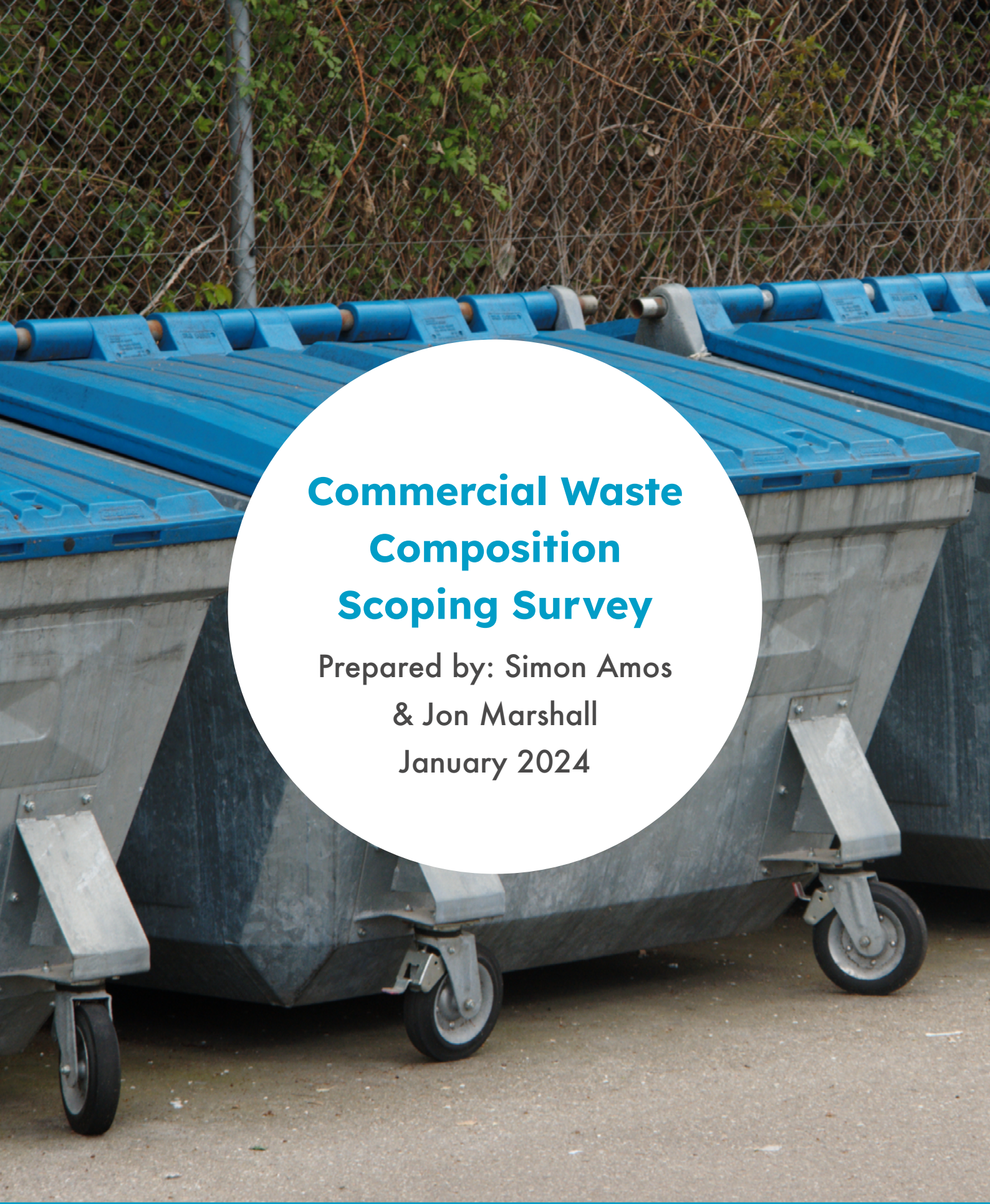

Commercial Waste Composition Scoping Survey

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ZERO WASTE SCOTLAND

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1 Executive Summary

Waste from commercial premises in Scotland is poorly understood. Around 700,000 tonnes of residual waste arise from such premises every year and based on household waste composition data this household-like waste stream could contain over 400,000 tonnes of material that could readily be recycled with existing services. The Scottish Government's consultation "Delivering Scotland's circular economy: A Route Map to 2025 and beyond" proposed undertaking a national compositional study of residual waste from commercial premises by 2024, in order to identify priority materials, products and sectors for waste prevention and recycling interventions. As a preparatory step collectors of commercial waste in Scotland (both private waste management companies and local authorities) were interviewed to identify what data they held that could either form part of the national compositional study (composition breakdown) or support the calculation of a national estimate (waste tonnages).

Eight collectors of commercial waste of varying size, experience and service area covered, took part in semi-structured interviews with Zero Waste Scotland researchers between June & August 2022. Themes addressed included (for both residual waste and dry mixed recycling) what compositional analysis the organisations performed, if analysis was not performed why that was, and attitudes to data collection and its value to them.

With regard to composition, the study found that commercial waste collectors were not performing any detailed compositional analysis of residual commercial waste. In addition, MRF CoP sampling of dry mixed recycling required by regulation to broad categories (e.g., metal, plastic, cardboard, etc...) was taking place, but no commercial waste collector sampled to a greater level of detail (e.g., HDPE drinks bottles, PET drinks bottles, plastic film packaging, non-packaging plastic film, etc...) such as that required for a compositional study. Tonnage data for both residual waste and DMR was being collected and technology allowing bins to be weighed at the time of collection was resulting in rich data sets for some companies.

The main driver for this scoping survey was to understand whether existing data held by operators collecting from commercial premises could assist in an ongoing study of commercial waste composition. Findings clearly show that no such composition dataset exists amongst commercial waste collectors and so any study of commercial waste composition would have to start from scratch.

