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Unit E-2: Environmental statistics and accounts; sustainable development

Guidance for the compilation and reporting of data on packaging and packaging waste according to Decision 2005/270/EC

(Note: The Commission Delegated Decision on average loss rates is currently being finalised, future versions of this guidance will contain further details on the published legal act.)

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Contents

- 1 Introduction..... 4
- 2 Scope and definitions 5
- 3 Due date for data submission and application of the stricter compilation rules..... 6
- 4 Guidance for the completion of the reporting tables..... 9
 - 4.1 Completing Table 1 on generation and recycling of packaging waste 9
 - 4.1.1 Waste generation11
 - 4.1.2 Recycling13
 - 4.1.3 Repair of wooden packaging14
 - 4.1.4 Recovery15
 - 4.2 Completing Table 1a on reporting attainment of the old recycling targets16
 - 4.3 Completing Table 2 for adjusting the recycling targets based on 3-yearly average share of reusable sales packaging.....17
 - 4.4 Completing Table 3 on reusable packaging19
- 5 Guidance for the completion of the quality report.....22
 - 5.1 Packaging waste generated and recycled.....22
 - 5.2 Composite packaging22
 - 5.3 Variation from the data submitted for the previous data year23
- 6 Good practice examples for collecting packaging placed on the market data23
- 7 Good practice examples for collecting packaging waste recycling data24
- Appendices25
 - Appendix 1 Reference manual: Good practice examples for collecting packaging placed on the market data.....25
 - A.1.1 Collecting packaging PoM data.....25
 - A.1.1.1 Data sources and data collection methods25
 - A.1.1.2 How to address data collection issues26
 - A.1.2 Calculating packaging PoM28
 - A.1.2.1 Identifying inaccurate data28
 - A.1.2.2 How to address inaccurate data.....30
 - A.1.3 Data validation34
 - A.1.4 Reporting of data from waste analysis34
 - Appendix 2 Reference manual: Reporting of data on packaging waste recycling37
 - A.2.1 Difference in reporting rules37
 - A.2.2 Correctly identifying the Calculation Points40

A.2.2.1	Plastics packaging	40
A.2.2.2	Paper/ board packaging.....	43
A.2.2.3	Glass packaging	43
A.2.2.4	Metal packaging	44
A.2.2.5	Wooden packaging	46
A.2.2.6	Fabric/ textile packaging	47
A.2.2.7	Composites packaging	47
A.2.3	Allowable measurement methods	47
A.2.4	Obtaining data at the Measurement Points	50
A.2.5	Recycling rate examples.....	53
A.2.5.1	Metals from IBA	54
A.2.5.2	Repair of wooden packaging	54
A.2.6	Metals from incinerator bottom ash (IBA)	55
A.2.6.1	Correctly identifying the Calculation Point.....	55
A.2.6.2	Allowable measurement methods and obtaining data at the Measurement Points	56
A.2.6.3	Losses within the incineration process.....	58
A.2.7	Identifying the packaging proportion in multi-stream treatment plants	61
A.2.7.1	Sampling standards and methodologies	64
A.2.8	Measuring the amounts of packaging composted	66
A.2.8.1	Processes where recycling and energy recovery of biowaste are combined	68
A.2.9	Guidance on proving compliance with requirement to ensure all waste outside the EU is treated under broadly equivalent conditions	68
A.2.9.1	A definition of “broadly equivalent conditions”	69
A.2.9.2	Guidance on establishing whether broadly equivalent conditions are in place	71
A.2.9.3	Guidance on common statistical issues	73
A.2.9.4	Information sharing	74
A.2.10	Applying the average loss methodology (to be completed once delegated act is finalised).....	74
A.2.10.1	Application of the average loss rate (ALR).....	74
A.2.10.2	Approaches to calculating ALR	76
A.2.10.3	Tracking ALR through the recycling chain.....	77
A.2.10.4	Data collection and verification	78

Appendix 3	List of relevant documents	79
Appendix 4	Suggestion for detailed questionnaire for reusable packaging to be sent by the Member States to the economic operators in the sector.	80

1 Introduction

The purpose of this document is to provide guidance to Member States on the reporting of packaging waste data, pursuant to the requirements laid down in Commission Decision 2005/270/EC as amended by Implementing Decision (EU) 2019/665 establishing the formats relating to the database system pursuant to European Parliament and Council Directive 94/62/EC on packaging and packaging waste [referred to in this document as Decision 2005/270].¹ In particular, this guidance highlights important considerations relating to the calculation of packaging waste generated and recycled. Guidance is also provided to support Member States in the completion of the quality check report (hereafter referred to as the 'quality report').

In March and April 2020, the Waste Statistics Working Group and the Committee on waste established under Article 39 of Directive 2008/98/EC – Packaging and Packaging Waste Directive – were consulted on a draft version of this guidance document and the accompanying Excel file with the questionnaire and quality report.

Following this consultation, the main changes introduced to the guidance document were:

- Legal clarification on new/old rules wording has replaced the previous text.
- Use of Table 1 was clarified. Table 1 is the new format for reporting on packaging and packaging waste. It must be used in all cases. Table 1a is only to be used if Table 1 contains data according to the new rules but a Member State wants to prove compliance with the old targets until 2025 (inclusive) using the old rules.
- It was clarified that if for the years 2018 and 2019 only data according to the old rules can be provided, Table 1 must still be used. In this case, provision of separate data for aluminium and steel packaging would be voluntary (in line with the old rules).
- Guidance on the calculation points for all packaging materials has been included.
- Reporting methodology for energy recovery: clarification was added to support reporting of data by Member States according to the “pure, clean and dry” approach for all the data in the table to be of a consistent methodology.
- The section on cross-checking of waste generation data (section 4.1.1.3) was amended to reflect the principle that the comparison should be done annually, but waste analyses used for such comparisons do not have to be done on an annual basis; those can be done e.g. every 5 years.
- Further detail regarding composite packaging derogation (e.g. <5%) were provided, and examples given.
- Broadly equivalent conditions: guidance section to help Member States on reporting evidence needed to meet the requirements was added.
- Clarification given to ensure the definition of the calculation point is clear and that material rejected after initial quality checking procedures in final recycling plants, would not be counted as recycling.

¹ For the consolidated version see <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583325017136&uri=CELEX:02005D0270-20190426>

- Clarification that biodegradable plastics placed on the market would be included in the total plastics generated figure.
- Metals / wooded pallets reporting notes and validation rules: Metals from IBA can be reported by Member States and included in the recycling rate by Member States, rules for reporting in Table 1 clarified and all text amended. Examples of filling in the table and recycling rate calculations added for IBA and repair of wooden pallets in the Appendix.
- Clarifications and amends were made to Appendix 4 (guidance for reporting on reusable packaging).

In addition, the document was restructured and further content moved to appendix. New appendix style headers were added to document for readability.

The main changes introduced to the Excel questionnaire (including quality report) were:

- Table 1. Note on the amounts reported in Waste generation was changed; it shall exclude the amount of wooden packaging repaired and of metals from IBA). For repair of wooden pallets, the Commission will calculate the adjusted recycling rates separately.
- The title of the table 1a was modified to indicate that this table is to be filled in only by the Member State that wants to prove compliance with the old targets until 2025 (inclusive) using the old rules
- Metadata: questions facilitating the calculation of the targets; on derogations and back calculations.
- Quality report: split over multiple sheets to add readability
- Voluntary question added into QR asking for split of Energy Recovery (R1) column between cement kilns / R1 incinerators.
- Quality report intro: note added to explain rationale and importance of slight variations in structure from the Annex of Decision 2005/270. Changes are in the spirit of the act and should help facilitate the provision of data though making the structure of the required data clearer.

This guidance document will be further improved and expanded as more experience becomes available with data collection and reporting. For revised versions of this guidance document, please check <https://ec.europa.eu/eurostat/web/waste/methodology>.

2 Scope and definitions

The reporting obligation is based on the implementing decisions for European Council Directive 94/62/EC, as described in the introduction.

Packaging is defined in Article 3(1) of European Council Directive 94/62/EC on packaging and packaging waste² as “all products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to

² For the consolidated version see <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:01994L0062-20180704&from=EN>

processed goods, from the producer to the user or the consumer. ‘Non-returnable’ items used for the same purposes shall also be considered to constitute packaging.” Packaging therefore consists of sales packaging or primary packaging, grouped packaging or secondary packaging, and transport packaging or tertiary packaging (as set out in Article 3).

The provision further clarifies that items as per the above definition shall constitute packaging “unless the item is an integral part of a product and it is necessary to contain, support or preserve that product throughout its lifetime and all elements are intended to be used, consumed or disposed of together”, including “items designed and intended to be filled at the point of sale and ‘disposable’ items sold, filled or designed and intended to be filled at the point of sale” as well as “packaging components and ancillary elements integrated into packaging”.

The Directive further defines packaging waste in Article 3(2) as “any packaging or packaging material covered by the definition of waste laid down in Article 3 of Directive 2008/98/EC, excluding production residues”.

3 Due date for data submission and application of the stricter compilation rules

Directive 94/62/EC on packaging and packaging waste³ (hereafter: the Directive), as last amended by Directive 2018/852⁴, sets out new recycling targets (Article 6(1), points (f) to (i)) and new calculation rules to account for their attainment. These new and clearer calculation rules are set, in particular, in provisions of Article 6a of the Directive as well as in new Articles 6a to 6d and Article 6f of Commission Decision 2005/270⁵ as last amended by Commission Implementing Decision 2019/665⁶).

However, the old targets, as set out in Article 6(1), points (a) to (e), of Directive 94/62, are still in force. The old calculation rules for these targets are described in particular in Articles 3 to 6 of Commission Decision 2005/270 as last amended.

Member States must fully **apply the new calculation rules from the reference year 2020 onwards, for which data are to be reported at the latest by 30 June 2022**. This follows from the new provision of **Article 12(3a) of the Directive**, which states:

“3a. Member States shall report the data concerning the implementation of points (a) to (i) of Article 6(1) and data on reusable packaging, for each calendar year to the Commission.

They shall report the data electronically within 18 months of the end of the reporting year for which the data are collected. The data shall be reported

³ OJ L 365, 31.12.1994, p. 10

⁴ OJ L 150, 14.6.2018, p. 141–154

⁵ OJ L 86, 5.4.2005, p. 6–12

⁶ OJ L 112, 26.4.2019, p. 26–46

in the format established by the Commission on the basis of Annex III in accordance with paragraph 3d of this Article.

The first reporting period concerning the targets set out in points (f) to (i) of Article 6(1) and data on reusable packaging shall start in the first full calendar year after the adoption of the implementing act that establishes the format for reporting, in accordance with paragraph 3d of this Article, and shall cover the data for that reporting period. “

The implementing act that establishes the format for reporting was adopted on 17 April 2019 (Commission Implementing Decision (EU) 2019/665 of 17 April 2019). Therefore, the first reference year for reporting (i.e. the first reporting period) on the new targets will be year 2020. **Member States shall report the data electronically within 18 months of the end of that reporting year for which the data will be collected**, that is, at the latest by 30 June 2022.

In addition, Article 12(3b) of the Directive states:

“3b. The data reported by Member States in accordance with this Article shall be accompanied by a quality check report and a report on the measures taken pursuant to Article 6a(3) and (8), including detailed information about the average loss rates where applicable.”

Member States must thus accompany their report for the reference year 2018 – the report which is due by 30 June 2020 – by a quality check report as set out in Commission Decision 2005/270/EC as amended by the Commission Implementing Decision 2019/665.

Member States must continue showing compliance with the old targets as set out in Article 6(1), points (a) to (e), of the Directive until the moment that they have to show compliance with the new targets as laid down in Article 6(1) points (f) and (g) on 31 December 2025.

While not expressly required⁷, Member States are encouraged to apply the new calculation rules for reporting on both old and new targets already now (i.e. in 2020 for the reporting period 2018) for reasons of administrative efficiency and transparency and for communication reasons. However, even after 2022, when reporting according to the new calculation rules for the new targets becomes mandatory, Member States can choose to report the attainment of the old targets based upon the old calculation rules. Any Member State that wishes to continue reporting on the attainment of the old targets based on the old rules must fill in a separate table. That means completing Table 1a in addition to Table 1. Those that wish to report attainment of the old and the new recycling targets based on the new calculation rules, only need to complete Table 1.

This follows from the following legal provisions:

⁷ Article 6e of Commission Decision 2005/270/EC as amended by the Commission Implementing Decision 2019/665 provides for the possibility to apply these new calculation rules.

- Article 6e of Commission Decision 2005/270/EC, as last amended by Commission Implementing Decision 2019/665:

“For the purposes of calculating and verifying attainment of the targets set in points (a) to (e) of Article 6(1) of Directive 94/62/EC [i.e. the old targets], Member States may apply the calculation rules laid down in Articles 6a to 6d” [i.e. the new calculation rules].”

- Article 9(5) of Commission Decision 2005/270/EC, as last amended by Commission Implementing Decision 2019/665:

“5. Where, for the purposes of verifying compliance with the targets set in points (a) to (e) of Article 6(1) of Directive 94/62/EC [i.e. the old targets], a Member State does not apply the calculation rules laid down in Articles 6a to 6d [i.e. a Member State decides not to use the new calculation rules], that Member State shall submit the data for verifying compliance with the targets set in points (a) to (e) of Article 6(1) of Directive 94/62/EC separately by using the format laid down in Table 1 of the Annex.”

For that purpose, Eurostat offers a simplified Table 1a in the questionnaire (see Section 4.2).

However, while Member States can choose the calculation rules under which they will report for the “old” targets, they must - already as from 2020 onwards (i.e. for the reporting year 2018 with deadline 30 June 2020), use the **new format** for reporting on packaging and packaging waste as set out in Commission Decision 2005/270 as last amended by Commission Implementing Decision 2019/665.

This follows from Article 12(3d) of the Directive, which states:

“By 31 March 2019, the Commission shall adopt implementing acts laying down the format for reporting data in accordance with paragraph 3a of this Article. For the purposes of reporting on the implementation of points (a) to (e) of Article 6(1) of this Directive, Member States shall use the format established in Commission Decision 2005/270/EC.”

It should be noted that Commission Implementing Decision 2019/665 amended Commission Decision 2005/270/EC and replaced the “old” format for reporting in Commission Decision 2005/270/EC with a new one. Therefore, “*the format established in Commission Decision 2005/270/EC*” that should be used for the reporting on Article 6(1) points (a) to (i) is now the new reporting format as established by Commission Implementing Decision 2019/665.⁸

⁸ This was clarified also at the TAC meeting on 19 February 2019.

4 Guidance for the completion of the reporting tables

4.1 Completing Table 1 on generation and recycling of packaging waste

Table 1 of the questionnaire requires data on waste generation, recycling, repair of wooden packaging and recovery of packaging to be completed. An image of Table 1 can be found in Figure 4-1 below.

Below the table, the subsequent sections provide a summary of how to complete the table for each key component:

- Section 4.1.1 'Waste generation';
- Section 4.1.2 'Recycling';
- Section 4.1.3 'Repair of wooden packaging' and
- Section 4.1.4 'Recovery'.

Note, as indicated above, Table 1 is the new format for reporting on packaging and packaging waste. Table 1 must be used in all cases. Table 1a (below) is only to be used if Table 1 contains data according to the new rules but a Member State wants to prove compliance with the old targets until the reference year 2025 (and beyond)⁹ using the old rules. Member States are encouraged to use the methodology to report according the new rules for reference years 2018 and 2019 already. However, if this is not possible and only data according to the old rules can be provided for these two years, Table 1 must still be used for reporting. In this case, provision of separate data for aluminium and steel packaging would be voluntary (in line with the old rules). Also for reference years 2018 and 2019, the three different recycling columns should be filled in as best possible, but it might not be possible to fill all in as the split was not required under the old rules. Finally, when reporting in line with the old rules, the 'Energy Recovery (R1)' column shall include the R 1 recovery operations as mentioned in Annex II of the Waste Framework Directive 2008/98/EC as last amended.¹⁰

⁹ In accordance with Article 6(1a) of Directive 94/62/EC, Member States may postpone this deadline by up to five years under certain conditions.

