

PackFlow Covid-19 Phase I: Metal

A review of the quantity of aluminium and steel packaging placed on the market (POM) and recycled in 2019

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October 2020



PackFlow COVID-19: Project Remit

This project seeks to estimate the impacts of Covid-19 and the subsequent lockdown measures (in isolation) on the compliance landscape for UK packaging recycling in 2020 and projecting forward to 2022.

This is achieved by:

1. Updating estimates for UK packaging POM (placed on the market) and recycling by material and by industry sector in 2019 to provide a baseline for future scenarios.
2. Using relevant data sources and industry insight to estimate and provide a narrative, by packaging material type, regarding the impacts of Covid-19 and the subsequent lockdown has in 2020-2022 on:
 - The total amount of material that is likely to be placed on the market (POM) by sector
 - The impact of the change in POM on the UK recycling rate by material, and by sector
 - The changes to the level of obligated tonnage by material
 - Including an indicative assessment of the potential impact of the recession on the proportion of POM that is recoded within the obligated tonnage each year

Scenarios, assumptions and data sources are agreed with the Steering Group made up of key industry stakeholders representing individual materials and sectors.

Where requested by stakeholders, further scenarios are developed to expand on aspects of recycling that may only in part be attributed to the Covid-19 situation but were not included in the initial project brief.

Valpak, the project funders and the stakeholders acknowledge that there are a myriad of factors that can affect the packaging waste system inside and outside of the current Covid-19 situation. This project seeks to isolate the impacts of the change of consumption patterns, recycling and direct impact on businesses of the Covid-19 situation. All stakeholders acknowledge that the continued evolution of the wider recycling system will also impact on the overall UK compliance position.

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J729 Metals Version 2

Executive Summary

Introduction

The PackFlow Covid-19 reports <https://www.valpak.co.uk/more/material-flow-reports> cover all packaging materials and have been produced to provide industry, Governments, and other stakeholders with evidence to better understand the potential implications of lockdown and the ensuing recession on packaging materials flows, packaging materials collection & recycling, and to assess potential compliance risks versus the packaging targets.

The PackFlow Covid-19 project has two phases:

Phase I

- Updates the baseline year to 2019 for estimates of packaging materials POM collections, recycling and end markets (from 2017 in the previous flow reports¹).

Phase II

- Collates data and market intel on impact of the Covid-19 lockdown (materials flow, collections, recycling and end markets)
- Develops scenarios for packaging materials flow and recycling from 2020 to 2022
- Assesses potential compliance risks versus recycling targets for packaging materials.

To support Defra and Governments in their packaging policy work and assist other industry stakeholders, this Phase I report focuses on generating robust estimates of UK metal packaging placed on the market (POM)² that are as accurate as is reasonably possible. The report also considers the quantities of metal packaging recycling, both in the UK and abroad, and provides insights into the end markets and products that are manufactured by packaging metal recyclers in the UK.

Data robustness assessments have been conducted and error margins are calculated and provided wherever possible throughout report.

¹ The previous packaging materials flow reports can found at <https://www.valpak.co.uk/more/material-flow-reports> .

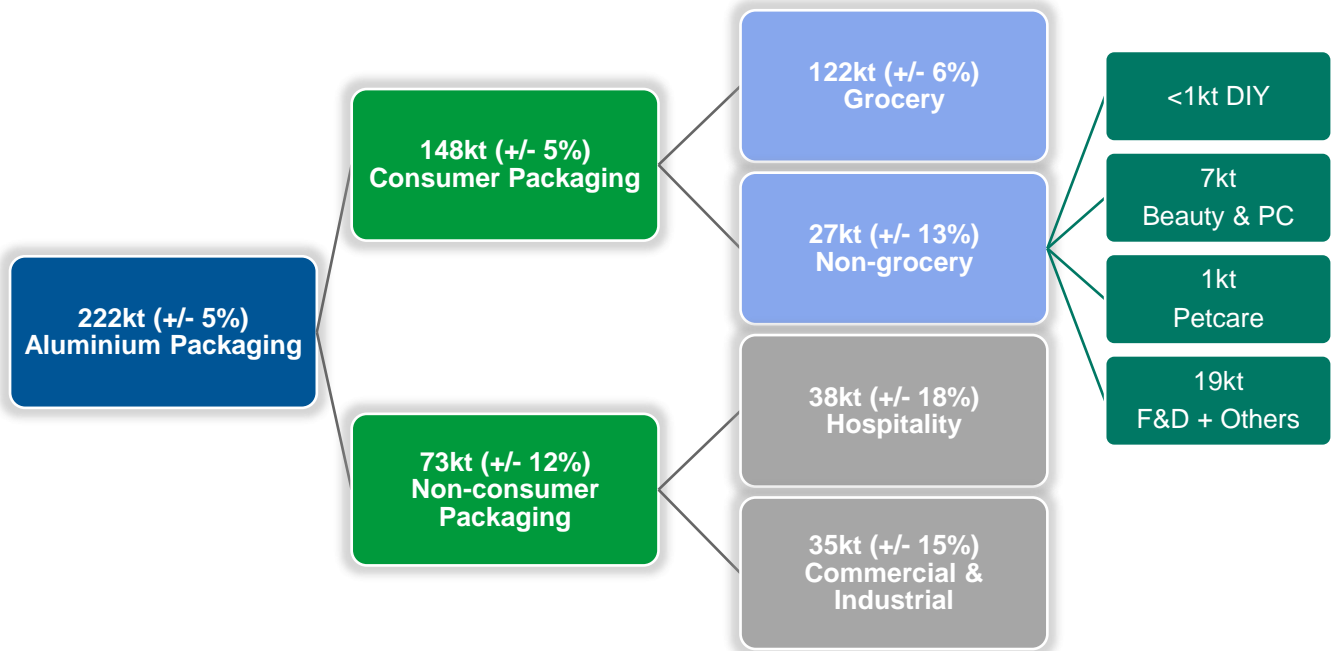
² Metal packaging placed on the market means all household and non-household metal packaging used around products sold and transported within the UK.

Aluminium Packaging POM

This report estimates aluminium packaging POM in 2019 to be 222k tonnes (+/- 5%).

This estimate is derived by calculating obligated metal packaging POM from data reported in the National Packaging Waste Database (NPWD) by obligated producers using the net pack fill method. Estimates of 1% non-obligated packaging for aluminium are added to the obligated packaging POM to generate the total aluminium POM estimate. The results of this method are cross-checked against secondary research and data/information provided by the project's industry Steering Group.

Figure 1 Aluminium Packaging POM by Sector, 2019 (k tonnes)



The estimate for aluminium packaging POM in the consumer sector is 148k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting the aluminium and steel project).

The estimate for aluminium packaging POM in the non-consumer sector is 73k tonnes (+/-12%) in 2019.

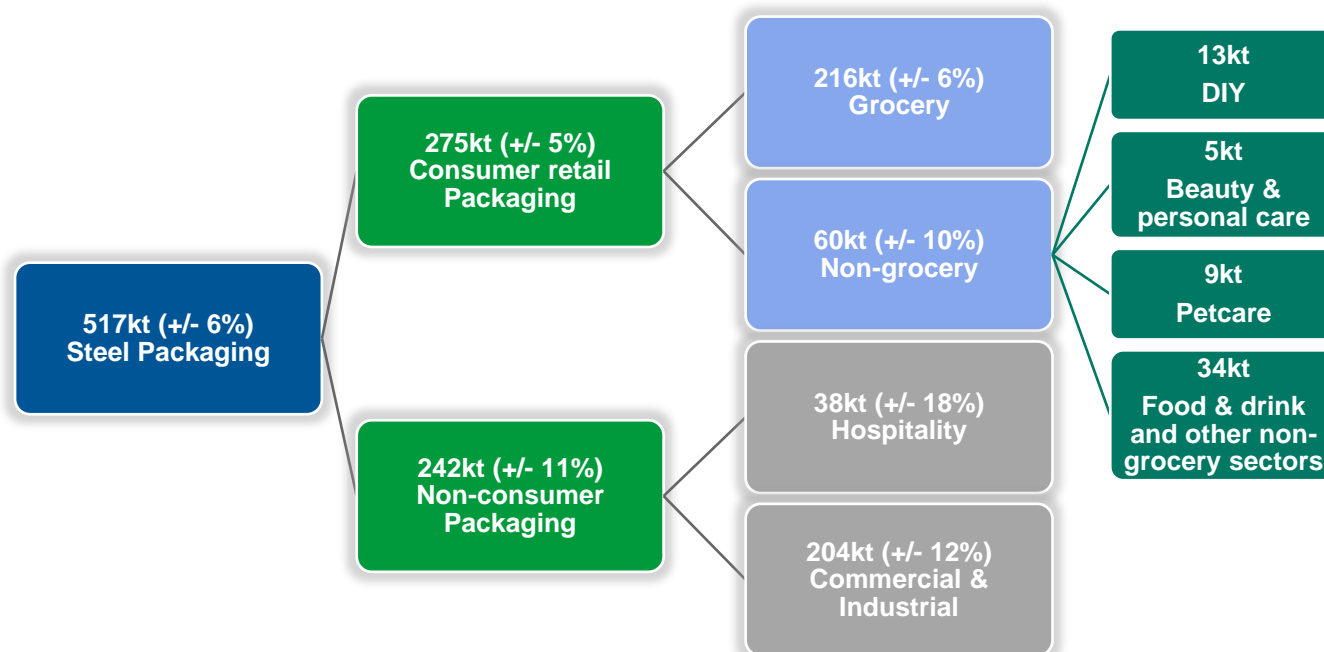
This estimate comprises of an estimate of aluminium packaging in the hospitality sector based on primary and market share data to which separate estimates of the amounts of direct sales of soft and alcoholic drinks based on industry sales figures are added. C&I aluminium packaging comprises the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total POM. There are no figures available to cross-check this data which may therefore include any missed tonnages of consumer grocery, consumer non-grocery and/or hospitality POM.

Steel Packaging POM

This report estimates steel packaging POM in 2019 to be 517k tonnes (+/- 6%).

This estimate is derived from reported obligated data (EA, NPWD) and cross-checked as far as is possible using a bottom-up methodology combining data from various sources for each sector and data provided by the project's industry Steering Group.

Figure 2 Steel Packaging POM by Sector, 2019 (k tonnes)



The estimate for steel packaging POM in the consumer sector is 275k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting this metal flow project).

The estimate for steel packaging POM in the non-consumer sector is 242k tonnes (+/-11%) in 2019.

This estimate comprises of an estimate of hospitality packaging based on primary and market share data to which separate quantities of direct sales of soft and alcoholic drinks using steel packaging are calculated based on industry figures. C&I steel packaging is estimated as the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total steel packaging POM. This figure is cross-checked using a bottom-up approach based on estimates of industrial packaging types using secondary research and industry/Steering Group knowledge. The cross-check figure is within 8% of the residual tonnage estimate (despite some steel packaging that could not be quantified).

Aluminium Packaging Recycling

Aluminium packaging recycling (recorded & unrecorded) is estimated to be 145k tonnes in 2019.

This includes accredited (or recorded) recycling of 117k tonnes (NPWD) and an estimate for unrecorded recycling of 28k tonnes. Based on the POM estimate in this project, the overall aluminium recycling rate is 66% in 2019. The accredited (or recorded) aluminium packaging recycling rate is 53% in 2019.

Consumer aluminium packaging recycling (recorded & unrecorded) is estimated to be 123k tonnes in 2019.

Based on this project's POM estimate the consumer aluminium packaging recycling rate is 83% in 2019.

Non-consumer aluminium packaging recycling (recorded & unrecorded) is estimated to be 22k tonnes in 2019.

This is calculated by subtracting the consumer recycling tonnage from total aluminium packaging recycled. Based on this project's POM the non-consumer aluminium packaging recycling rate is 30% in 2019.

It is estimated that 76k tonnes of aluminium packaging is not recycled, of which 13k tonnes (16%) is estimated to be lost during energy recovery and 64k tonnes (84%) goes to landfill.

This is based on an estimated total of 25k tonnes of consumer aluminium packaging and 51k tonnes of non-consumer aluminium packaging not being recycled.

Steel Packaging Recycling

Steel packaging recycling (recorded & unrecorded) is estimated to be 516k tonnes in 2019.

This includes accredited (or recorded) recycling of 398k tonnes (NPWD) and an estimate for unrecorded recycling of 118k tonnes. Based on this project's POM an overall steel packaging recycling rate of 100% is estimated, reasons for this are explored in section 3.7. The total recycling rate for steel packaging is dependent on applying protocols for the quantity of packaging within the recycling streams for ferrous metals. The accredited (or recorded) recycling rate for steel packaging is 77% in 2019.

Consumer steel packaging recycled is estimated to be 299k tonnes in 2019.

Based on this project's POM estimate a consumer recycling rate of over 100% is estimated (the figure is 110% and reasons for this are explored in section 3.7). Inclusion of non-consumer steel packaging recycling recorded on Waste Data Flow (WDF) or included within MSW supplied to EfW plants is likely to be a factor in the overstatement of consumer steel packaging recycling.

Non-consumer steel packaging recycled is estimated to be 218k tonnes in 2019.

This is estimated by subtracting consumer steel packaging recycling from total steel packaging recycling. Based on this project's POM the non-consumer steel packaging recycling rate is 89% in 2019.

It is assumed that all steel packaging is ultimately recovered from incinerator bottom ash (IBA), either in the UK, or overseas via exports of refuse derived fuel (RDF). Up to 27k tonnes of steel packaging not recycled may be landfilled.

Whilst this does not tally with the 100% steel packaging recycling rate, it falls within the error margins calculated for steel packaging POM and recycling. It is clear that the amount of steel within RDF, and the amount of steel packaging within ferrous metal grades, both being sent for recycling and for RDF, is an extremely sensitive metric for defining steel packaging recycling.

