Final Report

Drinks Recycling On-the-Go

Consumption, Recycling and Disposal of On-the-Go Drinks Containers

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Front cover photography: On the go recycling buns in Luton

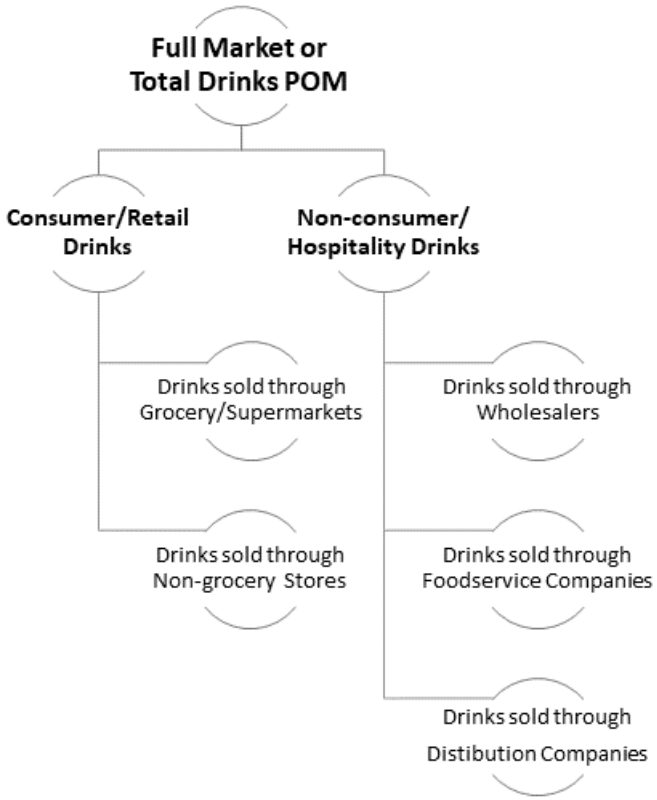
Executive summary

Introduction
The report 'Drinks Recycling On-the-Go' has been produced to support Defra in its understanding of the current levels of on-the-go (OTG) single use drinks containers that are placed on the market (POM), consumed, recycled or disposed of in the UK. Specifically, metal drinks cans, plastic and glass drinks bottles, drinks cartons and drinks pouches were researched. Defra requires estimates that are as accurate as possible for its packaging policy work, therefore every effort has been made to provide error margins and robust assessments wherever possible.

Drinks Containers POM
Drinks containers POM estimates were established using a bottom-up approach, as summarised in **Figure ES1** below. A number of data sources were used to generate estimates and to cross-check their validity, including:

- Valpak's EPIC database, for drinks sold through supermarkets, wholesalers & foodservice companies
- HDPE natural milk bottle industry experts
- The White Paper Dairy UK 2017
- UK Soft Drinks Report 2017
- UK PET/soft drinks industry experts
- Valpak's EPIC database and publicly available soft drinks market share data
- Valpak's Hot drink take-away cup Data
- Alupro
- British Glass
- ACE UK

Figure ES1 Streams and Sectors used to build Drinks Container POM



Each material/polymer type total drinks POM estimate was cross-checked with other industry estimates either by weight, units or both. Industry POM crosschecks generally fell within 2-8% of this project's estimates.

In order to potentially identify a POM estimate for drinks more likely to be taken OTG, Valpak EPIC data was used firstly to identify the quantity of drinks sold in single format (i.e. not as part of a multipack) and secondly to identify the proportions of single formats sold in four given drinks container size categories. These were: <500ml, 500-749ml, 750-999ml and 1000ml+, and the estimates are summarised as percentages in **Figure ES2**.

Figure ES2 Summary Drinks Container POM by format and size

Packaging Type	Total Quantity		Single Format by Weight					Single Format by Units				
	thousand tonnes	billion units	TOTAL	< 500ml	500 - 749ml	750- 999ml	1000ml +	TOTAL	< 500ml	500 - 749ml	750- 999ml	1000ml +
Plastic drinks bottles	435	14.4	82%	10%	27%	3%	60%	73%	13%	36%	3%	48%
Metal drinks cans	154	7.7	12%	86%	14%	0%	0%	17%	89%	11%	0%	0%
Glass drinks bottles	1836	5.5	65%	12%	27%	52%	9%	56%	22%	29%	43%	6%
Drinks cartons	53	1.8	79%	5%	2%	4%	88%	72%	14%	3%	4%	79%
Drinks pouches	4	0.3	6%	92%	3%	0%	5%	10%	93%	5%	0%	2%

The analysis showed that plastic drinks bottles are the most prolific drinks container POM by number of units and glass drinks bottles are the most prolific drinks container POM by weight. The majority of plastic and glass drinks bottles, as well as drinks cartons are sold in single format whereas metal drinks cans and drinks pouches are more commonly sold in multi-packs.

Consumer Survey of Drinks Consumption & Disposal

To build up a picture of drinks consumed OTG, a nationally representative sample (age, gender, region and work status) of 4,000 UK adults were asked about their drinks consumption from plastic bottles, glass bottles, metal cans and take-away hot drinks cups. The survey aimed to establish where drinks were purchased, where they were consumed, where they were disposed and how they were disposed.

The margins of error on the sample sizes are very low at +/-2%, however given the recent environmentally focused news stories and the breaking of plastic issues, social desirability bias is likely to play a factor in the participant responses observed. It is therefore likely that there is an over-reporting of "good behaviour".

The consumer survey reported that the majority of plastic bottles were consumed away from home (55%), whereas drinks cans and glass bottles were more likely to be consumed at home (55% and 57% respectively). Take-away drinks by nature are bought away from home and for the purpose of this survey were assumed to be consumed away from home. A breakdown of the proportion of drinks containers consumed and their consumption locations are shown in **Figure ES3** below.

Drinks disposal location did not necessarily match the drinks consumption location, with proportionally more drinks being disposed of at home than anywhere else for drinks cans and plastic and glass bottles. A small proportion of hot take-away cups are also disposed of at home. These findings are summarised in **Figure ES4** below. For all drinks containers surveyed, there were some disposal locations that did not fall into the 'at home' or 'AFH' categories, and these are listed as other. For example, containers that are kept for re-use.

Figure ES3 Consumer Survey: drinks consumption by packaging type (units)

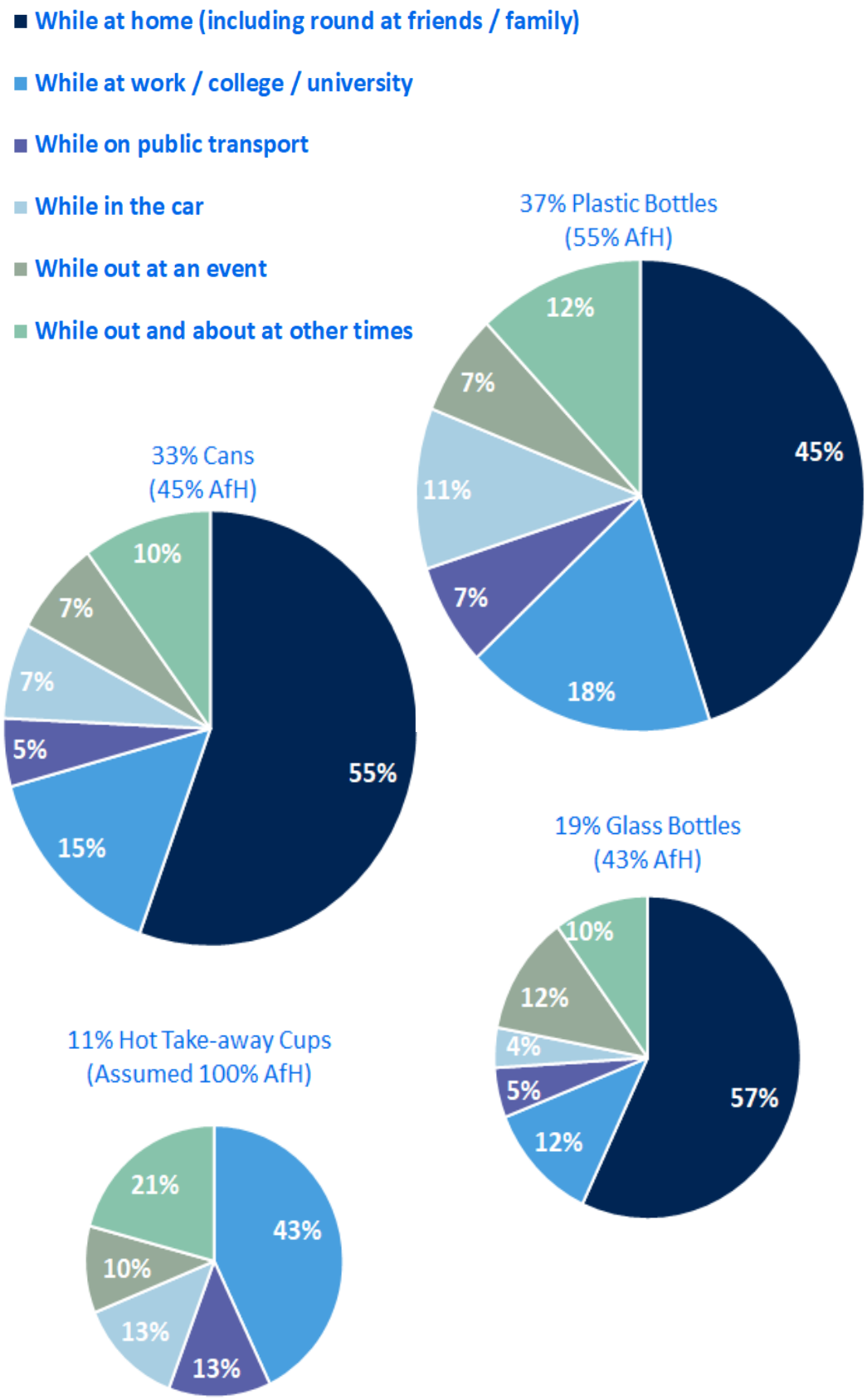
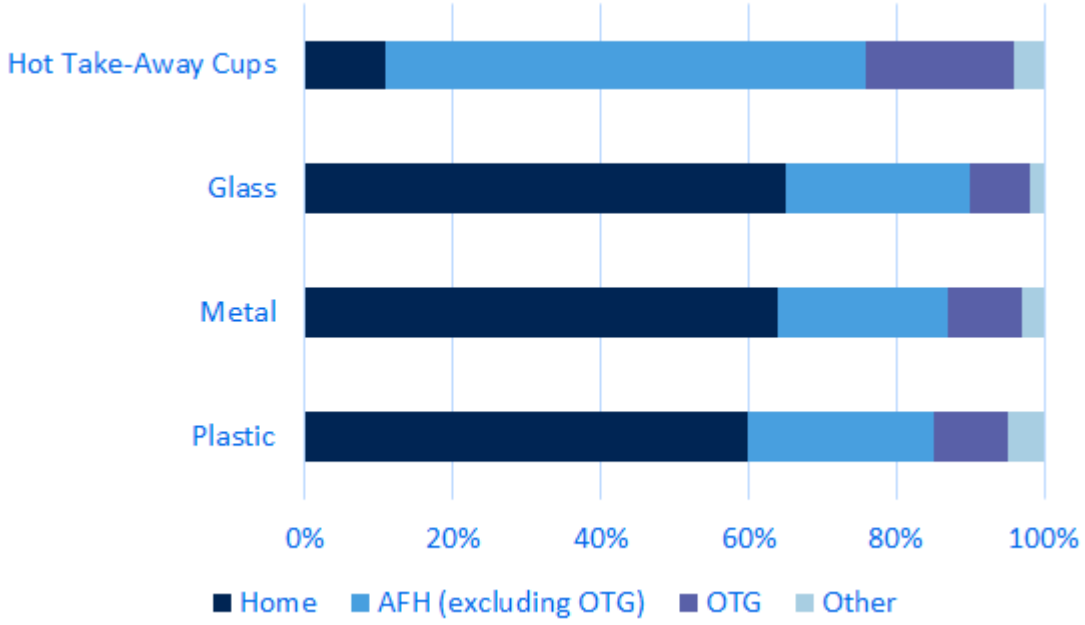


Figure ES4 Disposal Routes Based on the Consumer Survey Results



The disposal proportions identified in the survey were applied to Valpak's drinks POM estimates, however for plastic the POM figure for PET bottles was used as it is believed to be more representative, given that most HDPE bottles contain milk (commonly shared and unlikely to have been included in many survey responses). The disposal (rubbish/recycling/litter) tonnes and units are given in **Figure ES5** below.

Figure ES5 Drinks containers disposed as rubbish, recycling & litter (weight & units)

	Disposal Applied to Valpak POM							
	Drinks Cans		PET Drinks Bottles		Glass Drinks Bottles		Take-away Hot Drinks Cups	
	b units	k tonnes	b units	k tonnes	b units	k tonnes	b units	k tonnes
Disposed of OTG	**0.7**	**15kt**	**10.6**	**32kt**	**0.4**	**147kt**	**0.2**	**3kt**
Perceived as rubbish	*0.3*	*6kt*	*1.1*	*14kt*	*0.1*	*48kt*	*0.1*	*1kt*
Perceived as recycled	*0.4*	*7kt*	*0.5*	*16kt*	*0.2*	*75kt*	*0.1*	*1kt*
Left out / behind	*0.1*	*1kt*	*0.5*	*3kt*	*0.1*	*25kt*	*0.0*	*0kt*
Disposed of AFH (not including OTG)	**1.8**	**36kt**	**2.6**	**79kt**	**1.4**	**461kt**	**0.7**	**8kt**
Perceived as rubbish	*0.6*	*11kt*	*0.7*	*20kt*	*0.2*	*82kt*	*0.3*	*3kt*
Perceived as recycled	*1.1*	*21kt*	*1.7*	*52kt*	*0.8*	*250kt*	*0.3*	*4kt*
Left out / behind	*0.2*	*3kt*	*0.2*	*7kt*	*0.4*	*129kt*	*0.1*	*1kt*
Consumed AFH, Disposed at Home	**0.7**	**15kt**	**1.6**	**47kt**	**0.4**	**139kt**	**0.1**	**1kt**
Perceived as rubbish	*0.1*	*2kt*	*0.2*	*5kt*	*0.4*	*16kt*	*0.1*	*0kt*
Perceived as recycled	*0.6*	*13kt*	*1.4*	*42kt*	*0.0*	*123kt*	*0.0*	*1kt*
Consumed at Home, Disposed at Home	**4.2**	**85kt**	**4.8**	**142kt**	**3.2**	**1052kt**		**0kt**
Perceived as rubbish	*0.7*	*13kt*	*0.6*	*17kt*	*0.3*	*96kt*		*0kt*
Perceived as recycled	*3.4*	*69kt*	*3.8*	*115kt*	*2.6*	*869kt*		*0kt*
Left out / behind	*0.1*	*2kt*	*0.1*	*3kt*	*0.1*	*46kt*		*0kt*
Other	*0.0*	*0kt*	*0.2*	*7kt*	*0.1*	*41kt*		*0kt*
Location of Disposal Unknown	**0.1**	**1kt**	**0.1**	**2kt**	**0.0**	**8kt**	**0.0**	**0kt**
Perceived as rubbish	*0.0*	*0kt*	*0.0*	*1kt*	*0.0*	*1kt*	*0.0*	*0kt*
Perceived as recycled	*0.0*	*1kt*	*0.0*	*1kt*	*0.0*	*7kt*	*0.0*	*0kt*
Other	**0.1**	**2kt**	**0.5**	**14kt**	**0.1**	**29kt**	**0.0**	**0kt**
Still in possession	*0.1*	*2kt*	*0.2*	*5kt*	*0.0*	*10kt*	*0.0*	*0kt*
Something else	*0.0*	*1kt*	*0.3*	*8kt*	*0.1*	*19kt*	*0.0*	*0kt*
Total Disposed	**7.7**	**154kt**	**10.6**	**317kt**	**5.5**	**1836kt**	**1.1**	**13kt**
Perceived as rubbish	*1.7*	*34kt*	*1.9*	*57kt*	*0.7*	*243kt*	*0.4*	*5kt*
Perceived as recycled	*5.5*	*110kt*	*7.6*	*227kt*	*4.0*	*1324kt*	*0.5*	*6kt*
Left out / behind	*0.3*	*7kt*	*0.4*	*13kt*	*0.6*	*200kt*	*0.1*	*2kt*
Other	*0.2*	*3kt*	*0.7*	*21kt*	*0.2*	*70kt*	*0.0*	*0kt*

The implied recycling rates for each drinks container type AFH (excluding OTG) and OTG were relatively high, falling between 34% and 65%. In reality AFH and OTG recycling of plastic drinks bottles is not this high, as the scale and distribution of collection infrastructure does not exist, and the quantity of drinks containers actually recycled does not reflect the levels calculated.