¹⁰ For the consolidated version see <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02008L0098-20180705>

Figure 4-1: Table 1 – Generation and recycling of packaging waste

Unlock formulas		TABLE 1. Generation and recycling of packaging waste as established by Commission Decision 2005/270/EC as last amended by Commission Implementing Decision 2019/665⁽¹⁾ (in tonnes)																							
Country:																									
Reference year:		2018																							
Packaging waste material	Generation			Recycling <i>(The total weight of waste of each material type, at the relevant calculation points)</i>									Repair			Recovery									
	Waste generation ^(a)	Standard footnotes	Explanatory footnote	Recycling in the Member State	Standard footnotes	Explanatory footnote	Recycling in other Member States	Standard footnotes	Explanatory footnote	Recycling outside the EU	Standard footnotes	Explanatory footnote	Recycling (Total)	Standard footnotes	Explanatory footnote	Repair of wooden packaging	Standard footnotes	Explanatory footnote	Energy recovery ⁽²⁾ (R1)	Standard footnotes	Explanatory footnote	Other recovery ⁽³⁾	Standard footnotes	Explanatory footnote	
Plastic																									
Wood																									
Metal (total) ⁽⁵⁾																									
Ferrous metal																									
Aluminium																									
Ferrous metal from IBA ⁽⁶⁾																									
Aluminium from IBA ⁽⁷⁾																									
Glass																									
Paper and cardboard																									
Other																									
Total ⁽⁴⁾																									

Notes:

Cell shading:

White: Data provision is mandatory.
Light grey: The calculation of data is automatic. They can be edited after unlocking the cell with the button "Unlock formulas".
Light orange: Footnotes (only to be filled-in when relevant)
Black: Not applicable.
Light purple shaded boxes: reporting is mandatory only to Member States that include those amounts in the recycling rates. Member States that report on repair of wooden packaging shall not include these amounts in total recycling or in total waste generated or in any other white box! Instead, please indicate in the sheet Metadata if you wish to include the amounts in your recycling rates. The calculation of the adjusted recycling rates will be conducted by the Commission according to the method set out in the guidance document.

^(a) The amounts reported shall exclude the amount of wooden packaging repaired and of metals from IBA. For repair of wooden pallets, the Commission will calculate the adjusted recycling rates separately.

⁽¹⁾ Commission Decision 2005/270/EC establishing the formats relating to Directive 94/62/EC on packaging and packaging waste as last amended by Commission Implementing Decision 2019/665

⁽²⁾ This includes incineration with energy recovery and the reprocessing of waste to be used as fuel or other means to generate energy.

⁽³⁾ This excludes repair of wooden packaging, recycling and energy recovery and includes backfilling.

⁽⁴⁾ The 'Total' row should be a sum of all the amounts given in the separate rows within the table (except only one of either the 'Metal (total)' or 'Ferrous metal' and 'Aluminium' rows should be included, to ensure there is no double counting).

⁽⁵⁾ The 'Metal (total)' row should be equal to the sum of the 'Ferrous metal' and 'Aluminium' rows.

⁽⁶⁾ Ferrous metals recycled after their separation from incineration bottom ash shall be reported separately here and shall be included in the row for reporting ferrous metals.

⁽⁷⁾ Aluminium recycled after separation from incineration bottom ash shall be reported separately here and shall be included in the row for reporting aluminium.

4.1.1 Waste generation

The following points of guidance are additional to the instructions provided in the Excel template for reporting against Table 1 in Annex I of Decision 2005/270 (reporting on the recycling targets set in Article 6 of Directive 94/62/EC).

There are two main approaches to calculating packaging waste generated: based on packaging placed on the market (PoM), or based on waste analysis.

Clarification on composite packaging

Note that the following principle applies under both approaches. According to Article 6c(2) of Decision 2005/270 “composite packaging and other packaging composed of more than one material shall be calculated and reported per material contained in the packaging. Member States may derogate from this requirement where a given material constitutes an insignificant part of the packaging unit, and in no case more than 5 % of the total mass of the packaging unit.” Therefore, for the purposes of reporting waste generation data in this table, the amounts generated of each material should be reported under the respective packaging material category. Where the derogation is applied, the mass of each given material constituting less than 5% need not be calculated and reported separately, but rather, can be reported under the predominant material in that packaging unit by weight. The application of the derogation should be detailed in the Quality Report under question 3.1.5.

As an example, if a composite packaging unit had the following composition:

75% paperboard, 21% plastic, and 4% aluminium

Moreover, if the derogation would be applied, then the 4% aluminium would be assigned to the predominant material that is paperboard, so you would report the unit weight x 21% for weight of plastic and x 79% for paperboard.

If a product had two exactly equal ‘predominant materials’, e.g. 48% plastic, 48% paperboard and 4% aluminium, apportion the material <5% equally, so the weights of plastic and paperboard would be the unit weight x 50% in both cases.

It should be noted, however, that this allocation is a derogation not a requirement, and Member States should split out the materials in all cases if known. This would make the statistics more accurate.

Also, note that compostable or biodegradable plastics should be included in the total ‘Plastics’ figures, not ‘Other’.

4.1.1.1 Waste generation – waste analysis

Member States can use waste composition analysis to calculate packaging waste generated. Waste analysis provides information about the amounts and types of materials in a particular waste stream. The results give a breakdown of the total composition of waste, which has been sampled. An overview of the approach to waste analyses is given in Section A.1.4.

4.1.1.2 Waste generation – placed on the market

The data for waste generation should be gathered from relevant stakeholders in the country, such as extended producer responsibility (EPR) schemes that register packaging placed on the market for compliance purposes. If there are multiple schemes, data from all schemes must be gathered to ensure the amounts are not under-estimated. See Section 6 below for further guidance on data requirements relating to plastic packaging placed on the market. Data could also be obtained from other sources, e.g. based on production and import statistics and factors to estimate the amount of packaging associated to these product flows.

Where possible, estimates for correcting data that does not cover all packaging waste generated should be made. This should include corrections for e.g. underreporting of units that do report to an EPR scheme, for under coverage due to legally exempt units (de minimis), 'free riding', private imports or internet trade. These should be made and added to the total waste generation to provide an accurate figure (see Appendix 1 for further details). A description of the approach taken can be given as part of the responses to questions 3.1.2 and 3.1.3 of the quality report (see Section 5 for further details on completing the quality report).

4.1.1.3 Requirement to cross-check data on waste generation – Article 6f of 2005/270

According to Article 6f of Decision 2005/270, data shall be verified by appropriate measures, in particular:

'the amount of packaging waste generated shall be subject to verification and cross-checking, including by using data on the amount of packaging placed on the market, relevant data on waste and composition analyses of mixed municipal waste'

In essence, this requires using data from both of the approaches outlined above in sections 4.1.1.1 and 4.1.1.2 – please refer to the guidance therein. Therefore, both PoM data and data from waste analyses should be generated in each Member State for comparison and verification.

If PoM data is the primary method used, then waste analyses should be carried out at least once every 5 years in order to establish the type and proportion of packaging waste generated. This should be conducted at least once before the reporting of data for reference year 2025, when compliance with the new recycling targets is first to be proved. These factors, relating to the proportion of different types of packaging in certain types of waste, should be used for the annual cross-checks.

Through such cross-checking, Member States should identify, for each material, the gap between what is recorded as PoM and what is measured in waste. The likely reasons for this difference are the change in weight between PoM and waste due to differences in natural humidity, contamination, free-riders and the use of de-minimis reporting. For plastic packaging waste, if the proposed EU budgetary own resource is adopted in the course of 2020, these cross-checks between the amount of packaging PoM and the amount generated as waste will be required on an annual basis. Waste analyses would not have to be carried

out on an annual basis, but the periodically derived factors (see above) would be applied to different waste arisings in a given year.

Member States should ensure that all possible data inaccuracies and errors are corrected in order to narrow the gap between the two methods. Such inaccuracies are noted in sections 4.1 and 4.2, and above. A detailed explanation should be provided (in sections 3.1 and 3.3 of the Quality Report) to demonstrate the process of cross-checking, and, if there is a remaining gap between waste analysis and PoM data, to clearly explain the reasons why. Improvements in the two methods need to be identified and implemented (e.g. improved methods to correct for under coverage) so that the differences get reduced to plausible amounts.

4.1.2 Recycling

The total weight of waste recycled must be equal to the weight of waste at the Calculation Points given in Annex II of Decision 2005/270 and be obtained from relevant stakeholders in the value chain as necessary. Data should also be split into three columns depending on the location of the recycling activities (recycling in the Member State, recycling in other Member States and recycling outside the EU).

Further information on the relevance of the Calculation Points to the location of recycling activities in Table 1 is provided in the Appendix 2 at the end of this guidance. Some key considerations and best practice in identifying Calculation Points, the associated measurement methods that are allowable, and some options for obtaining data at each of the Measurement Points are also provided in Appendix 2.

According to Article 6c(2) of Decision 2005/270 “composite packaging and other packaging composed of more than one material shall be calculated and reported per material contained in the packaging. Member States may derogate from this requirement where a given material constitutes an insignificant part of the packaging unit, and in no case more than 5 % of the total mass of the packaging unit.” Therefore, for the purposes of reporting recycling data in this table, the amounts recycled of each material should be reported under the respective packaging material category (unless the derogation is being appropriately applied). Where the derogation is applied, the mass of each given material constituting less than 5% need not be calculated and reported separately, but rather, can be reported under the predominant material in that packaging unit by weight. The application of the derogation should be detailed in the Quality Report under question 3.2.4.

The “Other packaging” row should only be used if the packaging material is another material category not listed (e.g. fabric etc.). Composite packaging should be reported as per the point above, and not included in the “Other packaging” row.

The 'Metal (total)' row should be equal to the sum of the 'Ferrous metal' and 'Aluminium' rows (as per footnote 5 to Table 1 in the Excel file). Ferrous metal and/or aluminium separated from incinerator bottom ash (IBA) shall be reported in the separate rows and shall be included in the 'Ferrous metal' and/or 'Aluminium' rows (as per footnotes 6 and 7)

The ‘Total’ row should be a sum of all the amounts given in the separate rows within the table (with the exception of the “Ferrous metal from IBA” and “Aluminium from IBA” rows, to

ensure there is no double counting). An example calculation is given in Section A.2.5.1 of the Appendix.

Member States can include ferrous metal or aluminium from incineration bottom ash (IBA) in the recycled amounts. Further guidance on how to comply with the methodological requirements is set out in Section A.2.5 of the Appendix.

The recycling quantities should be reported at the same natural humidity rate as the packaging when it is placed on the market, and should not include non-packaging material or contamination of the packaging from the product, according to Article 6c (e) and (f) of Decision 2005/270.

Under Article 11a of the revised Waste Framework Directive and Article 6a of Directive 94/62/EC, Member States may apply Average Loss Rates (ALR) when measuring the amount of packaging recycled. Article 6a of amending Decision 2018/852, states the following:

“average loss rates for sorted waste for various waste types and waste management practices respectively. Average loss rates shall only be used in cases where reliable data cannot be otherwise obtained and shall be calculated on the basis of the calculation rules established in the delegated act adopted pursuant to Article 11a(10) of Directive 2008/98/EC.”

This exemption rule allows Member States to report waste recycled at an early stage in the recycling process by calculating the losses, which will occur after first sorting operations. ALR should only be used when no other reliable data on the weight of waste at Calculation Point are available, such as in the context of shipment and export of waste.

If ALR is applied, a full description of the approach used to calculate ALR must be provided in section 3.2.5 of the Quality Report. This should include the detail of the sorted packaging waste to which ALRs are applied, types of sorting plants to which different ALRs apply, the methodological approach to calculating ALRs at such point(s), including the statistical accuracy of any surveys used, or the nature of any technical specifications. See Section A.2.10 of the Appendix for further guidance on ALR.

Where waste is exported from the Union for recycling, it should only be accounted for where there is sound evidence that treatment was carried out under broadly equivalent conditions to those required under EU environmental law. Section A.2.9 of the Appendix provides guidance on how such evidence should be obtained. Details regarding this evidence should be reported under question 4.1.3 of the Quality Report.

4.1.3 Repair of wooden packaging

According to Article 6b(1) of Decision 2005/270:

“Where a Member State takes into account the amounts of wooden packaging that is repaired for reuse in the calculation of the targets laid down in point (f), point (g)(ii), point (h) and point (i)(ii) of Article 6(1) of Directive 94/62/EC, the amount of wooden packaging that is repaired for

reuse shall be added to both the generated packaging waste and the recycled packaging waste.”

If repair of wooden packaging is to be included in the table, this must be included only in the respective purple shaded cells, in the Wood and Total rows under the 'Repair' columns. The amount of repaired wooden packaging shall not be added to the totals under the Waste generation and recycling columns in the table itself. This will be done automatically by Eurostat when calculating the overall recycling rates.

The reported amount will then be considered for calculating the recycling rate by including it in the numerator and the denominator:

$$\text{Recycling rate} = (\text{recycling} + \text{repair}) / (\text{waste generated} + \text{repair})$$

The data for waste generation shall be reported excluding repair of wooden pallets in all cases. An example of how to fill out the table is given in Section A.2.5.2 of the Appendix.

4.1.4 Recovery

Regarding **energy recovery**, please fill in the table with the total weight of waste of each material type, where waste of that type has actually been subject to energy recovery. As highlighted in footnote 2 to the table, only data relating to the amount of waste treated at R1 recovery operations should be included in this column.

Regarding **other recovery**, please fill in the table with the total weight of waste of each material type, where waste of that type has actually been subject to other recovery. As highlighted in footnote 3 to the table, only recovery operations other than Energy Recovery (R1) and Recycling (which includes composting / digestion of biowastes as per the conditions set out in Article 6(a)(4) of Directive 94/62/EC) should be included in this column.

In addition, correction factors should also be applied to ensure the weight of packaging recovered is equivalent to that placed on the market. Correction factors relating to recovery are described under Article 5 of Decision 2005/270. The rules for recycling are somewhat more precise (see Article 6c (e) and (f) of Decision 2005/270). However, to ensure consistency of reported data within the reporting table, recovery data should be adjusted in the same manner as recycling data to ensure all data relate to the same approach for reporting clean and dry packaging only. If there is any deviation from reporting according to a consistent methodology, this should be clearly outlined in the Quality Report under question 3.2.6.

Note, the clean and dry concept means the principle not the practical reality, indeed most material going to recovery plants will not be clean and dry, hence why it has to be corrected for to ensure it approximates the clean and dry amounts that would have been PoM. In addition, the types of recovery facility used will not affect the composition of the input material; correction factors still need to be applied even if the plant is R1 compliant.

4.2 Completing Table 1a on reporting attainment of the old recycling targets

As discussed in Section 3, any Member States who wish to continue to report attainment of the old recycling targets based on the old rules until 2025 (and beyond) can complete Table 1a in the reporting template in addition to Table 1. Member States that also wish to do so should complete the packaging waste generated and packaging waste recycled columns in Table 1a (a figure of this table is provided in Figure 4-2 below).

The main differences in the old and new reporting rules, with respect to the attainment of the recycling targets, are summarised in Appendix A.2.1.

Regarding aspects other than recycling rates under the old targets as set out in Article 6(1) of Directive 94/62/EC, filling in Table 1 will be sufficient.

Figure 4-2: Table 1a - Reporting attainment of old targets based on old calculation rules

TABLE 1a. Generation and recycling of packaging waste calculated according to the old rules as set out in Articles 3, 4 and 5 of Decision 2005/270/EC ⁽¹⁾ for proving compliance with the old recycling targets in Article 6 (1) of Directive 94/62/EC (in tonnes) - to be filled in only by the Member States wanting to prove compliance with the old targets until 2025 (and beyond) using the old rules.							
Country:							
Reference year:		2018					
Unlock formulas	Material	Packaging waste generated according to the old calculation rules	Standard footnotes	Explanatory footnote	Packaging waste recycled according to the old calculation rules	Standard footnotes	Explanatory footnote
	Glass						
	Plastic						
	Paper and board						
	Metal	Aluminium					
		Steel					
		Total					
	Wood						
	Other						
	Total						

Notes:

This table is only for those Member States wishing to report against the old recycling targets in Article 6 of Directive 94/62/EC using the old calculation rules. If you have already used Table 1 to report data according the old calculations rules, there is no need to complete Table 1a. Those Member States reporting against the old and new recycling targets according to the new calculation rules, do not need to complete this table.