Recommendations for Further Work

Aluminium and Steel Packaging POM

The area of greatest uncertainty around aluminium and steel packaging POM estimates is around the quantities of 'other C&I' packaging in the non-consumer streams (i.e. C&I packaging, excluding hospitality packaging). This project progresses the quantification of 'other C&I' packaging for steel packaging but is unable to find much data or evidence of this type of packaging for aluminium. The latter therefore remains an area recommended for further research.

Aluminium and Steel Packaging POM Recycling

It is apparent from the comprehensive analysis for aluminium and steel packaging in this project that there are considerable amounts of unaccredited (or unrecorded) aluminium and steel packaging being recycled. If such quantities were able to become accredited (i.e. recorded) this would boost metal packaging recycling rates and performance versus UK recycling targets. Further work to promote the benefits or need for the industry to obtain accreditation and to support the EA in assessing and providing accreditation is therefore recommended.

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Appendix I Data Robustness Assessment

Glossary

AFH – Away-from-home

BAMA – British Aerosol Manufacturers Association

BBPA – British Beer & Pub Association

BCGA – British Compressed Gas Association

BSDA – British Soft Drinks Association

C&I – Commercial & Industrial

CA – Civic Amenity

DAERA – Department of Agriculture, Environment and Rural Affairs

DRS – Deposit Return Scheme

EA – Environment Agency (EA)

EfW – Energy from Waste

EPIC – Environmental Product Information Centre

HWRC – Household waste recycling centre

IBA – Incinerator Bottom Ash

IPA – Industrial Packaging Association

k – Thousand

kt – Thousand tonnes

LA – Local Authority

M – Million

MPMA – Metal Packaging Manufacturing Association

MRF – Materials Recovery Facility

MSW – Municipal solid waste

NPWD – National Packaging Waste Database

ONS – Office of National Statistics

OTG – On-the-Go

PERN – Packaging Export Recovery Note

PRN – Packaging Recovery Note

POM – Placed on the Market

Primary Packaging – Any packaging that the customer will take home, remove and throw away e.g. aluminium can, plastic bottle

PRN – Packaging Recovery Note

RDF – Refuse Derived Fuel

Secondary Packaging – Inner packaging used to transport or display goods to/in store, usually cardboard boxes or shelf-ready packaging

t – Tonnes

Transit/Tertiary Packaging – Any transit packaging e.g. pallets, shrink wrap, staples or strapping

UBCs – Used Beverage Cans

WDF – Waste Data Flow

Acknowledgements

Valpak Limited, the Industry Council for Packaging and the Environment (Incpen) and the Waste Resources Action Programme (WRAP) would like to thank the following organisations for their contributions to the PackFlow Covid-19 project for aluminium and steel:

- Tata Steel
- The Aluminium Packaging Recycling Organisation (Alupro)
- The Metal Packaging Manufacturers Association (MPMA)
- The Advisory Committee on Packaging (ACP)
- The Packaging Federation
- The Recycling Association
- Wastepack
- The Department for the Environment, Food & Rural Affairs (Defra)
- The Department of Agriculture, Environment and Rural Affairs (DAERA)
- The Environment Agency (EA)
- The Scottish Government
- The Scottish Environmental Protection Agency SEPA
- The Welsh Government
- Zero Waste Scotland (ZWS)

1. Introduction

1.1. Background

The PackFlow Covid-19 reports <https://www.valpak.co.uk/more/material-flow-reports> cover all packaging materials and have been produced to provide industry, Governments, and other stakeholders with evidence to better understand the potential implications of lockdown and the ensuing recession on packaging materials flows, packaging materials collection & recycling, and to assess potential compliance risks versus the packaging targets.

The PackFlow Covid-19 project has two phases:

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Phase II

- Collates data and market intel on impact of the Covid-19 lockdown (materials flow, collections, recycling and end markets)
- Develops scenarios for packaging materials flow, collections and recycling from 2020 to 2022
- Assesses potential compliance risks versus targets.

To support Defra and Governments and other industry stakeholders in their packaging policy work and assist other industry stakeholders, this Phase I report focuses on generating robust estimates of aluminium and steel packaging placed on the market (POM)⁴ in the UK that are as accurate as is reasonably possible. The report also considers the quantities of aluminium and steel packaging recycled, both in the UK and abroad, and provides insights into the end markets and products that are manufactured by aluminium and steel recyclers in the UK.

1.2. Phase I Objectives

The Pack Flow Covid-19 project for aluminium and steel packaging has the following objectives for Phase I:

- Provide updated (and cross-checked) baseline estimates of metal packaging placed on the UK market, by packaging format, stream and source:
 - Format (e.g. drinks can, food can, aerosol)
 - Stream (e.g. consumer, non-consumer)
 - Source (e.g. obligated, non-obligated producer)
- Estimate the quantities of metal packaging collected through CA sites, kerbside and bring collections and other collection types, by stream
- Estimate the quantities of metal packaging recovered and recycled; sent for incineration with energy recovery; sent to landfill, for both UK and overseas end destinations
- Provide estimates of the quantities of aluminium and steel packaging that is recycled (i.e. is recorded as accredited recycling) and aluminium and steel packaging that is recycled but does not generate a PRN/PERN (i.e. is unrecorded or unaccredited).

1.3. Methodology

Recycling rates for metal packaging can be calculated as the quantity of metal packaging recycled divided by the quantity of metal packaging waste arisings. It is commonly accepted, and indeed is accepted by the EU, that recycling rate calculations based on packaging materials POM is an appropriate method. However, approaches using packaging POM have recently been called into question by Eunomia (2018)⁵ in the case of plastic packaging

³ The previous packaging materials flow reports can found at <https://www.valpak.co.uk/more/material-flow-reports>.

⁴ Metal packaging placed on the market means all household and non-household metal packaging used around products within the UK.

⁵ Eunomia: Plastic Packaging – Shedding Light on the UK Data, <http://www.eunomia.co.uk/reports-tools/plastic-packaging-shedding-light-on-the-uk-data/>

recycling, particularly as estimates of packaging waste arisings established through composition analyses applied to waste data collated from multiple sources tend to yield higher results. The Eunomia report claims that data reported to NPWD is likely to be subject to systematic underestimation, as it suggests obligated companies have a vested interest in under-reporting their POM figures. And that this may result in an overestimate of the recycling rate.

While estimates of recycling rates based on packaging waste arisings are valid, like any methodology they are subject to a number of significant limitations since they critically rely on accurate data for:

- The composition of household waste;
- Waste arisings from local authorities; and
- Waste arisings and composition from commerce and industry.

The justification of the use of POM data over alternatives is provided in full in section 1.3.1 of PlasticFlow 2025⁶. An overview of how the POM and recycling rates for aluminium and steel packaging are calculated in this project are provided below.

1.3.1. Metal Packaging POM

Metal packaging POM is estimated using an assessment of the metal packaging POM reported on the National Packaging Waste Database (NPWD) by obligated producers. The results of this method are cross-checked against secondary research and data/information provided by the project's industry Steering Group. The baseline year is 2019, where 2019 data is not available the most recent available data is used.

1.3.1.1 Metal Packaging POM – Net Pack Fill

The net pack fill calculation is based on data reported to NPWD by obligated producers (who are registered). It is thought to capture the vast majority of the quantity of metal packaging that is obligated. But it does not cover metal packaging handled by non-obligated companies (who are below the threshold), free-riders (companies who are above the thresholds of a turnover of £2m and handling 50 tonnes of packaging or more but are not registered with the relevant agency), and packaging for internal company use which is non-obligated packaging under the regulations.

To estimate the amount of packaging placed on the UK market by obligated companies, the net pack fill calculation set out below is applied. This calculation uses the total data reported by business obligated under the packaging regulations and is available on the NPWD website⁷.

Net Pack Fill	=	Packing/Filling Table 1 - pack/filling	+	Imports Table 3A - imported for selling	+	Imports Table 3B - packaging removed from around imports	-	Exports Table 2A + Table 2B – pack/filling
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1.3.2 Metal Packaging Recycling

NPWD is the source for accredited (or recorded) recycling of metal packaging. Representatives from industry (including those involved in sorting, smelting and exporting metal) are also consulted on the amount of recycled metal packaging that might not, for whatever reason, be reported to NPWD. The output of these discussions is used to estimate a figure for unaccredited (or unrecorded) recycling of metal packaging.

The total metal recycling figures, the aggregation of recorded and unrecorded recycling, are then split into consumer and non-consumer recycling. Waste Data Flow (WDF), with adjustments applied to account for consumer metal packaging in IBA and RDF, is the source for consumer metal recycling data with the difference between the WDF total and the overall total assumed to be non-consumer metal packaging recycling.

⁶ <http://www.wrap.org.uk/content/plasticflow-2025-plastic-packaging-flow-data-report>

⁷ www.npwd.environment-agency.gov.uk

1.3.3 Data robustness

There are levels of uncertainty around the data used to establish the various elements that are combined to cross-check the total metal POM. Consumer metal packaging POM, non-consumer POM and total metal packaging POM estimates are presented with error margins to provide an indicative range of uncertainty. The robustness scores established for each dataset used in estimates are presented in Appendix I. These have been converted into a percentage and related to an appropriate margin of error⁸, as shown in Figure 3. The respective margins of error are provided throughout the report.

Figure 3 Relating Robustness Scores to Indicative Margins of Error

Robustness Score			Error Margin	
96%	to	100%	+/-	3%
91%	to	95%	+/-	6%
86%	to	90%	+/-	9%
81%	to	85%	+/-	12%
76%	to	80%	+/-	15%
71%	to	75%	+/-	18%
66%	to	70%	+/-	21%

To calculate an indicative margin of error for the total POM, the margins of error for the sub-elements that make up the total are converted to tonnages and then expressed as an overall percentage using a Root of Sum of Squares calculation (to approximate the overall error of a summation of subcategories with different error margins).

⁸ These are assumed to be indicative estimates of the degree of uncertainty and are not the outputs of a statistical calculation

2. Metal Packaging POM

2.1 Introduction

This section of the report presents estimates of metal packaging POM derived using the net pack fill methodology and cross-checked against available industry data using a 'bottom-up approach'.

Placed on the market (POM) refers to the flow of metal packaging onto the UK market. Consumption of goods using metal packaging can occur both in the consumer (in the home and on the move) and non-consumer (by business) streams.

Metal packaging is typically placed on the market in the following formats:

- Drinks containers – mainly cans with both steel and aluminium formats are used for soft and alcoholic drinks. Production of drinks in steel cans ceased in the UK in 2019, but imports of drinks in steel containers continues;
- Food cans – mainly steel, used to package a wide range of products such as soups, meats, vegetables and pet food;
- Aerosol cans – both aluminium and steel, used predominantly to package beauty & personal care and cleaning products;
- Other – all other forms of metal packaging such as foil containers and trays, plain foils, tins and closures.

2.2 Metal POM (Net Pack Fill)

The 2019 UK flow of metal packaging (separately for aluminium and steel packaging) is calculated using the packaging weights reported to the EA by registered producers that are publicly available on the NPWD website. The net pack fill calculation is shown in section 1.3.1.1 of this report.

This methodology focusses on the packaging weights reported at the *packing/filling* stage of the supply chain as opposed to the *selling* stage of the supply chain. Due to the larger size and fewer numbers of UK businesses that are packer fillers, the Steering Group believe⁹ that there are few (or no) unobligated packer/filler businesses in the UK in comparison to unobligated sellers. In addition, raw material manufacturing includes process losses, i.e. not everything manufactured will be converted or pack filled, so it is expected that obligated tonnage is likely to decline as we move further down the supply chain.

Using this method, the total obligated metal POM in 2019 is 219k tonnes for aluminium packaging and 470k tonnes for steel packaging (as shown in Figure 4)¹⁰.

It is important to stress that the Net Pack Fill estimates are open to the possibility of a degree of error because they rely on the robustness of the data that is submitted to NPWD. The NPWD data is widely recognised as being the best available. The NPWD data is used by policy makers and their agencies, and there is a legal obligation for companies to submit data to NPWD that is as accurate as is reasonably possible. The data is also audited by the regulating body.

⁹ Based on their knowledge of the industry. No other specific evidence data is available to support this.

¹⁰ As reported by businesses in 2019.

Figure 4 Obligated Packaging (Net Pack Fill Total), 2019 (k tonnes) – Using NPWD Data from July 2020, amendments to the data are still possible. Totals may not sum due to rounding

	Aluminium	Steel
Table 1 Pack fill (UK pack filling)	192	348
Imports		
3A Selling (filled imports)	51	168
3B (packaging removed from imports)	1	46
Total	243	562
2A P/F (direct exports)	20	85
2B P/F (third party exports)	4	7
Total Exported	24	92
Net Pack Fill	219	470

This method does not account for metal packaging handled by unregistered producers, which was likely to include the following:

- Non-obligated producers – those below the registration thresholds of 50 tonnes of packaging and £2 million turnover
- Free-riders – those obligated to register but not doing so, and
- Illegal importers.

There is no way of robustly quantifying the unreported quantity of aluminium and steel packaging. Based on the feedback from this project's Steering Group, it is believed the majority of unobligated producers import filled steel and aluminium packaging. Estimates of the unobligated quantities are: aluminium ~2k tonnes (or 1% of aluminium packaging POM), and steel ~47k tonnes (or 9.15% of steel packaging POM) are carried forward to this report from the previous MetalFlow¹¹ project.

To provide some context, the ratios of unobligated imports (assumed to be filled imports) to obligated filled imports is calculated for aluminium and steel packaging and compared to other materials. For aluminium, unobligated filled imports represent 4% of obligated filled imports which compares closely to 5% for glass packaging (also predominantly used for drinks packaging). For steel, which is predominantly used to package food (with drinks being only a small element) unobligated filled imports represent 30% of obligated filled imports. This is much higher than ratios for glass and aluminium but considerably lower than the ratio for plastic packaging, which is used to package a wider variety of products, at 82%.