However, on the question of whether collector-held tonnage data could be used to inform a national estimate, this study suggests that, whilst the detail of the data is variable, there may be a sufficient amount of good quality data to support scaling to a national estimate once a future compositional study has been performed. The datasets created by on-board weighing, whilst not universal in coverage, may well be significant enough to generate a reasonably caveated estimate at Scottish level.

2 Glossary

DMR	Dry Mixed Recycling
HDPE	High Density Polyethylene
MRF	Materials Recovery Facility
MRF CoP	Materials Recovery Facilities Code of Practice
PET	Polyethylene Terephthalate
SEPA	Scottish Environment Protection Agency

3 Background

Scotland's 2012 Waste (Scotland) regulations place requirements on all waste producers, except householders, to take all reasonable steps to present key recyclable wastes separately for collection. Business activity generates a volume of materials that are considered waste by the producer; consequently, businesses must decide whether to dispose of the material (to landfill or incineration) or recycle or reuse it. With a very large stakeholder base of over 350,000 businesses operating in Scotland (2020)[1], engaged in a wide variety of activities which impact directly on both type and tonnage of waste generated, including agriculture, forestry and fishing, manufacture of chemicals, plastics and pharmaceuticals, manufacture of food and beverage products, manufacture of wood products, mining and quarrying, power industry, waste management and the water industry, there are gaps in current understanding regarding commercial waste which requires additional insight.

Moreover, diversity of activity coupled with collections being operated by a range of different waste management companies means that data is patchy, and we do not have the same level of understanding of this waste stream as with, for example, household waste. SEPA estimates that the commercial and industrial ("C&I") recycling rates in Scotland are currently 53% (2018)[2], and C&I waste arisings have steadily reduced year on year with a 19.6% decrease between 2011 and 2018[3].

The changes in commercial waste management are significant and highlight the success of the waste industry to some extent in supporting their customers to recycle more and dispose of less. Significant changes between these periods include:

- Separately collected food waste more than doubling from 121,404 to 329,787 tonnes[4].
- Increases in separately collected glass of 85% and plastics of 40%[5].
- Mixed municipal waste falling by over 40% from 1.26 million to 721,797 tonnes[6].