Cell shading:

White: Data provision is mandatory for those Member States wishing to report against the old recycling targets in Article 6 of Directive 94/62/EC using the old calculation rules (only if they have reported data according the new calculation rules in Table 1)

Light grey: The calculation of data is automatic. Can be edited after unlocking the cell with the button "Unlock formulas".

Light blue: provision of data is voluntary.

Light orange: Footnotes (only to be filled-in when relevant)

⁽¹⁾ Commission Decision 2005/270/EC establishing the formats relating to Directive 94/62/EC on packaging and packaging waste

Recycling rate (%) for the purpose of Article 6(1) of Directive 94/62/EC will be calculated as packaging waste recycled divided by packaging waste generated x 100

4.3 Completing Table 2 for adjusting the recycling targets based on 3-yearly average share of reusable sales packaging

Table 2 needs to be completed if a Member State wants to make use – in accordance with Article 5(2) of Directive 94/62/EC - of the adjusted level for the recycling targets in Article 6(1)(f) to (i) of Directive 94/62/EC. These targets apply from reference years 2025 respectively 2030.

In principle, Table 3 (in columns #4 and #7, see Section 4.4) contains the necessary information required to calculate the share of reusable sales packaging for completing Table 2. Completion of Table 3 is obligatory for the reference year 2020 onwards, and the first report is due by 30 June 2022. Consequently, from reference year 2023 onwards, the necessary information to complete Table 2 for three previous years can be derived from Table 3 as reported for the previous reference years.

If a Member State wishes to see their distance to target for the 2025 targets already before - e.g. calculate the rate for the reference year 2018 - it is possible that the Member States complete the data for Table 2 for the three previous reference years (2017, 2016, 2015) if such data are available. Filling in these earlier years is voluntary. In this case, Table 2 must be completed by the Member State and shall be coherent with the reporting in Table 3. From reference year 2023 (reporting due by 30 June 2025) onwards, the cells of Table 2 shall not be filled in by the Member States but will be calculated automatically by Eurostat, based on the information reported by the Member States in Table 3 (columns #4 and #7, see Section 4.4) in the three previous years.

Updating values in Table 2 from reference year 2023 onwards

From reference year 2023 onwards, when Table 2 will be completed automatically by Eurostat from the values reported in Table 3, MS must report updated values for Table 3 (notably columns #4 and #7) if they want to report changes to the share of reusable sales packaging in Table 2 for any relevant previous year. Please contact Eurostat about the ways to report such revisions to previously submitted data.

Figure 4-3: Table 2 - Adjusted level of the targets in accordance with Article 5(2) of Directive 94/62/EC ⁽¹⁾

Table 2. Adjusted level of the targets in accordance with Article 5(2) of Directive 94/62/EC ⁽¹⁾				
Country:				
Reference year: 2018				
1	2	3	4	5
Packaging waste material	Share of reusable sales packaging in all sales packaging year 2015 (%)	Share of reusable sales packaging in all sales packaging year 2016 (%)	Share of reusable sales packaging in all sales packaging year 2017 (%)	Average share of reusable sales packaging in the three years preceding year 2018
Plastic				
Wood				
Ferrous metal				
Aluminium				
Glass				
Paper and cardboard				
Total				

Notes:

This table can be completed if you want to make use – in accordance with Article 5(2) of Directive 94/62 - of the adjusted level for the recycling targets in Article 6(1)(f) to (i) of Directive 94/62. These targets apply from reference years 2025 respectively 2030. In principle, Table 3 contains the necessary information for completing Table 2. Then, from reference year 2023 onwards, the necessary information to complete Table 2 for three previous years can be derived from Table 3 as reported for the previous reference years. If a Member State wishes to see the distance to target for the 2025 targets already before, it is possible to complete the data for Table 2 for the three previous reference years (2017, 2016, 2015) if such data are available. Filling in these earlier years is voluntary.

Cell shading:

Light grey: the calculation of data is automatic and represents the simple average of columns 2, 3 and 4.
Light blue: data is mandatory only for the material for which the Member State has decided to achieve an adjusted target.

⁽¹⁾ Directive 94/62/EC on packaging and packaging waste as last amended by Directive 2018/852.

4.4 Completing Table 3 on reusable packaging

Table 3 as established by Decision 2005/270 is displayed in Figure 4-4.

According to Article 12(3)(a) of Directive 94/62/EC, Member States shall report data on reusable packaging for the first time for the reference year 2020 and the report is due by the 30 June 2022. Subsequent reporting is due yearly.

In columns #2 and #4 (as well as #3 and #5 voluntarily), packaging placed on the market (PoM) for the first time is to be reported. This includes single-use as well as reusable packaging placed on the market for the first time.

“All packaging” (columns #2 and #3) includes transport, grouped and sales packaging, while in columns #4 and #5 only sales packaging has to be reported.

In columns #6 and #7, only reusable packaging placed on the market for the first time has to be reported.¹¹ As “systems for reuse”, only established arrangements (organisational, technical and/ or financial) shall be considered, which ensure the possibility of reuse. These include open-loop systems (system, in which reusable packaging is circulated amongst unspecified companies) and closed-loop systems (system, in which reusable packaging is circulated by a company or a co-operating known group of companies). So-called “hybrid systems” where packaging remains with the end user without a redistribution system leading to commercial refilling, shall not apply for consideration of reusable packaging as the monitoring and validation of data for such hybrid systems is not possible.

The ratio of columns #7 and #4 represents the share of reusable sales packaging. These values will serve as input to the calculation of the share of reusable sales packaging in Table 2 if a MS wishes to adjust the level of the recycling targets¹² in accordance with Article 5(2) of Directive 94/62/EC (see Section 4.3).

Finally, columns #8 and #10 (#9 and #11 voluntarily) ask for the rotations of reusable packaging performed in the reference year. This value represents the number of times a packaging is re-filled (first and subsequent refills) in a given year. It is suggested that information on the number of rotations is either available to the economic operators (for closed-loop systems) or has to be determined on the basis of studies (for open-loop systems).

The number of rotations will be different for different sub-categories of each reusable packaging: e.g. single plastic water bottles may show different numbers of rotations than plastic crates or containers. Therefore, for completing columns #8 and #10, it is suggested that MS conduct a more detailed collection of data on a disaggregated level, conduct national validation, but report to Eurostat the aggregated data. A suggestion on how such a detailed questionnaire may look like is included in Appendix 4.

¹¹ According to Article 3(2) reusable packaging shall be considered to be placed on the market for the first time when newly manufactured reusable packaging is made available on the market for the first time, together with the goods it is intended to contain, protect, handle, deliver or present. Reusable packaging that is reused in subsequent rotations shall not be considered to be placed on the market for the first time.

¹² as laid down in Article 6(1)(f) to (i) of Directive 94/62/EC

The data on tonnages collected by or calculated based on the detailed questionnaire for each sub-category of reusable packaging are then to be summed up and reported in Table 3 columns #8 and #10. Collecting information on the number of rotations is helpful on the disaggregated level but does not provide meaningful information on the aggregated level of Table 3, so that columns #9 and #11 may be left blank.

Figure 4-4: Table 3 - Reporting on reusable packaging

TABLE 3. Reporting on reusable packaging as established by Commission Decision 2005/270/EC as last amended by Commission Implementing Decision 2019/665 ⁽¹⁾																															
Country:																															
Reference year:		2018																													
1		2			3			4			5			6			7			8			9			10			11		
Packaging material	Unlock formulas	Packaging placed on the market for the first time										Reusable packaging placed on the market for the first time						Rotations per year ⁽⁴⁾													
		All packaging ⁽²⁾					Sales packaging ⁽³⁾					All reusable packaging			Reusable sales packaging			All reusable packaging					Reusable sales packaging								
		(t)	Standard footnote	Explanatory footnote	(units)	Standard footnote	Explanatory footnote	(t)	Standard footnote	Explanatory footnote	(units)	Standard footnote	Explanatory footnote	(t)	Standard footnote	Explanatory footnote	(t)	Standard footnote	Explanatory footnote	(t) ⁽⁵⁾	Standard footnote	Explanatory footnote	(number)	Standard footnote	Explanatory footnote	(t) ⁽⁵⁾	Standard footnote	Explanatory footnote	(number)	Standard footnote	Explanatory footnote
Plastic																															
Wood																															
Ferrous metal																															
Aluminium																															
Glass																															
Paper and cardboard																															
Other																															
Total																															

Notes:

Cell shading:

White: Data provision is mandatory from 2022 (reference year 2020)
Light grey: The calculation of data is automatic. Can be edited after unlocking the cell with the button "Unlock formulas".
Light blue: provision of data is voluntary.
Light orange: Footnotes (only to be filled-in when relevant)

⁽¹⁾ Commission Decision 2005/270/EC establishing the formats relating to Directive 94/62/EC on packaging and packaging waste as last amended by Commission Implementing Decision 2019/665

⁽²⁾ This means all reusable and single-use packaging comprising sales, transport and grouped packaging

⁽³⁾ This means reusable and single-use sales packaging.

⁽⁴⁾ This means the number of rotations that reusable packaging completes in a given year.

⁽⁵⁾ This means the number of rotations that reusable packaging completes in a given year multiplied by their mass.

5 Guidance for the completion of the quality report

Guidance notes for completing the quality report are included alongside the relevant questions in the Excel template, in the tab “Quality report”. Further instructions and examples to support responses to some specific questions are provided here, with the relevant row and question number in the Excel template referenced.

In most cases, the structure of the Quality Report follows the structure set out in the Decision 2005/270. Where there are some differences, the intention of the Act is maintained, however, changes have been introduced to ensure the responses are more accurate and easier to fill in by the Member States.

5.1 Packaging waste generated and recycled

Verification of data on packaging waste generated (question 3.1.6) and verification of data on packaging recycling (question 3.2.10)

If “yes” is identified for any of the aspects (cross-check/ time-series check/ audit), for any of the materials, the instructions provided in the quality report template state that the final column “verification process” should be used to describe the details of the relevant process. In responding to both questions 3.1.6 and question 3.2.10, this should include the following:

- Where cross-checks are conducted, please describe which other datasets (national or European or other) are used as the cross-check, what the nature of the check is and any margins of error or tolerances identified as acceptable or not acceptable between the data being cross-checked.
- For time series checks, please explain the period over which the checks are taking place, and any other necessary information.
- Related to ‘audits’, please describe whether they are voluntary or mandatory, if mandatory the legal basis for the audit, the nature of the entities being audited and doing the auditing, the level of training or guidance given to the auditors, and the mechanisms used to fund the audits, including who pays whom. Please, also describe any penalties or further actions resulting from non-compliance with such audits.

5.2 Composite packaging

Description of the methodology to determine per material the amount of recycled materials contained in composite packaging or packaging composed of multiple materials, and information on any exemptions applied for materials constituting less than 5% of the total mass of the packaging unit (question 3.2.4)

A range of methods could be used to determine the composition of wastes composed of multiple materials at any Calculation Point, so that the amounts are recorded under the respective components of packaging waste, as set out in the Table 1 of the questionnaire.

For example, a survey of producers of the products that become waste could be carried out in order to ascertain the composition of the products being placed on the market. This could be assumed equivalent to the composition of such products when they become wastes. The

composition would then be applied to the total weight of waste composed of multiple materials, to calculate the amount of waste recycled per material.

Sampling of a given waste stream could also be carried out at the Calculation Points to determine the per-material amounts of recycled materials. In this case, the methodology may have to correct for changes in moisture content or contaminants, so that the data are consistent with the amounts reported as generated wastes.

Where exemptions have been applied for composite materials constituting less than 5% of the total mass of the packaging unit, all such exemptions should be listed as part of the response to this question.

5.3 Variation from the data submitted for the previous data year

Explanation detailing the causes of the tonnage difference for any component of packaging waste generated and recycled which shows greater than a 10% variation from the data submitted for the previous data year (question 3.3.5)

For each waste component (component in this context means each waste category defined in Table 1, e.g. metals, glass, plastic, paper and cardboard, etc.), calculate the % variation in waste treated from the current year of reporting relative to the previous. For example:

$$\% \text{ Variation} = 100 \times \frac{(\text{Waste treated}_{\text{Year } x} - \text{Waste treated}_{\text{Year } x-1})}{\text{Waste treated}_{\text{Year } x-1}}$$

Where 'Year x' = the current year of reporting.

6 Good practice examples for collecting packaging placed on the market data

When collecting PoM data for packaging, Member States should consider the following points:

- Type of data used;
- Data sources;
- Method for reporting on composite packaging - as stated in Decision 2005/270, Member States are required to report on composite packaging, '*including where materials contained in composite packaging and representing less than 5 % of the mass of the packaging unit are not reported separately*';
- Method of data collection and calculation; and
- Method of estimations and assumptions used where data collection does not cover the whole market.

Appendix 1 provides additional detail on each of these points.

In addition, Member States should assess the quality of the PoM data used. The quality of the data may be compromised by a number of data collection issues, including:

- Data gaps and shortcomings;
- Inadequate reflection of import and export data;

- Data inaccuracies due to:
 - Free riding, typically facilitated by online sales and cross border trade;
 - The use of a De Minimis threshold for reporting standards; and
 - Reliance on inaccurate or incomplete industry data.

Appendix 1 further explains these challenges and recommends approaches that could be used to reduce data inaccuracies. Examples of how Member States are tackling the issue of free riding are also provided.

7 Good practice examples for collecting packaging waste recycling data

Best practice examples and key considerations related to identifying the Calculation Points for packaging materials (including metals from IBA), the allowable measurement methods associated with each of these, and some options for obtaining data at the Measurement Points are provided in Appendix 2. The appendix also provides further detail on identifying the packaging proportion in multi-stream treatment plants, measuring the amounts of packaging composted, and examples of the average loss rates for packaging. Finally, the appendix provides guidance on proving compliance with the requirement to ensure that all waste exported for treatment outside the EU is treated under broadly equivalent conditions, and the application of the average loss methodology.

Appendices

Appendix 1 Reference manual: Good practice examples for collecting packaging placed on the market data

The following sections relate to reporting in Tables 1, 2 and 3 and to Section 3.1 Packaging waste generation in the quality report.

As stated in Article 6a of Directive 94/62/EC:

“Member States shall calculate the weight of packaging waste generated and recycled in a given calendar year. Packaging waste generated in a Member State may be deemed to be equal to the amount of packaging placed on the market in the same year within that Member State.”

In order to complete Tables 1, 2 and 3, Member States can use data on packaging placed on the market (PoM). Accurate data for packaging placed on the market is particularly important in the context of higher recycling targets. Overestimating PoM could put targets out of reach, and underestimating could result in a significant drop in the level of actual performance required to meet a given target.

In order to improve the accuracy of reporting, it is recommended that the PoM data for packaging is verified/validated using a combination of checks. This will help to identify potential issues with the PoM data. If data errors are identified, then Member States can engage with the organisations providing the data to correct the issues. Appendix Section 8.3 outlines several methods for validating the data including cross-checking, auditing and evaluation.

These issues related to the collection, calculation and verification of packaging PoM data are discussed in the sections below.

A.1.1 Collecting packaging PoM data

A.1.1.1 Data sources and data collection methods

This section, and Section 8.2, relate to question 3.1.1 in the quality report. As stated in Directive 94/62/EC, Member States can gather data from a variety of ‘economic actors’. Typically, producers provide information on the amount of packaging PoM through their Extended Producer Responsibility (EPR) scheme, for example, to one or more Producer Responsibility Organisations (PROs), which may operate under the scheme. Other data sources include:

- Directly sourcing data from producers;
- Independent consulting companies;

- Primary data submitted directly to the national authority. This may include data submitted for other administrative purposes, such as under a packaging tax, or production and trade statistics; and
- Regional authorities.

Data can be collected in a variety of ways including:

- Reports/studies;
- Databases;
- Forms;
- Online registers; and
- Surveys.

Member States have different methods of collecting data and there are a number of common issues with data collection. For example, data collection may not be regular or comprehensive and data may not have been collected from every relevant producer, either directly, or through EPR schemes. Reliance on occasional studies and surveys, which may become quickly out of date, is also a problem.

A.1.1.2 How to address data collection issues

A number of steps should be taken to improve the collection of data by Member States.