The Steering Group agreed to maintain the unobligated percentages, although it was believed they could be high, particularly for steel packaging. However, a bottom-up cross-check of POM (see section 2.1.2 below) illustrated the existence of enough steel packaging on the market to justify a 9.15% unobligated figure for steel packaging.

¹¹ <https://www.wrap.org.uk/content/metal-flow-2025-%E2%80%93-metal-packaging-flow-data-report>

Combining the estimates of obligated and non-obligated packaging gives 2019 estimates of 222k tonnes (+/- 5%) for aluminium packaging POM and 517k tonnes (+/- 6%) for steel packaging POM.

2.2.1 Steering Group Data

Members of this project's Steering Group¹² and wider industry stakeholders provided confidential data on the flows of metal packaging onto the UK market. All data received was considered to be broadly in line with this project's 2019 estimates of POM for aluminium and steel packaging.

2.2.2 Metal POM Cross-check

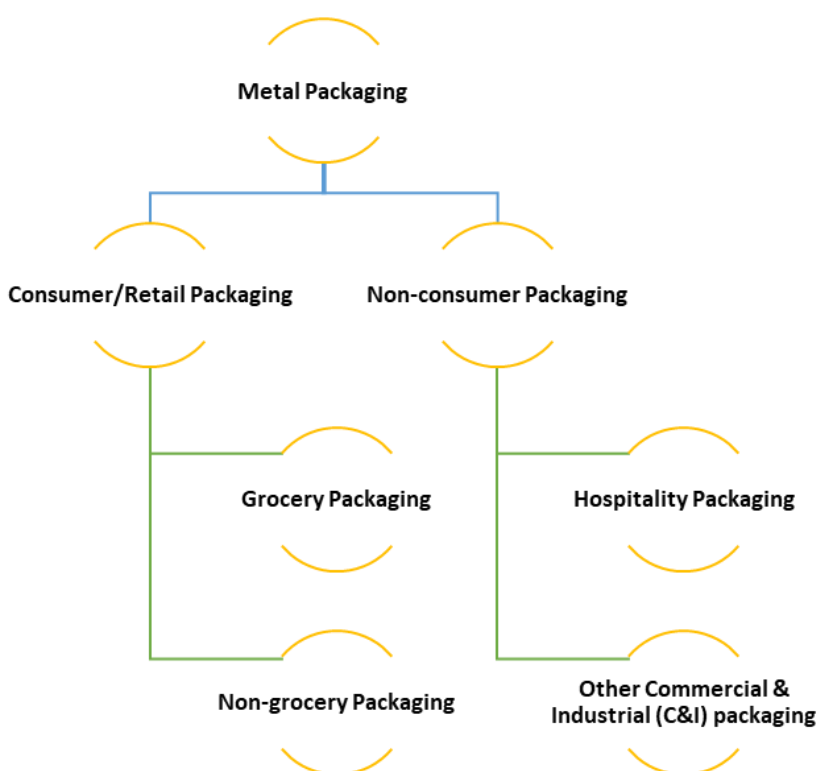
This section of the report provides an overview of how metal packaging flows onto the UK market and provides a cross-check for the net pack fill methodology used in section 1.3.1.1.

The cross-check splits the POM into different elements as shown in Figure 5. The first step is to estimate consumer grocery packaging as this dataset is believed to be the most robust. Next consumer non-grocery packaging element is identified (using a bottom-up approach in which individual sector tonnages are identified and combined).

The consumer grocery and consumer non-grocery figures are then combined to establish a total consumer/retail packaging POM for aluminium and steel packaging.

For each material non-consumer packaging is established by subtracting the consumer/retail packaging figure from the total POM figure. Within the non-consumer sector packaging in the hospitality sector is estimated (based on the availability of data for this sector) and subtracted from the non-consumer figure to establish an 'Other C&I' category. The other C&I estimate is therefore a residual figure and as such may contain any tonnages of consumer grocery, consumer non-grocery or hospitality metal packaging that have been missed in those sectors.

Figure 5 Metal POM Breakdown by Sector



¹² A list of Steering Group members can be found in the acknowledgements section of this report.

A composite packaging item is considered to be aluminium if aluminium is the predominant material by weight in the composite, and steel if steel is the predominant material by weight in the composite¹³.

2.3 Consumer Metal Packaging POM

For the purposes of this report, the consumer sector is divided into consumer grocery and consumer non-grocery packaging separately for aluminium and steel packaging. The addition of these two sub-sectors equates to the total consumer sector POM for each material.

2.3.1 Grocery Retail

A dataset provided by the Environment Agency (EA) is used to estimate consumer grocery POM for aluminium and steel packaging. The EA data is the 2019 sales quantities of aluminium and steel packaging reported in table 1 selling from NPWD (less export) for a sample for UK grocery retailers representing 84% of all UK grocery retail sales. The figures for this sample of UK grocery retailers are scaled to 100% of the UK grocery market.

Aluminium packaging POM in the consumer grocery sector is estimated to be 122k tonnes (+/-6%) in 2019.

Steel packaging POM in the consumer grocery sector is estimated to be 216k tonnes (+/-6%) in 2019¹⁴.

The aluminium packaging POM figure in the consumer grocery sector for 2019 is ~18% higher compared to the 2017 estimate of 103k tonnes. Steel packaging in the consumer grocery retail sector has declined ~8% since 2017, when it was estimated to be 235k tonnes. This decline is most likely due to loss of market share i.e. switching to other packaging materials such as aluminium beverage cans, pouches and trays. Some light-weighting of steel packaging may also have occurred but this is believed to be less significant in accounting for the decline.

2.3.2 Non-Grocery Retail

Key categories of products using metal packaging sold through non-grocery retailers are identified and the associated tonnage of metal packaging estimated. These categories are: Beauty & personal care (B&PC), DIY, and Petcare, as per the previous MetalFlow 2017, and a Food, drink and other grocery category. The latter is included in this report due to the quantity of food and drink and other (e.g. cleaning) products that are also sold through non-grocery retailers such as chemists and discounters.

2.3.2.1 Beauty and Personal Care

Valpak's EPIC data suggests that 7% of aluminium packaging and 2% of steel packaging (by weight) is used to package beauty and personal care products. Applied to total consumer grocery POM (see section 2.3.1) this gives 8k tonnes aluminium packaging and 5k tonnes steel packaging POM in the beauty and personal care sector. Using 2019 market data¹⁵ that 39% of beauty and personal care items are purchased at supermarkets (consumer grocery retail), this suggests the remaining 61% or 13k tonnes of aluminium and 8k tonnes of steel are purchased from non-grocery retail stores.

It is possible that the 39% supermarket share is an underestimate for metal packaged beauty and personal care

¹³ The EA definitions of composite and multi-layered packaging are defined in, the 'Agreed position and technical interpretations – producer responsibility for packaging'. Composite packaging is: 'multi-layered sheets of dissimilar materials which are bonded together and cannot be separated by hand', such as laminated paperboard, whereas multi-material packaging is: 'packages constructed of assembled components of different material', such as a blister pack made from cardboard and plastic and can be separated by hand. Within the technical interpretations guidance, the packaging weight for laminate packaging 'should be recorded under the predominant material by weight', compared to multi-material packaging weights, which should be recorded separately, by the different component materials.

¹⁴ Appendix I provides a detailed assessment of relative levels of confidence in the data.

¹⁵Sourced from Mintel

products which are predominantly deodorant aerosols; many glass and plastic packaged beauty and personal care products hold a considerably higher sales value, such as perfume and make-up. These types of products are more commonly bought in non-grocery outlets such as department stores, chemists and duty-free shops, than deodorant aerosols.

For this reason, scaling up the grocery share of beauty and personal care products also uses the supermarket share of sales of food, drink and other¹⁶ grocery products, which could be more representative of the sales of deodorants. Supermarkets sell a much higher proportion of grocery products, at approximately 86%¹⁷. However, this method generates very low estimates of 1k tonnes each for aluminium and steel non-grocery packaging.

In this report a midpoint was taken between the two sets of estimates as the best representation of metal packaging in the beauty and personal care products sector, as illustrated in Figure 6.

Figure 6 Beauty & Personal Care – Metal Packaging, 2019 (k tonnes)

	Grocery retail	Non-grocery retail	Total retail
Aluminium	8	7	15
Steel	5	5	10
Total Metal Packaging	13	12	25

2.3.2.2 DIY

To estimate non-grocery DIY steel packaging, the known market shares of Valpak members and POM data from their 2019 data submissions are used. This provides an estimate of 13k tonnes of steel packaging from DIY stores in 2019, ~5k tonnes higher than the previous estimate for 2017. The increase is likely to be due to material substitution (e.g. plastic to steel paint pots).

There is a negligible amount of aluminium packaging used in DIY retail stores.

2.3.2.3 Petcare

Market data suggests that 75% of pet food is purchased in supermarkets (grocery retail) with the remaining 25% being purchased from specialist stores, garden centres or from vets and breeders¹⁸. The quantity of pet food packaging sold outside of grocery retail uses this split and the quantity of aluminium and steel pet food packaging sold in grocery retail (proportion of petcare packaging in EPIC applied to scaled-up EA grocery data, see section 2.3.1. Estimates of aluminium and steel packaging in the petcare sector are shown in Figure 7.

Figure 7 Petcare – Metal Packaging POM, 2019 (k tonnes) - Totals may not sum due to rounding

	Grocery retail	Non-grocery retail	Total retail
Aluminium	2	1	2
Steel	26	9	35
Total Metal Packaging	28	9	37

¹⁶ Other refers to other grocery products excluding beauty & personal care and petcare which are analysed separately

¹⁷ IGD <https://www.igd.com/about-us/media/press-releases/press-release/t/uk-food-sales-to-grow-by-24bn-by-2024/i/21868>. Supermarket shares are estimated as hypermarkets + supermarkets + convenience stores + 50% discounters and 50% online retail sales.

¹⁸ Euromonitor International/Mintel

In comparison to the 2017 petcare data reported in the previous report MetalFlow 2025¹⁹, the quantities of petcare products using aluminium packaging appear to have remained similar in both the grocery and non-grocery sectors.

2.3.2.4 Food, Drink and Other Grocery Products²⁰

In order to estimate the sales of food, drink and other grocery products through non-grocery stores, 2019 IGD market data is used. This suggests that around 86% of food and grocery products are bought from supermarkets and around 14% are bought from non-grocery outlets.

Using this split and the quantity of aluminium and steel pet food packaging sold in grocery retail (proportion of food, drink and grocery packaging in EPIC applied to scaled-up EA grocery data, see section 2.3.1, minus any Petcare or B&PC products), the quantity of food, drink and other grocery products sold outside of grocery retail is calculated and shown in Figure 8.

Figure 8 Food, Drink & other Grocery – Metal Packaging, 2019 (k tonnes) – Totals may not sum due to rounding

	Grocery retail	Non-grocery retail	Total retail
Aluminium	114	19	133
Steel	185	34	219
Total Metal Packaging	299	53	352

2.3.3 Summary of Consumer Metal Packaging POM

In summary, the following key estimates were established for retail metal packaging consumption in the consumer sector in 2019:

- Total aluminium consumer packaging POM is 148k tonnes (+/- 5%) in 2019
 - 122k tonnes (+/- 6%) is aluminium packaging in consumer grocery retail
 - 27k tonnes (+/- 13%) is non-grocery retail aluminium packaging.
- Total steel consumer packaging POM is 275k tonnes (+/- 6%) in 2019
 - 216k tonnes (+/- 6%) is steel packaging in the consumer grocery retail
 - 60k tonnes (+/- 10%) is non-grocery retail steel packaging.

¹⁹ <https://www.valpak.co.uk/more/material-flow-reports/metalflow-2025>

²⁰ Other grocery products excludes beauty and personal care and petcare products which are estimated separately

2.4 Non-consumer Metal Packaging POM

To complete the breakdown of POM totals for aluminium and steel packaging requires an estimate of non-consumer packaging POM. Non-consumer packaging has been split into the two key sectors in the non-consumer sector: hospitality and other C&I.

2.4.1 Hospitality POM

Estimates of metal packaging used in the hospitality industry are made using newly available Valpak EPIC data relating to 34% of the cash and carry and delivered foodservice industry²¹. Market share information for the companies included in the sample is used to scale up the resulting tonnage to represent the whole foodservice, catering and hospitality sector, as depicted in Figure 9.

²¹ Valpak's EPIC database holds sales data and packaging weights information for clients signed up for the fully managed service.