Furthermore, industrial waste streams tend to show a relatively high degree of source segregation and are therefore easier to analyse.

However, with a recycling rate of 53% it is evident that a significant proportion of C&I waste is sent for disposal but it is not clear how much of this could potentially be recycled. Recycling performance in the business and commercial sector is not well understood internationally. There are few comparators for recycling rates and where they exist different methodologies have been used. This is due to several factors including the co-collection of household and commercial materials and the need to make assumptions on the split of the material collected and end-destination.

It is estimated that in Scotland 700,000 tonnes of commercial residual municipal waste (i.e., commercial residual waste that

[1]Businesses in Scotland: 2020 (https://www.gov.scot/publications/businesses-in-scotland-2020/)
[2]Technical Annex: Delivering Scotland's circular economy: A Route Map to 2025 and beyond (https://www.gov.scot/publications/technical-annex-delivering-scotlands-circular-economy-route-map-2025-beyond/)
[3]SEPA Business Waste Data (https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/business-waste-data/)
[4]SEPA Business Waste Data (https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/business-waste-data/)
[5]SEPA Business Waste Data (https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/business-waste-data/)
[6]SEPA Business Waste Data (https://www.sepa.org.uk/environment/waste/waste-data/waste-data-reporting/business-waste-data/)

is household-like)[7] is produced per year, but there is no robust compositional data of this waste to better understand in detail the proportion of its constituents. Given the similarity of this type of waste to household waste and assuming a similar composition to residual household waste, 60% of this material could be readily recycled using existing services; as much as 420,000 tonnes. The significant tonnage combined with the source of the material merits further investigation to establish the potential opportunity to divert waste away from residual collection. Better understanding of the composition of commercial waste streams will provide essential insights to as to how we can maximise prevention, reuse and recycling.

Delivering Scotland's circular economy: A Route Map to 2025 and beyond ("Route Map")[8] has proposed carrying out a national compositional study of residual waste from commercial premises by 2024, in order to identify priority materials, products and sectors for waste prevention and recycling interventions. This would be followed by a rolling assessment of residual commercial waste from 2025 so that changes over time can be assessed and the impacts of interventions evaluated. It may then be possible to combine the composition sampling indicating the relative proportions of the constituents of the residual waste with national tonnages to produce national estimates of the tonnage of different materials within residual commercial waste.

As a preliminary step, Zero Waste Scotland was asked by Scottish Government to conduct an initial survey of collectors of commercial waste in Scotland (both private waste management companies and local authorities) to identify what datasets those organisations hold in regard to commercial waste composition and tonnages and whether those datasets were of sufficient quality to form part of the national compositional study or support the calculation of a national estimate.

[7]Municipal waste is defined in the EU Waste Framework Directive as: (a) mixed waste and separately collected waste from households, including paper and cardboard, glass, metals, plastics, bio-waste, wood, textiles, packaging, waste electrical and electronic equipment, waste batteries and accumulators, and bulky waste, including mattresses and furniture; (b) mixed waste and separately collected waste from other sources, where such waste is similar in nature and composition to waste from households;
Municipal waste does not include waste from production, agriculture, forestry, fishing, septic tanks and sewage network and treatment, including sewage sludge, end-of-life vehicles or construction and demolition waste
[8]https://www.gov.scot/publications/consultation-delivering-scotlands-circular-economy-route-map-2025-beyond/

4 Aim

To better understand what data waste management companies and local authorities collect in relation to commercial waste with a specific focus on whether there are existing datasets covering:

a) the composition of residual waste from commercial premises.

b) the composition of dry mixed recycling ("DMR") from commercial premises to a finer granularity than the MRF CoP.

c) annual tonnages of residual and DMR from commercial premises.

5 Method

A qualitative research approach was employed given the exploratory nature of the research questions[9].