These are listed below:

- Member States should take the necessary measures to ensure that databases on packaging PoM are established, where not already in place. The databases shall include data based on Annex III in Directive 94/62/EC (total packaging placed on the market, in units or tonnes), and it should be ensured that:
 - data relate to the entire packaging unit, including separable packaging elements, such as plastic closures on packaging items (e.g. plastic closures on cartons)
 - the guidance for reporting on reusable packaging placed on the market is adhered to (see Sections 4.3 and 4.4, and Appendix 4);
 - reporting obligations are established for all relevant producers to report annually on packaging PoM, including any small producers that might otherwise be exempt because they fall under de minimis thresholds under EPR schemes;
 - PoM estimates are based on annual packaging PoM data from individual producers, to build the picture bottom-up by category and using data that is as accurate as reasonably possible, based on sales data, the entire packaging unit as explained above, and empty pack weights;
 - packaging definitions are well elaborated and guidance on these definitions is easily accessible for producers. Refer to definitions and examples of packaging as stated in Directive 94/62/EC, and in its subsequent amending directives including directives 2013/2/EU and 2018/852; and
 - clear and easily accessible guidance for producers that provides all the required information in one place and sets out step-by-step actions that need to be taken to ensure the correct data is collected.

In addition, the Commission’s upcoming guidance for EPR schemes (potentially to be adopted in June 2020) may recommend that Member States should require a more granular EPR fee structure, and associated reporting structure, based on packaging type. This structure includes several categories for plastic packaging based on format and polymer.

In order to reflect this, Member States should move to a position where they are collecting data on the format and type of plastic packaging PoM. Table A-1 gives an example of the plastic packaging categories as applied by the Fost Plus, Belgium’s largest PRO. Member States may need to consider the most appropriate level of granularity given their planned approach to fee modulation.

Table A-1: Example plastic packaging categories by format and polymer

PET - Bottles and Flasks - Transparent no colour
PET - Bottles and Flasks -Transparent blue
PET - Bottles and Flasks -Transparent green
HDPE - Bottles and Flasks
PP - Bottles and flasks and other rigid
PS – Rigid packaging except EPS and XPS
HDPE – Rigid packaging other than bottles and flasks
PET – Transparent, other than no colour, blue or green
PET – Rigid packaging other than bottles and flasks, transparent
PET – Bottles and flasks, opaque
PE – films
Other rigid plastics (except EPS, XPS, compostables)
Other films (except compostables)
EPS, XPS and compostable plastics
Complex packaging of which the majority is plastic
Multi-polymer plastic pouches

Source: Fost Plus

If Member States already have the data on these categories of packaging (and for other materials), it is recommended that they report the data at this level of detail in the final sheet of the questionnaire. Whilst a more detailed breakdown by packaging type is not mandatory, it is desirable. Indeed, it is highly likely that such data will be required from EPR schemes in the future. It would also be of value to Member State authorities to gather a more detailed breakdown of packaging generation to aid evaluation of national packaging policies.

A.1.2 Calculating packaging PoM

Even if a thorough and appropriate data collection method is used, the data provided by producers and the other sources listed in A.1.1.1. may be inaccurately calculated. Moreover, it is not often clear what methodology is applied by PROs and industry bodies to gather their own data, or whether they quality assure the data they submit.

A.1.2.1 Identifying inaccurate data

The variety of methodologies, data sources and level of validation for measuring packaging placed on the market, is problematic. There may be significant inaccuracies in the data collected due to:

- Data gaps and, either intentionally or unintentionally, mis-reported data;
- Double-counting of PoM data;
- Reliance on inaccurate or incomplete industry data; for example, inadequate sample sizes (to be representative) or on incorrect calculation methods (e.g. confusing kilograms for tonnes);
- Inadequate reflection of import and export data, including that by third parties;
- Declaring only the predominant packaging material, for example excluding plastic lids from glass jars;
- Exclusion of data on reusable plastic packaging items placed on the market for the first time, causing an underestimate of plastic packaging generated.

In addition, Member States should be aware that the following two issues can increase the risk of inaccurate PoM data:

- I. The use of a De Minimis threshold for reporting standards; and
- II. Free riding, typically facilitated by online sales and cross border trade.

A.1.2.1.1 *Issues with a De Minimis threshold*

In the Commission's draft new guidance for EPR schemes, it is recognised that full data reporting may prove challenging to some smaller producers. Member States may apply a De Minimis approach for reporting requirements, should it be deemed necessary. Using a De Minimis would set a threshold for the lowest level of reporting required. De Minimis thresholds, if applied, will vary across Member States.

If a De Minimis threshold is applied, smaller producers may not have to provide full details about the exact numbers of packaging PoM. In this situation, the Member State is required to estimate the number of units PoM below the threshold. Not making such estimates can compromise the accuracy of PoM data, as it does not provide complete coverage of the market due to the lack of data on small producers. As a result, plastic packaging generated would be underestimated, potentially causing an upward bias in recycling rates. If Member States apply estimates in the case of data collection, which does not cover the whole market, this needs to be explained in section 3.1.2 of the quality report, including detail on sources of information, assumptions made and when estimates were used.

A.1.2.1.2 Issues caused by free riding

Free riding typically takes the form of companies selling goods into a country where they are not contributing to either take-back for separate collection, or funding the subsequent collection and treatment. The free rider experiences the benefits without accruing the costs.

In this context, the free riders are those who place packaging on the market but do not report data or take responsibility for the costs of collecting or treating it. This presents a problem for reporting packaging PoM, because the lack of data on free riders means that the amounts of packaging PoM are underestimated; there is a risk of reporting substantially inaccurate values for packaging PoM. This issue applies to those who gather data directly from producers, and often occurs in the following three ways:

I. Wrong or mis-reported data

Intentional and unintentional under-reporting of packaging PoM by producers reduces the accuracy of data. Producers may under-report because EPR fees are typically based on the weight of packaging PoM. Therefore, there is an inherent incentive for companies to choose 'low' unit weights for use in packaging calculations in order to minimise the fees they are required to pay under EPR schemes.

II. Online sales

A 2018 study by the OECD has shown that online multi-seller platforms are a major contributor to free riding. The most significant free-riding problem in volume terms appears to relate to large and well-known multi-seller platforms with fulfilment centres in the EU. The OECD study estimated that online free-riding accounts for 5% to 10% of all electronic and electrical equipment (EEE) sales.¹³ As a result, the lack of data on online sales, both from seller websites inside and outside the EU, means that packaging PoM is understated. It is worth noting that these platforms often fulfil orders, i.e. have a warehousing operation, in the Member State or a neighbouring country, which further contributes to the issue.

III. Cross border sales

Cross border sales and purchases can also facilitate free riders. What is placed on the market in a Member State does not necessarily become waste in that country. This might be because:

- People may purchase a packaged item in one country and take it to another; or
- People may purchase items online from companies located in other countries.

In most cases, physical, private imports are unlikely to be of great significance. The flows of material from one country to another are unlikely to be a significant proportion of the packaging waste stream. The main exception is where e.g. different tax rates generate significant price differentials for packaged goods, for example, where alcohol excise duties vary across borders. This can be a significant problem, in particular for smaller EU countries

¹³ OECD (2018) Extended Producer Responsibility and the Impact of Online Sales. Available at <https://www.oecd.org/environment/waste/policy-highlights-extended-producer-responsibility-and-the-impact-of-online-sales.pdf>

where lower cost goods may be available a short distance away in another Member State, particularly where excise duties and similar taxes vary across borders.

In these situations, the amount of packaged product, which moves across borders is:

- Likely to be significant; and
- Likely to display a single direction of travel. This means that the flow in one direction is not 'cancelled out' by the flow in the opposite direction.

Cross-border trade can therefore lead to inaccurate PoM data and increase the risk of free riders.

A.1.2.2 How to address inaccurate data

A.1.2.2.1 Following the draft new EPR guidance on de minimis thresholds

If a De Minimis is used, the guidance recommends that the level of the threshold will need to minimise loss of market data whilst reducing reporting burdens for producers of smaller volumes of packaging. If deemed necessary, the De Minimis threshold should be set so that the vast majority of packaging accounted for by the PRO is reported to the full standard. Larger producers should be subject to the full reporting requirements. It is recommended that if a De Minimis is applied, the reporting threshold should be based on annual turnover, rather than tonnes of packaging PoM as turnover data is more accessible. In order to reduce reporting burden on small producers, this turnover threshold is likely to be a few million euros.

Crucially, the minimum reporting standard should not compromise the Member State's ability to obtain accurate data for what is placed on the market. If the minimum reporting requirements are based on amount PoM for a specific type of packaging, the typical weights applied need to be accurate. It is recommended that Member States review these weights and thresholds periodically.

Where small producers are not reporting to PROs/compliance schemes, it is recommended that the Member State require them to report directly to the relevant authority.

A.1.2.2.2 Identifying and reporting on free riders

A number of steps can be taken to identify and report on free-riders. Online selling is a particular priority. For online free riders specifically, it is recommended that Member States should engage with multi-seller platforms as a priority and obtain their commitment to action to deal with free-riding.

Concerning who should be considered a multi-seller platform, it is worth noting that the EU 'Blue Guide' on the implementation of EU product rules states that:

“where fulfilment service providers provide services ... which go beyond those of parcel service providers, they should be considered as distributors and should fulfil the corresponding legal responsibilities. Taking into account the variety of fulfilment houses and the services they provide, the

analysis of the economic model of some operators may conclude that they are importers.”

This would mean that it is legitimate to require fulfilment service providers to be obligated as distributors and potentially producers. However, not all multi-seller platforms undertake fulfilment, for example e-bay, a multi-seller platform, which does not have physical distribution warehouses. Therefore, such sites may not be required to take on producer responsibilities or full reporting requirements.

The following actions are recommended to identify and report on online free-riders:

1. Place a requirement on e-commerce platforms to:
 - a. check seller EPR registrations as part of the platform registration and contractual process; and either
 - b. prohibit access to those that cannot show appropriate EPR documentation for the products they sell; or
 - c. take on the EPR obligations of their sellers, where the platform facilitates import (fulfils delivery):
 - i. and the seller is not EPR registered; and/or
 - ii. the seller falls below a de minimis that excludes them from obligations.
 - d. provide seller quantity data in EPR product categories to PROs and/or regulators as appropriate to allow auditing of declared quantities under EPR registrations.

If a less stringent approach is required, the following is an alternative option:

2. Require online multi-seller platforms to sign up to an e-commerce code of practice. This is a standard for websites that includes the proof of Producer Responsibility Organisation registration details for each seller, the legal entity address and contact information, and potentially a logo. This could build on the SafeShops.be model and similar e-commerce quality labels. This would provide a mechanism for enforcement authorities and informed consumers to check. It would still require Member State authorities to verify the validity of registration details however.

In addition, the following complimentary actions are recommended to be taken by Member States to identify, minimise and report on free-riders in the market. These actions reflect what maybe recommended in the Commission’s upcoming guidance for EPR schemes.

1. Implement market surveillance activities to identify obligated producers placing unregistered packaging on the market;
2. Mandate an attempt to quantify the data on unregistered packaging PoM and on cross-border purchases. For example, Member State customs agencies could conduct surveys to estimate the annual flows of packaging across certain borders, and compare these figures with sales data from the countries, as well as any collection scheme like Deposit Return Scheme (DRS);

3. Producer responsibility organisations, enforcement agencies, customs authorities, trading standards authorities and tax authorities should share information to identify and counter free-riding. One example is cross checking customs data in regards to imports and products that are declared under EPR registration. EPR and VAT registration could also be linked. Customs authorities could also require an EPR registration and PRO contract whenever they detect the importation of a product covered by EPR legislation. This type of interlinking and cross-checking of obligations is already done automatically where there are relevant databases;
4. Obligations could be placed on couriers and parcel services where the seller does not have a physical establishment in the country in question. Large couriers and logistics companies such as UPS, DHL and FedEx would therefore be motivated to ensure that:
 - a. the sellers are registered where possible with a PRO or Authorised Representative (AR); or
 - b. that any costs incurred by the courier company in fulfilling obligations are passed on contractually.
5. Harmonisation of EPR regulations and electronic registration. Steps should be taken to ensure that all producer and distributor registers are electronic, public and, as far as possible, standardised for each product group. The trading name of the web site should be required for registration, as well as the legal entity name. Harmonisation will facilitate information exchange and checking for free-riders by PROs and enforcement authorities;
6. Build into national/territory legislation the ability to prosecute a company for illegal action in another country/territory to facilitate enforcement. Member States should consider introducing additional enforcement powers, and enabling private actions, to prevent illegal online selling; and
7. PROs should be obligated to undertake promotional and awareness raising work overseas.

Good practice examples

A number of Member States have taken action to tackle free riding. Although some of these examples relate to waste electrical and electronic equipment (WEEE), the methods used are still instructive:

- In 2019, France made steps to tackle free riders by announcing new obligations for online platforms, as part of the French Circular Economy Law. The Law requires online multi-seller platforms such as Amazon and Alibaba to ensure that the collection and recycling of packaging arising from products marketed and sold on such websites is properly financed (i.e. that sellers are EPR registered). The online platforms will, by default, be held responsible and take the EPR obligations from their sellers if they cannot prove this.
- In Germany, under the “Gesetz gegen den unlauteren Wettbewerb – UWG” law, a competitor can issue a “warning” (effectively a cease-and-desist letter) and demand

compensation from a non-compliant producer, stop the producer from selling non-registered EEE (injunction), and request disclosure of sales and their recipients. The Federal Environment Agency can also request the “absorption” of profit gained through unfair competition. Germany has also noted that it has plans to roll out an automated procedure for identifying potential free-riders by website keyword search and is assessing the possibility of requiring the online platforms to check the compliance for their sellers and block them, if not compliant (duty of examination). The new German Packaging Law (VerpackG) tackles free-riders in on-line sales by creation of a new centralised office, which manages a packaging register collecting data on actors and the quantities of packaging that they put on the German market.

- In Ireland, online sellers of EEE are required to show the EEE producer and EPR registration number. Furthermore, the Environmental Protection Agency (EPA) has an enforcement programme for the WEEE and battery system that includes free-rider investigations. On-the-spot fines can also be used to penalise non-compliant web sites.

A.1.2.2.3 Improving estimates

This section relates to Section 3.1.2 and 3.1.3 in the quality report. Where data is inaccurate, missing or unavailable, it is often necessary for Member States to use estimates for the amount of packaging PoM. The accuracy of the estimates clearly depends on the quality of the data upon which they are based, and this can vary between Member States.

The following steps are proposed to improve current estimation methods:

1. Make substantiated estimates based on monitoring across a representative sample of producers, for example across those that fall below a De Minimis threshold or online sellers. Statistical modelling could also be used to estimate the number of producers in a country and the quantity of packaging PoM, as demonstrated – for plastic packaging – in WRAP’s PlasticFlow 2025 report.¹⁴ In a best-case scenario, this would be a representative survey of the weights of packaging PoM in a Member State.
2. Use targeted stakeholder interviews to:
 - a. refine the estimates from the above techniques for certain types of producers who may be significantly different from other producers; and
 - b. test the validity of the estimated number of producers through industry expert interviews.

A.1.2.2.4 Harmonisation of data

Although Member States have no obligation to do so, harmonisation of data reporting across Member States will facilitate reduced burdens for producers. Harmonisation relates to the type of data requested, the format of the requested data, and the frequency of requested data. If possible, Member States should consider if they can require reporting that aligns with other Member States.

¹⁴ WRAP (2018) PlasticFlow 2025: Plastic Packaging Flow Data Report. Available at http://www.wrap.org.uk/sites/files/wrap/PlasticFlow%202025%20Plastic%20Packaging%20Flow%20Data%20Report_0.pdf

A.1.3 Data validation

This section relates to Section 3.1.4 and 3.1.6 in the quality report. It is recommended that the data collected is verified using a combination of checks. This will help to identify any potential issues with the PoM data. If data errors are identified, then Member States can engage with the organisations providing the data to correct the issues.