Figure 9 Overview of the Foodservice, Catering & Hospitality Sector -Totals may not sum due to rounding

New view - sector summary 2018

The new approach enables the sector to be segmented as follows:

UK wholesale sector value 2018
£28,282m

Customer groups

Retail channel £15,673m	Catering/foodservice channel £10,946m	PBUs £1,663m
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Customer ordering platform

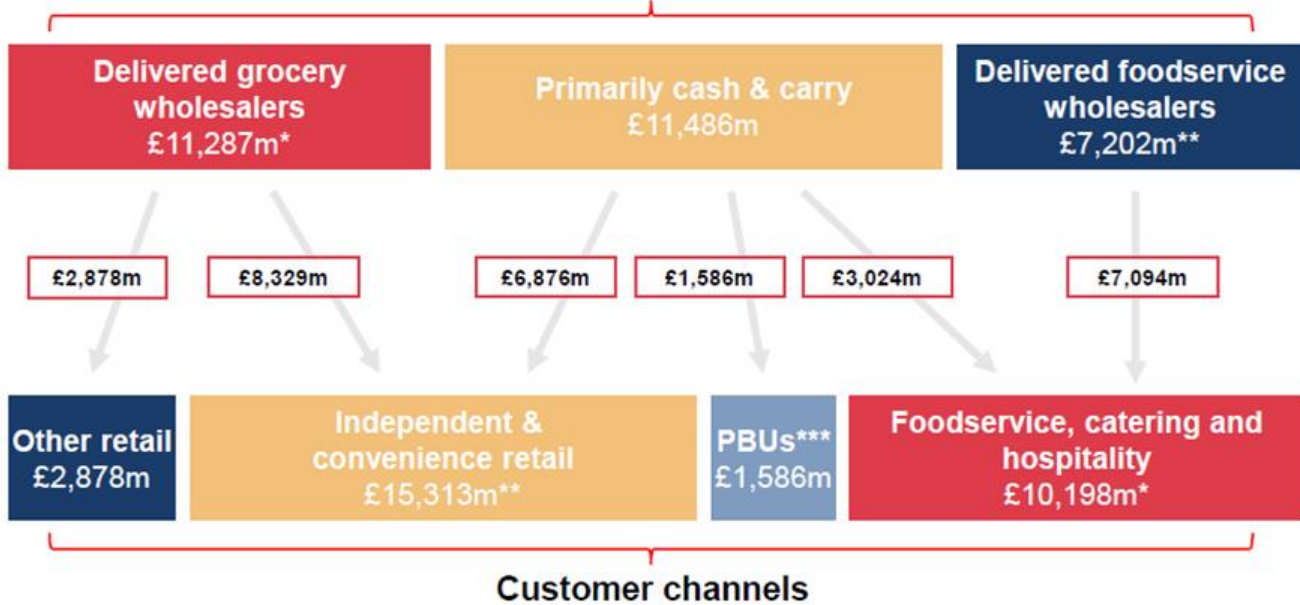
Customer fulfilment

£m	Online	Telesales/PLOF	In-depot	Total	£m	Delivery	Collect	Total
Retail	7,962	2,029	5,682	15,673	Retail	10,023	5,650	15,673
Catering	3,153	5,785	2,008	10,946	Catering	8,987	1,959	10,946
PBUs	87	1	1,575	1,663	PBUs	88	1,575	1,663
Total	11,202	7,815	9,265	28,282	Total	19,098	9,184	28,282

A £30bn market: wholesale and customer map, 2016

Notes:
 *Includes £80m supplied from delivered wholesalers to foodservice, catering and hospitality
 **Includes £108m supplied from delivered foodservice into retailers
 ***PBUs = professional business users

Routes to market



This method estimates 15k tonnes of aluminium packaging in hospitality and 35k tonnes of steel packaging in hospitality. However, considerable quantities of soft and alcoholic drinks sold directly to bars and restaurants need to be added to this figure. Further research identified the additional tonnages and the full total and breakdown is shown in Figure 10.

Figure 10 Breakdown of Hospitality Packaging by Source, 2019 (k tonnes) – Totals may not sum due to rounding

	Aluminium	Steel
Wholesale and Foodservice (scaled-up from EPIC)	15	35
Additional direct sales of soft drinks	5	1
Additional direct sales of alcoholic drinks	8	1
Additional adjusted tonnage ²²	10	-
Total Metal Packaging in Hospitality	38 (+/- 18%)	38 (+/- 18%)

Additional direct sales of soft drink cans are estimated by taking the total volume sales of soft drinks and the proportion sold in metal packaging. Valpak's EPIC grocery split of aluminium to steel drinks cans is used as a proxy to apportion the metal soft drinks cans, giving the total volume (litres) of aluminium and steel soft drink cans. EPIC data is also used to provide a proxy for the litres per gram of packaging, which gave a total of 63k tonnes aluminium soft drinks packaging and 1k tonnes steel soft drinks packaging. Subtracting the already identified quantities of packaging from these totals, left the 'missing' packaging of 5k tonnes aluminium soft drinks packaging and 1k tonnes steel soft drinks packaging.

Additional direct sales of alcoholic drinks packaging are estimated using figures for the total number of beer cans sold into pubs in 2019 provided by the British Beer & Pub Association, from which the number of alcoholic drinks cans units already accounted for are subtracted. The hospitality aluminium/steel can unit split established in the Drinks Recycling OTG²³ report is used to estimate the number of aluminium and steel cans, and an average hospitality can weight was applied²³ to each. This generated estimates of 8k tonnes of 'missing' alcoholic aluminium drinks cans and 1k tonnes of 'missing' alcoholic drinks in steel cans. These estimates are considered low/minimum as they relate only to beer, and only to pubs, and therefore not to all alcoholic drinks sold in hospitality outlets.

2.4.2 Other C&I POM

The other C&I POM is the residual tonnage once the consumer grocery, consumer non-grocery and hospitality streams are subtracted from total POM. It should be noted that as this stream is a residual tonnage, it may include any missed tonnages of consumer grocery, consumer non-grocery and hospitality packaging and not entirely be all other C&I.

For aluminium, the initial estimate was 45k tonnes, but the Steering Group agreed that it would make better sense to transfer 10k tonnes from other C&I to hospitality to align with Alupro's 2019 estimates for aluminium cans and also provide a more realistic balance between hospitality and other C&I.

Minimal data exists on C&I packaging outside of hospitality, in particular for aluminium. It is known that aluminium is used to some extent in the manufacture of gas canisters, drums and industrial aerosols, but no figures to illustrate the respective quantities are available.

²² The Steering Group agreed to adjust split between hospitality and C&I.

²³ WRAP Drinks Recycling On-the-Go 2018, <http://www.wrap.org.uk/consumption-recycling-and-disposal-go-drinks-containers>.

The total other C&I POM estimate for aluminium packaging is 35k tonnes (+/- 15%)²⁴ in 2019.

To establish the other C&I indicative error margin, the combined error margins of consumer grocery, consumer non-grocery and hospitality POM are used, as other C&I is the residual figure once these three streams are subtracted from total aluminium packaging POM.

The total other C&I steel packaging POM estimate is 204k tonnes (+/- 12%) in 2019.

As for aluminium, the steel packaging other C&I indicative error margin is the combined error margins of consumer grocery, consumer non-grocery and hospitality steel packaging POMs, as the other C&I category is a residual figure once these three streams are subtracted from the total steel packaging POM.

2.5 Summary of Metal Packaging POM

Aluminium packaging POM is estimated in 2019 to be 222k tonnes (+/- 5%).

This estimate is derived by calculating obligated metal packaging POM from data reported in the National Packaging Waste Database (NPWD) by obligated producers using the net pack fill method. Estimates of 1% non-obligated packaging for aluminium are added to the obligated packaging POM to generate the total aluminium POM estimate. The results of this method are cross-checked against secondary research and data/information provided by the project's industry Steering Group.

Aluminium packaging POM in the consumer sector is estimated to be 148k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting the aluminium and steel project).

Aluminium packaging POM in the non-consumer sector is estimated to be 73k tonnes (+/-12%) in 2019.

This estimate comprises of an estimate of aluminium packaging in the hospitality sector based on primary and market share data to which separate estimates of the amounts of direct sales of soft and alcoholic drinks based on industry sales figures are added. C&I aluminium packaging comprises the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total POM. There are no figures available to cross-check this data which may therefore include any missed tonnages of consumer grocery, consumer non-grocery and/or hospitality POM.

Steel packaging POM in 2019 is estimated to be 517k tonnes (+/- 6%).

This estimate is derived from reported obligated data (EA, NPWD) and cross-checked as far as is possible using a bottom-up methodology combining data from various sources for each sector and data provided by the project's industry Steering Group.

The estimate for steel packaging POM in the consumer sector is 275k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting this metal flow project).

²⁴ Due to lack of data it is assumed that the error margin around the residual Other C&I figure is the same as the combined error margins of grocery, non-grocery and hospitality estimates (which are subtracted from total POM to estimate Other C&I).

The estimate for steel packaging POM in the non-consumer sector is 242k tonnes (+/-11%) in 2019.

This estimate comprises of an estimate of hospitality packaging based on primary and market share data to which separate quantities of direct sales of soft and alcoholic drinks using steel packaging are calculated based on industry

figures. C&I steel packaging is estimated as the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total steel packaging POM. This figure is cross-checked using a bottom-up approach based on estimates of industrial packaging types using secondary research and industry/Steering Group knowledge. The cross-check figure is within 8% of the residual tonnage estimate (despite some steel packaging that could not be quantified).

Figure 11 Total Metal Packaging POM Breakdown by Stream, 2019 – Totals may not sum due to rounding

	Aluminium		Steel	
	K tonnes	Error margin	K tonnes	Error margin
Consumer grocery retail	122	+/-6%	216	+/-6%
Consumer non-grocery retail	27	+/-13%	60	+/-10%
Total consumer retail	148	+/-5%	275	+/-5%
Non-consumer hospitality	38	+/-18%	38	+/-18%
Non-consumer other C&I	35	+/-15%	204	+/-12%
Total non-consumer	73	+/-12%	242	+/-11%
Total metal packaging POM	222	+/-5%	517	+/-6%

2.6 Metal Packaging POM by format

The composition of aluminium and steel packaging in the consumer grocery stream in 2019, as identified through Valpak’s EPIC database, are illustrated in Figure 12 and Figure 13.

Figure 12 Composition of Aluminium Grocery Packaging POM, 2019 (%)

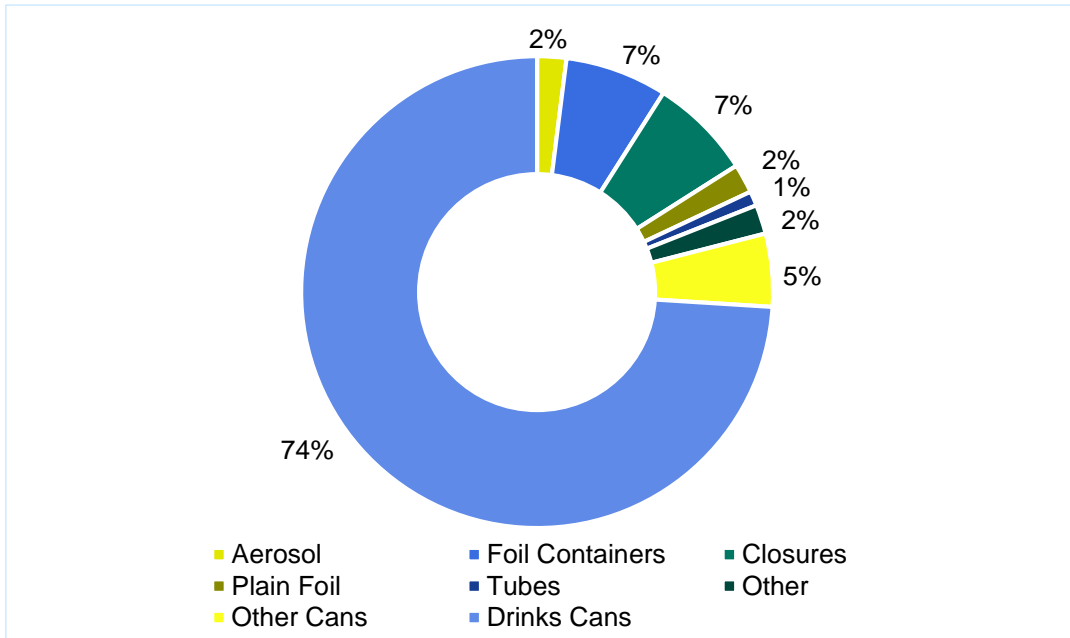
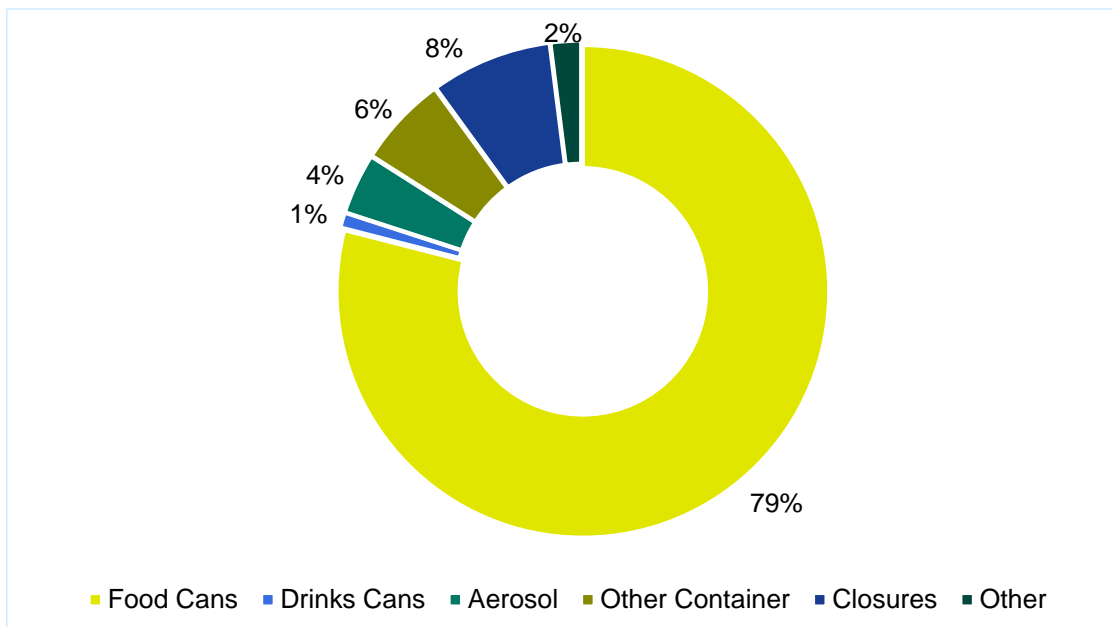


Figure 13 Composition of Steel Grocery Packaging POM, 2019 (%)



3. Collection & Reprocessing of Metal Packaging

3.1 Aluminium Packaging Recycling

This section of the report examines the levels of aluminium packaging waste collected in the UK and then recycled, either in UK domestic smelters or overseas. The collection streams are split between consumer (Local Authority managed collections from households) and non-consumer collections. Waste Data Flow (WDF), combined with adjustments for consumer aluminium in incinerator bottom ash (IBA) and refuse derived fuel (RDF), is used to estimate household recycling and data from NPWD is used for total accredited (or recorded) recycling. However, NPWD figures do not account for unaccredited (unrecorded) aluminium packaging recycling, therefore this project provides a separate analysis on this element to estimate a total (recorded + unrecorded) aluminium packaging recycling figure.