Beginning in June 2022, 25 waste management companies and three local authorities were identified as performing waste collections from commercial premises in Scotland. They were all approached to take part in an interview to discuss the waste data they collect. Six waste management companies and two local authorities, who are well-established providers in the sector, responded positively and agreed to be interviewed, one company advised that they did not run commercial collections in Scotland and the remaining organisations did not respond. The intention was to speak with a sample of organisations that included larger private companies with a UK-wide presence, smaller private companies with Scottish focussed operations, and local authorities. Of the eight organisations interviewed three were UK-wide, three had a Scottish focus, and 2 were local authorities (further details in Table 1 below).

Table 1: Description of respondents within sample

Respondent	Business Size	Area served within UK
R1	SME	Scotland
R2	Large	UK
R3	SME	Scotland
R4	Large	UK
R5	n/a	Local Authority
R6	n/a	Local Authority
R7	SME	Scotland
R8	Large	UK

[9]Bryman, A., 2016. Social research methods. Oxford university press.

Semi-structured interview schedules were prepared with an emphasis towards collecting information about the composition analysis that organisations were carrying out (see Appendix 2 for full schedule). This approach enabled flexibility in the data collected and new themes were identified regarding the contractor's attitudes to collecting data. Interviews were conducted by Zero Waste Scotland researchers using Microsoft Teams between June & August 2022 with collectors of commercial waste in Scotland. The interviews were split into sections on residual waste and DMR. The themes covered in both sections were the same:

- Is compositional analysis is performed?
- If it is performed, then further details sought about the analysis (e.g., drivers, frequency, process).
- If it is not performed, then further detail sought about why that is.

There were also questions to gain a better understanding of the collector's attitudes to data collection and the value of data to their business/service. Interviews lasted approximately 45 minutes and were summarised as notes. The notes of all interviews were collated, tabulated, and thematic analysis was undertaken. Findings are reported in the following section.

6 Findings

The study found that no detailed compositional analysis of residual commercial waste was being carried out by commercial waste collectors. Regarding DMR, all required MRF CoP sampling (see Appendix 1) was taking place, but no commercial waste collector sampled to a greater level of detail than that. Tonnage data for both residual waste and DMR was being collected and technology allowing bins to be weighed at the time of collection was resulting in rich data sets for some companies.

6.1 Composition

6.1.1 Residual Waste

Three out of eight respondents (R1, R3 & R4) advised that they carried out some compositional analysis of residual waste. Subsequent questioning clarified that such analysis was only conducted following a customer request, at the start or review of a contract, on identification of a service issue, or to support business improvement / new investment and consequently took place at sporadic and irregular intervals. In the cases where analysis was carried out, high-level categories were used such as those used in sampling for the MRF CoP (see Appendix 1) rather than the more detailed categorisations typically used in compositional analysis (e.g., HDPE drinks bottles, PET drinks bottles, plastic film packaging, non-packaging plastic film, etc...). Where the residual waste was destined for incineration then all respondents advised that calorific value and/or loss of ignition testing was performed (if not by the waste collector, then by the receiving plant).

6.1.2 Dry Mixed Recycling

Five respondents (R2, R3, R4, R5 & R8) reported that they carried out composition analysis to the standard set out in the MRF CoP. Of those who did not, one respondent (R1) did not sort DMR as it was passed to a contractor for processing. A further respondent's (R7) DMR tonnages were below that that required MRF CoP analysis to be undertaken. Finally, R6's DMR from commercial premises was mixed with household waste before being sent to a MRF where the combined waste was analysed to MRF CoP standard.

6.2 Annual Tonnages

6.2.1 Residual Waste & Dry Mixed Recycling

The processes and facilities for collecting tonnage data were the same for both residual and DMR for all respondents.