The following data validation techniques can be used:

- Annual checks should be made by PROs, and regulators as appropriate, to check any clear anomalies in producer data; e.g. a significant increase or decrease in a particular material quantity from previous years. Ideally, this should be done by an automated software system/algorithm to minimise labour requirements;
- Producers should be subject to random third party spot-check auditing by their PRO and less regularly, but in more detail, by the relevant regional or national authorities. These investigations should:
 - Check data sources and their reliability;
 - Check for any anomalous or suspicious individual packaging weights; and
 - Check calculations (e.g. Excel formulae).
- It is recommended that PROs be subject to occasional audits by national authorities;
- Member States should require producers to, as accurately as possible, assess their suppliers for the weight of PoM; and
- Cross-check the data submitted by the PRO/s against other collective sources of data, for example from producer associations and sales data.

Data validation of the kinds listed above should always be undertaken by independent experts without any conflict of interest in regards to the producer or PRO being audited.

A.1.4 Reporting of data from waste analysis

Waste composition analysis typically applies the following key methodological steps:

1. Samples of specific waste streams are taken;
2. The sample volume is often reduced to a manageable size;
3. Each sample is physically sorted, often by hand, into separate, predetermined categories; and
4. The amount of waste in each category is calculated using weight.

At present, Member States and Producer Responsibility Organisations (PROs) or similar, use a variety of methods for waste analysis and there are many existing standards and methodological guidance documents for carrying out waste compositional analyses. For example, those given in Section A.2.7.1 of Appendix 2.

It is beyond the scope of this document to provide comprehensive guidance on how waste analysis should be conducted; however, a number of key principles are outlined in the following section.

Key Principles of Waste Composition Analysis

Member States should apply a reasonable and proportionate estimation method in order to determine the quantities of certain waste categories in specific waste streams. It is important to recognise that waste composition analysis provides data for a single, specific point in time and location. There are four key factors, which can influence the accuracy of this data, and thus need consideration:

Scope/number of samples – samples need to be representative of the area or waste stream in question. Consideration needs to be given to the sampling procedure followed, such as whether a stratified sampling approach is used;

- Size of the individual samples – the size, either by weight or by volume, of each sample should be uniform across the study. When commercial waste is included, the sample size needs to be larger to attain the same level of accuracy, as there is greater variability in the composition of waste between samples than for household waste;
- Frequency of sampling – the time of year and day can affect amounts of waste generated. For instance, more plastic beverage bottle waste tends to arise during the summer. The chosen frequency should ensure sufficient account of variation in waste arisings; and
- A sufficiently detailed breakdown of the categories which the waste is sorted into and guidance to ensure the consistent use of categories. More detailed reporting will also be required under fee modulation currently applied by EPR schemes and proposed in the draft new EPR guidance.

What is more, for analysis relating to household waste, Member States should consider the following factors when conducting sampling:

- Settlement structure e.g. rural/urban;
- Household size/number of occupants;
- Household type e.g. single, low-rise or multi-occupancy, high-rise;
- Type of occupant and socio-economic factors, as the income and lifestyle of the occupant will affect the amount and type of waste they generate e.g. elderly, young family, low/high income etc.;
- Waste service in operation, including the type and size of containers used (e.g. large waste containers for several households used together vs individual household waste bins) and the collection cycle (e.g. weekly, door-to-door); and
- The influence of pay as you throw (PAYT) / residual waste charging schemes, as the composition can change as the level of the charges increase (i.e. householders put more contamination in the recycling bins to avoid the charges).

For waste analysis relating to commercial waste, Member States should consider the following additional factors when conducting sampling:

- The representation of different sectors/business types in the sampling framework;
- The representation of different sized businesses in the sampling framework;
- The use of on-site audits, and the approach used for very large sites;
- Waste service in operation, including the collection cycle.

It is recommended that Member States refer to the relevant national guidance on waste composition analysis for practical implementation strategies, as well as the Methodology for the Analysis of Solid Waste developed for the European Commission.¹⁵

Important elements to ensure high quality data on packaging waste based on waste analysis include:

- Consideration needs to be given to the difference in weight of packaging when measured at the specific points where composition analysis is undertaken, and what is weighed at the point of recycling. The principle should be to obtain weights that are equivalent to the weights put on the market, i.e. the waste fractions should be “pure, clean and dry”. This is to ensure that the results from the sampling process are as equivalent as possible to the weight of packaging placed on the market.
- To ensure that the grossing up of the sampling results to the totals is based on a well defined approach to stratification (as per examples given above). This includes the selection of the waste flows to which the coefficients from the sampling are applied.

¹⁵ <https://www.wien.gv.at/meu/fdb/pdf/swa-tool-759-ma48.pdf>

Appendix 2 Reference manual: Reporting of data on packaging waste recycling

For filling in the columns related to recycling in Table 1, data should be split into three columns depending on the location of the recycling activities. The important aspect here is where the Calculation Point is located. Waste data systems must be set up to ensure data from operators within the country clearly correspond to the Calculation Points to identify whether recycling has occurred in the Member State. If the Calculation Point has not been reached in the Member State, in which the waste originates, then data must be gathered from operators further down the recycling value chain e.g. exporters or recycling companies in other countries.

The waste data systems mentioned above will need to account for situations in which waste is exported to another Member State, and subsequently exported outside of the EU, to ensure that all columns of the table can be filled out. Approximations for the amounts of waste recycled outside the Member State based on studies and research can be used, if exact information on the flows of waste is not available. A description of the approach taken should be given in Section 3 of the 'quality report' (see Section 5 of the guidance for further details on completing the quality report).

Further information on identifying the Calculation Points for different packaging materials, as well as obtaining data and allowable measurement methods, are provided in the sections below. Firstly, a summary of the difference between the old and new calculation rules is given.

A.2.1 Difference in reporting rules

Table A-2: Difference in Reporting Rules

Calculation Rule Element	Old Rules	New Rules	Key Difference
Point of Reporting of Recycled Amounts	2005/270 (prior to 2019/665) Article 3(4) The weight of recovered or recycled packaging waste shall be the input of packaging waste to an effective recovery or recycling process. If the output of a sorting plant is sent to effective recycling or recovery processes without significant losses, it is acceptable to consider this output to be the	2005/270 as amended by 2019/665 Article 6c(1) point (a) The amount of recycled packaging waste shall be the amount of waste at the Calculation Point. The amount of packaging waste entering the recycling operation shall include targeted materials. It may include non-targeted materials only to the extent that their presence is permissible for the specific recycling operation. The Calculation Points applicable to certain packaging waste materials and certain recycling operations are specified in Annex II.	Effective recycling processes are now defined by the Calculation Points, and losses between output of sorting plants and the Calculation Points must be deducted, whether they are significant or not. This removes the possibility to report the recycled quantities as the input to a 'recycling process' after sorting whereby there are significant losses through the process before the output materials are

Calculation Rule Element	Old Rules	New Rules	Key Difference
	weight of recovered or recycled packaging waste.	Article 6c(1) point (b) Where the Measurement Point relates to the output of a facility that sends packaging waste for recycling without further preliminary treatment, or to the input of a facility where packaging waste enters the recycling operation without further preliminary treatment, the amount of sorted packaging waste that is rejected by the recycling facility shall not be included in the amount of recycled packaging waste.	actually reprocessed into products, materials or substances
Preliminary treatment	(no rules, waste removed from preliminary treatment at recycling facilities could be included in the amounts reported as recycled.)	Article 6c(1) point (c) Where a facility carries out preliminary treatment prior to the Calculation Point in that facility, the waste removed during the preliminary treatment shall not be included in the amount of recycled packaging waste reported by that facility.	Waste removed from preliminary treatment at recycling facilities cannot be included in the amounts reported as recycled from that facility but could be included further along the recycling chain.
Biodegradable packaging	'organic recycling' shall mean the aerobic (composting) or anaerobic (biomethanization) treatment, under controlled conditions and using micro-organisms, of the biodegradable parts of packaging waste	94/62/EC as amended by 2018/852 4. For the purposes of calculating whether the targets laid down in points (f) to (i) of Article 6(1) have been attained, the amount of biodegradable packaging waste that enters aerobic or anaerobic treatment may be counted as recycled where that treatment generates compost, digestate, or other output with a similar quantity of recycled content in relation to input, which is to be used as a recycled product, material or substance. Where the output is used on land, Member States may count it as recycled only if this use results in benefits to agriculture or ecological improvement. 2005/270 as amended by 2019/665 Article 6c(1) point (d) Where biodegradable packaging that is subject to aerobic or anaerobic	More precise definition of when biodegradable packaging treated in composting and/or digestion plants can be counted as being recycled under the attainment of the targets.

Calculation Rule Element	Old Rules	New Rules	Key Difference
		treatment is included in the recycled amounts for the respective packaging material, the amount of biodegradable packaging in biodegradable waste shall be determined by performing regular composition analyses of the biodegradable waste entering those operations. Biodegradable packaging waste that is removed before, during or after the recycling operation shall not be included in the recycled amounts.	
Composite packaging	2005/270 (prior to 2019/665): Art 3(3) Composite packaging shall be reported under the predominant material by weight.	2005/270 as amended by 2019/665 Art 6c(2) For the purposes of calculating and verifying attainment of the recycling targets set in points (f) to (i) of Article 6(1) of Directive 94/62/EC, composite packaging and other packaging composed of more than one material shall be calculated and reported per material contained in the packaging. Member States may derogate from this requirement where a given material constitutes an insignificant part of the packaging unit, and in no case more than 5 % of the total mass of the packaging unit.	The amounts of different materials at the Calculation Points, i.e. where reported as recycled, should be reported per material, and not assigned fully to the predominant material of the packaging type. Except where the derogation might be taken. This rule change may impact on both the amount of waste generated and the amount of waste recycled.
Exclusion of non-packaging materials	2005/270 (prior to 2019/665): Article 5(2) The weight of recovered or recycled packaging waste shall, as far as is practical, exclude non-packaging materials collected together with the packaging waste.	2005/270 as amended by 2019/665 Article 6c(1) point (f) The amount of recycled packaging waste shall exclude non-packaging materials collected together with the packaging waste, such as waste of the same material that does not originate from packaging, and residues from products that the packaging used to contain.	The new rules remove the provision for non-packaging materials to be deducted on 'as far as is practical' which might be interpreted in different ways. The approaches taken must seek to ensure the weight of recycled packaging excludes non-packaging materials.

A.2.2 Correctly identifying the Calculation Points

A.2.2.1 Plastics packaging

A.2.2.1.1 Mechanical recycling

The calculation rules below are defined in the Decision 2005/270, and aligned with the wording of Article 6(a) of the aforementioned Directive.

The Calculation Point for plastic packaging is defined in Annex II of Decision 2005/270 as follows:

- Plastic separated by polymer that does not undergo further processing before entering pelletisation, extrusion, or moulding operations;
- Plastic flakes that do not undergo further processing before their use in a final product.¹⁶

As illustrated below in Figure A-1, the definition sets the Calculation Point to measure the weight of a product that has been:

- ground/flaked (necessary for adequate sorting and washing processes)
- sorted (so that the product does not include the weight of materials that are not the required resins (polymers) to be recycled);
- washed (so that the product does not include the weight of materials that are not the required resins (polymers) to be recycled); and
- dried (so that the weight does not include moisture in excess of the “natural humidity”).

As regards whole loads of material that are rejected from entering a recycling process, they cannot be counted as recycled for the purposes of the recycling calculation.

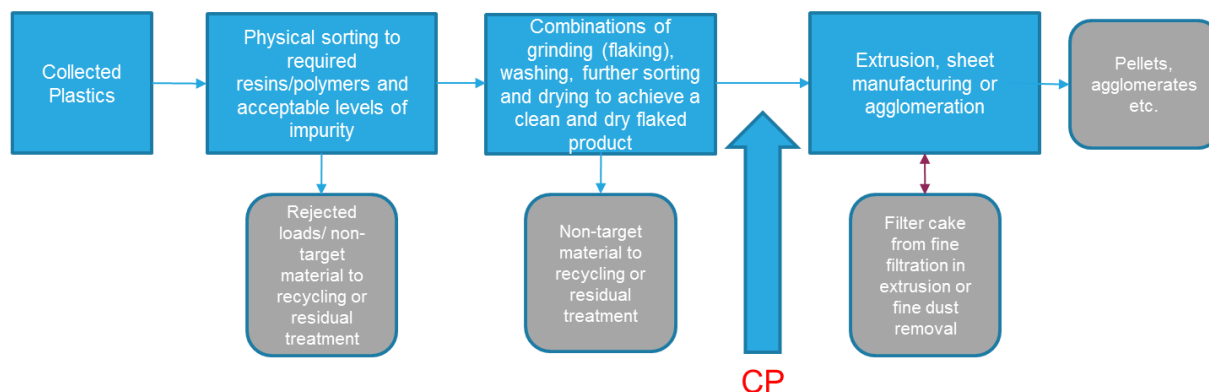
In some cases, specific preliminary and recycling operations are integrated into a single facility whereas in other cases they might be located at different facilities, within the same company or operated by another company. Where plastics are recycled within an integrated system, the Calculation Point may therefore need to be identified between key operations, such that it is consistent with the Calculation Points identified in the Commission Implementing Decision – this may correspond with the production of secondary raw materials at certain industry specifications.

Additionally, there may be processes that do not measure the weight of the plastics at the Calculation Point because the material is sent onto extrusion or agglomeration processes. It is permissible to set the Measurement Points further down the processes, so as to measure the outputs from extrusion or agglomeration processes. In these cases it is not necessary to deduct the weight of extruded filtration cake or fine dust that are subsequently disposed of, as these are considered to be ‘inherent losses’. In some cases, however, extruded filter cake can be re-ground and reintroduced into the recycling process, where the tolerances for contamination are relatively high (e.g. polyolefin recycling batches). In such cases, if the

¹⁶ Final products in this context include extruded products, sheet and agglomerates. Other examples of “final products” will be considered on a case-by-case basis, using the principle of equivalence.

extruded filter cake is subsequently recycled, it can no longer be considered an inherent loss, and so the measurement method should be developed in such a way that it prevents double counting (and thereby overestimation of the packaging recycled). See Figure A-1 below.

Figure A-1: Plastics Calculation Point



Note: If the weight of clean and dried flake is not known then it is acceptable to count the weight of the products produced in later processes for example the weight of pellets plus filter cake from extrusion processes may be counted as the weight recycled.

A.2.2.1.2 Chemical recycling

Feedstock recycling, also known as “chemical recycling,” is the process of breaking down collected plastics into their constituent monomers and other basic chemical elements (“depolymerisation”). There is an increased interest in its application focused on recycling plastic products that are challenging to recycle using current mechanical technologies, mainly due to the physical characteristics of the product, for example, when several types of plastics have been combined for optimal performance i.e. composite packaging, or plastics with adhering residues (e. g. food residues on packaging). Equally, the technology is considered as potentially having a role to play in enabling the recycling process to further reduce contamination, or address polymer degradation, possibly allowing recycling into food-contact applications to occur with greater confidence, or substitution of higher proportions of primary material in a given application (e.g. PET bottles).

Whilst chemical recycling has been in the R&D phase for many years (e.g. studied by the European Commission with respect to PVC in 1999), the technology is still not available at commercial scale for use in recycling mixed polymer MSW or packaging plastics.¹⁷

Companies such as BASF have pilot projects ongoing such as ChemCycling, which describes the process as¹⁸:

¹⁷ TNO Institute of Strategy, Technology and Policy (1999) *Chemical Recycling of Plastics Waste (PVC and other resins)*, Final Report for the European Commission, http://ec.europa.eu/environment/waste/studies/pvc/chem_recycle.pdf

¹⁸ BASF (2019) *Chemical recycling of plastic waste*, Accessed 13th February 2019, <https://www.basf.com/global/en/who-we-are/sustainability/management-and-instruments/circular-economy/chemcycling.html>

“Through thermochemical processes, plastic waste is broken down to oil or gaseous products as raw materials for the chemical industry. These raw materials can replace fossil feedstock to produce new products, especially plastics.”

Not all of the plastic waste may, though, be recycled back into new plastic products. Some monomers may be utilised for fuels, which would clearly not be considered as recycling according to the Waste Framework Directive:

“‘recycling’ means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations”

In such circumstances, it would not be appropriate to count the total input of plastic feedstock into a chemical recycling process as ‘recycling’. Some outputs from the process are fuels, which should therefore not be accounted for as recycling but as energy recovery. This could also apply for any energy generated from the waste that is used to power the recycling process itself.