3.1.1 Recorded Recycling of Aluminium Packaging

NPWD is used to identify the total recorded recycling of aluminium packaging, for both UK domestic recycling and export recycling. For 2019, this shows 117k tonnes of recycling of aluminium packaging, of which 41k tonnes (35%) took place in the UK. Of the total (UK and exports), 89k tonnes (77%) relates to the recycling of aluminium cans and associated packaging, 26k tonnes (22%) is from the recycling of aluminium packaging in incinerator bottom ash (IBA) and 2k tonnes (2%) is from other protocols agreed with the regulators.

Based on the total aluminium POM estimated in this report (222k tonnes), the total recorded recycling figure of 117k tonnes gives a recorded recycling rate for aluminium packaging of 53% in 2019.

3.1.2 Unrecorded Recycling of Aluminium Packaging

It is important to recognise that not all aluminium recycling is captured on NPWD. To identify the scale of unrecorded recycling, conversations were held with the Steering Group as well as UK operators and exporters handling recovered aluminium packaging. Firstly, conversations focused on any unaccredited recycling or export of the key grades of aluminium packaging (excluding IBA). In particular, this relates to the recycling of aluminium cans and associated packaging (e.g. aerosols and foils), but also to other grades, such as caps and closures generated from the glass recycling sector.

The general feeling was that much of the aluminium packaging recycling of this type is being captured because key players specialising in packaging recycling are accredited and there is an economic incentive to keep grades, such as used beverage cans (UBCs), separate from other streams of aluminium. However, it was felt that some aluminium packaging is being lost (in terms of data capture), for example, at large metal yards where smaller quantities of aluminium packaging might be accepted, but where the scale of the operation means that operationally it is not practical to keep it as a separate grade and so it is mixed with non-packaging aluminium. In addition, there was evidence of at least one UK aluminium smelter not being accredited to issue PRNs in 2019 handling a relatively significant quantity of aluminium packaging.

Based on input from industry, it is estimated that the recorded recycling of key grades of aluminium packaging (excluding IBA) on NPWD in 2019 is 96%. That is to say that the data on NPWD accounts for 96% of the actual recycling of these grades of aluminium. For exports, the estimate was the same. This equates to 2k tonnes of unrecorded aluminium packaging recycling occurring in the UK and 2k tonnes for exports.

A second area investigated the recycling of the non-ferrous metal fraction recovered from IBA. For this grade of non-ferrous metal there are two national PRN protocols in place: one for unprocessed non-ferrous IBA metal, where there is a protocol of 70% aluminium packaging in place, and the other for part processed non-ferrous IBA metal, where an 87.5% protocol is used. Conversations with industry suggested that not all recycling of this grade was captured on NPWD in 2019 and so an estimate of the missing tonnage was made.

To do this, a figure of 2.4m tonnes²⁵ of IBA generation in 2019 was used combined with an assumed non-ferrous metal content of 2%²⁶. This gives a total non-ferrous metal generation from IBA of 48k tonnes in 2019 and a total aluminium packaging content of 34k tonnes using the 70% protocol. On NPWD, 26k tonnes of aluminium packaging recycling from IBA was recorded (76% of the estimated total), leaving a difference between the two figures of 8k tonnes (24% of the estimated total).

On the assumption that all IBA is treated and the non-ferrous content recovered, there was 8k tonnes of unrecorded aluminium packaging recycling related to IBA processing in 2019.

Finally, UK RDF exports and the aluminium packaging content is investigated. As with Energy from Waste Plants (EfW) in the UK, this analysis assumes that any RDF exported to mainland Europe is treated in a plant where the IBA is processed and the non-ferrous metal content recycled. In 2019 2,796k tonnes of RDF was exported from the UK²⁷ with an estimated aluminium packaging content of 0.75%²⁸. However, there is a loss of aluminium packaging during incineration which must be taken into consideration. This loss varies depending on the thickness of the aluminium and therefore the mix of packaging that makes up the 0.75%. It is assumed here that the transfer rate during incineration is 80% with a loss of 20%. This figure is approximate but takes into consideration research on transfer rates by the European Aluminium Association and Alufoil²⁹ and input from Alupro.

Based on these assumptions, the unrecorded recycling rate estimate of aluminium packaging in RDF is 17k tonnes in 2019.

It should be noted that throughout the project there have been discussions at various times with Steering Group members on the assumed percentage of aluminium packaging in RDF. The original figure used in the modelling was 0.5%, however evidence was presented to suggest it should be higher (and potentially higher still than the 0.75% adopted). One of the reasons an aluminium packaging percentage higher than 0.75% was not used is that the tonnage of aluminium packaging recycled from IBA derived from exported RDF would become very high compared to what would be generated if the RDF was sent to EfW plants in the UK and the IBA protocol used.

Taking into consideration the aforementioned factors, the total unrecorded (unaccredited) recycling of aluminium packaging in 2019 is estimated to be 28k tonnes.

3.1.3 Total Recycling of Aluminium Packaging

Total aluminium packaging recycling (recorded + unrecorded) can be calculated by combining the recorded recycling on NPWD with estimates of unrecorded aluminium packaging recycling:

$$\text{Total aluminium packaging recycled} = \text{Total recorded recycling} + \text{Total unrecorded recycling}$$

This methodology estimates the total tonnage of aluminium packaging recycled to be 145k tonnes in 2019. Based on this project's aluminium packaging POM (222k tonnes), the total aluminium packaging recycling rate is 66% in 2019.

²⁵ Tolvic Consulting UK Energy from Waste Statistics 2019

²⁶ Assumptions on ferrous (7%) and non-ferrous (2%) content in IBA were based on conversations with industry and desk research. Data from Defra UK Statistics of Waste (07.03.19) shows that in 2017 189k tonnes of metals from bottom ash was recycled. When combining this with Tolvic's IBA generation figure of 2.2m tonnes in 2017, this would give a metals content of 8.6% which is broadly in line with the combined metals total being used (9%).

²⁷ This is based on data from the Environment Agency, National Resources Wales (Contains Natural Resources Wales information © Natural Resources Wales and Database Right. All rights Reserved), the Department of Agriculture, Environment and Rural Affairs in Northern Ireland, and the Scottish Environment Protection Agency. The data from England and Wales is subject to the Open Government License (<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>).

²⁸ Metal content percentages in RDF were based on in-house information and conversations with industry.

²⁹ European Aluminium Association / Alufoil: Fact Sheet (February 201) More aluminium packaging recovered from incinerator bottom ashes than expected!

3.2 Aluminium Packaging Recycling by Sector

3.2.1 Consumer Recycling of Aluminium Packaging

Consumer recycling data is extracted from WDF where the latest available reported figures are for the financial year 2018/19. This means there is a degree of inconsistency between the collection figures for April 2018 - March 2019 and the consumption figures for January 2019 - December 2019³⁰. A summary of aluminium packaging collections is shown in Figure 14.

Figure 14 Aluminium Packaging Collection, WDF Data 2018/19 (k tonnes)

	Total	Kerbside	Bring	CA
Aluminium packaging collected	87	86	<1	<1

A significant proportion of the aluminium packaging in the total in Figure 14 is generated from *mixed cans*; it has been assumed, based on WDF analysis, that the aluminium content of mixed cans is 20%, with the remainder being steel tins and cans.

The WDF data in Figure 14 does not include figures for consumer aluminium packaging that is recycled from IBA or RDF processes and so estimates are made for these. For IBA, Tolvic reports²⁵ that of the 12.63m tonnes of waste inputs to UK energy from waste plants in 2019, 81.5% was MSW and the remainder C&I. This 81.5% is used as a proxy for consumer waste, although it is recognised that it will include some *household like* waste from non-households. It is also assumed that the aluminium content in both the MSW and C&I is similar.

Assuming that 81.5% of the aluminium packaging recycled from IBA is consumer then consumer recycling of aluminium packaging amounts to approximately 27k tonnes (81.5% of 34k tonnes) in 2019. RDF is typically produced with a mix of household and C&I waste to achieve target specifications for EfW plants. Here it is assumed that an average of 30% of the aluminium recycled is from consumer sources, which amounts to approximately 8k tonnes.

Combining the above, it is estimated here that in total there is 123k tonnes of aluminium packaging recycling from consumer sources. Based on this project's consumer POM figure (148k tonnes), this is a recycling rate of 83% for consumer aluminium packaging.

³⁰ Cleansed and partially analysed WDF data provided by WRAP

3.2.2 Non-consumer Recycling of Aluminium Packaging

Non-consumer aluminium packaging recycling is estimated as follows:

Figure 15 Non-consumer Aluminium Packaging Recycling, 2019 (k tonnes)

Non-consumer recycling	=	Total aluminium packaging recycled	-	Consumer recycling
Total UK aluminium packaging recycling				145
Aluminium consumer recycling				123
Aluminium non-consumer recycling				22

Figure 15 gives the amount of non-consumer aluminium packaging recycling as 22k tonnes in 2019. Based on this project's non-consumer POM estimate, this is a recycling rate of 30%. It should be noted that this figure is likely to be low due to the presence of some non-consumer aluminium packaging both in that reported on WDF and in the MSW supplied to UK EfW plants.

3.3 Aluminium Packaging Not Recycled

Subtracting the consumer and non-consumer recycling totals from the respective total packaging POMs gives estimates of the quantities of aluminium not recycled for each of the consumer and non-consumer streams.

For consumer aluminium packaging, it is estimated that a total of 25k tonnes is not recycled in 2019. For aluminium not recycled, the method here includes an estimate for the aluminium lost during incineration both in UK EfW plants and those overseas accepting UK derived RDF. A transfer rate of 80% is assumed, with a loss of 20% of the aluminium during the process. This accounts for 9k tonnes of the total. The remaining 16k tonnes is an estimate of consumer aluminium packaging contained in residual waste sent to landfill.

For non-consumer aluminium packaging, the non-recycled total is 51k tonnes in 2019. As for consumer aluminium packaging, an estimate is made for loss during incineration both in the UK and overseas using the same methodology.

This accounts for approximately 4k tonnes of the total. The remainder 48k tonnes is an estimate of non-consumer aluminium packaging contained in residual waste sent for landfill.

3.4 Steel Packaging Recycling

3.4.1 Recorded Recycling of Steel Packaging

NPWD is used to identify total recorded recycling of steel packaging both in the UK and that exported for recycling. For 2019, this shows 398k tonnes of recycling of steel packaging, of which 241k tonnes (61%) took place in the UK.

Of the total (UK and exports), 231k tonnes (58%) relates to the recycling of steel cans and associated packaging, 143k tonnes (36%) is from the recycling of other steel grades with national protocols (where it is expected one might find mainly non-consumer packaging, such as UK ferrous grades, 1, 2 and 3b) and the remaining 24k tonnes (6%) is for ferrous grades where individual protocols have been agreed with the regulators.

Based on the total POM estimated in this report, the total recorded steel packaging recycling is 398k tonnes in 2019 represents a recorded recycling rate of 77% in 2019.

3.4.2 Unrecorded Recycling of Steel Packaging

It is important to recognise that not all of the recycling of steel packaging is captured (as recorded recycling) on NPWD. To identify the scale of unrecorded steel packaging recycling, conversations were held with the Steering Group as well as with UK operators and exporters handling recovered steel packaging.

Firstly, conversations focused on any unaccredited recycling or export of the key grades of steel packaging (excluding IBA). Discussions focused on the recycling of steel cans and associated packaging (e.g. aerosols) and also other grades where a national protocol exists (for example for UK ferrous grades 1 & 2 and fragmented light steel). The general feeling was that a high percentage of the steel packaging recycling falling into these categories is being captured. For steel cans, this was due to the main UK steel mills being accredited and exports being limited. For other grades, it was felt that the data on NPWD suggests much is being captured and that the size of shipments means there is a strong incentive for exporters to get accredited.

Based on input from industry, it is estimated that the recorded recycling of key grades of steel packaging (excluding IBA) on NPWD in 2019 was 98%. The same % figure is used for exports. This equates to 8k tonnes of unrecorded steel packaging recycling from these sources.

A second area of investigation was the recycling of the ferrous metal fraction recovered from IBA. Unlike aluminium, there is no national protocol for steel packaging recovered from IBA and so individual agreements must be made between UK mills or exporters and the regulators.

In 2019, approximately 24k tonnes of PRNs were issued based on local protocols from a flow of steel scrap of just under 40k tonnes. The average rate of the protocol is therefore 61%. There were no locally agreed protocols on exports in 2019. Discussions with industry suggest the PRNs issued based on locally agreed protocols are primarily generated on the ferrous fraction from IBA and ferrous scrap recovered at the front end of waste treatment plants, for example from EfW / MBT / RDF plants. It was estimated that the packaging content in the IBA ferrous fraction is around 70% and also that 75% of the PRNs generated from locally agreed protocols came from the IBA ferrous fraction in 2019.

Despite a relatively high percentage of the total PRNs on these local protocols coming from the IBA ferrous fraction, this would indicate that a large percentage of this IBA ferrous fraction was not having PRNs issued on it and so an attempt was made to calculate how much might be missing. To do this, a figure of 2.4m tonnes²⁵ of IBA generation in 2019 was used and combined with an assumed ferrous metal content of 7%²⁶.

This gives a total ferrous generation from IBA of 168k tonnes in 2019.