To put the level of implied recycling into context, Valpak used its knowledge of hot drinks cup POM and recycling. As co-founders and administrators of Costa's new industry take-away cup recycling scheme, we have in-depth knowledge of the number of take-away hot drinks cups used and collected for recycling. Valpak's data shows that for coffee cups the AFH recycling tonnage was exaggerated by 85% (see Section 0). If this level of exaggeration is used as a proxy for other drinks containers implied to be recycled away from home, the recycling rates for AFH and OTG fall between 5% and 9%[1].

Although survey recycling rates are exaggerated, this is potentially positive – respondents either feel they should or are trying to recycle AFH and OTG

[1] *For all container types to calculate an adjusted recycling rate, 85% of the container tonnage implied to have been recycled was disregarded and a new recycling rate calculated on the remaining 15% of implied recycled tonnage*

infrastructure was further developed it would be used. However, it also highlights that more infrastructure is required and that education is imperative to improve both the quality and quantity of recycling.

A second key message is that AFH disposal excluding OTG is more than double OTG disposal and is therefore a larger target for recycling. Responsibility for providing bins (rubbish and/or recycling) for this type of disposal falls on businesses or organisations such as schools and colleges. In Scotland, legislation is already in place that requires businesses/organisations to present recyclables separately for collection, but this is not the case in the rest of the UK and is left to individual businesses and organisations to choose whether to offer recycling facilities.

LA Operated OTG Recycling Service Provision

A survey was undertaken asking LAs in the UK whether they provide a recycling OTG collection scheme. Just less than half (48%) of LAs provide a recycling OTG scheme, with the number of units in each scheme varying between LAs. The consensus is that the coverage of units was not extensive enough. LAs are investigating or planning to trial OTG recycling schemes but the business case and incentive to provide a scheme is currently not strong enough, with operational costs and ongoing contamination issues key barriers. There is also inadequate OTG recycling collection provision in transport hubs and places of work.

Drinks Containers Recycling & Waste Composition Analysis

Material composition analysis from a range of recycling AFH schemes took place to understand the composition and complexities of the schemes. Material from three key areas of AFH recycling collection schemes were analysed – LA operated schemes, transport hubs and places of work.

The findings show that PET drinks bottles are the dominant drinks container across all collection schemes. There are also significant streams of drinks cans and glass bottles, with HDPE drinks bottles and coffee cups small material streams in comparison.

Extensive contamination is prevalent across all AFH recycling collection schemes, with consumers using recycling collection bins as general waste bins. Contamination is particularly evident in locations with high levels of footfall and movement in transport hubs. Hot and cold drinks cups causing a particular area of confusion for consumers.

Common contaminates, from LA operated schemes in particular, include decomposing food waste, bagged dog waste, and plastic film such as sweet wrappers and crisp packets. Food that was disposed of either with or without its packaging decomposes and contaminates the overall material quality, which makes frequent collection of material and timely waste management processing important to maximise the opportunity for a recycling end destination for that material. Liquid from hot and cold drinks (including coffee cups) is a significant cause of contamination, leaking into other dry materials. Many plastic bottles were disposed of with liquid inside.

When considering the effectiveness of disposal AFH, any use of a Deposit Return Scheme would likely remove significant quantities of recyclable materials from OTG recycling collection bins, making the service less financially viable and increasing contamination levels further. The number of DRS Reverse Vending Machines and deposit points and the level of access for consumers are key factors. There could still be effective uses for recycling OTG bins in areas where DRS collection points are not present, or in areas of high footfall where ease of disposal is the primary disposal objective of the consumer.

There is extensive inconsistency of packaging materials and container types collected from AFH recycling schemes. This fragmented approach is an issue for LA operated, transport hub and work place schemes and causes consumer confusion about what they can and should not recycle OTG. A vast array of signage is used to communicate to the consumer what they can recycle, with signage even varying considerably within an individual recycling scheme. In particular, the message to the consumer about 'Dry Mixed Recycling' is not clear and is open to interpretation about what the consumer thinks should be collected for recycling, not what is collected. There would be wide-ranging benefits for all in providing a consistent approach to what materials are collected and the signage used.

There is evidence that OTG litter and recycling bins are used by commercial premises e.g. high street cafes or food and drink tenants in train stations. This could be to demonstrate positive recycling behaviour by using OTG recycling bins, but it is primarily to reduce commercial waste disposal costs and demands. Consideration should be given to interventions for businesses to separate recycling and general waste and an enforcement mechanism to deter use of OTG litter and recycling bins.

The contents of work place recycling collection schemes are primarily dictated by the products available and used onsite. Product availability and/or staff purchasing habits of packaging used for onsite canteens, food and drinks vending machines and refreshment options available such as water stations directly affects material composition and quality. Non-target materials present in the material composition analysis included plastic disposal drinks cups and blue roll, suggesting companies need to understand the facilities they use has a direct impact on any recycling scheme in place.

Consumers are placing drinks containers in LA operated OTG general waste litter bins, with 23% by weight of general waste drinks containers and 7% dry mixed recycling. The material composition analysis reflected consumer confusion about coffee cups, with coffee cups making up 3% of the overall composition of recycling and general waste material. Interventions to make consumers think about using the right bin when disposing of their drink containers should be considered.

Conclusions and Recommendations for Further Works

Conclusions: POM

Plastic bottles are the most prolific drinks container POM by number of units

- 14.4b plastic drinks bottles were POM in the UK in 2017
- Of these, 10.5b are sold single format and nearly half are >1l

Glass bottles are the most prolific drinks container POM by weight

- 1836kt glass drinks bottles were POM in the UK in 2017
- Of this, 1185kt is sold single format and just over half are 750-999ml

Plastic and glass drinks bottles and drinks cartons are more commonly sold in single format

- 78% (246kt) or 71% (7.5b units) of PET drinks bottles are sold in single format
- 94% (110kt) or 78% (3.0b units) of HDPE drinks bottles are sold in single format
- 65% (1185kt) or 56% (3.1b units) of glass drinks bottles are sold in single format
- 79% (42kt) or 72% (1.3b units) of drinks cartons are sold in single format

Drinks cans and pouches are more commonly sold as multipacks

- 86% (103kt) or 81% (5.3b units) of aluminium drinks cans are sold in multipacks
- 96% (33kt) or 95% (1.0b units) of steel drinks cans are sold in multipacks
- 94% (4kt) or 90% (0.3b units) of drinks pouches are sold in multipacks

The majority of glass drinks bottles contain alcoholic drinks

- 93% by weight contain alcoholic drinks, of which 81% are sold in single format
- 85% by units contain alcoholic drinks, of which 86% are sold in single format

Metal drinks cans <500ml, sold in multipacks are the most prolific drinks can

- 90% by weight are <500ml and sold in multipacks
- 85% by units are <500ml and sold in multipacks

Conclusions: Consumer Survey

More drinks in PET plastic bottles are consumed AFH than at home

- 55% of drinks in plastic bottles were consumed AFH
- 43% of drinks in glass bottles and 45% of drinks in cans were also consumed AFH

The majority of drinks in cans and plastic bottles are disposed of away from the hospitality outlet they were bought from

- 74% of drinks in plastic bottles were taken-away from hospitality outlets
- 71% of drinks in cans were taken-away from hospitality outlets
- 46% of drinks in glass bottles were taken-away from hospitality outlets
- 83% of hot drinks in take-away cups were taken-away from hospitality outlets

By units, glass drinks bottles are the least frequently consumed AFH

- Less than 5% of the survey results (units) were glass drinks bottles consumed AFH
- This compares 15% aluminium drinks cans, 19% hot take-away cups and 20% plastic drinks bottles

Recycling rates for drinks containers disposed of AFH/OTG appear highly exaggerated in the survey results (all materials)

- AFH recycling rates of 22% (coffee cups) to 65% (plastic bottles) were calculated

Adjusted recycling rates for drinks containers disposed of AFH/OTG are <10%

- Plastic drinks bottle recycling is estimated at 9% AFH (including OTG) and 7% OTG
- Drinks can recycling is estimated at 9% AFH (including OTG) and 7% OTG
- Glass drinks bottle recycling is estimated at 8% AFH (including OTG) and 8% OTG
- Take-away hot drink cup recycling is estimated at up to 5% AFH (including OTG)

Exaggerated AFH/OTG recycling rates suggest both positive aspirations and attempts to recycle

- For those respondents who believed they were recycling (thought a rubbish bin was a recycling bin, recycling not recycled due to contamination) this suggests that with more infrastructure and communications that recycling rates would increase
- For those respondents who believed they should have recycled (so claimed they did when they didn't), this suggests that if recycling AFH/OTG is easier due to more infrastructure and communications, that recycling rates would increase

OTG disposal only counts for 8-10% of plastic, metal and glass drinks container disposal

- 10% (32kt) of PET drinks bottles are disposed of OTG
- 10% (15kt) of metal cans are disposed of OTG
- 8% (147kt) of glass drinks bottles are disposed of OTG

AFH disposal, excluding OTG, is more than double OTG disposal and potentially a larger target for untapped recycling

- 25% (79kt) of PET drinks bottles are disposed of AFH (excluding OTG)
- 23% (36kt) of metal cans are disposed of AFH (excluding OTG)

- 25% (461kt) of glass drinks bottles are disposed of AFH (excluding OTG)
- Only in Scotland are businesses/organisations legally required to present recyclables separately for collection

Nearly two-thirds of take-away cups are disposed of AFH, but not OTG
- 20% (3kt) of take-away hot drinks cups are disposed of OTG
- 65% (8kt) of take-away hot drinks cups are disposed of AFH (not including OTG)
- 11% (1kt) of take-away hot drinks cups are taken home for disposal

Conclusions: Recycling & Waste Composition Analysis

PET is the dominant drinks container across all collection schemes
- 38% by weight in LA operated schemes, 57% in transport hubs and 52% in work places

HDPE plastic bottles are a small drinks container material stream
- 3% by weight in LA operated schemes, 6% in transport hubs and 6% in work places

Drinks cans are a prominent material stream by unit numbers, but less so by weight
- 22% by weight and 46% by unit numbers in LA operated schemes
- 8% by weight and 37% by units in transport hubs
- 38% by weight and 58% by units in work places

Glass bottles are the most significant material by weight, but not by unit numbers
- 37% by weight in LA operated schemes, 29% in transport hubs and 4% in work places
- 5% by unit numbers in LA operated schemes, 11% in transport hubs and 1% in work places
- Glass can often be broken into shards, which is then categorised as contamination

Coffee cups are a small material stream, but are more prevalent in transport hubs
- 12% by weight in transport hubs, 3% in LA operated schemes and 2% in work places

Inadequate AFH collection points
- 48% of LAs in the UK provide a recycling OTG collection scheme
- Number of recycling OTG collection bins vary in each scheme, with the consensus that the coverage of bins was not extensive enough
- There is not a strong enough business case or incentive for many LAs to provide anything other than litter bins
- LAs are investigating/planning to trial recycling OTG collection schemes in busy town centre locations, but operational costs and contamination issues remain key barriers
- There is inadequate OTG recycling collection provision in transport hubs and places of work

Extensive inconsistency of packaging materials and container types collected across all AFH recycling collection schemes
- This fragmented approach is an issue for LA operated, transport hub and work place recycling schemes and causes consumer confusion about what they can and should not recycle OTG

Extensive inconsistency of signage used on recycling bins across all AFH recycling collection schemes
- A vast array of signage is used to communicate to the consumer what they should recycle, and this can even vary considerably within an individual recycling scheme

- The message to the consumer about 'Dry Mixed Recycling' is not clear and is open to interpretation about what the consumer thinks should be collected for recycling, not what is collected in any individual scheme

Extensive contamination is prevalent across all AFH recycling collection schemes (including coffee cups)

- 50% overall contamination levels in LA operated schemes – 47% general contamination and 3% coffee cups
- 78% in transport hubs – 66% general contamination and 12% coffee cups
- 42% in work places – 40% general contamination and 2% coffee cups

Consumers are using recycling collection bins as general waste bins

- Common contaminates from LA operated schemes in particular include decomposing food waste, bagged dog waste, and plastic film such as sweet wrappers and crisp packets

Materials from commercial premises are being placed in LA operated OTG litter and recycling bins

- These materials include cardboard boxes, 4 or 6 litre milk bottles, and juice cartons

Liquid is a significant cause of contamination

- Liquid from hot and cold drinks (including coffee cups) is a significant cause of contamination, leaking into other dry materials.
- Many plastic bottles were disposed of with liquid inside

Contents of work place recycling collection schemes are primarily dictated by the products available and used onsite

- Product availability and/or staff purchasing habits of packaging used for onsite canteens, food and drinks vending machines and refreshment options available such as water stations is prevalent in recycling OTG collection bins, and directly affects material composition and quality
- Non-target materials present include plastic disposal drinks cups and blue roll

Waste management approach is particularly important for AFH collection schemes

- Some LAs collect material from both litter and recycling bins together as general waste and recyclable materials are recovered through a Mechanical Biological Treatment facility before the material goes to incineration or landfill
- Food that was disposed of either with or without the food packaging decomposes and contaminates the overall material quality - frequent collection of material and timely waste management processing is important to maximise the opportunity for a recycling end destination for that material

Consumers are placing drinks containers in LA operated OTG general waste litter bins

- 30% of general waste material analysed was drinks containers or dry mixed recycling
- 23% of the general waste material by weight was drinks containers – 53% glass, 28% PET bottles, 15% cans and 4% HDPE bottles
- Dry mixed recycling material make up 7% of the general waste material
- Comparing the recycling and general waste material there were 20% more drinks containers from recycling bins than general waste bins
- 3% of the general waste material was coffee cups – the same % composition of the recycling material analysed

Recommendations for Further Work

1. Interventions to ensure all AFH recycling is encouraged, not just OTG. Locations such as schools, workplaces and events outside of Scotland have no legal requirement to separate recyclables for collection. An enforcement mechanism to deter businesses use of OTG litter and recycling bins should be considered.

2. Mechanisms to significantly limit or reduce the levels of contamination in OTG recycling collections.

3. Mechanisms to stop consumers placing drinks containers in general waste litter bins that are target materials in the OTG recycling schemes.

4. A study to understand the impact and viability of Deposit Return Schemes on OTG recycling collections should be undertaken to assess effective use of recycling OTG bins in areas where DRS collection points are not present and the level of access for consumers.

5. Excluding or managing food waste and liquids in OTG recycling collections.

6. Recycling composition analyses and consumer survey results are likely to vary at different times of this year, therefore to add robustness to these findings, repeating the work at several other times of the year is recommended. This is particularly valid for LA operated OTG recycling schemes.

7. A separate study to understand the recycling provision for transport hubs, particularly train stations, should be undertaken. This also applies for work places, which vary considerably due to the size, type of business and products available and used onsite.

8. A study to understand the viability and variables to collect consistent packaging materials and container types using consistent signage across all AFH recycling schemes.

9. Flow work to confirm hot-take away cup POM and to establish cold take-away cup POM, so that a complete and robust 'disposable cup POM' can be adopted and published.

Contents

Figures

Glossary

ACE	The Alliance for Beverage Cartons and the Environment
Alupro	The Aluminium Packaging Recycling Organisation
AFH	Away from home
b	Billion
BSDA	The British Soft Drinks Association
DRS	Deposit Return Scheme
EPIC	Valpak's Environmental Packaging Information Centre
l	Litre
IBA	Incinerator Bottom Ash
kt	Thousand tonnes
LA	Local Authority
M	Million
OTG	On-the-go
POM	Placed on the market
UK	United Kingdom
WRAP	Waste and Resources Action Programme

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- Alupro
- British Plastics Federation
- British Glass
- Confederation of Paper Industries
- Keep Scotland Beautiful
- Local Authority Recycling Advisory Committee
- National Association of Waste Disposal Officers

1.0 Introduction

1.1 Background and existing data

Defra is eager to attain estimates of the quantities and units of on-the-go (OTG) single use drinks containers made from glass, plastic (PET and HDPE), and metal (aluminium and steel) that are consumed, recycled and disposed of in the UK. Having a sufficiently accurate and robust data assessment is essential and would support future policy decisions within this field.

1.2 Objectives

The Drinks Recycling On-the-Go project had the following key objectives:

- Review existing estimates (where available) for each of glass, plastic (PET and HDPE), and metal (aluminium and steel), drinks containers to establish a methodology to provide estimates by container format and by material type of:
    - The quantities and units of OTG beverage containers placed on the market
    - The quantities and units of OTG beverage containers taken home for disposal/recycling
    - The quantities and units of OTG beverage containers disposed of in a rubbish bin or by littering
    - The quantities and units of OTG beverage containers collected for recycling OTG
    - The recycling rates of OTG drinks containers

1.3 Definitions

For the purpose of this project, the following definitions have been adopted:

On the Go (OTG) disposal/recycling – the disposal/recycling of material in a public place such as a street, train station, shopping centre, etc.