Reflecting the fact that not all the chemicals derived from chemical / feedstock recycling will necessarily be used to synthesise non-fuel products, materials or substances, it was considered appropriate to establish a Calculation Point, and to set in place principles, which would allow for the amount of material recycled to be determined.

The Calculation Point would be based around the quantity of chemicals derived from the process that were subsequently used to manufacture new non-fuel materials products, or substances. Operators would be required to provide a full mass balance of their process to national agencies responsible for reporting on recycling. In order to enable a calculation of the quantity of input material, which had actually been recycled, operators would be required to demonstrate how the outputs were derived from the inputs. This would be necessary to ensure that only the input material from which were derived those chemical feedstocks that were used in making new non-fuel materials, products or substances only were counted as ‘recycled’. In this way, the amount of plastic recycling from these processes should not be overestimated. A possible option would be to consider as recycled the amount of chemicals (by weight) derived from the process that are subsequently used in the synthesis of new non-fuel materials, products or substances.

Member States should outline the full details of the mass balance approach used to identify any packaging currently reported as recycled from chemical processes as part of the quality report (under question 2.1). Member States should outline any quality assurance/chain of custody schemes to be established to ensure the mass balance is conducted according to the calculation rules put in place. Further Calculation Points and associated measurement methods may be identified for chemical recycling processes, subject to further consideration of the scope and scale of such processes by the Commission in future.

A.2.2.2 Paper/ board packaging

The Calculation Point for paper and board packaging is indicated in

Figure A-2. The Calculation Point for paper and board packaging is defined in Annex II of Decision 2005/270 as follows:

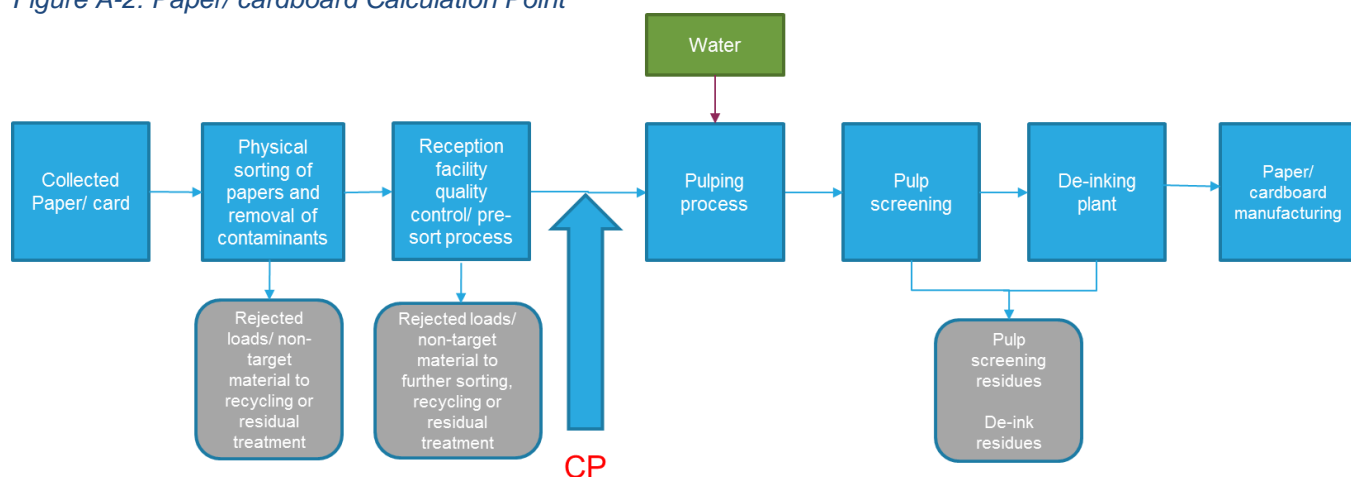
- Sorted paper [and board] that does not undergo further processing before entering a pulping operation

Paper and board is typically reprocessed into similar materials by being introduced to a pulping process; the Calculation Point has been set on the weight of material entering this process on the basis that this material meets the standards of EN643. This ensures that the requirement for recycling to be ‘high quality’ in Article 6a(1) of the PPWD Directive. Material with higher levels of non-fibre contamination than allowed for under EN643 standards that are introduced to a pulping process would result in an overstated recycling rate and in these cases, there should be a corresponding deduction from the mass of the material introduced to the pulping operation.

Paper may also be recycled by processes that differ from a pulping process.

Certain fractions of the mass of material into the pulping process do not yield fibres for remanufacturing but result in material sent for disposal or energy recovery such as screened material from pulp screening or chemicals/inks from the de-inking processes. On the assumption that material introduced to the pulping operation complies with EN643 standards, the losses from the pulping process onwards count as *inherent losses* and therefore it is not necessary to deduct the weight of these losses from the final recycling reported.

Figure A-2: Paper/ cardboard Calculation Point



A.2.2.3 Glass packaging

The Calculation Point for glass is indicated in Figure A-3. The definition in Annex II of Decision 2005/270 is as follows:

- Sorted glass that does not undergo further processing before entering a glass furnace or the production of filtration media, abrasive materials, glass fibre insulation and construction materials.

Collected end of life packaging glass items require sorting treatment before the material can be introduced to a glass furnace or any of the other stated production processes stated in the definition. The Calculation Point is set to account for the material entering the glass furnace or other relevant processes after unwanted material is removed through sorting processes.

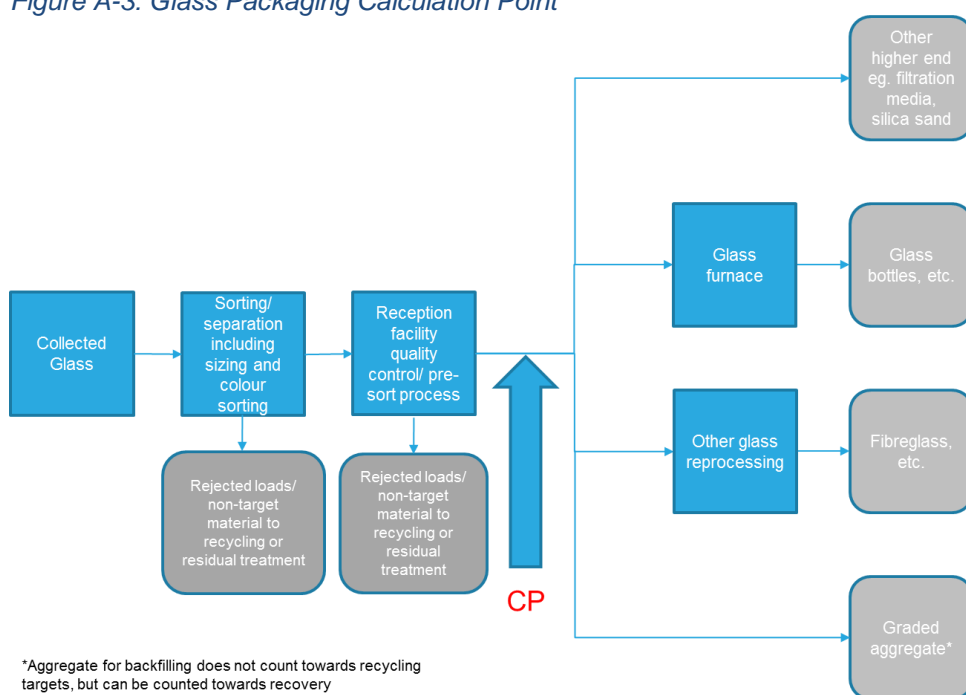
It is noted that in the case of glass bottles, some materials (such as aluminium closures) may count towards recycling targets for other materials (such as aluminium recycling). Therefore, these materials should not be counted towards the recycling targets for glass, and should be captured under the metal Calculation Point (see below).

Further, it is noted that the production of glass aggregate for backfilling or landfilling counts does not count towards recycling targets, as set out in Article 6a(5) of the revised PPWD:

- (...), end-of-waste materials to be used as fuels or other means to generate energy, or to be incinerated, backfilled or landfilled, shall not be counted towards the attainment of the recycling targets.

However, aggregate used for backfilling can be reported towards recovery targets (as indicated in the footnote to the “Other recovery” column in Table 1 of Annex 1 in Decision 2005/270).

Figure A-3: Glass Packaging Calculation Point



A.2.2.4 Metal packaging

The Calculation Point for metal packaging is indicated in Figure A-4 (for ferrous metals) and Figure A-5 (for aluminium). The definition in Annex II of Decision 2005/270 is as follows:

- Sorted metal that does not undergo further processing before entering a metal smelter or furnace.

Collected end of life metals sometimes require sorting processes before they can be introduced to a metal smelter or furnace. The Calculation Point is set to account for the material entering the metal furnace or other relevant processes after unwanted material is removed through such sorting processes.

For the purposes of the calculation rules, tinned packaging is acceptable to the operation of the furnace, as indicated above, and so these tramp elements should not be deducted from the weight of steel counted as recycled.

It is noted that preliminary treatment of metals (shown in the figure below as a separate step called “reception facility quality control/ pre-sort”) may also take place within the metal smelting/ refining facility itself. In this case, any pre-sorting prior to smelting counts as “preliminary treatment” within the refining facility, and any waste removed during this stage can therefore not be counted towards the recycled packaging waste reported by that facility. This is set out in Article 6a(5) of the revised PPWD:

- Where a facility carries out preliminary treatment prior to the Calculation Point in that facility, the waste removed during the preliminary treatment shall not be included in the amount of recycled packaging waste reported by that facility.

Multiple Calculation Points may be needed for metals given the different flows in the recycling chain for different types of MSW and packaging metal wastes. The output of the above-mentioned specialised operation is equivalent to the input to the metal smelter or furnace, so Member States can report at the entry to these plants, if it is easier for them to do so, or if separately collected metals are sent directly to a smelter or furnace, as long as any materials removed during preliminary treatment are suitably deducted from the weight of packaging reported as recycling.

In the case of recycled aluminium closures for glass bottles (see above), the Calculation Point can correspond to the output of the glass sorting facility if the separated aluminium fraction is sent directly for smelting with no prior treatment. In this case, care must be taken to avoid double counting of this fraction at the point of input into the smelter as well.

Figure A-4: Steel Calculation Point

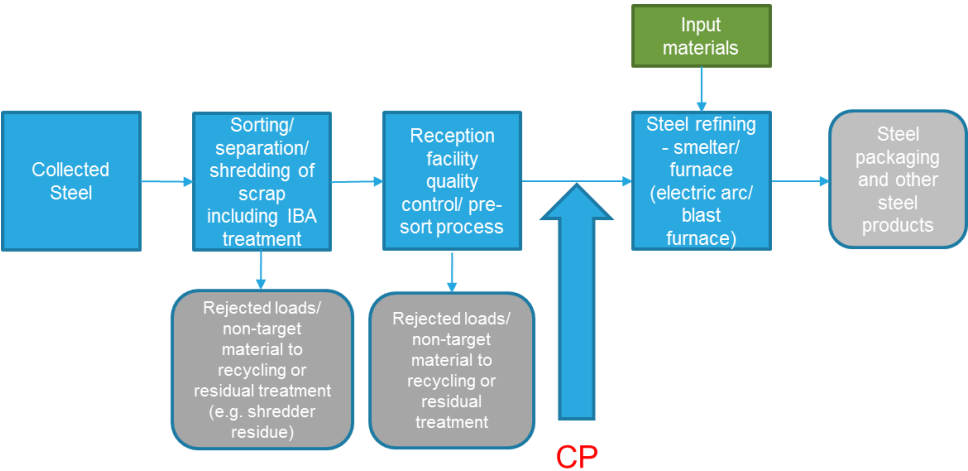
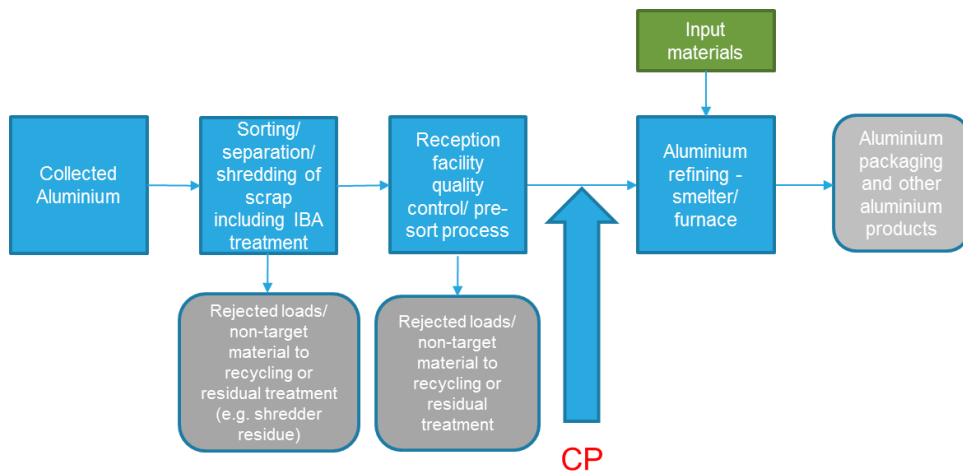


Figure A-5: Aluminium Calculation Point



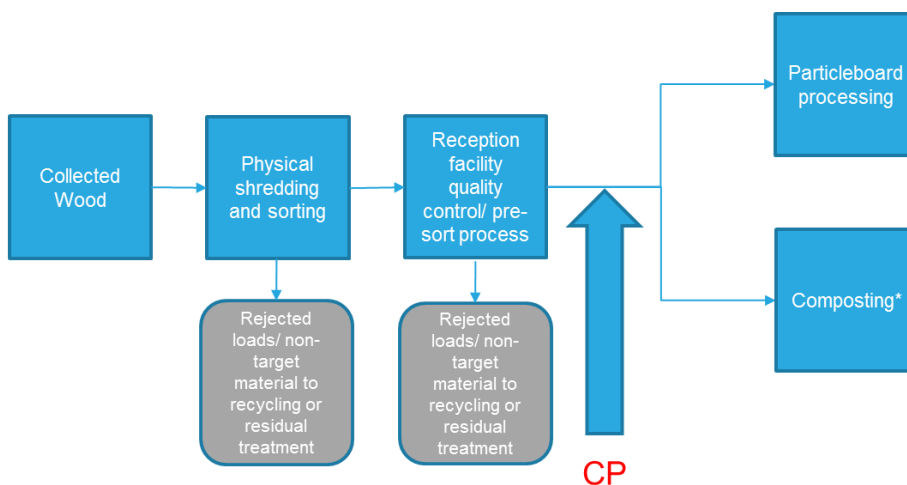
A.2.2.5 Wooden packaging

The Calculation Point in this case may be the amount of fine material sent off for recycled board manufacture, or the input waste minus non-target material extracted for recycling, disposal or thermal recovery, as shown in Figure A-6. The definition is as follows.

- Sorted wood that does not undergo further treatment before utilisation in particleboard manufacture.
- Sorted wood entering a composting operation.

Sorted wood entering a composting operation would need to meet certain criteria to ensure the quality of the output compost could meet relevant standards. In addition, only food waste collected separately at source can be counted for recycling, so wood waste composted should only be counted for recycling if also from segregated sources. Energy recovery of wood waste does not count as recycling.

Figure A-6: Wood Calculation Point



Note: Only wood waste segregated at source and composted counts towards the recycling targets

A.2.2.6 Fabric/ textile packaging

The Calculation Point for textiles is defined as follows:

- Sorted textile material that does not undergo further processing before its utilisation for the production of textile fibres, rags or granulates.

The output of a sorting process is a pragmatic point for reporting, and can be reported by the plant operator to the national authorities.

Chemical recycling of textiles should also be accounted for as per the conditions set out for plastics in Section A.2.2.1.2, whereby a mass balance approach is proposed, and the Calculation Point becomes the point where chemicals from the process are used as the basis for manufacturing new plastics (and not as fuel).

Finally, while preparation of textile packaging for reuse counts towards the recycling targets, reuse of textile packaging (such as cotton/ jute carrier bags) shall not (except reusable sales packaging up to 5% of the target).

A.2.2.7 Composites packaging

The Calculation Point for 'composite packaging and packaging composed of multiple materials is defined as follows:

- Plastic, glass, metal, wood, paper and cardboard and other materials resulting from the treatment of composite packaging or of packaging composed of multiple materials that do not undergo further processing before reaching the Calculation Point established for the specific material.

