The future of recycling flexible plastic packaging in the UK

Flexible Plastic Fund
FlexCollect Project
Final report and blueprint

Executive summary

Produced on behalf of the Flexible Plastic Fund

suez

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Abel & Cole

Eat Real

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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 the full 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 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 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 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 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 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 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 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 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.

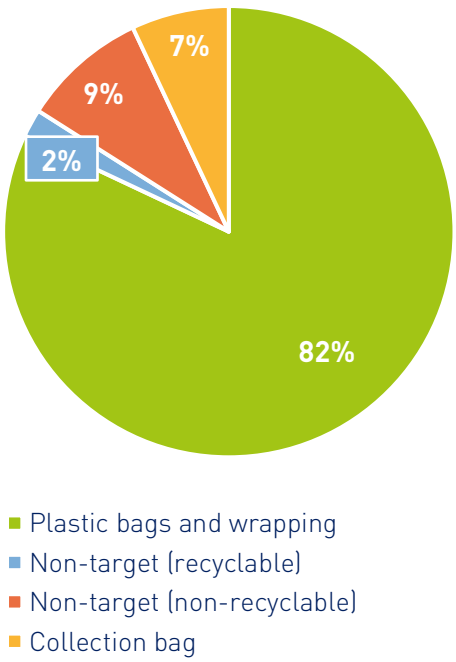
Figure two • Weight per household per category (normalised per week) and bags per household per cycle (not normalised for collection frequency)

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 full 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.

SUEZ recycling and recovery UK,
SUEZ House, Grenfell Road
Maidenhead, Berkshire SL6 1ES
www.suez.co.uk