Away from Home (AfH) disposal/recycling – the disposal/recycling of material by the public anywhere, except at home. Includes OTG (unless stated), but also disposal/recycling of material at work, school, events, café, etc.

Packaging waste arisings – are represented by the quantity of packaging placed on the market (POM), which in general is calculated through multiplying known and assumed packaging weights by UK sales (please see Section 2.1 for details).

1.4 Project Advisory Group

An Advisory Group provided the project with specialist input, guidance and expertise through two teleconference meetings and additional individual emails and calls. The Advisory Group was comprised of representatives from the following organisations:

- Alupro
- British Plastics Federation
- British Glass
- Confederation of Paper Industries
- Defra
- Keep Scotland Beautiful
- Local Authority Recycling Advisory Committee
- National Association of Waste Disposal Officers
- RECOUP
- WRAP
- Valpak

2.0 Drinks Containers POM

Valpak's Environmental Product Information Centre (EPIC) database contains product data for ~20 million packaged products sold in the UK (2017) and provides a huge insight into the types and quantities of packaging used, and arising in the waste stream, in the UK.

EPIC packaging data was used as the key source in establishing estimates of consumer and non-consumer drinks packaging POM. In addition, where data gaps were perceived, or cross-checks made, both published industry information and confidential commercial data sources where sought and used.

The following key estimates have been made, by drinks container material/type, in order to establish OTG recycling rates for drinks containers:

- Total POM
- Total POM sold as single format (excludes drinks sold in multipacks)
- Total single format POM for container sizes <500ml, 500-749ml, 750-999ml and 1l +
- For glass, estimates were also made for bottles containing only non-alcoholic drinks

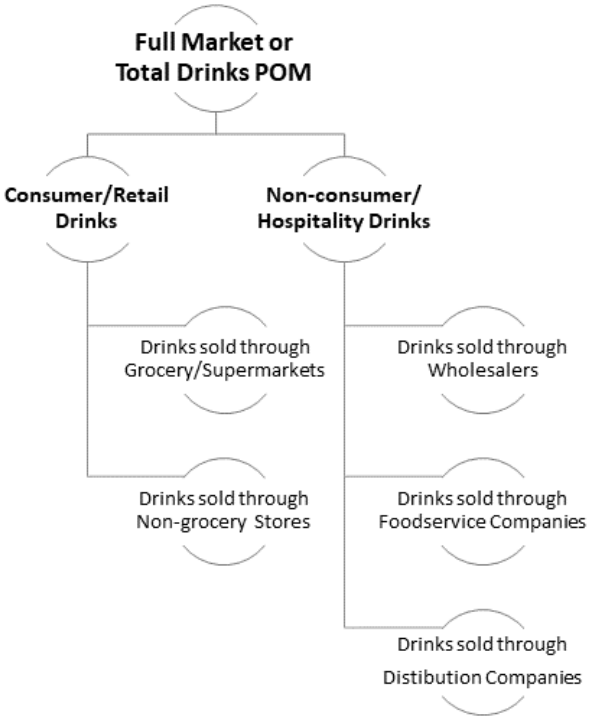
The estimates for total POM sold as single format by container size <1l have been used as a proxy for the 'maximum POM' likely to be disposed of on the go, as they represent the most common format and size of drinks consumed/disposed OTG.

Please see Appendix I for an assessment of the robustness of the POM data estimates by material/container type.

2.1 Working Method – Total POM

Estimates for the total quantity (both packaging weight and product units) of plastic drinks bottles, metal drinks cans, glass drinks bottles, drinks cartons and drinks pouches placed on the UK market in the UK in 2017 were established using a bottom-up approach, whereby estimates were made for drinks POM through the consumer grocery, consumer non- grocery and non-consumer hospitality sectors, then added together to give a 'full market' estimate.

Figure 6 Streams and Sectors used to build Drinks Container POM



Adding together the grocery and non-grocery sectors gives a consumer stream, which represents all retail sales. For drinks, the non-consumer stream is represented by the hospitality sector, which itself is made up of sales from wholesalers, foodservice companies and distribution companies. A map of these streams and sectors is given in **Figure 6** above.

Below, a description of the method used by stream (consumer, non-consumer) and where necessary by material, is given.

2.1.1 Consumer grocery POM

For the grocery sector we scaled-up data supplied by major retailers (51% grocery market share by packaging weight[2]) and contained in EPIC as a proxy for consumer drinks sales.

2.1.2 Consumer non-grocery POM

To estimate non-grocery retail sale of drinks, a percentage of grocery sales were taken. This percentage varied between materials, but was initially based on research undertaken into soft drinks sales; member data analysis, industry input and an understanding of total market size. For PET plastic bottles this was approximately 14% of grocery sales. This proportion was reduced to 10%[3] for cans, pouches and cartons, as they are generally non-resealable containers and sold less in non-grocery stores. For HDPE and glass bottles, where additional information was available, estimating non-grocery sales differed as detailed in sections 2.1.7 and 2.1.8 below.

2.1.3 Total consumer POM

This is simply the sum of consumer grocery and non-grocery plastic packaging POM.

2.1.4 Non-Consumer/hospitality POM

2017 drinks container estimates for the hospitality sector have been established using newly available Valpak EPIC data relating to 34% of the cash and carry and delivered foodservice industry[4]. Market share information for the companies included in the sample was used to scale up the resulting tonnage to represent the whole foodservice, catering and hospitality sector, as depicted in **Figure 7**.

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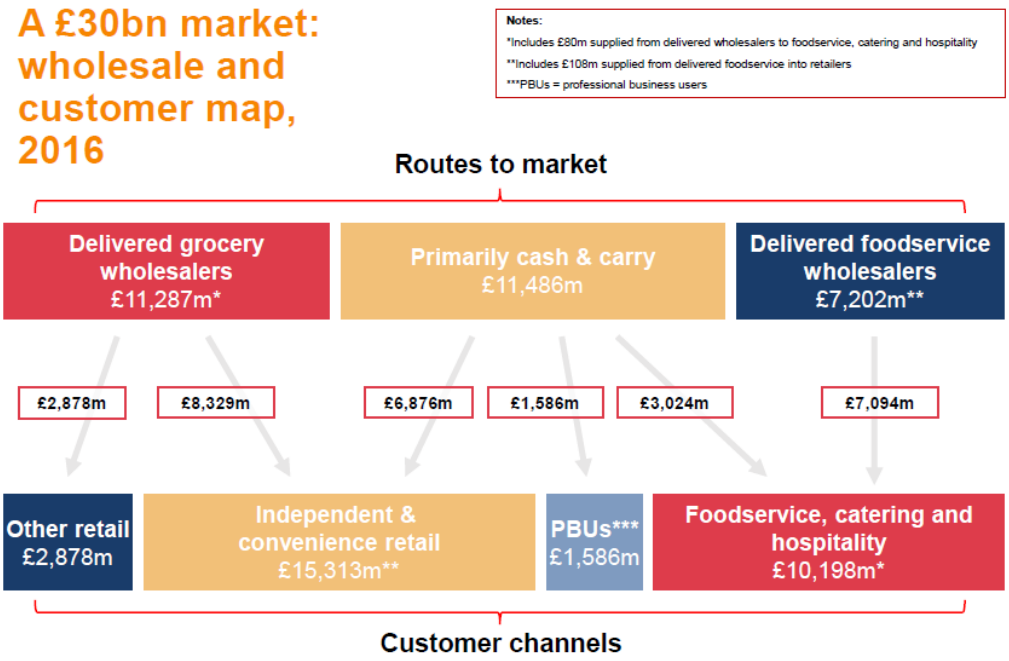
[2] As part of PlasticFlow 2025, WRAP/Valpak 2017, it was established that although Valpak's supermarket data represents 55% of the grocery market by sales (Kantar), for plastic packaging by weight it holds a slightly smaller market share at 51%. It is believed this is due Valpak's supermarket data not including any discount grocery retailers such as Aldi or Lidl. We have used 51% market share as a proxy for all materials in this project.

[3] Data made available from Alupro helped inform the 10% estimate, based on the size of the total can market in the UK

[4] Valpak's EPIC database holds sales data and packaging weights information for clients signed up for the fully managed service.

Figure 7 Overview of the Foodservice, Catering & Hospitality Sector[5]



2.1.6 PET bottles methodology

In addition to wholesale supply of soft drinks to non-grocery retailers (estimated through EPIC), soft drinks are also supplied to outlets from manufacturers through distribution companies. It is estimated that the tonnage of PET soft drinks bottles unaccounted for when using only Valpak EPIC data is approximately 69k tonnes[6]. The majority (62kt) has been allocated to the hospitality stream, but a nominal 10% (7kt) was allocated to the consumer non-grocery sector.

2.1.7 HDPE bottles methodology

Dairy UK's 'The White Paper 2017' quantifies (litres) the sales channels of milk and was analysed to estimate non-grocery HDPE drinks POM. As a result of the analysis 5% of grocery sales were used to represent non-grocery store sales, whilst an additional 1kt of HDPE bottles were included to represent direct sales of milk through a traditional milkman and a further 1kt included to represent direct sales from farmers to consumers (neither of which are accounted for using Valpak's EPIC database[7] alone).

2.1.8 Glass bottles methodology

As with PET soft drinks, a proportion of glass drinks bottles are known to be sold direct from manufacturers (mainly through distribution companies) to hospitality outlets. These sales are not accounted for using Valpak's EPIC database alone. To estimate the missing drinks, the 75% consumer to 25% non-consumer glass packaging split established in WRAP/Valpak's

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5 https://www.igd.com/Portals/0/Downloads/Events/UKGroceryFoodserviceWholesaling2017.pdf

6 Using the total litres sold in 2016 published in The British Soft Drinks Association 'Making it Happen Annual Report 2017' and converted into a total tonnage of PET drinks bottles, it was identified that ~69kt of PET drinks bottle packaging was missing, once consumer and hospitality PET bottle sales were subtracted from the total.

7 1% of HDPE milk sales were found to be through a traditional milkman and 1% direct from farmers. Average packaging weights have been applied to calculate the tonnage of HDPE this relates to http://www.dairyuk.org/images/documents/publications/THE-WHITE-PAPER-2017.pdf

GlassFlow report (and supported by British Glass) was used, resulting in a further 272kt included. This tonnage has been assumed to be sold through non-consumer/hospitality, all alcoholic drinks (although a negligible proportion will be soft drinks) and all single format.

2.2 Working Method – Potential OTG POM

Potential OTG POM is represented by single format drinks containers, which are presented within size categories. Proportions for drinks sold in single format and by size were established from EPIC data, both for the consumer and non-consumer streams, and applied to the POM quantities – tonnes and units.

2.3 Results

The results of the UK drinks POM 2017 analysis are presented in **Figure 8** below. Where possible cross-checks have been undertaken to ensure the robustness of results presented.

2.3.1 Cross-check: PET soft drinks

Using commercially sensitive Valpak member data, industry insight and published market data, we were able to establish a market size for soft drinks sales in the UK. The estimate adopted in this project falls within 2% of this industry estimate.

2.3.2 Cross-check: HDPE (natural) milk bottles

The estimate for HDPE (natural) milk bottles adopted in this project falls within +/-8% of (and in between) two independent industry estimates.

2.3.3 Cross-check: Drinks cans

The Aluminium Packaging Recycling Organsiation (Alupro), generate their own estimation of aluminium cans POM, through consultation with all aluminium can manufacturers in the UK. Their POM figure also includes an estimate for canned drinks imported: a negligible sum in comparison to UK manufactured cans. The aluminium drinks cans estimate adopted in this project falls within 2% of Alupro's POM estimate.

Alupro were also able to comment on the project's steel drinks can POM for 2017, which they believed to be appropriate. It was highlighted that as of Q2 2018, there would be no further steel drinks can production in the UK and that future drinks can POM would be based almost wholly on UK aluminium drinks can manufacture (bar a miniscule import tonnage of aluminium and steel drinks cans).

2.3.4 Cross-check: Drinks cartons

The Alliance for Beverage Cartons and the Environment (ACE) UK were asked to verify the project's drinks POM estimates. For the full market estimate, 53kt was confirmed as about right, however the 1.8b units was thought to be low (their estimate is 3b units). No further analysis has been done to understand this difference as part of this project.

2.3.5 Cross-check: Drinks pouches

The British Soft Drinks Association's Annual Report 2017 'Making it Happen', gives the proportion of still and juice drink packed in pouches as 7% of the total volume (1,135M litres). This equates to 79M litres. For this same category, using EPIC data and the method described above, we achieve an estimate of 74M litres, within 7% of the BSDA estimate.

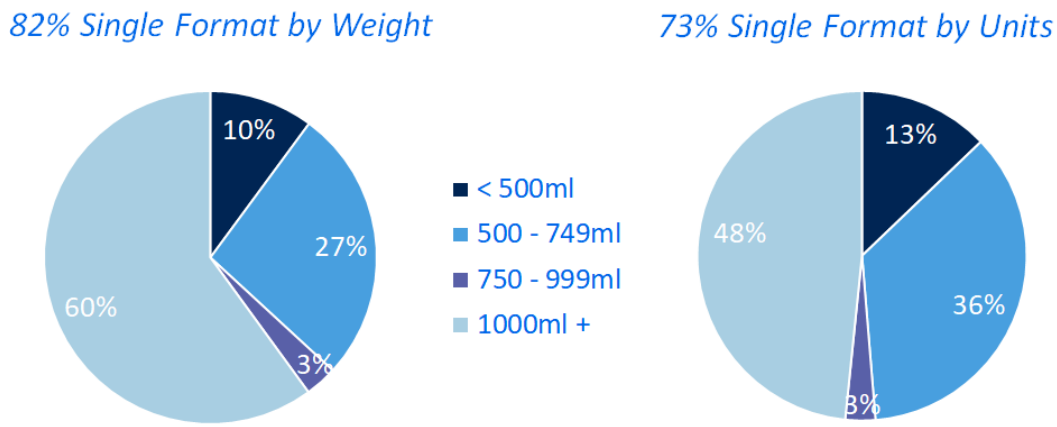
Figure 8 UK Drinks packaging POM by packaging type and stream

Packaging Type	Stream	Total Quantity		Single Format (thousand tonnes)					Single Format (billion units)				
		thousand tonnes	billion units	Total	< 500ml	500 - 749ml	750-999ml	1000ml +	Total	< 500ml	500 - 749ml	750-999ml	1000ml +
Plastic drinks bottles	**Full Market**	**435**	**14.4**	**357**	**36**	**95**	**11**	**214**	***10.5***	***1.3***	***3.7***	***0.3***	***5.1***
PET drinks bottles	*Consumer (Retail)*	*224*	*7.2*	*154*	*8*	*24*	*10*	*113*	*4.2*	*0.3*	*1.0*	*0.3*	*2.6*
PET drinks bottles	*Non-consumer (Hospitality)*	*94*	*3.4*	*92*	*22*	*64*	*1*	*4*	*3.3*	*0.8*	*2.4*	*0.0*	*0.1*
PET drinks bottles	*Full Market*	*317*	*10.6*	*246*	*30*	*88*	*11*	*117*	*7.5*	*1.1*	*3.4*	*0.3*	*2.7*
HDPE drinks bottles	*Consumer (Retail)*	*103*	*3.6*	*95*	*5*	*5*	*0*	*85*	*2.8*	*0.2*	*0.3*	*0.0*	*2.3*
HDPE drinks bottles	*Non-consumer (Hospitality)*	*15*	*0.2*	*15*	*1*	*2*	*0*	*12*	*0.2*	*0.0*	*0.0*	*0.0*	*0.1*
HDPE drinks bottles	*Full Market*	*118*	*3.8*	*110*	*6*	*7*	*0*	*97*	*3.0*	*0.2*	*0.3*	*0.0*	*2.4*
Metal drinks cans	***Full Market***	**154**	**7.7**	**18**	**16**	**3**	**0**	**0**	***1.3***	***1.2***	***0.1***	***0.0***	***0.0***
Aluminium drink cans	*Consumer (Retail)*	*109*	*5.8*	*8*	*6*	*2*	*0*	*0*	*0.6*	*0.5*	*0.1*	*0.0*	*0.0*
Aluminium drink cans	*Non-consumer (Hospitality)*	*11*	*0.8*	*9*	*8*	*1*	*0*	*0*	*0.7*	*0.6*	*0.0*	*0.0*	*0.0*
Aluminium drink cans	*Full Market*	*119*	*6.6*	*17*	*14*	*3*	*0*	*0*	*1.3*	*1.1*	*0.1*	*0.0*	*0.0*
Steel drinks cans	*Consumer (Retail)*	*33*	*1.0*	*0*	*0*	*0*	*0*	*0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Steel drinks cans	*Non-consumer (Hospitality)*	*1*	*0.1*	*1*	*1*	*0*	*0*	*0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Steel drinks cans	*Full Market*	*35*	*1.1*	*1*	*1*	*0*	*0*	*0*	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*
Glass drinks bottles	***Full Market***	**1836**	**5.5**	*1185*	*139*	*318*	*622*	*106*	*3.1*	*0.7*	*0.9*	*1.3*	*0.2*
Glass drinks bottles	*Consumer (Retail)*	*1377*	*4.2*	*1010*	*47*	*271*	*597*	*96*	*2.4*	*0.2*	*0.8*	*1.3*	*0.2*
Glass drinks bottles	*Non-consumer (Hospitality)*	*459*	*1.4*	*175*	*93*	*47*	*25*	*10*	*0.7*	*0.5*	*0.1*	*0.1*	*0.0*
Glass drinks bottles - no alcohol	*Consumer (Retail)*	*74*	*0.2*	*53*	*4*	*0*	*17*	*31*	*0.2*	*0.0*	*0.1*	*0.1*	*0.0*
Glass drinks bottles - no alcohol	*Non-consumer (Hospitality)*	*59*	*0.6*	*55*	*49*	*1*	*2*	*3*	*0.6*	*0.5*	*0.0*	*0.0*	*0.0*
Glass drinks bottles - no alcohol	***Full Market***	**133**	**0.9**	*107*	*53*	*2*	*19*	*34*	*0.7*	*0.5*	*0.1*	*0.1*	*0.0*
Cartons	***Full Market***	**53**	**1.8**	*42*	*2*	*1*	*2*	*37*	*1.3*	*0.2*	*0.0*	*0.1*	*1.0*
Cartons	*Consumer (Retail)*	*47*	*1.5*	*36*	*1*	*1*	*2*	*33*	*1.1*	*0.0*	*0.0*	*0.1*	*0.9*
Cartons	*Non-consumer (Hospitality)*	*5*	*0.3*	*5*	*2*	*0*	*0*	*4*	*0.3*	*0.1*	*0.0*	*0.0*	*0.1*
Pouches	***Full Market***	**4**	**0.3**	*0.3*	*0.2*	*0.0*	*0.0*	*0.0*	*0.03*	*0.03*	*0.00*	*0.00*	*0.00*
Pouches	*Consumer (Retail)*	*4*	*0.3*	*0.2*	*0.2*	*0.0*	*0.0*	*0.0*	*0.02*	*0.01*	*0.00*	*0.00*	*0.00*
Pouches	*Non-consumer (Hospitality)*	*0*	*0.0*	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*