Materials present within composites, e.g. paper, wood, metal, plastic, textiles, should be captured by Calculation Points for these specific materials, as separated material would be sent for further material specific recycling operations. However, for some composite products, such as beverage cartons, the preliminary treatment process includes a pulping operation to recover the fibres. If the output were counted, this would not be in-line with the approach for paper and cardboard recycling. However, the input to the recycling plant should not be used, as some elements, such as the plastics, are generally sent for energy recovery and not recycling. Therefore, the approach should be to measure the input and deduct any outputs sent for energy recovery or other material recycling operations.

It is noted that should only be the case if the component parts are not insignificant, i.e. if they are <5% of the total item weight they can be accounted for as being recycling along with the predominant material of the packaging.

A.2.3 Allowable measurement methods

The measurement method is the approach(es) that is taken to calculate the amount of recycling at the Calculation Points defined in the Implementing Decision. The approach could make use of different Measurement Points and arithmetic formulas to make the calculation. In this section, some guidance is given on measuring the amount of recycling at the Calculation Points for plastics.

A generalised multi-stage recycling value chain is shown in

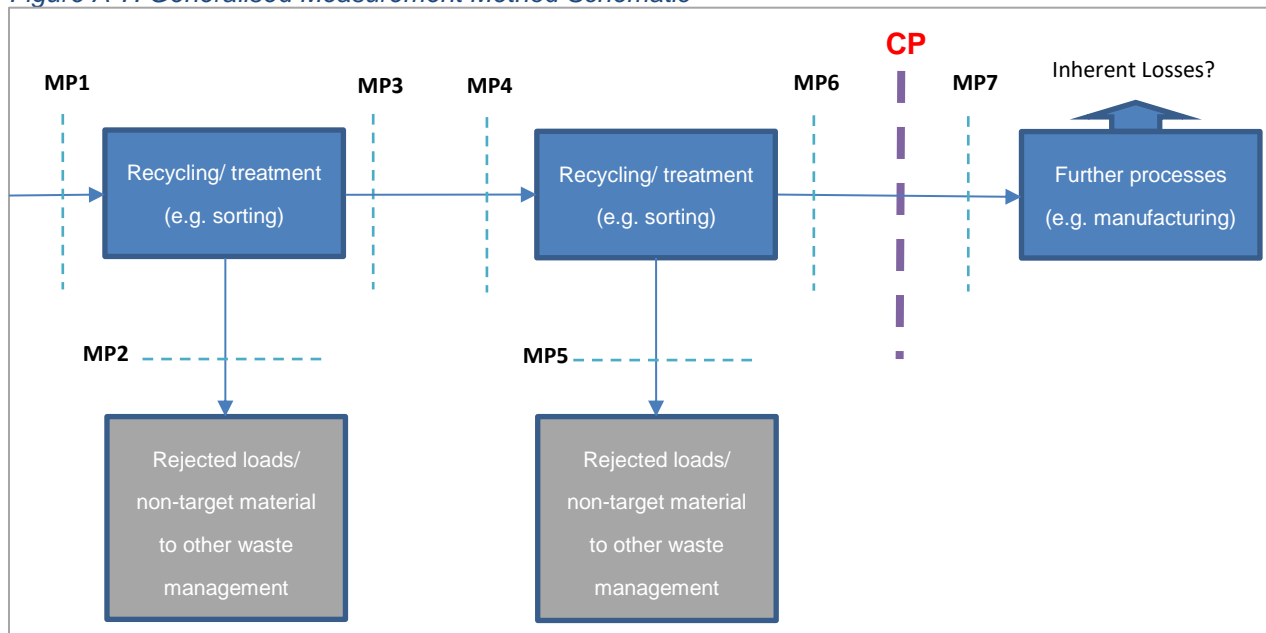
Figure A-7. The weight of material at the Calculation Point should be calculated and reported for each material in-line with the reporting formats in the Implementing Act. Some rules should be considered:

- Some amount of moisture added to the waste after any point at which that waste or product is weighed for inclusion in the denominator (e.g. waste generated) may need to be adjusted for within the amounts reported at the Calculation Point (see Section A.2.4 below for further detail on this).
- It can be assumed that the weight of material at the output of one operation is equivalent to the weight of material at the input to the next operation (except in cases where entire loads are rejected). Consequently, MP3 = MP4 (output from initial sorting = input to further sorting process) and MP6 = MP7 (output from sorting = input to further processes) as shown in figure A-7.
- The weight of material may be calculated at recycling processes further downstream of MP7 if they provides the more practicable points for measurements. In these cases, it is not necessary to deduct inherent losses (losses in weight of materials or substances due to physical or chemical transformation processes inherent in the recycling operation where packaging waste is actually reprocessed into products, materials or substances) that occur after MP7 from the amount of material calculated as recycled. Some examples of inherent losses that may be relevant to different packaging materials are provided in the table below:

Table A-3: Examples of inherent losses

Material	Example of inherent loss
Plastic	Extruded filter cake (not reintroduced into the recycling process)/ fine dust
Biowaste	Water/ CO ₂
Metals	Slag
Glass	Glass fines
Paper/ board	Inks/ dragged fibres

Figure A-7: Generalised Measurement Method Schematic



In this example, therefore, there are a number of ways to calculate the weight of material at the Calculation Point (CP):

- $CP = MP7$
- $CP = MP6$ (only if there are no inherent losses before MP6)
- $CP = MP4 - MP5$
- $CP = MP3 - MP5$
- $CP = MP1 - MP2 - MP5$

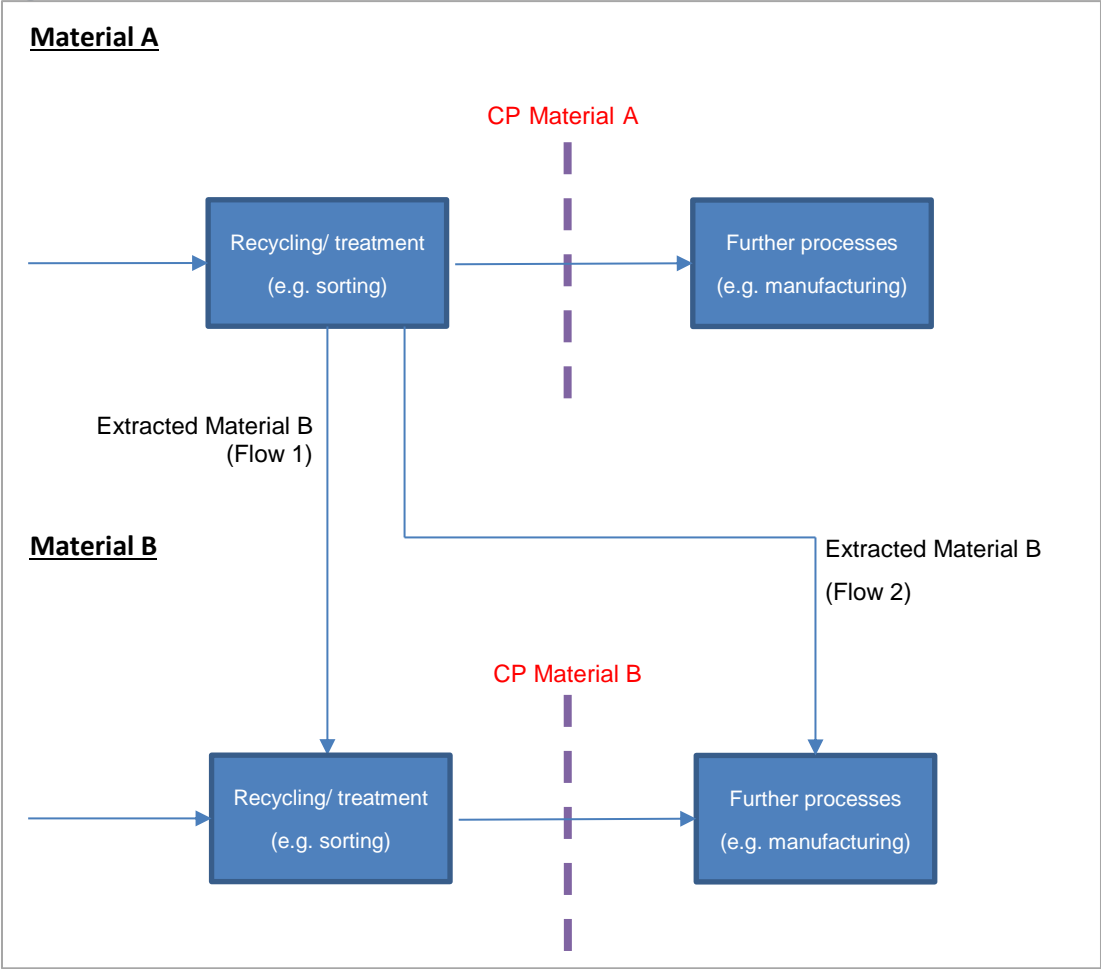
This Measurement Method approach should be applied to each material flow as relevant to the individual Member State. Example flow diagrams are given in Section A.2.2 above.

In this regard, consideration will have to be given to composite packaging (i.e. packaging composed of more than one material), which, as per Decision 2005/270, shall be calculated and reported per material contained in the packaging, except where a given material constitutes an insignificant part of the packaging unit, and in no case more than 5% of the total mass of the packaging unit.

In addition, consideration should be given to the flows of materials from a given recycling process that are sent for further recycling, but are not primarily being targeted by the recycling operation for which the material is being accounted for. The different recycling flows would have to be considered on a national level by the Member States to ensure that this material was included in the amounts reported as recycled. The key consideration is that these output flows may, or may not pass the Calculation Point related to the other material(s). This is exemplified in Figure A-8. In the case of flow 1, material B, which is not primarily targeted by the recycling operation for material A, is sent to a recycling operation where the output is prior to the Calculation Point for that material. In the case of flow 2, material B may not need further sorting before being accepted as a secondary raw material in further processes. In this case, although the material has been recycled, it would not be

accounted for under material A or B. Consequently, a clear mechanism is required to understand the fate of material B to avoid double counting. For example, it may be preferable to set a Calculation Point for Material B at the output of the process targeting Material A, if it is clear that Flow 2 does not pass a Calculation Point for Material B.

Figure A-8: Generalised Schematic Related to Cross-material Flows



A.2.4 Obtaining data at the Measurement Points

As discussed above, a range of Measurement Points could be used with certain associated formulae used to calculate the weight of material recycled at the Calculation Points. Some further consideration around obtaining such data is now given.

With regards to packaging, the preferred Measurement Point is the total output weight of targeted material(s) (i.e. the material which the recycling operation is targeting to be sold as a secondary raw material, where no further processing is undergone). This will generally be a known quantity, as financial transfers (gate fees or payments for materials) will generally be related to the amount, in tonnage, of material quantities purchased or sold. These data could be submitted by plant operators to provide actual weight data for this type of Measurement Point, which corresponds to the Calculation Point (see MP 6 in

Figure A-7). Note, any loads rejected after this Measurement Point from downstream quality checking procedures would have to be deducted from the amount to be consistent with Decision 2005/270, so that the amounts reported as recycled are not overestimated.

Alternatively, the total plant input (i.e. the weight of material received at the plant) can be used as a Measurement Point. This is, once again, highly likely to be known as financial transfers are likely to be made in relation to material quantities recycled/ treated. These data could be submitted by plant operators to provide actual weight data for this type of Measurement Point. This weight should relate to the amount of material accepted by the plant, and should not, therefore, include the weight of material rejected after any initial quality checking procedures.

A final Measurement Point for packaging is the total output weight of non-targeted material (i.e. the material, which the recycling operation is not targeting). This is very likely to be known as this material will be sent on to further operations that might include recovery or disposal operations, and related financial transactions will generally be made on the basis of the quantity (and quality) of what is sold. These data could be submitted by plant operators to provide actual weight data for this type of Measurement Point. Note, that if any non-target material is sent to a process where material could be extracted and recycled, an appropriate Calculation Point would need to be defined to ensure any recycled material is accurately reported (also see Figure A-8 above).

Having obtained the data above, moisture within material at the Calculation Points may need to be adjusted for in order to ensure the correct weight (dry or wet) of material is compared with the amount of waste generated. This is particularly important for packaging, for which waste generation is equivalent to packaging normal state and consistent with what is reported for the denominator. Moisture is particularly relevant for paper/board, which absorbs water, although water can also be present in food and drink packaging, and plastic packaging where the weight of the moisture can be a relatively significant proportion of the overall weight of the wet item. Moisture limits in technical specifications could be used to form the basis of factors for correcting for the measured data. Article 5 of Decision 2005/270 sets this requirement:

“...the weight of recovered or recycled packaging waste shall be measured using a natural humidity rate of the packaging waste comparable to the humidity rate of equivalent packaging put on the market.

Corrections shall be made to measured data relating to the weight of recovered or recycled packaging waste, if the humidity rate of that packaging waste regularly and significantly differs from that of packaging placed on the market and if this factor risks leading to substantial over- or underestimates of packaging recovery or recycling rates.”

Accordingly, a natural humidity rate of packaging placed on the market will firstly have to be established through a programme of surveys of each packaging type in each Member State, to be undertaken periodically. This can be compared against the humidity rate for packaging

waste, which tends to be known by recycling buyers (who, in many cases, have established specifications with tolerances for moisture/ humidity content, as this is an important consideration for the recycling process). For those packaging waste types that exhibit a significant variation in natural humidity rates (e.g. the packaging waste humidity rate exceeds the natural humidity rate by 5% or more), more detailed surveys will need to be undertaken, with the aim of establishing a protocol whereby correction factors can be adopted to adjust for such variation. The natural humidity rates thereby established should be deducted from the recycling data received by Member States prior to submission to the Commission, and should be reviewed every couple of years.

It is noted that the European reprocessing industry (particularly for plastic packaging) has confirmed that plant operators will hold data relating to the amount at the Calculation Points (or relevant Measurement Points), so Member State authorities will need to ensure they have the legal means in place to request these data, and systems in place (e.g. electronic registries) to enable these data to be reported efficiently.

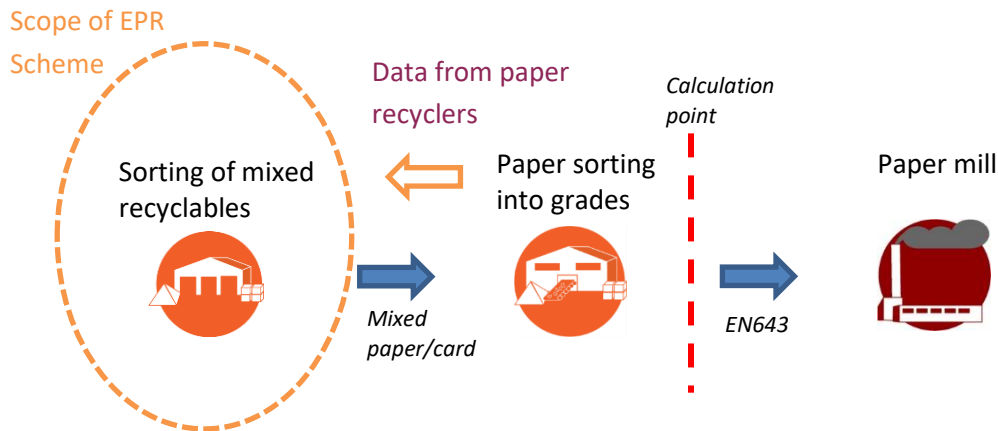
To gather data relating to these Measurement Points, Member States should therefore consider implementation of electronic registries, in order to gather data directly from the various operators in the recycling value chain, as supported by Article 6a(3) of the PPWD Directive):

“3. Member States shall establish an effective system of quality control and traceability of the packaging waste to ensure that the conditions laid down in point (a) of paragraph 1 of this Article and points (a) and (b) of paragraph 2 of this Article are met. To ensure the reliability and accuracy of the data gathered on recycled packaging waste, the system may consist of electronic registries set up pursuant to Article 35(4) of Directive 2008/98/EC, technical specifications for the quality requirements of sorted waste, or average loss rates for sorted waste for various waste types and waste management practices respectively.”