Seven of eight respondents confirmed that they collected annual total tonnages of residual waste and DMR from commercial premises (all except R8 who was unable to confirm). Of those who did, four respondents (R2, R3, R4 & R7) did this at the point of collection using vehicles with the ability to weigh each bin as it is emptied ("on-board weighing") and were therefore creating a detailed dataset at customer level over time. Two respondents (R1 & R6) utilised weighbridges therefore creating much coarser datasets at vehicle level. The remaining positive respondent (R5) advised that their data was based on standard weights and the collection schedule. All the respondents operating on-board weighing indicated they would be willing to share their data with Zero Waste Scotland (subject to appropriate confidentiality measures).

6.3 Attitudes to Data

Apart from one notable exception (R2), the overall sense from the remaining seven organisations interviewed was that data collection was a cost to be minimised rather than an opportunity to learn more and consequently, develop and improve their business and service. Regarding composition, nothing more than the regulatory minimum was being undertaken. With regards to weight data half of the sample had invested in on-board weighing which provides a detailed dataset.

One UK-wide company with on-board weighing (R2) does now actively seek to improve its tonnage dataset and sees its detailed bin level time series data as a route to better performance through the analysis of variances and trends. This company collected and stored their data for several years before realising the value of it during the volatile business conditions caused by the lockdowns of the Covid pandemic.

7 Conclusion

Within the Route Map consultation document, it is indicated that the clearest opportunity for Commercial & Industrial waste to further contribute to Scottish Government's 'all waste' recycling target is in the segregation of municipal-type commercial wastes. Recycling performance in this sector is poorly understood internationally. Consequently, carrying out a national Scottish compositional study of residual waste from commercial premises by 2024, in order to identify priority materials, products and sectors for waste prevention and recycling interventions, has been proposed. Therefore, this exploratory study of collectors of commercial waste in Scotland sought to identify what datasets the collecting organisations hold in regard to commercial waste (composition and tonnages) and whether those datasets are of sufficient quality to form part of the national compositional study and a subsequent national tonnage estimate.

The study found that commercial waste collectors did not conduct compositional analysis of residual waste as part of their standard operations. Any compositional analysis that was carried out was sporadic in nature and was undertaken in response to a distinct one-off driver (e.g., customer request, investment decision). Compositional analysis of dry mixed recycling was only performed to the minimum regulatory requirement resulting in the reporting of high-level categories (e.g., wood, plastic) which does not provide the granularity required by a compositional analysis.

The outlook on overall tonnage data is more promising as seven of eight respondents confirmed that they reported annual tonnages for both residual and dry mixed recycling and four of those operated on-board weighing allowing them to create a rich dataset at the bin and customer level over time.

In terms of attitudes to data, the study finds that waste collectors, save for one notable exception, view data collection as an externally driven requirement and a cost to be minimised or in some cases a benefit whose cost could not be justified. The investments in on-board weighing seem more likely to have been driven by process improvements to reduce cost (e.g., billing, customer management) rather than a desire to engage in data analysis to drive business improvements through a better understanding of the marketplace they operate in. The notable exception was a company operating UK-wide, but even here the wider benefits of data analysis only became apparent to them during the business disruptions that occurred during the Covid lockdown periods (after they had been collecting data for several years).

In summary, the main driver for this scoping survey was to understand whether there was existing data held by operators collecting from commercial premises that could assist in an ongoing study of commercial waste composition. It is clear that no such composition dataset exists and so any study of commercial waste composition would have to start from scratch. With regard to whether collector-held tonnage data could be used in combination with compositional analysis to inform a national estimate, this study suggests that, whilst the detail of the data is variable, there may be a sufficient amount of good quality data to support scaling to a national estimate once a compositional study has been performed. The datasets created by on-board weighing, whilst not universal in coverage, may well be significant enough to generate a reasonably caveated estimate at Scottish level.