2.4 Results – Single format plastic bottles

Compared to cans and glass bottles, a large majority of plastic bottles are sold in single format: 73% by number of units and 82% by weight. The largest size category of plastic bottles, both by weight and units, is the 1000ml + category; the least likely to be consumed OTG.

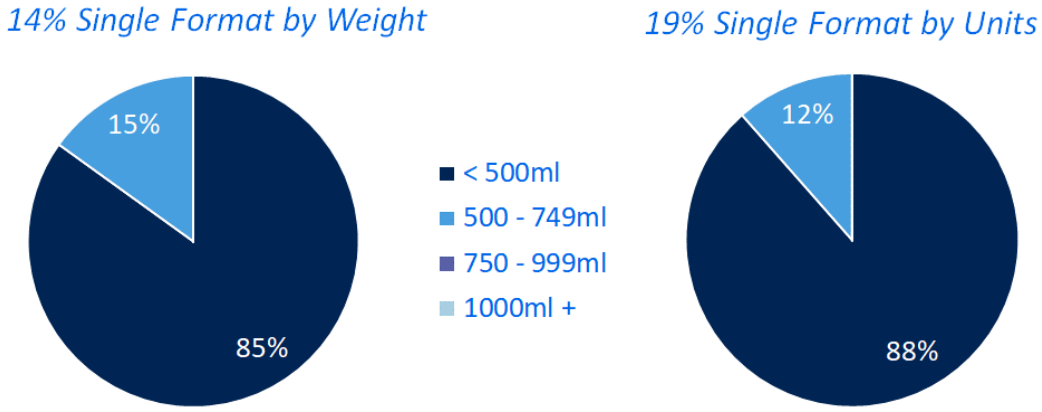
Figure 9 Single format plastic drinks bottles, by size



2.5 Results – Single format metal cans

On the contrary, metal drinks cans are far more commonly sold in multi-packs than single format, with only 14% of cans by weight and 19% of cans by unit being sold as single format. Of those sold as single format, a large majority (85%, 88%) fall into the <500ml category, the most likely to be consumed OTG.

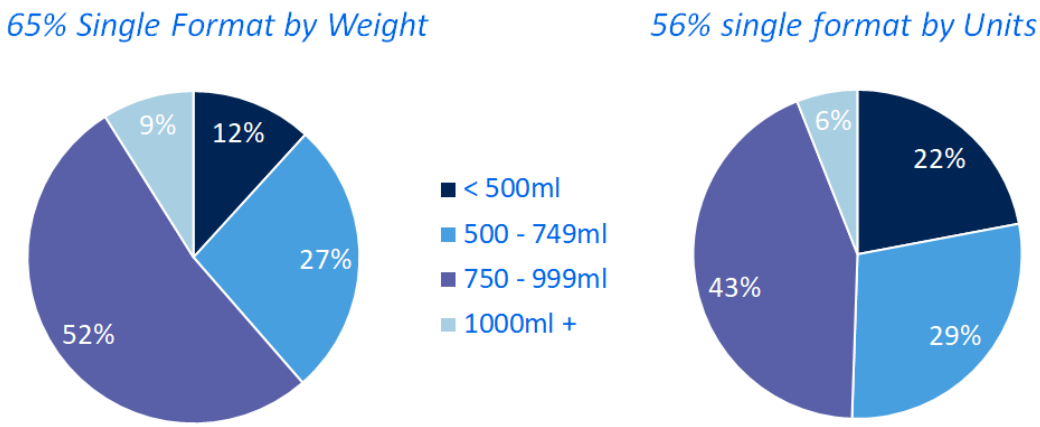
Figure 10 Single format drinks cans, by size



2.6 Results – Single format glass bottles

Glass drinks bottles are more commonly sold single format that drinks cans, but less commonly than plastic drinks bottles, with 65% sold single format by weight and 56% by units. Where glass differs significantly from both plastic and metal drinks containers is the distribution of single format bottles by size, with the largest category being the 750-999ml. This is the most common size of bottle for wines and champagnes. Glass bottles <750ml and <500ml are sold in similar proportions to plastic drinks bottles (39%, 51%), although the weight of glass drinks bottles sold is around three to four times greater than plastic drinks bottles, whilst the units are around two to three times fewer than plastic drinks bottles.

Figure 11 Single format glass drinks bottles, by size



If alcoholic drinks sold in glass bottles are excluded from this analysis, then the quantity of glass drinks bottles drops dramatically, from 1,836kt/5.5b units, to 74kt and 0.2b units. The proportion of non-alcoholic drinks sold as single format increases to 81% by weight and 86% by units and the proportion of non-alcoholic drinks sold in the <500ml category grows both in weight and units.

2.7 Results – Single format cartons

The majority of drinks cartons are sold as single format, with 79% by weight and 72% by units sold this way. A large majority (88% by weight, 79% by units) of drinks cartons fall into the 1000ml+ category, which are less likely to be consumed OTG than the <500ml individual portion drinks cartons.

2.8 Results – Single format pouches

The vast majority of drinks pouches, 94% by weight and 90% by units, are sold as part of a multipack. Those that are sold single format are almost all individual portions that fall into the <500ml category (92% by weight, 93% by units).

3.0 Consumer Survey of Drinks Consumption & Disposal

3.1 Introduction

In order to build up a comprehensive picture of drinks consumed outside the home, a survey was undertaken on multiple drink container types – plastic bottles, glass bottles, metal cans and take-away hot drinks cups. The survey aimed to establish where drinks were purchased, where they were consumed, where they were disposed and how they were disposed.

3.2 Working method

Survey fieldwork was undertaken between 28th June and 13th July 2018, using online panels. A nationally representative sample (age, gender, region and work status) of 4,000 UK adults were asked about their drinks consumption over three days. The results were then scaled-up to represent one week and one year. At the time of the fieldwork, the English football team were participating in the World Cup and it would seem this has lead to an over-estimation of drinks consumed in a year. For this reason, only the proportions of drinks consumed and disposed have been used in the findings of this project.

3.3 Robustness

The 4,000 strong sample provided an overall effective sample of 3,607. That's to say 3,607 (90%) respondents had consumed at least one drink from one of the four container types in the previous three days. For each drinks container type, the effective sample sizes were as follows:

- Metal cans: 2,569 (64%)
- Plastic bottles: 2,936 (73%)
- Glass bottles: 2,104 (53%)
- Hot take-away cup: 1,813 (45%)

The margins of error on the sample sizes are very low at +/-2%, however given the recent environmentally focused news stories and the breaking of the plastic issues social desirability bias is likely to play a factor in the participant responses observed. It is therefore likely that there is an over-reporting of "good behaviour".

3.4 Drinks Consumption

Respondents were given the choice of six different locations for the consumption of drinks as follows:

- While at home (including round at friends/family)
- While at work / college / university (including in a café/canteen/coffee shop)
- While on public transport
- While in the car
- While out at an event (including in a café/canteen/coffee shop)
- While out and about at other times (including in a café/canteen/coffee shop)

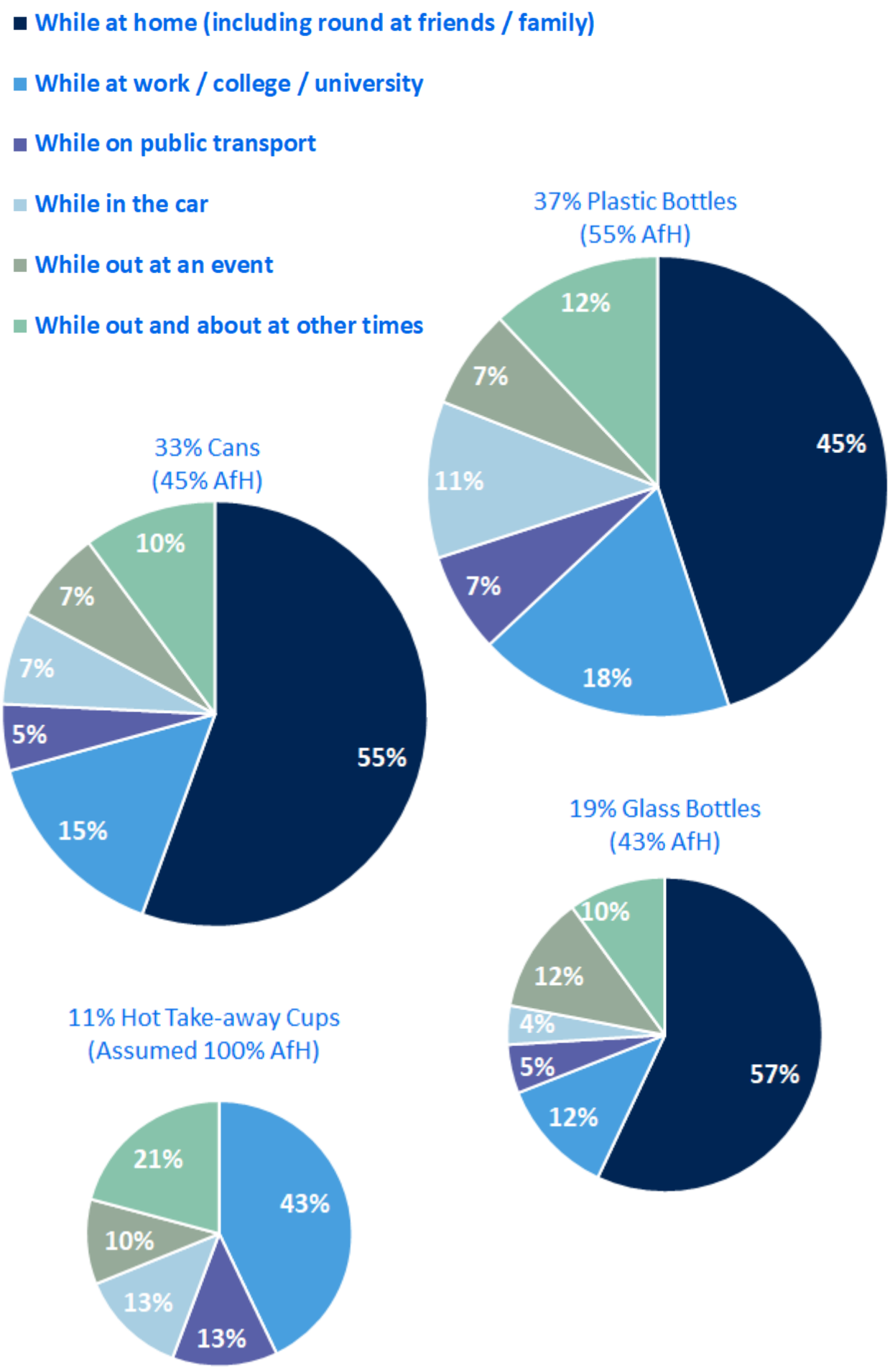
Consumption of a drink in a café/coffee shop/restaurant was not given as a separate location, but was included within several of the locations. It was possible to estimate the proportion of drinks bought from a hospitality outlet through a combination of knowing where drinks were bought and where they were disposed.

For drinks cans and glass bottles, the majority of drinks (55%, 57%) were consumed at home. This differed to plastic bottles where the majority (55%) where reported to be consumed away from home. Take-away drinks by nature are bought away from home and for the purpose of this survey were assumed to be consumed away from home, but with the potential for disposal at home.

Figure 12 below illustrates where drinks were consumed (and the proportion of each drinks container type) according to the number of units recorded in the survey results. Plastic drinks bottles were the most commonly consumed (by number of units), followed by drinks cans. Glass bottles were less commonly consumed as were take-away hot drinks.

For glass drinks bottles in particular this is significant, with only 11% of survey drinks being consumed from glass bottles and of these, only 43% consumed AFH. This means that less than 5% of the survey results were glass drinks bottles consumed AFH, compared to 15% aluminium drinks cans, 19% hot take-away cups and 20% plastic drinks bottles.

Figure 12 Consumer Survey: drinks consumption by packaging type (units)

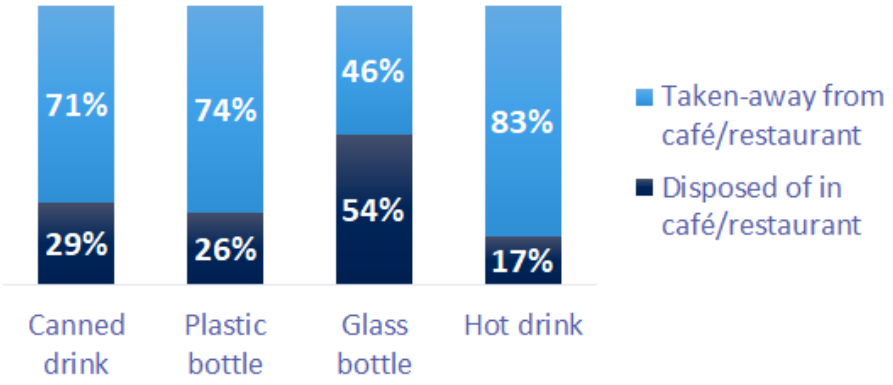


3.5 Drinks Disposal

Drinks disposal location did not necessarily match the drinks consumption location, with disposal at home being between 10% and 15% higher than consumption at home for drinks cans and bottles.

For those drinks bought from hospitality (café, coffee shop, café, restaurant, etc) the proportion disposed of in the location or taken away varied by drinks type as shown below:

Figure 13 Consumer Survey: hospitality drinks disposal



3.5.1 Plastic drinks bottles

The majority of plastic drinks bottles (60%) were reported to be disposed of at home and the implied recycling rate at home was 83%. For plastic drinks bottles disposed away from home, whether at work, school, university, in a café, etc. (but excluding OTG) the recycling rate was implied to be much lower at 65%. For plastic drinks bottles disposed of OTG (on the street and open public spaces), the implied recycling rate drops lower again to 49%.

In reality AFH and OTG recycling of plastic drinks bottles is not this high, as the scale and distribution of collection infrastructure does not exist, and the tonnages of plastic drinks bottles actually recycled does not reflect the levels calculated.

To put the level of implied recycling into context, Valpak used its knowledge of hot drinks cup POM and recycling. As co-founders and administrators of Costa's new industry take-away cup recycling scheme, we have in-depth knowledge of the number of take-away hot drinks cups used and collected for recycling. Valpak's data shows that for coffee cups the AFH recycling tonnage was exaggerated by 85% (see Section 0). If this level of exaggeration is used as a proxy[1] for plastic drinks implied to be recycled away from home, the AFH (including OTG) PET drinks bottle recycling rate is more likely to be approximately 9% (~10kt) and the OTG PET drinks bottle recycling rate is more likely to be approximately 7% (~2kt)[8].

