
Technology: In 2022 a proposed development for an energy and resource park to produce 30kt capacity granulate for plastic lumber products which might've accepted flexible plastic packaging.

https://prodelix.com/
Location: Portugal
Capacity: Unknown
Technology: Plastic board / lumber / sheet

www.quantafuel.com
Locations: Sites in Denmark and Norway and plans to build a site in the UK in Sunderland
Capacity: 100kt
Technology: Pyrolysis

https://recycleforfuture.com/recycle/
Location: 183 Fengate, Peterborough PE1 5PE
Capacity: 25kt
Technology: Mechanical recycling – sorting, shred and extrusion

No active website
Address: Unit B2, Stirling Court, Stirling Rd, Swindon SN3 4TQ and Binn Ecopark, Binn Farm, Glenfarg, Perth, PH2 9PX
Capacity: Pilot site at Swindon and Binn Farm site was not operational
Technology: Chemical recycling – pyrolysis
*Went into administration in September 2022*

https://stormboard.net/
Location: Unit 2, Farleigh Yard, Farleigh Rd, Norton St Philip, Bath, BA2 7NG
Capacity: Unknown
Technology: Plastic board / lumber / sheet

www.yesrecycling.org
Address: Fife, Scotland
Capacity: 10kt
Technology: Plastic lumber / board / sheet
*Went into administration in April 2023*

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