8 Appendix 1

8.1 Materials Recovery Facilities Code of Practice ("MRF CoP") Sampling Requirements

Materials Recovery Facilities (MRFs) are facilities where mixed dry recyclable waste is treated in order to separate that waste into separate dry waste streams of material for recycling. Companies that operate a MRF and expect it to receive over 1,000 tonnes of dry recyclable waste per year are required to sample both mixed waste received (by supplier) and their sorted output recyclate streams under the MRF Code of Practice ("MRF CoP") and report the data to SEPA. This reporting requirement covers broad categorisations (e.g., metal, plastic, cardboard, etc...), but does not capture data at the more detailed category levels typically used in composition analysis (e.g., HDPE drinks bottles, PET drinks bottles, plastic film packaging, non-packaging plastic film, etc...). Further details on the sampling required by the MRF CoP can be found in Appendix 1. Therefore, the lack of detailed data or analysis of commercial waste at a Scottish level means it is unknown how much recyclable material is contained in residual commercial waste.

Sampling must be carried out if the MRF expects to receive over 1,000 tonnes of dry recyclable waste per year

8.1.1 Input Sampling Requirements

- Sampling must be performed per waste supplier.
- A sample must be taken for every 125 tonnes of waste received.
- Samples must be of a standard size and be no less than 60kg in weight.
- A sample can consist of multiple parts, but each part must be at least 20kg in weight and they must be collected immediately after one another.

8.1.2 Output Sampling Requirements

As with input sampling samples should be of a standard size.

Table 2: Output Sampling Requirements for the MRF CoP

Material	Frequency	Minimum weight of sample	Sampling in parts allowed?	Minimum weight of sample part
Glass	Every 50 tonnes	10kg	No	n/a
Paper	Every 60 tonnes	50kg	Yes	20kg
Cardboard	Every 60 tonnes	50kg	Yes	20kg
Metal	Every 20 tonnes	10kg	No	n/a
Plastic	Every 15 tonnes	20kg	No	n/a

9 Appendix 2

9.1 Interview Script

Company

Miscellaneous

Residual Waste:

Does your organisation carry out composition analysis of non-recyclable (residual) waste collected specifically from commercial premises?

If yes:

Is the waste sampled prior to any sorting/treatment?

How often is waste sampled?
e.g once per week/month etc, or using a defined weight or volume?

How often do you repeat sampling?
e.g. following regular schedule – monthly, annually etc; or for specific intel – i.e. ahead of investments.

How is the sample selected?
e.g. ind company, by business type, round by round, at random. Do you repeat?

What material categories do you sort the waste to?
e.g. share/describe our HH WCA list.

Does your organisation follow a defined sampling methodology?
e.g. consistent sampling process - standardisation across studies/sites.

Can you describe the process and controls in place?
e.g. collection, sort site, data recording.

Would you be happy to share (a blank example) template of their sampling categories used?

Do you routinely gather data on the total annual tonnages of residual waste collected specifically from commercial premises?

Would you be happy to share your data in the future?
(anonymised format, under confidentiality agreement)

If no:

Do you use any other process or data to understand waste composition?

Do you recognise benefits in this type of data?

What would encourage you to adopt regular sampling into your operations?

Dry Recycling:

Does your organisation carry out composition analysis of dry mixed recycling collected specifically from commercial premises?

If yes:

Is the waste sampled prior to any sorting/treatment? What further analysis undertaken post treatment?

How often is waste sampled?
e.g once per week/month etc, or using a defined weight or volume?

How often do you repeat sampling?
e.g. following regular schedule – monthly, annually etc; or for specific intel – i.e. ahead of investments.

How is the sample selected?
e.g. ind company/commerce activity, round by round?

What material categories do you sort the waste to?
e.g to the level specified in the CoP, or a more detailed level of categorisation? Share/describe our HH WCA list.

Does your organisation follow a defined sampling methodology?
e.g. consistent sampling process - standardisation across studies/sites.

Can you describe the process and controls in place?
e.g. collection, sort site, data recording.

Would you be happy to share (a blank example) template of their sampling categories used?

Do you routinely gather data on the total annual tonnages of residual waste collected specifically from commercial premises?

Would you be happy to share your data in the future?
(anonymised format, under confidentiality agreement)

If no:

Do you use any other process or data to understand recyclate composition?

Do you recognise benefits in this type of data?

What would encourage you to adopt regular sampling into your operations?

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