[8] *Adjusted recycling levels were calculated by taking the implied tonnages recycled OTG and AFH and multiplying them by 15% (the proportion of hot cups Valpak believes are recycled as opposed to implied to be recycled). These levels were then divided by the total tonnages disposed of OTG and AWF to give adjusted recycling levels.*

Figure 14 Consumer Survey: summary of plastic drinks bottle disposal

How Disposed		Disposal Applied to Valpak PET Drinks POM b units	Disposal Applied to Valpak PET Drinks POM k tonnes	% by Location
Disposed of OTG		**10.6**	**32kt**	
Perceived as rubbish	*43%*	*1.1*	*14kt*	
Perceived as recycled	*49%*	*0.5*	*16kt*	**10%**
Left out / behind	*8%*	*0.5*	*3kt*	
Disposed of AFH (*not including OTG*)		**2.6**	**79kt**	
Perceived as rubbish	*26%*	*0.7*	*20kt*	
Perceived as recycled	*65%*	*1.7*	*52kt*	**25%**
Left out / behind	*9%*	*0.2*	*7kt*	
Consumed AFH, Disposed at Home		**1.6**	**47kt**	
Perceived as rubbish	*11%*	*0.2*	*5kt*	**15%**
Perceived as recycled	*89%*	*1.4*	*42kt*	
Consumed at Home, Disposed at Home		**4.8**	**142kt**	
Perceived as rubbish	*12%*	*0.6*	*17kt*	
Perceived as recycled	*81%*	*3.8*	*115kt*	**45%**
Left out / behind	*2%*	*0.1*	*3kt*	
Other	*5%*	*0.2*	*7kt*	
Location of Disposal Unknown		**0.1**	**2kt**	
Perceived as rubbish	*38%*	*0.0*	*1kt*	**1%**
Perceived as recycled	*62%*	*0.0*	*1kt*	
Other		**0.5**	**14kt**	
Still in possession	*39%*	*0.2*	*5kt*	**4%**
Something else	*61%*	*0.3*	*8kt*	
Total Disposed		**10.6**	**317kt**	
Perceived as rubbish	*18%*	*1.9*	*57kt*	
Perceived as recycled	*71%*	*7.6*	*227kt*	**100%**
Left out / behind	*4%*	*0.4*	*13kt*	
Other	*7%*	*0.7*	*21kt*	

35% Disposed AWAY from HOME

60% Disposed at HOME

An exaggerated AFH/OTG recycling rate could be due to a number of factors such as:

- Respondents believe they have disposed of drink containers in a recycling bin, when they've placed it in a general waste litter bin (attempt to recycle)
- Respondents feel they should have disposed of drink containers in a recycling bin, so have answered that they have (aspiration to recycle)
- Respondents have disposed of drink containers in a recycling bin, but the levels of contamination in the bin are so high that the material is not recycled (attempt to recycle)

Plastic drink bottle disposal applied to Valpak POM

The disposal proportions identified in the survey were applied to Valpak's PET drinks bottles POM, as this was believed more appropriate than PET and HDPE drinks POM combined. PET drinks bottles mainly contain soft drinks and water, whereas HDPE drinks bottles are mainly milk bottles. Commonly for hospitality milk bottles consumers share consumption of them and have no knowledge of disposal (i.e. milk added to a drink in a coffee shop). It is also likely that the majority of milk consumed at home or in locations such as offices, staff rooms, etc is shared and will not have been included in the survey responses.

For 2017, Valpak have calculated a PET drinks bottle POM of 317kt[9], which when combined with the Consumer Survey results gives an OTG disposal of 32kt, AFH (including OTG) disposal of 111kt and home disposal of 190kt. Comprehensive collection infrastructure exists for home recycling, but the extent of AFH collection infrastructure is relatively unknown. OTG infrastructure is very limited with around half of UK local authorities offering some OTG collection infrastructure and some shopping centres, train stations, service stations, etc also offering some recycling collections.

The overall implied recycling rate for all PET bottles from all disposal options (71%) and applied tonnage (227kt) are approximately 2-3% higher than Valpak's PET drinks bottle recycling rate (69%) and level (219kt).

Plastic bottles differ from cans in their ability to be re-sealed, which not only facilitates consumers holding on to them to recycle at home, or other location where recycling may be offered, but it also means they can be re-used. The majority of 8kt/61% of 'other' given by respondents as to where/how their plastic bottles were disposed of is attributable to re-use.

Key Findings – plastic drinks bottles

In all three cases of 'exaggeration' given above, the indications are potentially positive – respondents either feel they should or are trying to recycle AFH and OTG, which suggests if AFH and OTG infrastructure was further developed it would be used. However, it also highlights that more infrastructure is required and that education is imperative to improve both the quality and quantity of recycling.

A second key message is that AFH disposal excluding OTG is more than double OTG disposal and is therefore a larger target for recycling. Responsibility for providing bins (rubbish and/or recycling) for this type of disposal falls on businesses or organisations such as schools and colleges. In Scotland, legislation is already in place that requires businesses/organisations to present recyclables separately for collection, but this is not the case in the rest of the UK and is left to individual businesses and organisations to choose whether to offer recycling facilities.

3.5.2 Drinks cans

The majority of drinks cans (64%) were reported to be disposed of at home and the implied recycling rate at home was 82%. For drinks cans disposed away from home (but not including OTG), whether at work, school, university, in a café, etc. the recycling rate was implied to be much lower at 59%. For drinks cans disposed of OTG only (on the street and open public spaces), the implied recycling rate drops lower again to 48%.

In reality OTG and AFH recycling of drinks cans is not this high, as the scale and distribution of collection infrastructure does not exist, and the tonnages of drinks cans actually collected does not reflect the levels calculated.

To put the level of implied recycling into context, Valpak used its knowledge of hot drinks cup POM and recycling. As co-founders and administrators of Costa's new industry take-away cup recycling scheme, we have in-depth knowledge of the number of take-away hot drinks cups used and collected for recycling. Valpak's data shows that for coffee cups the AFH recycling tonnage was exaggerated by 85% (see Section 0). If this level of exaggeration is used as a proxy[1]for drinks cans implied to be recycled away from home, the AFH including

[9] *PlasticFlow 2025, as yet unpublished WRAP/Valpak*

OTG) drinks cans recycling rate is more likely to be approximately 9% (~3kt) and the OTG drinks cans recycling rate is more likely to be approximately 7% (~1kt)[10].

Figure 15 Consumer Survey: summary of drinks cans disposal

How Disposed		Disposal Applied to Valpak Drinks Can POM b units	Disposal Applied to Valpak Drinks Can POM k tonnes	% by Location	
Disposed of OTG		**0.7**	**15kt**		
Perceived as rubbish	*43%*	*0.3*	*6kt*	**10%**	
Perceived as recycled	*48%*	*0.4*	*7kt*		
Left out / behind	*9%*	*0.1*	*1kt*		
Disposed of AFH (*not including OTG*)		**1.8**	**36kt**		
Perceived as rubbish	*32%*	*0.6*	*11kt*	**23%**	**33%** Dispose AWAY from HOME
Perceived as recycled	*59%*	*1.1*	*21kt*		
Left out / behind	*9%*	*0.2*	*3kt*		
Consumed AFH, Disposed at Home		**0.7**	**15kt**		
Perceived as rubbish	*15%*	*0.1*	*2kt*	**10%**	
Perceived as recycled	*85%*	*0.6*	*13kt*		
Consumed at Home, Disposed at Home		**4.2**	**85kt**		
Perceived as rubbish	*16%*	*0.7*	*13kt*	**55%**	**64%** Dispose at HOME
Perceived as recycled	*81%*	*3.4*	*69kt*		
Left out / behind	*2%*	*0.1*	*2kt*		
Other		*0.0*	*0kt*		
Location of Disposal Unknown		**0.1**	**1kt**		
Perceived as rubbish	*35%*	*0.0*	*0kt*	**1%**	
Perceived as recycled	*65%*	*0.0*	*1kt*		
Other		**0.1**	**2kt**		
Still in possession	*77%*	*0.1*	*2kt*	**2%**	
Something else	*23%*	*0.0*	*1kt*		
Total Disposed		**7.7**	**154kt**		
Perceived as rubbish	*22%*	*1.7*	*34kt*	**100%**	
Perceived as recycled	*72%*	*5.5*	*110kt*		
Left out / behind	*4%*	*0.3*	*7kt*		
Other	*2%*	*0.2*	*3kt*		

Drinks can disposal applied to Valpak POM

The disposal proportions identified in the survey were applied to Valpak's drinks can POM. For 2017, Valpak have calculated a drinks can POM of 154kt, which when combined with the Consumer Survey results gives an OTG disposal of 15kt, AFH (including OTG) disposal of 51kt and home disposal of 99kt. Comprehensive collection infrastructure exists for home recycling, but the extent of AFH collection infrastructure is relatively unknown. OTG infrastructure is very limited with around half of UK local authorities offering some OTG collection infrastructure and some shopping centres, train stations and services stations, etc. also offering some recycling collections.

[10] *Adjusted recycling levels were calculated by taking the implied tonnages recycled OTG and AFH and multiplying them by 15% (the proportion of hot cups Valpak believes are recycled as opposed to implied to be recycled). These levels were then divided by the total tonnages disposed of OTG and AWF to give adjusted recycling levels.*

The overall recycling rate for all drinks cans from all disposal options (72%, 110kt) appears to equal the recycling rate estimate made by Alupro for 2017, however Alupro's estimate includes an allowance for aluminium cans recycled from incinerator bottom ash (IBA) which would not be included in the survey results (26% of aluminium cans recycled are recycled from IBA). Alupro's 2017 recycling rate excluding recycling of IBA would be 69% (89kt if applied to Valpak's drinks can POM).

Key Findings – drinks cans
As per plastic drinks bottles, AFH and OTG recycling rates were found to be exaggerated (see section 3.5.1 for potential reasons).

Overall, survey results show that drinks cans are less likely to be taken on the go than plastic bottles, but more likely than glass drinks bottles. However, ~45% of drinks cans are consumed out of the home, representing a considerable tonnage (~69kt). The majority (~40kt) of this tonnage is not drinks containers consumed and disposed OTG, but in hospitality and other business/organisation premises.

3.5.3 Glass drinks bottles

The majority of glass drinks bottles (65%) were reported to be disposed of at home and the implied recycling rate at home was 83%. For glass drinks bottles disposed away from home, whether at work, school, university, in a café, etc. (but not including OTG) the recycling rate was implied to be much lower at 54%. For glass drinks bottles disposed of OTG, the implied recycling rate is similar at 51%.

In reality OTG and AFH recycling of glass drinks bottles is not this high, as the scale and distribution of collection infrastructure does not exist, and the tonnages of glass drinks bottles actually recycled do not reflect such recycling rates.

To put the level of implied recycling into context, Valpak used its knowledge of hot drinks cup POM and recycling. As co-founders and administrators of Costa's new industry take-away cup recycling scheme, we have in-depth knowledge of the number of take-away hot drinks cups used and collected for recycling. Valpak's data shows that for coffee cups the AFH recycling tonnage was exaggerated by 85% (see Section 0). If this level of exaggeration is used as a proxy[1] for glass drinks bottles implied to be recycled away from home the AFH (including OTG) glass drinks bottles recycling rate is more likely to be approximately 8% (~48kt) and the OTG glass drinks bottles recycling rate is also approximately 8% (~11kt) [11].

Glass drinks bottle disposal applied to Valpak POM
The disposal proportions identified in the survey were applied to Valpak's glass drinks bottle POM. For 2017, Valpak have calculated a glass drinks bottle POM of 1856kt, which when combined with the Consumer Survey results gives an OTG disposal of 147kt, AFH (including OTG) disposal of 608kt and home disposal of 1191kt. Comprehensive collection infrastructure exists for home recycling, but the extent of AFH collection infrastructure is relatively unknown. OTG infrastructure is very limited with around half of UK LAs offering some OTG collection infrastructure and some shopping centres and train stations also offering some recycling collections.

Key Findings – glass drinks bottles
As per plastic drinks bottles, AFH and OTG recycling rates were found to be exaggerated (see section 3.5.1 for potential reasons).

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[11] Adjusted recycling levels were calculated by taking the implied tonnages recycled OTG and AFH and multiplying them by 15% (the proportion of hot cups Valpak believes are recycled as opposed to implied to be recycled). These levels were then divided by the total tonnages disposed of OTG and AWF to give adjusted recycling levels.

Overall, survey results show that glass drinks bottles are less likely to be taken on the go:

- a smaller proportion is taken-away from hospitality outlets (46% Vs 71% & 74% for plastic bottles and cans)
- a larger proportion is consumed at home (57%) than plastic bottles (45%)
- a smaller proportion is taken home for disposal (8%) than plastic bottles (15%)

However, over 40% of glass drinks bottles are consumed out of the home, representing a considerable tonnage (~784kt). The majority (~637kt) of this tonnage is not drinks containers consumed and disposed OTG, but in hospitality and other business/organisation premises.

Although some recycling collection infrastructure is already in place for glass drinks bottles if recycling rates are to increase this needs to be significantly grown.

Figure 16 Consumer Survey: summary of glass drinks bottles disposal

How Disposed		Disposal Applied to Valpak Glass Drinks POM b units	k tonnes	% by Location
Disposed of OTG		**0.4**	**147kt**	
Perceived as rubbish	32%	*0.1*	*48kt*	**8%**
Perceived as recycled	51%	*0.2*	*75kt*	
Left out / behind	17%	*0.1*	*25kt*	
Disposed of AFH (*not including OTG*)		**1.4**	**461kt**	
Perceived as rubbish	18%	*0.2*	*82kt*	**25%**
Perceived as recycled	54%	*0.8*	*250kt*	
Left out / behind	28%	*0.4*	*129kt*	
Consumed AFH, Disposed at Home		**0.4**	**139kt**	
Perceived as rubbish	12%	*0.4*	*16kt*	**8%**
Perceived as recycled	88%	*0.0*	*123kt*	
Consumed at Home, Disposed at Hom		**3.2**	**1052kt**	
Perceived as rubbish	9%	*0.3*	*96kt*	**57%**
Perceived as recycled	83%	*2.6*	*869kt*	
Left out / behind	4%	*0.1*	*46kt*	
Other	4%	*0.1*	*41kt*	
Location of Disposal Unknown		**0.0**	**8kt**	
Perceived as rubbish	15%	*0.0*	*1kt*	**0%**
Perceived as recycled	85%	*0.0*	*7kt*	
Other		**0.1**	**29kt**	
Still in possession	35%	*0.0*	*10kt*	**2%**
Something else	65%	*0.1*	*19kt*	
Total Disposed		**5.5**	**1836kt**	
Perceived as rubbish	13%	*0.7*	*243kt*	**100%**
Perceived as recycled	72%	*4.0*	*1324kt*	
Left out / behind	11%	*0.6*	*200kt*	
Other	4%	*0.2*	*70kt*	

33% **Disposed AWAY from HOME**

65% **Disposed at HOME**

3.5.4 Take-away hot drinks cups

The majority of take-away hot drink cups (85%) were reported to be disposed of away from home[12] and the implied recycling rate AFH (including OTG) was 22% (21kt if applied to Valpak's estimated take-away hot drinks cup POM[13]). However, through the Costa/Valpak Coffee-cup Recycling Scheme[14] collections it has been possible to estimate a collection tonnage for 2018 of up to 560 tonnes of hot drinks cups. This suggests that AFH (including OTG) hot take-away drink recycling rate is exaggerated by ~85%.

Figure 17 Consumer Survey: summary of take-away hot drinks cup disposal

	Total	Disposal Applied to Valpak Hot Take-away Drinks POM b units	k tonnes	Disposal Location
Disposed of OTG		**0.2**	**3kt**	
Perceived as rubbish	*58%*	*0.1*	*1kt*	**20%**
Perceived as recycled	*34%*	*0.1*	*1kt*	
Left out / behind	*8%*	*0.0*	*0kt*	
Disposed of AFH (*not including OTG*)		**0.7**	**8kt**	
Perceived as rubbish	*38%*	*0.3*	*3kt*	**65%**
Perceived as recycled	*45%*	*0.3*	*4kt*	
Left out / behind	*17%*	*0.1*	*1kt*	
Consumed AFH, Disposed at Home		**0.1**	**1kt**	
Perceived as rubbish		*0.1*	*0kt*	**11%**
Perceived as recycled	*74%*	*0.0*	*1kt*	
Location of Disposal Unknown		**0.0**	**0kt**	
Perceived as rubbish	*55%*	*0.0*	*0kt*	**1%**
Perceived as recycled	*45%*	*0.0*	*0kt*	
Other		**0.0**	**0kt**	
Still in possession	*34%*	*0.0*	*0kt*	**3%**
Something else	*66%*	*0.0*	*0kt*	
Total Disposed		**1.1**	**13kt**	
Perceived as rubbish	*40%*	*0.4*	*5kt*	**100%**
Perceived as recycled	*45%*	*0.5*	*6kt*	
Left out / behind	*12%*	*0.1*	*2kt*	
Other	*3%*	*0.0*	*0kt*	

85% Disposed AWAY from HOME

11% Disposed at HOME

[12] Take-away hot drinks cups are by definition not derived from home – they are bought from a hospitality or retail outlet, therefor any survey responses that reported take-away drinks to have been consumed at home have been excluded, as it was apparent from responses that the vast majority of these were not 'take-away' coffees, but home-made coffees in re-usable cups.