As we estimate that 75% of the PRNs issued using a local protocol came from the IBA ferrous fraction, it is concluded that PRNs are being issued on just under 26k tonnes of the total ferrous scrap generated of 168k tonnes. This leaves 142k tonnes where PRNs have not been issued. The unrecorded recycling of steel could be calculated by multiplying the 142k tonnes by the estimate for the packaging content in this fraction, 70%. However, discussions with industry suggested that some of the ferrous IBA fraction may be finding its way into fragmented steel. Whilst IBA ferrous is technically not permitted in this grade, there is an economic incentive for this to happen. As the protocol on this grade is low as a percent (4.1%) and this figure would not account for any IBA content (as the protocol was developed prior to any significant recovery of ferrous from IBA) the inclusion of some IBA ferrous would increase the tonnage of this grade and therefore have some very marginal impact on PRNs issued (i.e. they are not all 'lost').

As a result, the 70% figure was reduced slightly to reflect this by 4% points to 66%. And this is the figure used as the average unrecorded steel packaging content in the ferrous IBA fraction where a local protocol is not being used. This gives an estimate of total unrecorded steel packaging from the ferrous IBA route of 94k tonnes.

Finally, the export of RDF from the UK and its steel packaging content was investigated. As with Energy from Waste Plants (EfW) in the UK, it is assumed that any RDF exported to mainland Europe will be treated in a plant where the IBA is processed and the ferrous metal content recycled. In 2019, 2,796k tonnes of RDF were exported from the UK²⁷ and it is estimated that within the RDF the steel packaging content is 0.60%²⁸, on average. This gives an unrecorded recycling tonnage for steel packaging from RDF of 17k tonnes in 2019.

Taking into consideration all of the aforementioned factors, the total unrecorded (unaccredited) recycling of steel packaging in 2019 was estimated to be 118k tonnes.

3.4.3 Total Recycling of Steel Packaging

Total steel packaging recycling (recorded + unrecorded) is calculated by combining the recorded recycling on NPWD with the estimate for unrecorded steel packaging recycling:

$$\text{Total steel packaging recycled} = \text{Total recorded recycling} + \text{Total unrecorded recycling}$$

This gives a total recycling rate for steel packaging of 516k tonnes in 2019. Based on this project's steel packaging POM this represents a steel packaging recycling rate of up to 100% depending on the accuracy of the protocols used.

Valpak and the Steering Group acknowledge that although the protocols, sampling activity and other assumptions examined here suggest otherwise, it is not plausibly possible to achieve a 100% recycling rate for steel packaging. Up to a maximum of 27k tonnes of steel packaging has been identified that may be going to landfill (see section 3.6). A further explanation of how steel packaging recycling is captured and why the recycling rate is extremely high is explored in more detail in section 3.7.

3.5 Steel Packaging Recycling by Sector

3.5.1 Consumer Recycling of Steel Packaging

Consumer recycling data based on the financial year 2018/19 is extracted from WDF. This means there is some degree of inconsistency between the collection figures for April 2018 - March 2019 and the consumption figures for January 2019 - December 2019³⁰. A summary of steel packaging collections is shown in Figure 16.

Figure 16 Steel Packaging Collected for Recycling, WDF Data 2018/19 (k tonnes)

	Total	Kerbside	Bring	CA
Steel packaging collected	199	196	<1	2

The WDF data in Figure 16 does not include figures for consumer steel packaging recycled from IBA or RDF. Estimates were made for these. For IBA, Tolvic report¹ that of the 12.63m tonnes of waste inputs to UK energy for waste plants in 2019, 81.5% was MSW and the remainder C&I. The 81.5% is used as a proxy for consumer waste, although it is recognised that it will include some *household like* waste from non-households. It is also assumed that the steel content in both the MSW and C&I is similar. It is therefore assumed that 81.5% of steel packaging recycled from IBA is consumer, which amounts to approximately 91k tonnes (or 81.5% of 112k tonnes). RDF is typically produced with a mix of household and C&I waste to achieve target specifications for EfW plants. Here it is assumed that an average of 50% of the steel recycled from RDF is from consumer sources, which amounts to approximately 8k tonnes (50% of 17k tonnes).

Combining the above (Local Authority collected steel packaging + IBA + RDF), it is estimated that there is approximately 299k tonnes of steel packaging recycling from consumer sources. Based on the estimated consumer steel POM figure in this report (272k tonnes), the consumer recycling rate for steel packaging in 2019 is 110%. Clearly this cannot be correct and possible reasons for this figure are explored in section 3.7.

3.5.2 Non-consumer Recycling of Steel Packaging

Non-consumer steel packaging recycling is estimated as follows:

Figure 17 Non-consumer Steel Packaging Recycling, 2019 (k tonnes)

Non-consumer recycling	=	Total steel packaging recycled	-	Consumer recycling
				516
				299
				218

This gives a non-consumer recycling tonnage for steel packaging of 218k tonnes in 2019. Based on this project's estimate of non-consumer steel packaging POM (245k tonnes), the non-consumer steel packaging recycling rate is 89% for 2019.

3.6 Steel Packaging Not Recycled

Subtracting the consumer and non-consumer steel packaging recycling totals from the respective sector POMs gives estimates of the tonnages of steel packaging that is not recycled.

For consumer steel packaging, the non-recycled steel packaging total is *negative* due to the consumer steel packaging recycling rate being over 100%. This is explored further in section 3.7.

For non-consumer steel packaging, the non-recycled total for steel packaging is 27k tonnes. Assumed that all of the steel packaging in IBA is recycled, both in the UK and via RDF overseas, then this is the figure for steel packaging going to landfill and not being recycled.

3.7 Explanations for the High Steel Packaging Recycling Rates

Combining the estimates of recorded and unrecorded steel packaging recycling gives a total figure of 100%. Whilst figures over 100% are clearly not correct, it is expected here that steel packaging has very high recycling rates because:

- Capture through household recycling systems is already high prior to making adjustments for unrecorded recycling. Based only on WDF data and the estimated POM, the consumer recycling rate is already 73%.
- Even when steel is not separated for recycling at source and remains in residual waste it is often captured for recycling at some point in the supply chain. For example, at an MBT plant, during production of RDF, at a waste transfer station prior to incineration (less common than historically but it occurs), or from IBA processing.
- Capture rates of steel once it is collected in household collections will be relatively high as losses at MRFs are lower than for some other materials as over-band magnets are generally efficient.
- There is no transfer loss for steel packaging, as there is for aluminium, during incineration at EFW facilities.

Possible reasons why the overall recycling rate may be too high could relate to inaccuracies in the protocols. For example, steel cans & associated packaging grades (classed as 6E on NPWD) has a protocol of 97.5%, which may be achieved at some MRFs but not at others. As an observation, WDF has a total figure of 199k tonnes for steel (which one would expect to be nearly all steel cans or packaging that would be included with cans, such as aerosols).

On NPWD the steel can total is 231k tonnes. Of course, some of this difference will relate to C&I collections of steel packaging. For the C&I protocols, fragmented ferrous generate 96k tonnes of steel packaging evidence (18% of POM, 24% of all recycling, 67% of the C& I protocol total). The total recycling rate is therefore sensitive to the percentage used in the protocol, currently 4.1%.

Of particular note here, it is clear that the recycling rate for consumer steel recycling is incorrect at 110%. Possible reasons for this are:

- Non-consumer household like steel will be entering household collection systems. For example, restaurants may choose to separate steel tins and place them in bring banks or take them home and add them to kerbside collected materials.
- The steel packaging from consumer sources in IBA is estimated using the percentage of municipal waste inputs to EfW as a proxy for consumer waste. Municipal waste includes household like packaging from C&I sources and so this figure will be overstated. These points are particularly important for consumer recycling as 81.5% of EfW inputs are assumed to be consumer.

It is also recognised that assumptions have had to be made when analysing unrecorded recycling, and minor changes to them can impact on the numbers. For example, assuming a 7% ferrous content in IBA and that 70% is packaging. On 2.4m tonnes of IBA this is 118k tonnes of steel packaging, or 23% of POM. To put this in context, NPWD has total steel packaging recycling at 398k tonnes in 2019. The importance of the assumption is increased as it is estimated that only 15% of IBA is currently appearing in the NPWD numbers and so here a further 85% in unrecorded is added, 81.5% of which is assumed to be consumer steel packaging.

Separately, it is calculated that up 27k tonnes of steel packaging not being recycled may be landfilled. Whilst this does not tally with the 100% recycling rate, it falls within the error margins calculated for POM and recycling. It is clear that the amount of steel within RDF, and the amount of packaging within ferrous material, both being sent for recycling and for RDF, is an extremely sensitive metric for defining packaging recycling.

4. End Markets for Metal Packaging

4.1 Aluminium Packaging End Markets

Recycled aluminium from used beverage cans (UBCs) packaging typically goes back into rolled aluminium products, including new cans. Most other grades of recycled aluminium, such as that derived from IBA or from foils or from caps and closures, is currently used in cast applications (for example). Based on NPWD figures for 2019, 35% of recorded aluminium packaging recycling took place in the UK and 65% overseas. A freedom of information request was made to the Environment Agency to determine where aluminium packaging was exported to for recycling, by tonnage.

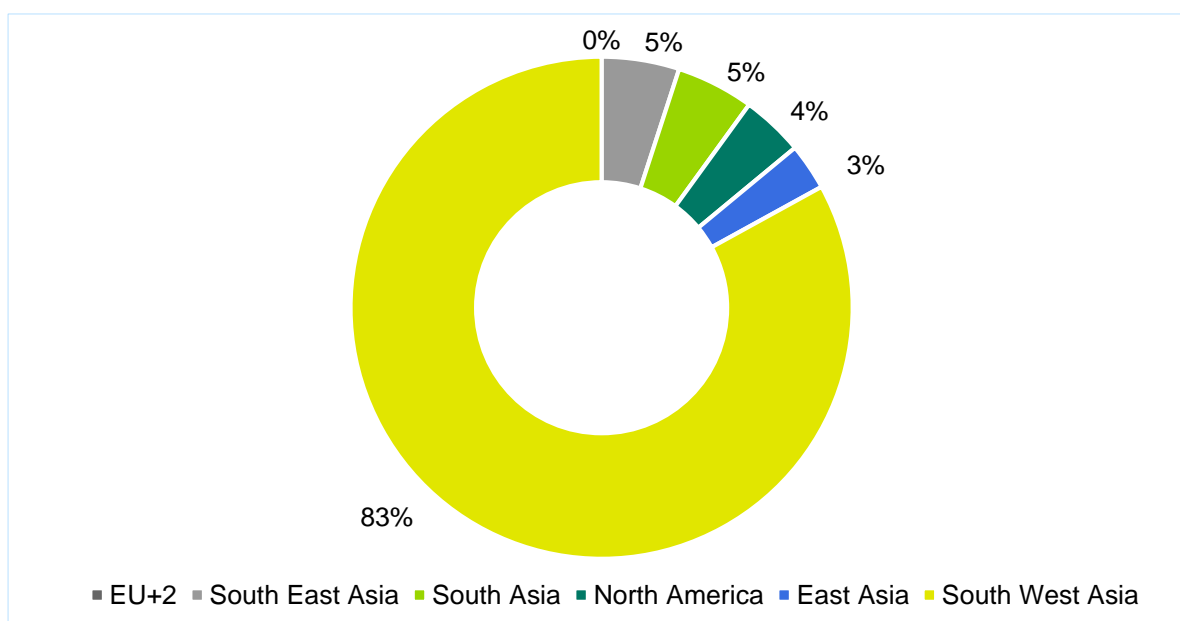
These figures exclude any non-aluminium packaging that might be present.

It can be seen from the breakdowns given in Figure 18 that a large proportion of exports were to the EU+2 countries (83%) with the remainder primarily split between Asia and North America.

Figure 18 – Destination of UK Aluminium Packaging Exports by Region, 2019 (k tonnes)

Export Regions	
Region	Export Tonnage
EU+2	62
South East Asia	4
South Asia	4
North America	3
East Asia	2
South West Asia	0

Figure 19 - Aluminium Packaging Exports (%) - Destination Regions, 2019 (%)



In terms of the destination country for aluminium packaging exported from the UK in 2019, 65% went to the top 3 destinations, namely, Germany, the Netherlands and Belgium.

Figure 20 - Aluminium Packaging Exports – Top 10 Destination Countries, 2019 (%)

Top 10 export destinations	
Country	% of exports
GERMANY	55%
NETHERLANDS	9%
BELGIUM	5%
UNITED STATES	4%
THAILAND	4%
POLAND	3%
PAKISTAN	3%
INDIA	2%
GREECE	2%
KOREA	2%

Data source: UK Environment Agency. Freedom of Information request

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4.2 Steel Packaging End Markets

Recycled steel packaging is used in a wide range of different products once recycled, including in construction, automotive and packaging applications. Based on NPWD figures for 2019, 61% of the recorded steel packaging recycling took place in the UK and 39% overseas.

A freedom of information request was made to the Environment Agency to determine where steel packaging was exported to for recycling, by tonnage. These figures exclude any non-steel packaging that might be present.

It can be seen from the breakdowns given in Figures 21 to 23 that South Asian countries are key export destinations, notably Pakistan. Then the EU+2 being in the list of key export destinations, most notably Turkey and Spain. Referring to NPWD, it can be seen that the vast majority of exports (79% in 2019) are of protocol grades that do not typically contain household packaging. These include fragmented old light steel and old steel grades 1 & 2. Steel tins and cans tend to be recycled in the UK (86% in 2019).