[13] The POM for take-away hot drinks cups was not established as part of this project, but through the Costa/Valpak coffee-cup recycling scheme that has recently been set-up. POM was established through scaling up known sales of hot-drink cups using market shares and converting units to weight.

[14] https://www.recycle-more.co.uk/how-is-it-recycled-/coffee-cup-recycling

4.0 Drinks Containers Recycling & Waste Composition Analysis

There are a wide variety of recycling OTG collection schemes for consumers to use AFH.

The schemes differ depending on the likely users of the scheme, the target location and level of footfall. Typical schemes include:

- LA operated schemes in locations such as town and city centres and open public spaces;
- Transport hubs which include train and bus stations and road service stations; and
- Work places, including both office and manufacturing environments.

Many schemes typically target drinks containers - plastic bottles, metal cans, and glass bottles, but increasingly all household dry mixed recycling has been targeted, which includes plastics pots, tubs and trays, cartons, and paper / card. Coffee cups are a typical source of confusion for consumers as to whether they can be placed for recycling or not.

The performance of schemes can vary greatly in terms of composition - the quantity collected for recycling and the quality of the material. Many recycling OTG schemes do not maximise the potential performance due to negative consumer disposal behaviour i.e. placing the wrong material in the wrong bin. This can often occur when there is not enough litter bin collection provision in place, inconsistent bin design, and lack of clear and engaging signage and effective communications.

Performance of Local Authority operated schemes can be affected by a number of factors:

- Increased population and footfall;
- Creating operational efficiencies by reducing the frequency of collections of material and increasing the probability of a surplus of non-target material around the bins; and
- A range of specific problem locations – these include water front locations (sea front, beaches and rivers), night life in town and city centre locations, and roads (both urban and rural).

4.1 Methodology

Two surveys were undertaken to estimate the quantities of OTG drinks containers collected for recycling:

- Local Authorities in the UK that provide a recycling OTG collection provision service
- Composition analysis of the recycling OTG bins

4.1.1 Local Authority Service Provision

Every LA in the UK was contacted, either through the *RECOUP UK Household Plastics Collection Survey* research, or directly through calls with the waste and recycling teams or via a general enquiry.

4.1.2 Recycling & Waste Composition Analysis

All three key areas of AFH collection schemes were targeted to analyse the quantities of drinks containers collected – LA operated schemes; transport hubs; and places of work.

To attain a robust representative sample from recycling OTG schemes, a number of locations were analysed covering varied socio-demographic locations in town and city centres, public green spaces, transport hubs, and places of work.

Locations for the analysis were agreed through direct contact with Local Authorities or through the waste management provider, or directly with the work places and transport hubs.

A representative sample was sought across different disposal times – weekdays and weekends. The material was provided in bags, with some being tagged to specify the bin location (town centre, park, train platform, etc) and the day the material was collected.

The material was collected from the recycling bins by the LA or waste management provider and stored until enough material was generated to be analysed. It was then transported to a secure rain and wind proof indoor location to be analysed.

The contents were then separated by: target material; non-target material; material composition for drinks containers; and contamination, including any overall key observations including main types of contamination.

The expectation was to analyse approximately 80-100 bags of material (200kg-300kg) from each location, but this was not possible due to material decomposing during the hot weather during the delivery period of the project. This meant that more detail was able to be provided in the analysis and coffee cups were included as a separate material fraction.

The composition of the material was reported for:

- Drinks containers:
    - PET plastic bottles (e.g. water and fizzy drinks)
    - HDPE plastic bottles (e.g. milk and juice drinks)
    - Drinks cans
    - Glass bottles;
- Coffee cups;
- Other dry mixed material – this could include plastic pots, tubs and trays (e.g. yoghurt pots, margarine/butter tubs, clear fruit punnets, food trays); mixed paper; cardboard; glass jars and lids; foil; and non-drinks plastic bottles (sauce, washing up liquid, cooking oil, household cleaners, shampoo, medicine); and
- Contamination – this could include expanded polystyrene, disposable nappies, textiles, bagged dog waste, plastic bags, sweet wrappers, crisp wrappers, food waste (including fast food) and liquids

Each category of material was weighed using electronic weighing scales accurate to the nearest 0.5g. Photographs were taken of all the bags, the typical material contents, and any contamination that would be of interest in understanding disposal OTG.

All weights were recorded by hand onto a data sheet and then transferred to a spreadsheet format for data analysis.

Data is also reported by number of units. It is also important to distinguish the weight of drinks containers and the number of units. This particularly applies for glass bottles as they are significantly heavier than other drinks containers and, although they can make up a good proportion of the weight, the numbers of glass bottles can be low.

The recycling material was supplemented by material provided from general waste litter bins from some LA schemes, which is reported separately.

4.2 Recycling OTG Local Authority Service Provision

An up-to-date overview for all Local Authorities in the UK was not available before the project was initiated.

There are 391 Local Authorities collecting plastics for recycling in the UK – 326 in England, 32 in Scotland, 22 in Wales, and 11 in Northern Ireland.

With responses from all 391 LAs 48% of Local Authorities confirmed they operate a recycling OTG scheme (52% do not). It has not been possible in this research to understand the number of bins in each LA location, but additional data has been made available by some Local Authorities about the general location of the bins, future plans for existing schemes or plans to trial a new one.

4.3 Recycling & Waste Composition Analysis

Overall, compositional analysis is provided for 11 locations across LA operated schemes, transport hubs and work places.

4.3.1 Local Authority Operated Schemes

Recycling material was analysed from LA schemes across the UK:

- Local Authority A – Northern Ireland
- Local Authority B – South East England
- Local Authority C – South Midlands England
- Local Authority D – London
- Local Authority E – Wales
- Local Authority F – North West England

One of these authorities used data from existing recycling composition analysis.

There were common points for the material collected for recycling across all schemes due to the hot weather in Summer 2018.

- **Storing material.** It can take some time to build up the quantity of material to complete a material composition analysis, and the hot weather during Summer 2018 when the project was delivered meant that a relatively low weight was able to be stored, transported and analysed.
- **Food and material decomposition.** Food that was disposed of either with or without the food packaging decomposed and attracted flies and maggots.
- **Number of drinks containers.** A disproportionally high volume of drinks containers was observed in the stream.

Overall observation of the recycling material found there were common items that contaminated the material:

- Food waste
- Liquids and wet bags
- Plastic film – bags, and crisp and sweet wrappers
- Broken glass, cigarette ends and ash
- Textiles – including clothing and pillows
- Commercial premises using bins

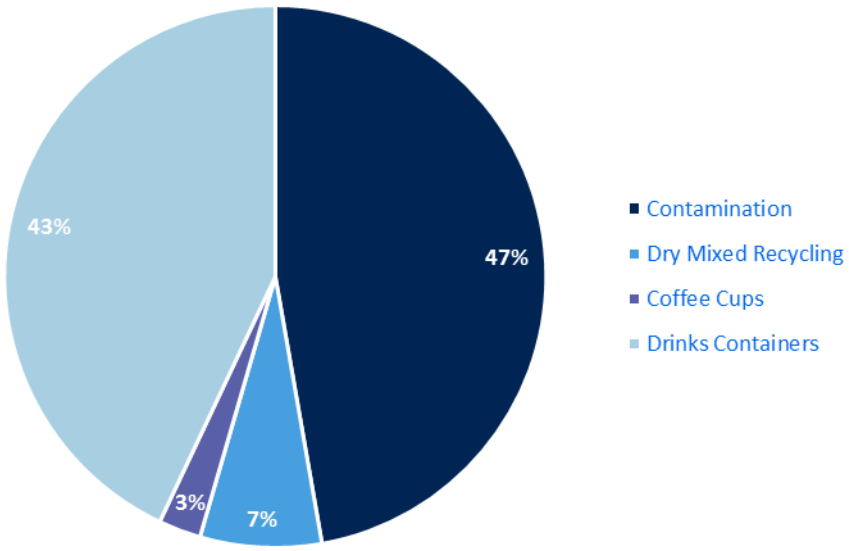
More detailed observations can be found in Appendix II.

General waste material was also analysed from three LAs. Two provided recycling and general waste, Local Authority B in South East England and Local Authority C in South Midlands England. There was also a general waste only sample from one LA – Local Authority F in Scotland.

Recycling Material

The overall composition of the material by weight from the LA schemes is shown in **Figure 18**:

Figure 18 Recycling composition analysis: overall composition of LA OTG material



The breakdown of drinks containers only by weight and units from the LA schemes are shown in **Figure 19** and **Figure 20**:

Figure 19 Recycling composition analysis: composition of LA OTG drinks containers (weight)

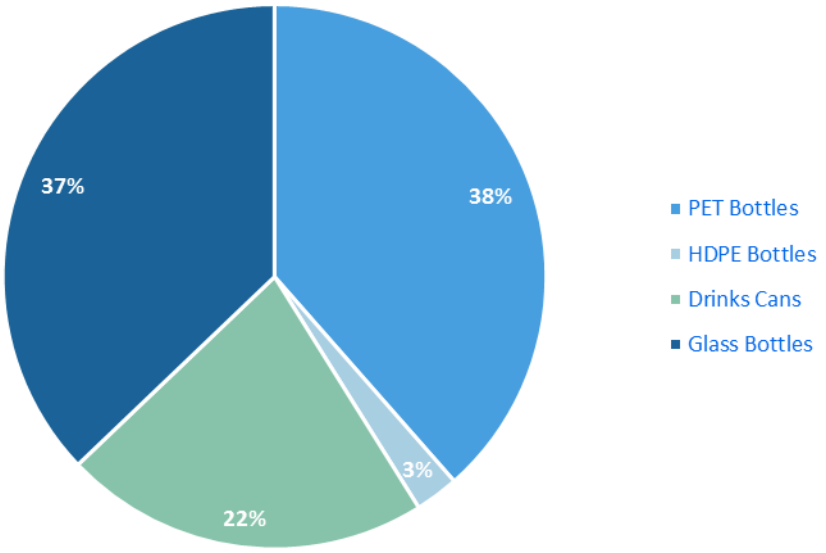
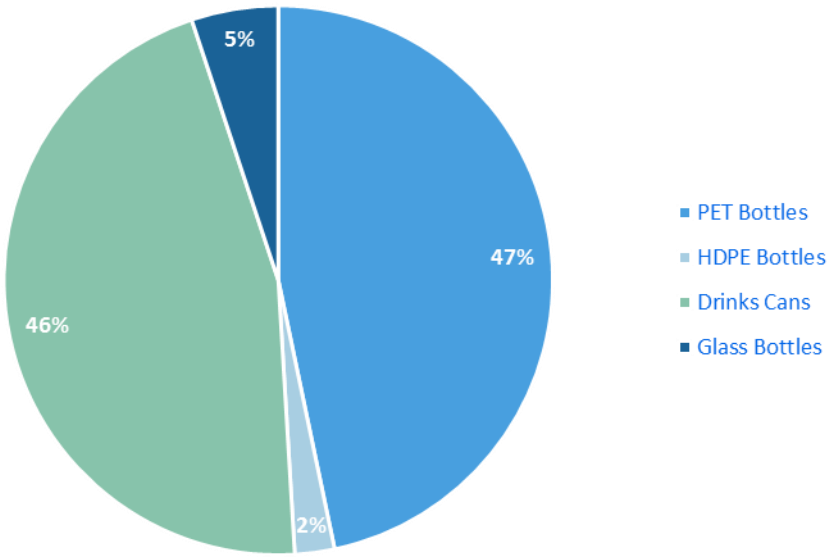


Figure 20 Recycling composition analysis: composition of LA OTG drinks containers (units)



A total weight of 47kg-212kg was analysed for each scheme.

The range of composition by weight was:

- Contamination – 19%-87%
- Dry Mixed Recycling – 3%-17%
- Coffee cups – 1%-6%
- Drinks containers - 13%-71%

The range of composition for drinks containers by weight was:

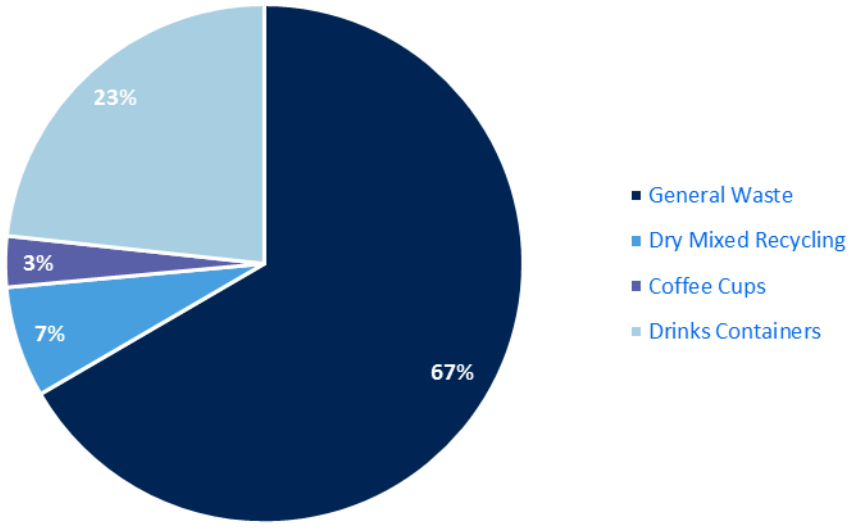
- PET drinks bottles – 23%-63%
- HDPE – 0%-4%
- Cans – 10%-26%
- Glass – 11%-61%

Typical contamination from the LA operated schemes can be seen below, which demonstrates the challenges that recycling OTG operators face on a daily basis:

General Waste

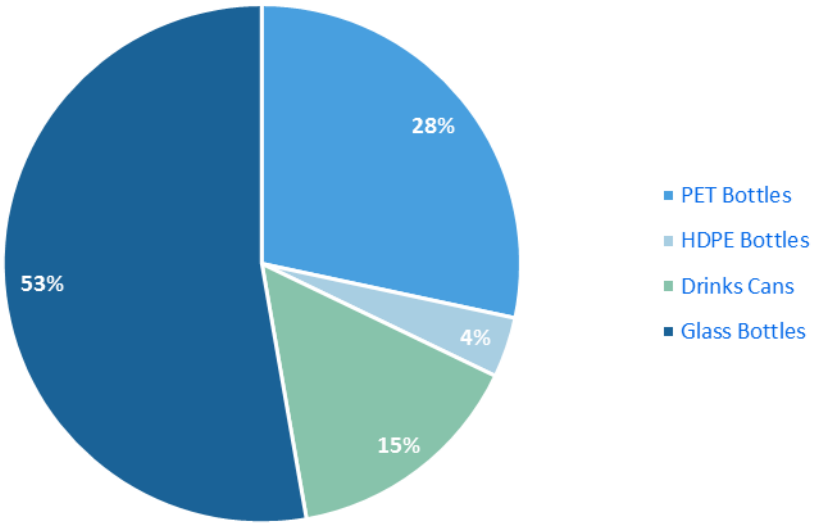
The overall composition of the general waste material by weight from the LA schemes is shown in **Figure 21**:

Figure 21 Overall composition of general waste material by weight from LA schemes



The breakdown of drinks containers only by weight of the general waste from the LA schemes are shown in **Figure 22**.

Figure 22 Breakdown of drinks containers by weight of general waste from LA schemes



A total weight of 28kg-220kg was analysed for each scheme.

The range of composition by weight was:

- General waste – 53%-79%
- Dry Mixed Recycling – 2%-10%
- Coffee cups – 2%-6%
- Drinks containers - 13%-35%

The range of composition for drinks containers by weight was:

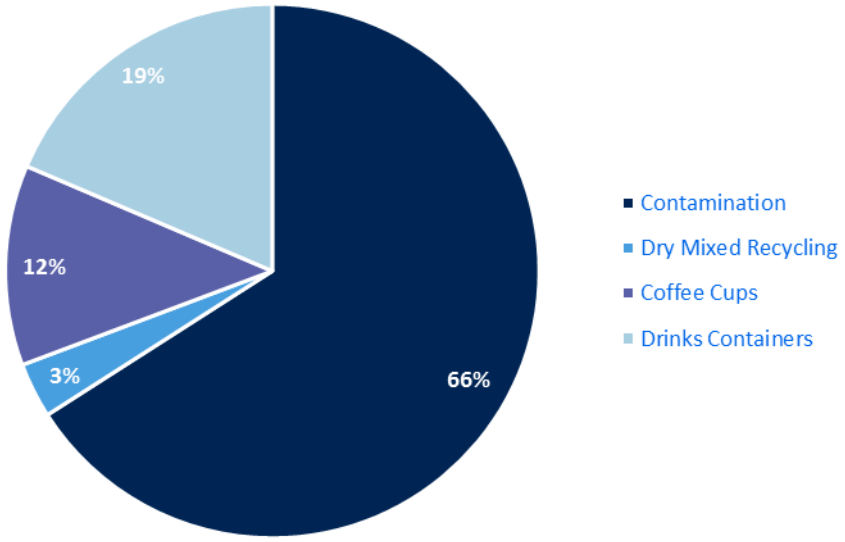
- PET drinks bottles – 19%-45%
- HDPE – 2%-7%
- Cans – 9%-25%
- Glass – 36%-70%

4.3.2 Transport Hubs

Material from a major train stations with recycling OTG provision and a major roadside services station were analysed.

The overall composition of the material by weight from the transport hubs is shown in **Figure 23**:

Figure 23 Waste composition analysis: overall composition for transport hubs (weight)



The breakdown of drinks containers only by weight and units from the transport hubs are shown in **Figure 24** and **Figure 25**:

Figure 24 Waste composition analysis: composition for transport hubs of drinks containers (weight)

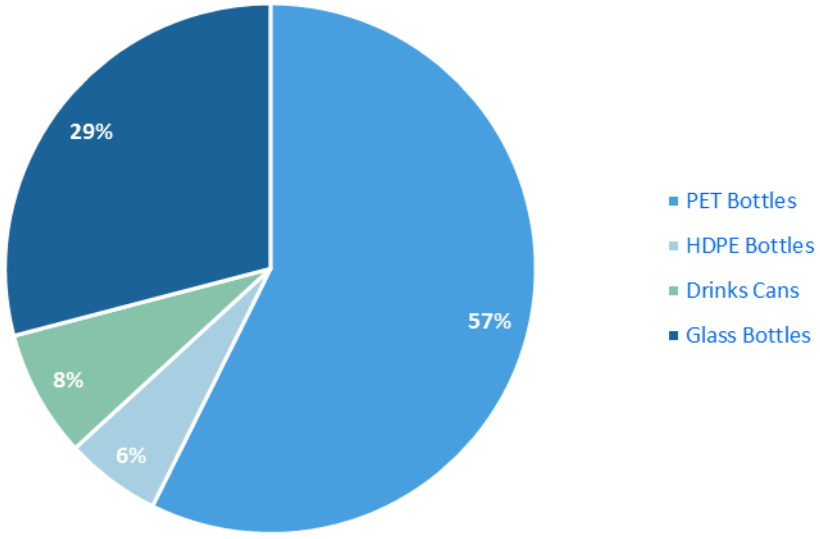
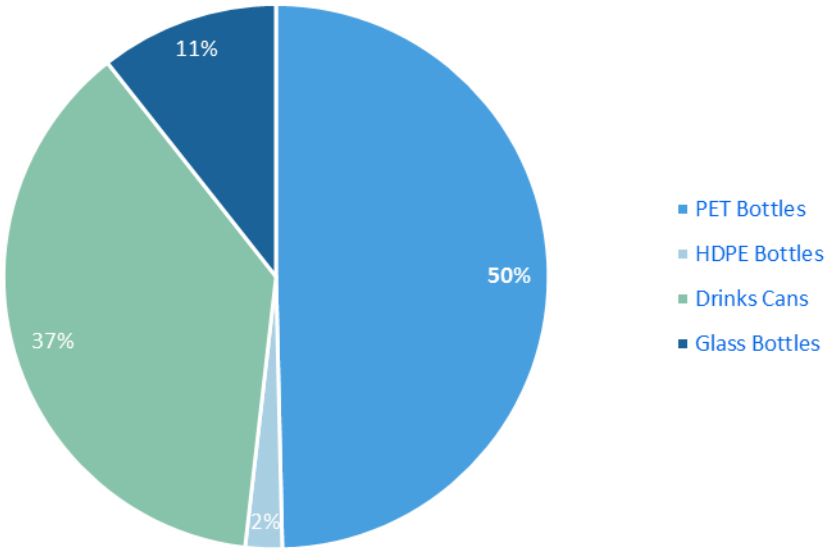


Figure 25 Waste composition analysis: composition for transport hubs of drinks containers (units)



A total weight of 89kg-93kg was analysed for each scheme.

The range of composition was:

- Drinks containers – 3%-34%
- Contamination – 47%-85%
- Dry Mixed Recycling – 1%-6%
- Coffee cups – 11%-13%

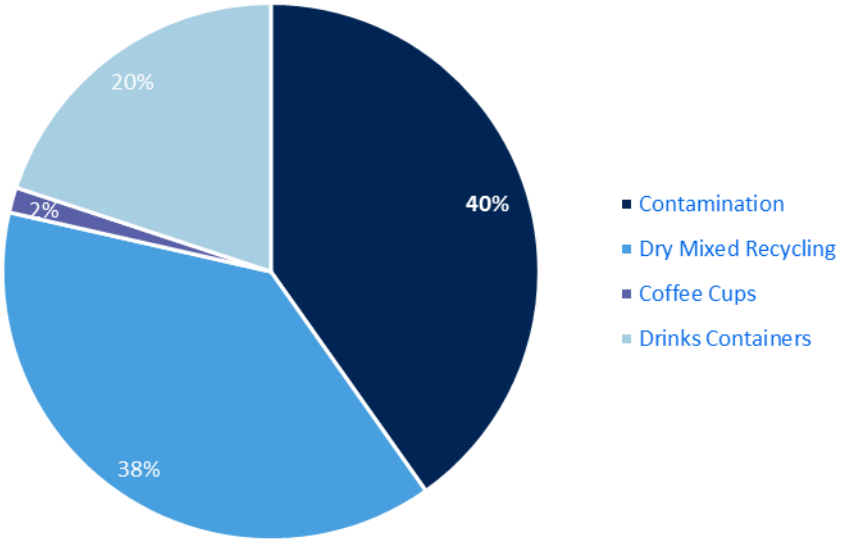
4.3.3 Work Places

The composition of the recycling OTG schemes were analysed at one medium sized manufacturing facility and one large office administration and distribution headquarters.

The overall composition of the material by weight analysed from the work places is shown in

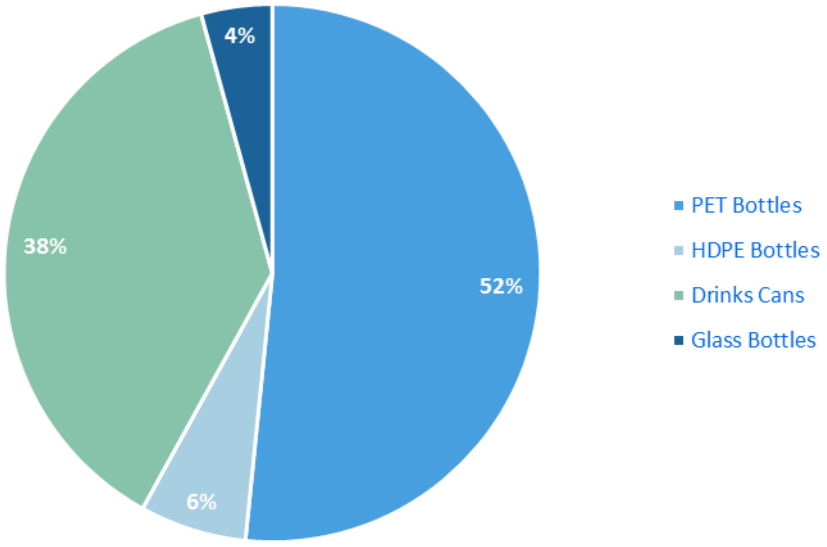
Figure 26:

Figure 26 Waste composition analysis: overall composition for work places (weight)



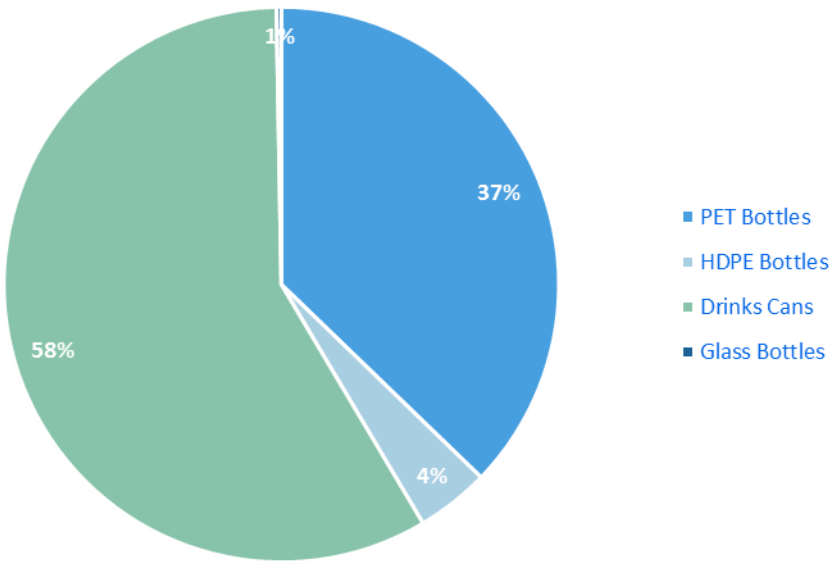
The breakdown of drinks containers only by weight and units from the work places are shown in **Figure 27** and **Figure 28**:

Figure 27 Recycling composition analysis: composition for work places of drinks containers (weight)



The drinks containers reported by number of units was:

Figure 28 Recycling composition analysis: composition for work places of drinks containers (units)



A total weight of 27kg-74kg was analysed for each scheme.

The range of composition was:

- Contamination – 16%-65%
- Dry Mixed Recycling – 16%-60%
- Coffee cups – 0%-3%
- Drinks containers - 19%-21%

5.0 Project Conclusions

Conclusions: POM

Plastic bottles are the most prolific drinks container POM by number of units

- 14.4b plastic drinks bottles were POM in the UK in 2017
- Of these, 10.5b are sold single format and nearly half are >1l

Glass bottles are the most prolific drinks container POM by weight

- 1836kt glass drinks bottles were POM in the UK in 2017
- Of this, 1185kt is sold single format and just over half are 750-999ml

Plastic and glass drinks bottles and drinks cartons are more commonly sold in single format

- 78% (246kt) or 71% (7.5b units) of PET drinks bottles are sold in single format
- 94% (110kt) or 78% (3.0b units) of HDPE drinks bottles are sold in single format
- 65% (1185kt) or 56% (3.1b units) of glass drinks bottles are sold in single format
- 79% (42kt) or 72% (1.3b units) of drinks cartons are sold in single format

Drinks cans and pouches are more commonly sold as multipacks

- 86% (103kt) or 81% (5.3b units) of aluminium drinks cans are sold in multipacks
- 96% (33kt) or 95% (1.0b units) of steel drinks cans are sold in multipacks
- 94% (4kt) or 90% (0.3b units) of drinks pouches are sold in multipacks

The majority of glass drinks bottles contain alcoholic drinks

- 93% by weight contain alcoholic drinks, of which 81% are sold in single format
- 85% by units contain alcoholic drinks, of which 86% are sold in single format

Metal drinks cans <500ml, sold in multipacks are the most prolific drinks can

- 90% by weight are <500ml and sold in multipacks
- 85% by units are <500ml and sold in multipacks

Conclusions: Consumer Survey

More drinks in PET plastic bottles are consumed AFH than at home

- 55% of drinks in plastic bottles were consumed AFH
- 43% of drinks in glass bottles and 45% of drinks in cans were also consumed AFH

The majority of drinks in cans and plastic bottles are disposed of away from the hospitality outlet they were bought from

- 74% of drinks in plastic bottles were taken-away from hospitality outlets
- 71% of drinks in cans were taken-away from hospitality outlets
- 46% of drinks in glass bottles were taken-away from hospitality outlets
- 83% of hot drinks in take-away cups were taken-away from hospitality outlets

By units, glass drinks bottles are the least frequently consumed AFH

- Less than 5% of the survey results (units) were glass drinks bottles consumed AFH
- This compares 15% aluminium drinks cans, 19% hot take-away cups and 20% plastic drinks bottles

Recycling rates for drinks containers disposed of AFH/OTG appear highly exaggerated in the survey results (all materials)

- AFH Recycling rates of 22% (coffee cups) to 65% (plastic bottles) were calculated

Adjusted recycling rates for drinks containers disposed of AFH/OTG are <10%

- Plastic drinks bottle recycling is estimated at 9% AFH (including OTG) and 7% OTG

- Drinks can recycling is estimated at 9% AFH (including OTG) and 7% OTG
- Glass drinks bottle recycling is estimated at 8% AFH (including OTG) and 8% OTG
- Take-away hot drink cup recycling is estimated at up to 5% AFH (including OTG)

Exaggerated AFH/OTG recycling rates suggest both positive aspirations and attempts to recycle

- For those respondents who believed they were recycling (thought a rubbish bin was a recycling bin, recycling not recycled due to contamination) this suggests that with more infrastructure and communications that recycling rates would increase
- For those respondents who believed they should have recycled (so claimed they did when they didn't), this suggests that if recycling AFH/OTG is easier due to more infrastructure and communications, that recycling rates would increase

OTG disposal only counts for 8-10% of plastic, metal and glass drinks container disposal

- 10% (32kt) of PET drinks bottles are disposed of OTG
- 10% (15kt) of metal cans are disposed of OTG
- 8% (147kt) of glass drinks bottles are disposed of OTG

AFH disposal, excluding OTG, is more than double OTG disposal and potentially a larger target for untapped recycling

- 25% (79kt) of PET drinks bottles are disposed of AFH (excluding OTG)
- 23% (36kt) of metal cans are disposed of OTG (excluding OTG)
- 25% (461kt) of glass drinks bottles are disposed of OTG (excluding OTG)
- Only in Scotland are businesses/organisations legally required to present recyclables separately for collection

Nearly two-thirds of take-away cups are disposed of AFH, but not OTG

- 20% (3kt) of take-away hot drinks cups are disposed of OTG
- 65% (8kt) of take-away hot drinks cups are disposed of AFH (not including OTG)
- 11% (1kt) of take-away hot drinks cups are taken home for disposal

Conclusions: Recycling & Waste Composition Analysis

PET is the dominant drinks container across all collection schemes

- 38% by weight in LA operated schemes, 57% in transport hubs and 52% in work places

HDPE plastic bottles are a small drinks container material stream

- 3% by weight in LA operated schemes, 6% in transport hubs and 6% in work places

Drinks cans are a prominent material stream by unit numbers, but less so by weight

- 22% by weight and 46% by unit numbers in LA operated schemes
- 8% by weight and 37% by units in transport hubs
- 38% by weight and 58% by units in work places

Glass bottles are the most significant material by weight, but not by unit numbers

- 37% by weight in LA operated schemes, 29% in transport hubs and 4% in work places
- 5% by unit numbers in LA operated schemes, 11% in transport hubs and 1% in work places
- Glass can often be broken into shards, which is then categorised as contamination

Coffee cups are a small material stream, but are more prevalent in transport hubs

- 12% by weight in transport hubs, 3% in LA operated schemes and 2% in work places

Inadequate AFH collection points

- 48% of LAs in the UK provide a recycling OTG collection scheme
- Number of recycling OTG collection bins vary in each scheme, with the consensus that the coverage of bins was not extensive enough
- There is not a strong enough business case or incentive for many LAs to provide anything other than litter bins
- LAs are investigating/planning to trial recycling OTG collection schemes in busy town centre locations, but operational costs and contamination issues remain key barriers
- There is inadequate OTG recycling collection provision in transport hubs and places of work

Extensive inconsistency of packaging materials and container types collected across all AfH recycling collection schemes

- This fragmented approach is an issue for LA operated, transport hub and work place recycling schemes and causes consumer confusion about what they can and should not recycle OTG

Extensive inconsistency of signage used on recycling bins across all AFH recycling collection schemes

- A vast array of signage is used to communicate to the consumer what they should recycle, and this can even vary considerably within an individual recycling scheme
- The message to the consumer about 'Dry Mixed Recycling' is not clear and is open to interpretation about what the consumer thinks should be collected for recycling, not what is collected in any individual scheme

Extensive contamination is prevalent across all AFH recycling collection schemes (including coffee cups)

- 50% overall contamination levels in LA operated schemes – 47% general contamination and 3% coffee cups
- 78% in transport hubs – 66% general contamination and 12% coffee cups
- 42% in work places – 40% general contamination and 2% coffee cups

Consumers are using recycling collection bins as general waste bins

- Common contaminates from LA operated schemes in particular include decomposing food waste, bagged dog waste, and plastic film such as sweet wrappers and crisp packets

Materials from commercial premises are being placed in LA operated OTG litter and recycling bins

- These materials include cardboard boxes, 4 or 6 litre milk bottles, and juice cartons.