Figure 21 - Steel Packaging Exports - Destination Regions, 2019 (k tonnes)

Export Regions	
Region	Export Tonnage
EU+2	67
South Asia	52
NW Africa	15
N America	8
SE Asia	5
South America	4
East Asia	3
N Africa	3

Figure 22 - Steel Packaging Exports – Destination Regions, 2019 (%)

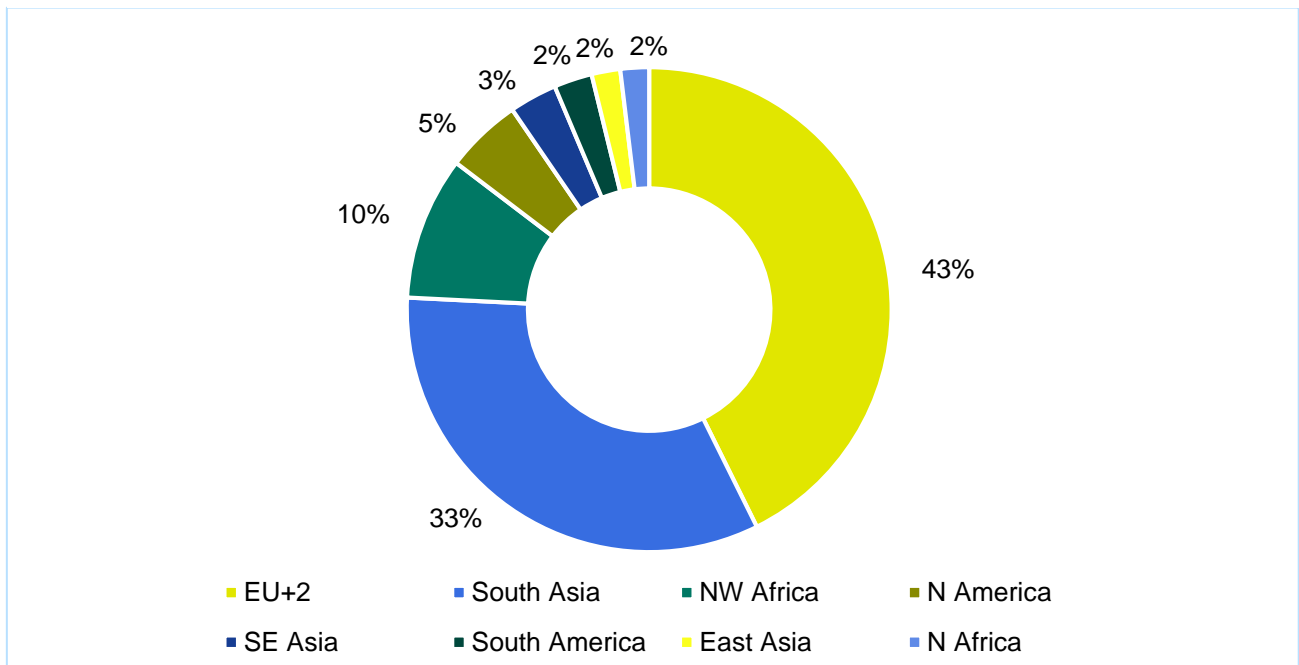


Figure 23 Steel Packaging Exports - Top 10 Destination Countries, 2019 (k tonnes)

Top 10 export destinations	
Country	% of exports
PAKISTAN	19%
TURKEY	19%
SPAIN	19%
EGYPT	10%
BANGLADESH	7%
INDIA	7%
UNITED STATES	5%
INDONESIA	3%
PORTUGAL	2%
BRAZIL	2%

Data source: UK Environment Agency. Freedom of Information request
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<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

5. Conclusions and Recommendations for Further Work

5.1 Conclusions: POM

This report estimates aluminium packaging POM in 2019 to be 222k tonnes (+/- 5%).

This estimate is derived by calculating obligated metal packaging POM from data reported in the National Packaging Waste Database (NPWD) by obligated producers using the net pack fill method. Estimates of 1% non-obligated packaging for aluminium are added to the obligated packaging POM to generate the total aluminium POM estimate. The results of this method are cross-checked against secondary research and data/information provided by the project's industry Steering Group.

The estimate for aluminium packaging POM in the consumer sector is 148k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting the aluminium and steel project).

The estimate for aluminium packaging POM in the non-consumer sector is 73k tonnes (+/-12%) in 2019.

This estimate comprises of an estimate of aluminium packaging in the hospitality sector based on primary and market share data to which separate estimates of the amounts of direct sales of soft and alcoholic drinks based on industry sales figures are added. C&I aluminium packaging comprises the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total POM. There are no figures available to cross-check this data which may therefore include any missed tonnages of consumer grocery, consumer non-grocery and/or hospitality POM.

This report estimates steel packaging POM in 2019 to be 517k tonnes (+/- 6%).

This estimate is derived from reported obligated data (EA, NPWD) and cross-checked as far as is possible using a bottom-up methodology combining data from various sources for each sector and data provided by the project's industry Steering Group.

The estimate for steel packaging POM in the consumer sector is 275k tonnes (+/-5%) in 2019.

This estimate is based on primary data alongside reliable market share data. No other method is used for deriving consumer data as this method is considered the most robust available and is accepted by the industry Steering Group supporting this metal flow project).

The estimate for steel packaging POM in the non-consumer sector is 242k tonnes (+/-11%) in 2019.

This estimate comprises of an estimate of hospitality packaging based on primary and market share data to which separate quantities of direct sales of soft and alcoholic drinks using steel packaging are calculated based on industry figures. C&I steel packaging is estimated as the remaining part of non-consumer POM and is the residual tonnage once consumer and hospitality POM are deducted from total steel packaging POM. This figure is cross-checked using a bottom-up approach based on estimates of industrial packaging types using secondary research and industry/Steering Group knowledge. The cross-check figure is within 8% of the residual tonnage estimate (despite some steel packaging that could not be quantified).

5.2 Conclusions : Recycling

Aluminium packaging recycling (recorded & unrecorded) is estimated to be 145k tonnes in 2019.

This includes accredited (or recorded) recycling of 117k tonnes (NPWD) and an estimate for unrecorded recycling of 28k tonnes. Based on the POM estimate in this project, the overall aluminium recycling rate is 66% in 2019. The accredited (or recorded) aluminium packaging recycling rate is 53% in 2019.

Consumer aluminium packaging recycling (recorded & unrecorded) is estimated to be 123k tonnes in 2019.

Based on this project's POM estimate the consumer aluminium packaging recycling rate is 83% in 2019.

Non-consumer aluminium packaging recycling (recorded & unrecorded) is estimated to be 22k tonnes in 2019.

This is calculated by subtracting the consumer recycling tonnage from total aluminium packaging recycled. Based on this project's POM the non-consumer aluminium packaging recycling rate is 30% in 2019.

It is estimated that 76k tonnes of aluminium packaging is not recycled, of which 13k tonnes (16%) is estimated to be lost during energy recovery and 64k tonnes (84%) goes to landfill.

This is based on an estimated total of 25k tonnes of consumer aluminium packaging and 51k tonnes of non-consumer aluminium packaging not being recycled.

Steel Packaging Recycling

Steel packaging recycling (recorded & unrecorded) is estimated to be 516k tonnes in 2019.

This includes accredited (or recorded) recycling of 398k tonnes (NPWD) and an estimate for unrecorded recycling of 118k tonnes. Based on this project's POM an overall steel packaging recycling rate of 100% is estimated, reasons for this are explored in section 3.7. The total recycling rate for steel packaging is dependent on applying extremely sensitive protocols for the quantity of packaging within the recycling streams for ferrous metals. The accredited (or recorded) recycling rate for steel packaging is 77% in 2019.

Consumer steel packaging recycled is estimated to be 299k tonnes in 2019.

Based on this project's POM estimate a consumer recycling rate of over 100% is estimated (the figure is 110% and reasons for this are explored in section 3.7). Inclusion of non-consumer steel packaging recycling recorded on WDF or included within MSW supplied to EfW plants is likely to be a factor in the overstatement of consumer steel packaging recycling.

Non-consumer steel packaging recycled is estimated to be 218k tonnes in 2019.

This is estimated by subtracting consumer steel packaging recycling from total steel packaging recycling. Based on this project's POM the non-consumer steel packaging recycling rate is 89% in 2019.

It is assumed that all steel packaging is ultimately recovered from incinerator bottom ash (IBA), either in the UK, or overseas via exports of refuse derived fuel (RDF). Up to 27k tonnes of steel packaging not recycled may be landfilled.

Whilst this does not tally with the 100% steel packaging recycling rate, it falls within the error margins calculated for steel packaging POM and recycling. It is clear that the amount of steel within RDF, and the amount of steel packaging within ferrous metal grades, both being sent for recycling and for RDF, is an extremely sensitive metric for defining steel packaging recycling.

5.2.3 Recommendations for Further Work

Aluminium and Steel Packaging POM

The area of greatest uncertainty around aluminium and steel packaging POM estimates is around the quantities of 'other C&I' packaging in the non-consumer streams (i.e. C&I packaging, excluding hospitality packaging). This project progresses the quantification of 'other C&I' packaging for steel packaging but is unable to find much data or evidence of this type of packaging for aluminium. The latter therefore remains an area recommended for further research.

Aluminium and Steel Packaging POM Recycling

It is apparent from the comprehensive analysis for aluminium and steel packaging in this project that there are considerable amounts of unaccredited (or unrecorded) aluminium and steel packaging being recycled. If such quantities were able to become accredited (i.e. recorded) this would boost metal packaging recycling rates and performance versus UK recycling targets. Further work to promote the benefits or need for the industry to obtain accreditation and to support the EA in assessing and providing accreditation is therefore recommended.

Appendix I

Data Robustness Assessment

A robustness analysis assessment is completed here on the data sources used. This is developed to provide an indicative level of uncertainty for each data source by scoring the data sources on their robustness and the level of agreement amongst stakeholders.

Questions are posed 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 in figures : Figure 24 (Aluminium POM), Figure 25 (Steel POM) and Figure 26 (Metal Recycling) and a summary in Figure27, which has been constructed based on analysis completed for each project estimate. The tables thereafter provide a full breakdown of the data robustness and agreement assessments for each dataset in the project.