Liquid is a significant cause of contamination

- Liquid from hot and cold drinks (including coffee cups) is a significant cause of contamination, leaking into other dry materials.
- Many plastic bottles were disposed of with liquid inside

Contents of work place recycling collection schemes are primarily dictated by the products available and used onsite

- Product availability and/or staff purchasing habits of packaging used for onsite canteens, food and drinks vending machines and refreshment options available such

as water stations is prevalent in recycling OTG collection bins, and directly affects material composition and quality
- Non-target materials present include plastic disposal drinks cups and blue roll

Waste management approach is particularly important for AFH collection schemes

- Some LAs collect material from both litter and recycling bins together as general waste and recyclable materials are recovered through a Mechanical Biological Treatment facility before the material goes to incineration or landfill
- Food that was disposed of either with or without the food packaging decomposes and contaminates the overall material quality - frequent collection of material and timely waste management processing is important to maximise the opportunity for a recycling end destination for that material

Consumers are placing drinks containers in LA operated OTG general waste litter bins

- 30% of general waste material analysed was drinks containers or dry mixed recycling
- 23% of the general waste material by weight was drinks containers – 53% glass, 28% PET bottles, 15% cans and 4% HDPE bottles
- Dry mixed recycling material make up 7% of the general waste material
- Comparing the recycling and general waste material there were 20% more drinks containers from recycling bins than general waste bins
- 3% of the general waste material was coffee cups – the same % composition of the recycling material analysed

6.0 Recommendations for Further Work

1. Interventions to ensure all AFH recycling is encouraged, not just OTG. Locations such as schools, workplaces and events outside of Scotland have no legal requirement to separate recyclables for collection. An enforcement mechanism to deter businesses use of OTG litter and recycling bins should be considered.

2. Mechanisms to significantly limit or reduce the levels of contamination in OTG recycling collections.

3. Mechanisms to stop consumers placing drinks containers in general waste litter bins that are target materials in the OTG recycling schemes.

4. A study to understand the impact and viability of Deposit Return Schemes on OTG recycling collections should be undertaken to assess effective use of recycling OTG bins in areas where DRS collection points are not present and the level of access for consumers.

5. Excluding or managing food waste and liquids in OTG recycling collections.

6. Recycling composition analyses and consumer survey results are likely to vary at different times of this year, therefore to add robustness to these findings, repeating the work at several other times of the year is recommended. This is particularly valid for LA operated OTG recycling schemes.

7. A separate study to understand the recycling provision for transport hubs, particularly train stations, should be undertaken. This also applies for work places, which vary considerably due to the size, type of business and products available and used onsite.

8. A study to understand the viability and variables to collect consistent packaging materials and container types using consistent signage across all AFH recycling schemes.

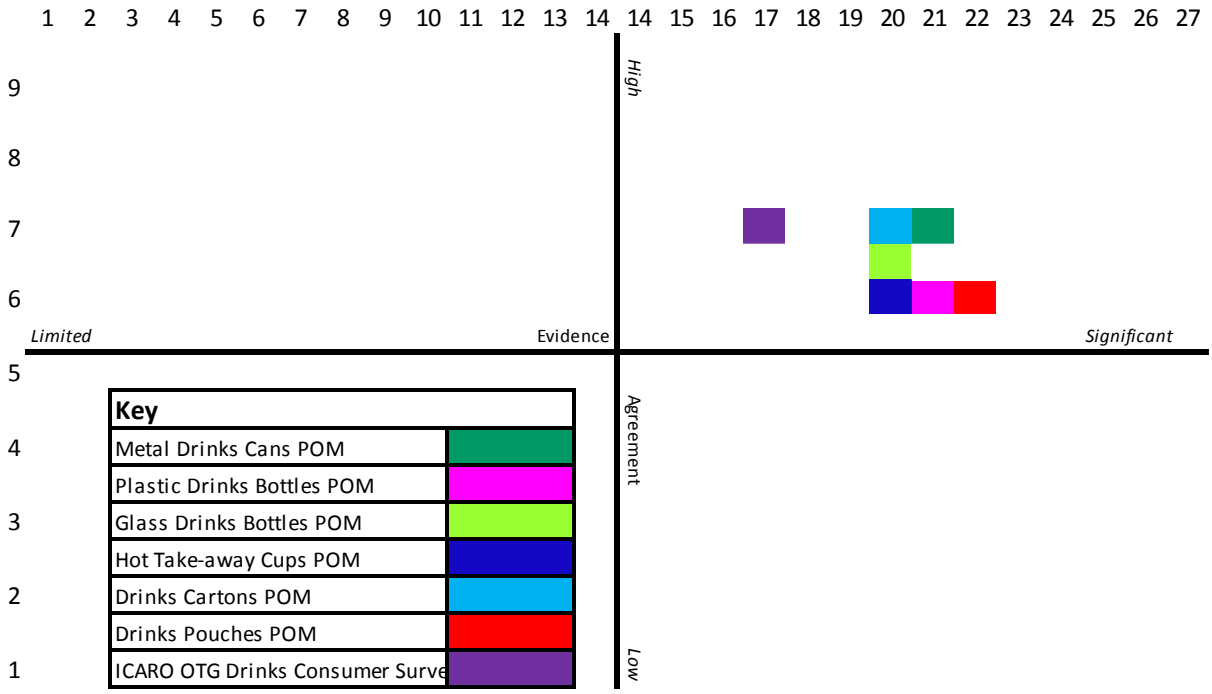
9. Flow work to confirm hot-take away cup POM and to establish cold take-away cup POM, so that a complete and robust 'disposable cup POM' can be adopted and published.

Appendix I – Data Robustness

A robustness analysis was completed on the data sources used. This was developed to highlight the level of uncertainty for each data source by scoring the data sources on the evidence and agreement level from stakeholders. Questions were asked relating to the evidence and agreement levels of the data used (see the tables later in this section for details) and then the data were scored on each axis. The averaged results for each material POM and the consumer survey are shown in **Figure 29**.

The tables thereafter provide a full breakdown for each project estimate. If the question is answered 'Yes' then a score of 3 is given, if 'No' then a score of 0.

Figure 29 Data Robustness Assessment Results – POM



Data		
Valpak EPIC Grocery drinks POM		
Source		
Valpak		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	Yes with some reservations	2
Is the methodology/calculation reasonably free from concerns?	Yes	3
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**23**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**8**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Valpak EPIC Non-grocery drinks POM estimate		
Source		
Valpak		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	More yes than no, but equivocal	1
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	More yes than no, but equivocal	1
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**18**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	More yes than no, but equivocal	1
Do the key stakeholders/experts actively agree with the findings?	Yes with some reservations	2
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**6**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Valpak EPIC Non-consumer glass drinks POM estimate		
Source		
Valpak		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	More yes than no, but equivocal	1
Does the data provide complete coverage?	More yes than no, but equivocal	1
Has the data been sourced from credible, up-to-date sources?	More yes than no, but equivocal	1
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	More yes than no, but equivocal	1
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes with some reservations	2
Total		**13**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	No	0
Do the key stakeholders/experts actively agree with the findings?	Yes with some reservations	2
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**5**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Valpak Hospitality EPIC Data		
Source		
Valpak		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	Yes	3
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes	3
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes with some reservations	2
Total		**22**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	No	0
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**6**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
The White Paper Dairy UK 2017		
Source		
Dairy UK		
Data Used In:		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	Yes	3
Have the findings been independently peer-reviewed?	Yes with some reservations	2
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	No	0
Total		**21**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**5**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Milk cross-check 1		
Source		
Commercially sensitive		
Data Used In:		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes	3
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**21**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**5**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Milk cross-check 1		
Source		
Commercially sensitive		
Data Used In:		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes	4
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**22**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**5**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
UK Soft Drinks Report 2017		
Source		
British Soft Drinks Association		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	Yes with some reservations	2
Have the findings been independently peer-reviewed?	More yes than no, but equivocal	1
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	4
Total		**23**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes	3
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**6**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Soft drinks cross-check		
Source		
Commercially sensitive		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**20**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes	3
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**6**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Alupro Cans POM cross-check		
Source		
Alupro		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**20**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes	3
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**9**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
BG Beverages Sales Data		
Source		
British Glass		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**20**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes	3
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**9**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Valpak Hot Take-away Cups Data		
Source		
Valpak		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes with some reservations	2
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	No	0
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes	3
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	No	0
Total		**16**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	No	0
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	No	0
Total		**3**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Carton Cross-check		
Source		
ACE UK		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	More yes than no, but equivocal	1
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	No	0
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**18**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes with some reservations	2
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**7**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
OTG Drinks Consumer Survey		
Source		
ICARO		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes with some reservations	2
Does the data provide complete coverage?	More yes than no, but equivocal	1
Has the data been sourced from credible, up-to-date sources?	Yes with some reservations	2
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	No	0
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes	3
Have the methodology/calculations been independently checked (internally or externally)?	Yes	3
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**17**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	More yes than no, but equivocal	1
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**7**

Scoring	Score
Yes	3
Yes with some reservations	2
More yes than no, but equivocal	1
No	0

Data		
Alupro Can Recycling Rate		
Source		
Alupro		

Evidence (Robustness and completeness, max 27):	Scoring (Max 27)	
Does the data cover the correct time-frame?	Yes	3
Does the data provide complete coverage?	Yes with some reservations	2
Has the data been sourced from credible, up-to-date sources?	Yes	3
Is the underlying data reasonably free from concerns (e.g. official data from the ONS)?	More yes than no, but equivocal	1
Have the findings been independently peer-reviewed?	No	0
Is the methodology/calculation reasonably free from concerns?	Yes with some reservations	2
Have the methodology/calculations been independently checked (internally or externally)?	No	0
Is the quantitative evidence well rooted in a wider qualitative understanding of the issue?	Yes	3
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
Total		**17**

Degree of agreement around the findings (max 9):	Scoring (Max 09)	
Does more than one data source confirm the findings (within +/- 5%)?	Yes with some reservations	2
Do the key stakeholders/experts actively agree with the findings?	Yes	3
Has feedback from the key stakeholders been incorporated in the reporting of findings?	Yes	3
Total		**8**

	Scoring	Score
	Yes	3
	Yes with some reservations	2
	More yes than no, but equivocal	1
	No	0

Appendix II – OTG Recycling Composition

6.1 Local Authority Operated Schemes

6.1.1 Local Authority A – Northern Ireland

Material was collected from all 34 (100%) recycling OTG bins over a 4-day period. The bins contain 4 compartments for material comprising of: plastic bottles; drinks cans; paper and card; and general waste. Although glass has been counted as a target material in this project, glass is not a target material for this LA scheme.

The material arrived in large industrial bags, with the bin bags within. Many of the bags were broken and there was a lot of loose material in the large bag. All bags in tact were removed and analysed, and then recyclables were picked out from the loose material and contamination weighed separately.

The material analysed was generally very contaminated. Most of the bags seemed to have been chewed through, which can be typical after being stored for a short time after being collected. The contents were wet with high levels of mould, food waste, and what looked to be soil / dirt and contained items including shoes, clothing and nappies. The contamination weight was considerably higher than it otherwise would've been due to the amount of liquid and moisture in the bags.

6.1.2 Local Authority B – South East England

The material included large numbers of plastic bottles, with very few containing any remaining liquid. The reasons for this could include the seafront location combined with the hot weather in Summer 2018 meaning consumers will be more likely to finish their drinks.

The rate of contamination appeared lower in comparison to other LA schemes. The LA also provided some general waste for analysis, and the results showed that the majority of the material placed in these bins was in fact general waste with a small proportion of recyclable material.

6.1.3 Local Authority C – South Midlands England

The target material is plastic bottles; drinks cans and newspapers and magazines.

The material generally contained high levels of contamination. The material was stored at a transfer station in 1100l bins outside whilst collection of the material took place and took around 2 weeks to accrue enough material to be analysed. Due to hot weather in Summer 2018, this meant a small number of bags could not be analysed because of an infestation of maggots. One bag contained a dead bird.

Although glass has been counted as a target material in this project, glass is not a target material for this LA scheme.

Due to the number of bin collections, the LA also provided some general waste for analysis. The showed similar results compared to the recycling stream.

6.1.4 Local Authority D - London

A significant quantity of material categorised as contamination was broken glass. Had this glass been full and intact, it would have been counted as target material and the % figure for drinks containers would have been higher.

A number of bins assessed contained material which looked as though it had come from commercial premises – cardboard boxes, 4 or 6 litre milk bottles, high numbers of juice cartons, etc. Whilst this was included as target material, it could skew the findings as this is seemingly not OTG material placed for recycling by consumers.

Target material for the OTG scheme is the same as for household collections – plastic bottles; plastic pots, tubs and trays; drinks cans, tins and foil; paper/card; and glass.

6.1.5 Local Authority E - Wales

The material collected came from road lay-bys and was not representative as a generic OTG scenario.

During the assessment, there were several bottles of urine discovered, along with soiled clothing and a large amount of glass bottles and cans (mainly alcoholic). The contamination in the material was generally a mix of food waste, non-recyclable packaging, liquids and clothing. Due to the number of full plastic bottles, the weight of contamination was much higher.

6.1.6 Local Authority F – North West England

Target material for this LA included dry mixed recycling - plastic bottles; plastic pots, tubs and trays; drinks cans, tins and foil; paper/card; and glass. This LA is an established high performing scheme with many local activities to promote the scheme.

6.1.7 Local Authority F – Scotland (General Waste Only)

Several household items were recovered including frying pans, a printer and cables and mirrors as well as clothing and shoes. It appeared as though a home clear-out had taken the place and the items discarded of in the OTG litter bins. A possible explanation is the time of year that the assessment took place coincided with the end of the university term.

6.2 Transport Hubs

6.2.1 Train Station

The bins are double hoops with one bag for general waste and one bag for recycling. Target material specified was: plastic bottles; plastic pots, tubs and trays; drinks cans; and paper / card.

Material was collected from 8 out of 11 recycling bins (73%) across the station over a period of 3 days.

Upon collection of the material, it was evident that one bag contained used sanitary products. For health and safety reasons, this was disposed of immediately.

A large contamination issue was liquid, seemingly from coffee cups, which had been soaked up by the various paper food packing items and newspapers. This not only meant the paper was categorised as contamination, it also increased the weight of contamination.

There were also large numbers of plastic bottles with liquid left in which has increased contamination.

The majority of the cans and glass bottles were alcohol drink containers – some of which were still full. It should be noted that the collections took place over a bank holiday weekend when footfall was higher, and people are more likely to travel for a night out.

6.2.2 Roadside Services Station

The material analysed at was very much unique in comparison to other AfH locations analysed.

There were very few recyclable drinks containers recovered, with just 82 PET bottles, and the majority of the drink containers were either coffee cups or cold drink paper cups. There were no alcohol drinks containers recovered.

There were a number of large 2l bottles included within the 82 PET bottles, which is likely to be from visitors who have taken their own food and drink from home on their journey and disposed of empty packaging at the Service Station.

It is assumed that many of the drinks that are purchased in plastic bottles are resealed and taken away to be consumed away from the service station, or that the majority of drinks are purchased at take away food outlets with meals, which explains the high number of cold drinks cups.

Although the contamination rate was high, the majority of this contamination (estimated at 90%) came from take away food packaging. This all comprised of paper bags and cardboard boxes, however due to grease / leftover food, this had to be categorised as contamination.

Other contamination included a small amount of food waste, liquid and used napkins. This could be a result of the "Recycling Centre" bin set up within the service station, which has separate compartments for food waste, liquids, recycling, and general waste. It possible that people are in less of a hurry in this setting and are more likely to take the time to separate their waste.

6.3 Work Places

6.3.1 Manufacturing Facility

A large proportion of material analysed was classified as "other recycling target material". This mainly consisted of plastic disposable drinking cups that you usually find at water coolers and coffee machines. This is not a typical "On the Go" scenario, as normally consumers buy water/soft drinks in plastic bottles rather than cups.

The bulk of the weight in the contamination stream came from used blue roll. The assumption was that this had been used for cleaning and disposed of in the recycling bin and was thought to be recyclable. It should be noted it wasn't clear what the waste contractor accepted for recycling, although generally used tissue / kitchen roll / blue roll is not accepted for recycling.

6.3.2 Large Office Administration and Distribution Headquarters

Materials collected was plastic bottles; metal cans; paper; food waste; and general waste. The material was collected from every recycling bin in one day.

The material collected had very low contamination rates. One reason for this could be that the company provide segregated bins for different material types. This was very apparent during the assessment as there were bags full of just plastic bottles, drinks cans and paper. The majority of the recycling target material was paper.

There was a very low number of PET bottles compared to other locations and a much higher number of cans. This could be due to the refreshment options available to staff – water stations to refill bottles or vending machines with cans only (which have a reduced need to reseal a drink when at a desk compared to being out and about).

www.wrap.org.uk/relevant link

recycle