Figure 24 Data Robustness Assessment Results – Aluminium POM

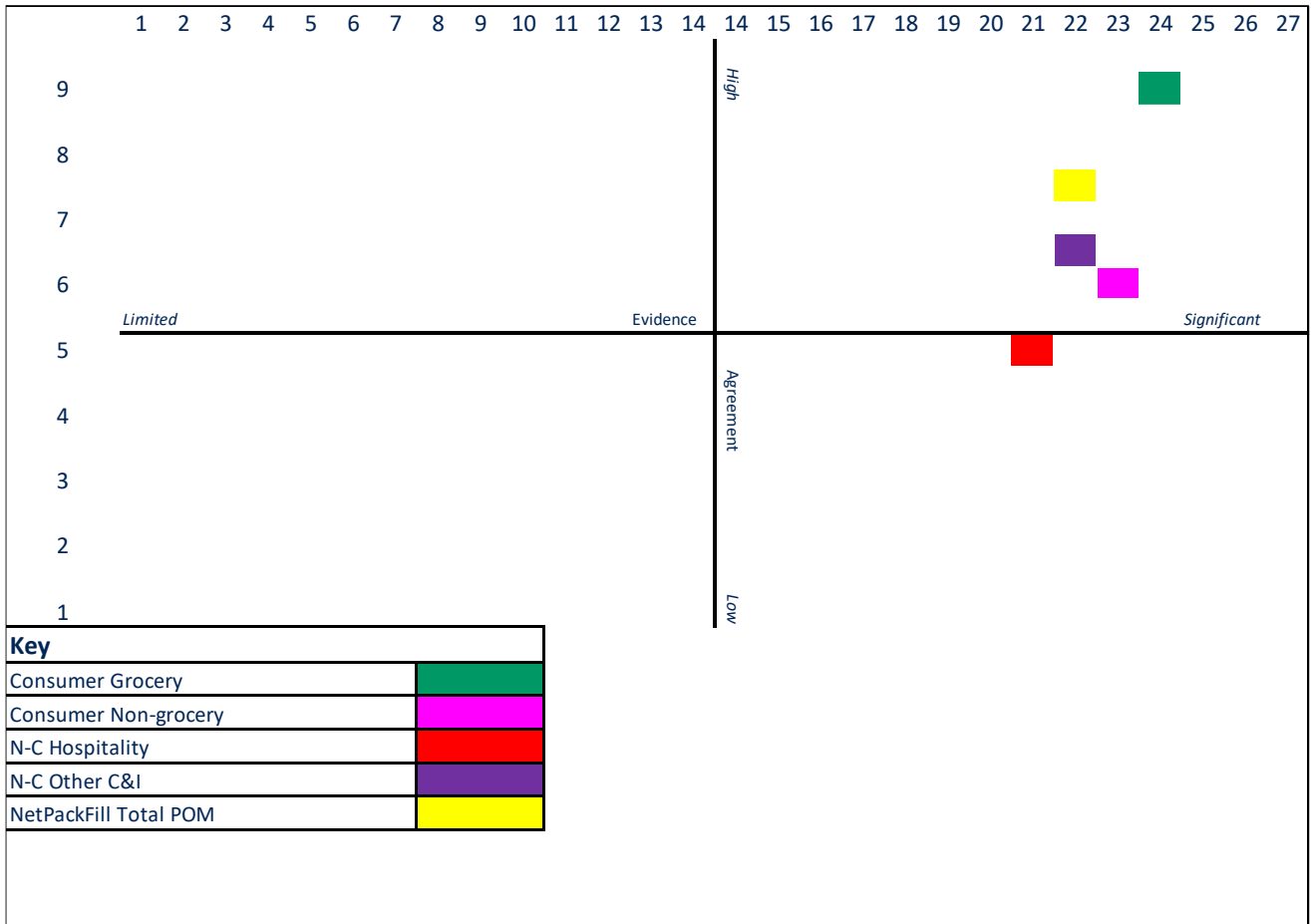


Figure 25 Data Robustness Assessment Results – Steel POM

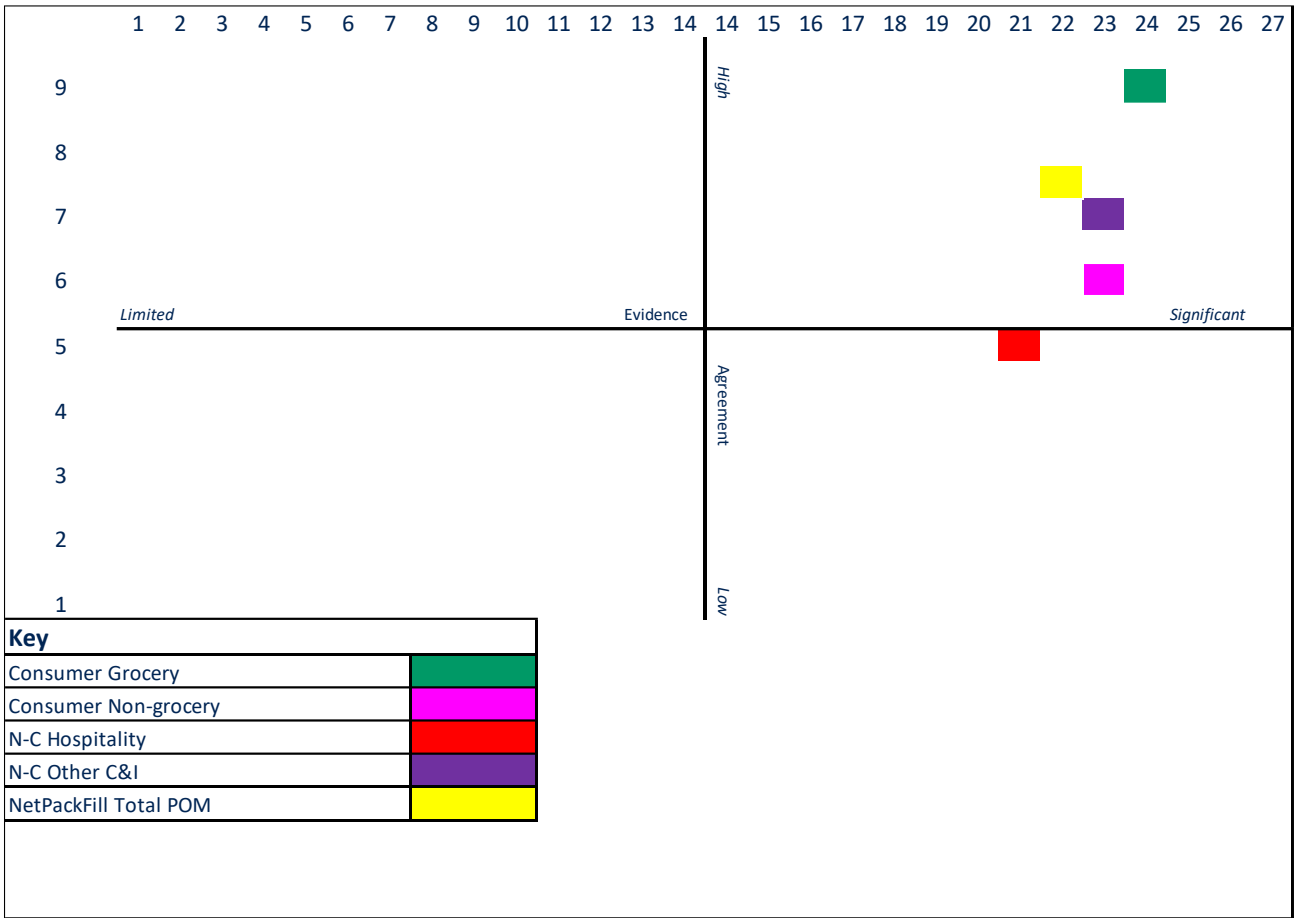
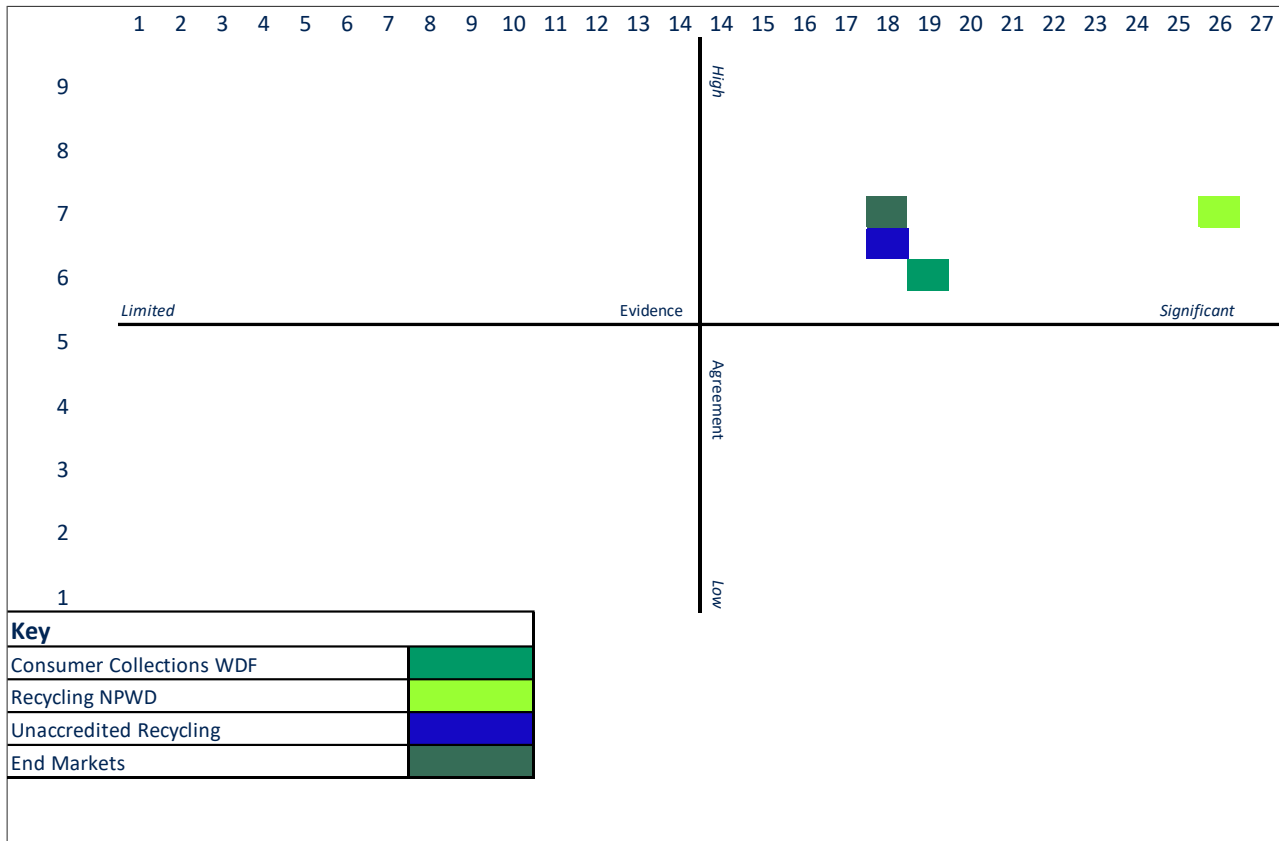


Figure 26 Data Robustness Assessment Results – Metal Recycling



To convert scores to a percentage that could be used to relate to an appropriate error margin³¹, the evidence and agreement levels scores were added and the percentage of the total possible score taken.

³¹ These are assumed estimates of error margin and not the outputs of statistical calculation

Figure 27 Data Robustness Assessment Results – Summary

	Data & Source	Robustness Scores		Error Margin
		Evidence (Robustness and completeness, max 27):	Degree of agreement around the findings (max 9):	+/-
1	Environment Agency Grocery Retailer Packaging Handled	24	9	6%
2	Valpak Grocery EPIC Data	24	7	9%
3	Mintel Beauty & Personal Care Value Sales by Sales Channel	23	6	9%
4	IGD Grocery Sales Channels	23	6	12%
5	Valpak DIY Compliance submissions 2019	21	6	18%
6	Insight Article Mkt share	21	4	21%
7	Euromonitor/Mintel Dog Food Value Sales by Sales Channel	24	6	12%
9	Valpak Hospitality EPIC Data	22	6	15%
10	IGD Hospitality Sales Channels	23	6	12%
11	British Soft Drinks Association	20	4	21%
12	British Beer & Pub Association	19	3	24%
13	NPWD Producer Data 2019	26	6	9%
14	Project Team & Advisory Group Non-obligated estimate Aluminium & Steel	18	8	18%
16	British Aerosol Manufacturers Association (BAMA)	14	3	33%
17	Drum POM: Tata Steel, HMRC & NPWD	21	4	27%
18	HMRC TradeInfo	23	5	15%
19	Baling Wire News article	16	3	30%
20	British Compressed Gas Association (BCGA)	18	4	24%
21	Industrial Packaging Association	18	4	24%
22	House of Commons Library Briefing Paper	14	2	36%
24	NPWD Recycling Data 2019	26	6	9%
25	Verde Research and Consulting Ltd Survey of Recyclers and Exporters 2019	18	7	21%
26	WDF 2018/19	19	6	21%

Data		
Environment Agency Grocery Retailer Packaging Handled		
Source		
Environment Agency Data		
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)?		Yes 3
Total		24
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

Data		
Estimated Distribution of Spending on Beauty & Personal Care Products 2019		
Source		
Intel		
Data Used In:		
Non-grocery Estimate		
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)?	Yes	3
Have the findings been independently peer-reviewed?	More yes than no, but equivocal	1
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%)?	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

Data		
The UK DIY & Gardening Market 2017-2022		
Source		
PR Newswire		
Data Used In:		
Non-grocery Estimate		
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)?	Yes	3
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 with some reservations	2
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%)?	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?	More yes than no, but equivocal	1
Total		4

Data		
UK Food & Grocery Value 2019		
Source		
IGD		
Data Used In:		
Non-grocery Estimate		
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?	More yes than no, but equivocal	1
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		23
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

Data		
Valpak DIY Annual Compliance Data Submissions 2019		
Source		
Valpak		
Data Used In:		
Non-grocery		
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?	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%)?	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

Data		
Valpak EPIC Grocery Data		
Source		
Valpak		
Data Used In:		
Grocery & Non-grocery		
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)?	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	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		24
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

Data		
Estimated Distribution of Spending on Petcare		
Source		
Mintel/Euromonitor (undefined in credit)		
Data Used In:		
Non-grocery Estimate		
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?	More yes than no, but equivocal	1
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		24
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

Data		
IGD Foodservice, Catering & Hospitality Sector Routes to Market		
Source		
IGD		
Data Used In:		
Non-grocery Estimate		
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?	More yes than no, but equivocal	1
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		23
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

Data		
UK Soft Drinks Report 2017		
Source		
British Soft Drinks Association		
Data Used In:		
Non-grocery		
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?	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		20
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?	No	0
Total		4

Data		
Total Volume by Package		
Source		
British Beer & Pub Association		
Data Used In:		
Non-grocery		
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)?	No	0
Total		19
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

Data		
Valpak Hospitality EPIC Data		
Source		
Valpak		
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?	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

Data		
Estimating Household/C&I split of Aerosols		
Source		
British Aerosol Manufacturers Association		
Data Used In:		
Non-grocery		
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?	Yes with some reservations	2
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)?	Yes with some reservations	2
Have the findings been independently peer-reviewed?	No	
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 with some reservations	2
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	No	0
Total		14
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?	More yes than no, but equivocal	1
Total		3

Data		
TradeInfo Import/Arrivals Data 2019		
Source		
HMRC		
Data Used In:		
Other C&I		
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	3
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 with some reservations	2
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	More yes than no, but equivocal	1
Total		23
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 with some reservations	2
Total		5

Data		
NPWD Producer Data 2019		
Source		
NPWD		
Data Used In:		
Method 2 - POM		
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	3
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		26
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

Data		
Non-obligated estimate Aluminium		
Source		
Project Team & Advisory Group		
Data Used In:		
NPF POM		
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?	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?	More yes than no, but equivocal	1
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%)?	Yes	3
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		8

Data		
BARNSELY BALING WIRE MANUFACTURER EXPANDS WITH BOOMING WASTE PROCESSING INDUSTRY		
Source		
CAPITAL B Media / D R Baling supplies		
Data Used In:		
Other C&I		
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?	Yes with some reservations	2
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)?	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 with some reservations	2
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	Yes	3
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 with some reservations	2
Has feedback from the key stakeholders been incorporated in the reporting of findings?	More yes than no, but equivocal	1
Total		3

Data		
UK POM estimate of Steel Gas Cylinders		
Source		
British Compressed Gas Association		
Data Used In:		
Other C&I		
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)?	Yes with some reservations	2
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		18
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 with some reservations	2
Total		4

Data		
UK POM estimate of Steel IBCs		
Source		
Industrial Packaging Association		
Data Used In:		
Other C&I		
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)?	Yes with some reservations	2
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		18
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 with some reservations	2
Total		4

Data		
UK Share of European Steel Production		
Source		
House of Commons Library Briefing Paper		
Data Used In:		
Other C&I		
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	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?	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?	More yes than no, but equivocal	1
Have the findings been sense-checked against credible alternative sources (incl. inconclusively)?	No	0
Total		14
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?	More yes than no, but equivocal	1
Has feedback from the key stakeholders been incorporated in the reporting of findings?	More yes than no, but equivocal	1
Total		2

Data		
WDF Local Authority Collection Data		
Source		
WDF 2018/19		
Data Used In:		
Consumer Recycling		
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)?	Yes with some reservations	2
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 with some reservations	2
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		19
Degree of agreement around the findings (max 9):		Scoring (Max 9)
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

Data		
Survey of Recyclers and Exporters 2019		
Source		
Verde Research and Consulting Ltd		
Data Used In:		
Recycling & Unaccredited Recycling		
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)?	More yes than no, but equivocal	1
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