Legal requirements to provide data may be needed at the national level to mandate the submission of the necessary information by private sector operators to the electronic registries. Until such registers are in place, Member States could rely on other data gathering approaches, e.g. from extended producer responsibility (EPR) schemes (subject to these being audited independently to ensure the data are reliable) or surveys of recycling operators and the development of statistical models.

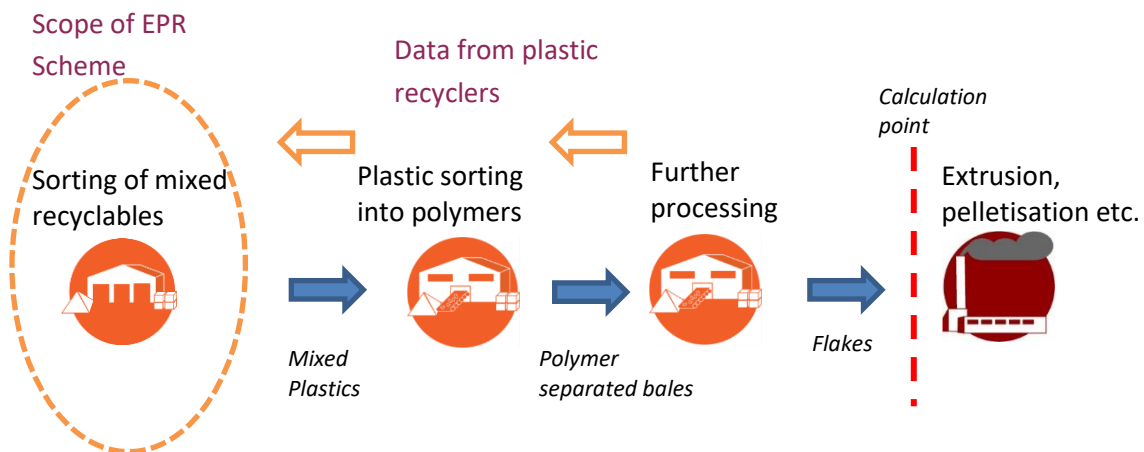
The current scope of reporting from EPR schemes can be limited, as downstream recycling/ treatment operations may not be under the control of the EPR scheme. If data are, in the short term, to be gathered through EPR schemes, they would, therefore, most likely need to obtain data from operators of any further recycling/ treatment plants prior to the Calculation Points in order to gather data on all the relevant Measurement Points. This is exemplified in Figure A-9 when there are two stages before the Calculation Point. For example, the ‘data from paper recyclers’ would have to be obtained by the plant ‘paper sorting into grades’, which may be from plants not currently under the scope of reporting by EPR schemes.

Figure A-9: Potential Data Flows via EPR Schemes for 2-stage Process



The process becomes more complicated when there are three stages before the Calculation Point. This is exemplified by Figure A-10. In this case, data may need to be passed through intermediate companies, if the EPR scheme was to be able to report information on all the Measurement Points. Direct reporting from all operators in the chain would alleviate this problem, and hence, the suggested focus on implementing nationwide electronic registries with mandatory reporting requirements in law.

Figure A-10: Potential Data Flows via EPR Schemes for 3-stage Process



A.2.5 Recycling rate examples

In this section, two example calculations are given of Table 1 to explain how it should be filled in by Member States and how the overall recycling rates will be calculated.

A.2.5.1 Metals from IBA

The following example describes how the cells in Table 1 should be filled in regarding metals from IBA. The total recycling data will include the amounts reported by Member States that chose to report metals from IBA. Eurostat will calculate the recycling rate as total recycling / generation.

Figure A-11: Example of Table 1 regarding metals from IBA

Packaging waste material	Generation			Recycling <small>(The total weight of waste of each material type, at the relevant calculation points)</small>					
	Waste generation ^(a)	Standard footnotes	Explanatory footnote	Recycling in the Member State	Standard footnotes	Explanatory footnote	Recycling in the Member State	Standard footnotes	Explanatory footnote
Plastic									
Wood									
Metal (total) ⁽⁵⁾	100			80					
Ferrous metal	80			70					
Aluminium	20			10					
Ferrous metal from IBA ⁽⁶⁾				10					
Aluminium from IBA ⁽⁷⁾				5					
Glass									
Paper and cardboard									
Other									
Total ⁽⁴⁾	100			80					

Metal (total) (80) = Ferrous metal (70) + aluminium (10)

= Ferrous metal from IBA (10) + ferrous metal not from IBA (e.g. 60)

= Aluminium from IBA (5) + Aluminium not from IBA (e.g. 5)

Recycling Rate = Total Recycling / Generation e.g. = 80 / 100 = 80%

Total (80) = Metal (total) (80) OR Ferrous metal (70) + aluminium (10) + other materials

A.2.5.2 Repair of wooden packaging

If repair of wooden packaging is included by a Member State, the amounts should only be included in the “Repair of wooden packaging” column. They should not also be included in the “Generation” or “Recycling” columns.

Figure A-12: Example of Table 1 regarding repaid of wooden packaging

Packaging waste material	Generation			Recycling <small>(The total weight of waste of each material type, at the relevant calculation points)</small>						Repair		
	Waste generation ^(a)	Standard footnotes	Explanatory footnote	Recycling in the Member State	Standard footnotes	Explanatory footnote	Recycling in the Member State	Standard footnotes	Explanatory footnote	Repair of wooden packaging	Standard footnotes	Explanatory footnote
Plastic												
Wood	100			20						200		
Metal (total) ⁽⁵⁾												
Ferrous metal												
Aluminium												
Ferrous metal from IBA ⁽⁶⁾												
Aluminium from IBA ⁽⁷⁾												
Glass												
Paper and cardboard												
Other												
Total ⁽⁴⁾	100			20						200		

Does not include repair of wooden pallets

Recycling rate = (recycling (20) + repair (200)) / (waste generated (100) + repair (200)) = 220 / 300 = e.g. 73%

Only include repair of wooden pallets in these two cells

Does not include repair of wooden pallets

A.2.6 Metals from incinerator bottom ash (IBA)

Article 6(a)(6) in the revised PPWD outlines that recycled metals separated after incineration of packaging waste can be included in the reporting of the metal packaging recycling targets, stating:

“For the purposes of calculating whether the targets laid down in points (f) to (i) of Article 6(1) have been attained, Member States may take into account the recycling of metals separated after incineration of waste in proportion to the share of the packaging waste incinerated provided that the recycled metals meet certain quality criteria laid down in the implementing act adopted pursuant to Article 11a(9) of Directive 2008/98/EC.”

Article 6(d) in Decision 2005/270, further specifies that

“the amount of recycled metals separated from incineration bottom ash shall be the mass of metals in the metal concentrate that is separated from raw incineration bottom ash originating from packaging waste, and shall not include other materials contained in the metal concentrate such as mineral adhesions or metals that do not originate from packaging waste” and sets out the methodology for calculating the mass of recycled metals separated from incineration bottom ash in Annex III.

This section provides further guidance on the use of the calculation methodology set out in Annex III.

A.2.6.1 Correctly identifying the Calculation Point

The key flows of metals in this case are outlined in Figure A-13. Waste from a range of sources (municipal, including packaging, as well as commercial and industrial wastes) are input to Municipal Solid Waste Incinerators (MSWIs) at point 1. At this point, due to the mixing of wastes, it becomes challenging, if not impossible, to identify the source of waste. The output of the MSWI includes incinerator bottom ash (IBA), which contains *inter alia* metallic elements.

Some processing of the IBA may occur on site. The most common approach is to extract ferrous (Fe) metals through over-band magnets. Although steel is a Fe metal, Stainless Steel (StS) is not magnetic, so it is not extracted through over-band magnets, hence it is identified separately. Some facilities are now also carrying out extraction of non-ferrous (NFe) metals by using eddy-current separators: however, this is less common and most operators chose to send IBA to dedicated processors.

At these dedicated IBA processing sites, the IBA is usually separated into an aggregate fraction for use as a secondary raw material, and two metallic fractions, Fe and a NFe concentrate, the latter including light and heavy NFe metals and StS. The Fe fraction is further processed to shred into different fractions for sale as varying grades, with different technical specifications, to steel plants. The NFe concentrate is sent to further metal recovery

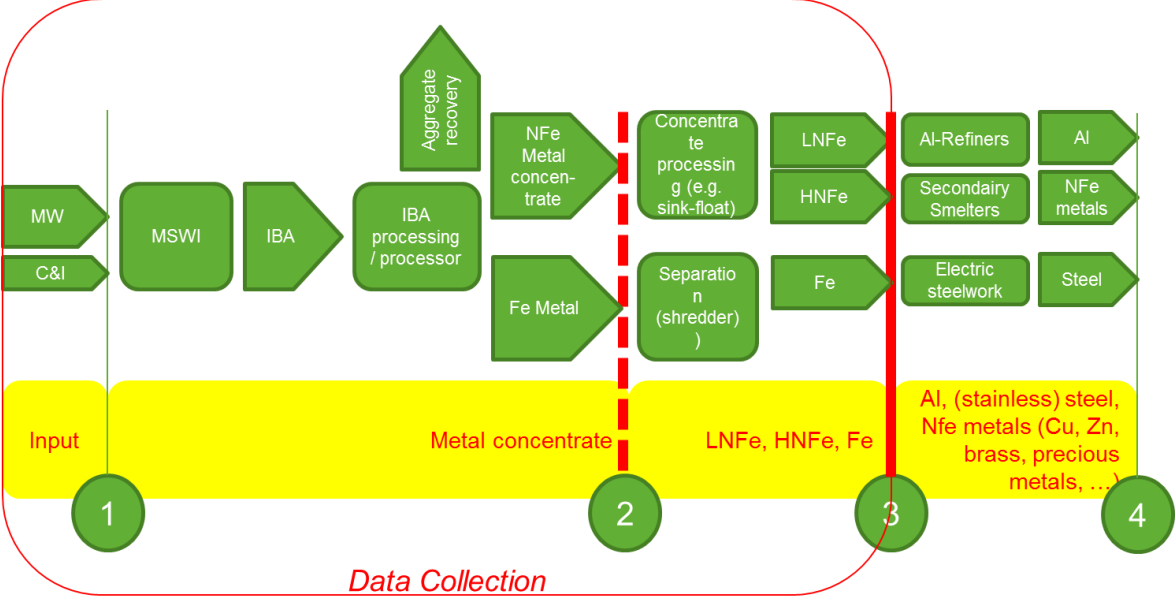
companies that specialise in extracting different metals from a metal concentrate. These processes result in a large number of different fractions, of different metals and particle sizes. The light NFe is almost exclusively aluminium. The heavy NFe would include StS, brass, zinc and other metals.

Based on this material flow, the Calculation Point for accounting metals from IBA as being 'recycled', in-line with the Calculation Points discussed above for other metals (see Section A.2.2.4), should be:

- Sorted metal that does not undergo further processing before entering a metal smelter or furnace

This is represented by point 3 in Figure A-13, which measures only the weight of metal that is actually recycled, and therefore takes any losses into account. Examples of these losses are discussed in the next section.

Figure A-13: Key Metal Flows



Source: CEWEP

A.2.6.2 Allowable measurement methods and obtaining data at the Measurement Points

The Measurement Method for metals from incinerator bottom ash is set out in Annex III of Decision 2005/270. The method is designed to take into account the fact that at the point of input to a furnace or smelter, it may not be possible to determine the source of the material. Therefore, Measurement Points are set to measure the metallic outputs from IBA processing that are sent to furnaces and smelters, and the amount adjusted to take the source of the waste into account.

It is also important to add that, for the aluminium and steel targets, the weight of material counted as recycled is not 'pure' metal atoms, but an aluminium or steel product that may contain alloying elements; these alloys may account for a few percent of the total mass of the

metal. These alloying elements are an integral part of the material, and desired by manufacturers who will mainly use alloyed materials in their products. Thus, the alloys should not be deducted from the weight of aluminium or steel recycled.

The Measurement Method is described under the following four steps.

1. Gather data from facilities that separate metal concentrates from raw incineration bottom ash, and apply the coefficients derived under step 2 to estimate the metallic amounts only, using the formula in Paragraph 3 of Annex III. Fe fractions can be reported under the 'Steel' packaging fraction – along with StS – the aluminium fraction in the metal concentrate under the 'Aluminium' packaging fraction.
2. Use the formulae in Paragraph 4 of Annex III to calculate the coefficients needed to adjust the total metal concentrate figures captured under step 1, which approximate the concentration of ferrous metals and aluminium resulting from the processing of metal concentrates extracted from facilities that separate metal concentrates from raw incineration bottom ash.
3. As per Annex III, this shall be calculated by using data collected by regular surveys from facilities that process metal concentrates and from other facilities that use metals separated from incineration bottom ash to produce metal products. The coefficients require an understanding of the total plant input and total metallic content. This can be determined by studies, spot sampling or available purity data at the treatment plants based on metal concentrate sale (e.g. metal concentrate sale as a proportion of total plant input). According to stakeholders, data should be available at the plant level for the three main fractions, Fe, NFe and StS. At the Member State level, an average for each of the three key categories should be calculated. Where sampling were used to determine the metallic element of the concentrate, these studies should be statistically significant and repeated at least every 3 years.
4. Apply the coefficients under step 2 to the total amounts of metal concentrate captured under step 1 to estimate the total amount of Steel and Aluminium recycled from incinerator bottom ash.
5. Use the formula under Paragraph 5 of Annex III to estimate the mass of recycled ferrous metals/aluminium originating from packaging waste in all recycled ferrous metals/aluminium separated from incineration bottom ash. This effectively applies a further coefficient (proportion of packaging waste) to the figure calculated under step 3.
6. As per Annex III, this shall be determined through sampling surveys of the waste that enters the incineration operation, which shall be carried out at least every five years and when there are reasons to expect that the composition of the incinerated waste has significantly changed.
7. Such sampling already exists in several Member States. For example, in Belgium, the MSWI operators are required to sample inputs to determine the overall packaging proportion, and in Estonia operators have to sample 4x per year to determine the

proportion of biodegradable wastes in relation to renewable energy support schemes. Therefore, input sampling surveys can be carried out without critical impact on MSWIs. However, to minimise the burden to industry, the surveys could be carried out through a programme funded by the national government, or packaging EPR schemes (relating to packaging), and the approach should be risk based. For example, initially a survey should be carried out on an annual basis. If the variation in the data is small, the survey could then be carried out on a two yearly basis, and again on a five yearly basis. If any surveys see a significant change in the proportions, sampling on an annual basis should start again.

8. The consequence of not carrying out these surveys is that the proportion of packaging is inaccurate, and either over or understates the amount recycled.
9. Finally, an adjustment factor may be needed to address the reduction in the amount of material passing through a MSWI. For example, tin plate is oxidised from the surface of steel cans and thin aluminium foils also oxidise to some extent (see further detail in Section A.2.6.3 below). Therefore, if the input to a MSWI alone is used in the calculation, this would not take such effects into account and may over or underestimate the amount of material counted for under the recycling targets. This may be particularly relevant for the aluminium packaging target, where thin packaging foils are more subject to these issues, thereby reducing the relative proportion of the recovered light NFe metals that are from packaging sources compared to the input. Member States should seek to assess the significance of such losses through reviewing relevant evidence and make the necessary adjustments.

A description of the methodological approach(es) taken should be described under question 3.2.11 of the Quality Report.

For voluntary reporting of data under the new rules in 2020, where surveys of incinerator plants, bottom ash and metal concentrates do not currently exist, Member States may use average values from the survey results under the Measurement Method study (see Section 6.0 Task 4 of the final study report).¹⁹

A.2.6.3 Losses within the incineration process

Metals passing through incinerators undergo, to varying degrees, a number of physical and chemical transformations. The extent of the transformations depends on the physical and chemical structures of the metals themselves and how they tolerate the conditions (such as high temperatures and varying levels of oxygen) to which they are exposed during the incineration process. These transformations are important to consider in the context of metal packaging because:

- they may reduce the volume of metals which end up in IBA;

¹⁹ Eunomia et al (2019) *Study to Support the Implementation of Reporting Obligations Resulting from the New Waste Legislation Adopted in 2018*, Final Report for the European Commission DG Environment under Framework Contract No ENV.B.3/FRA/2017/0005, <https://op.europa.eu/en/publication-detail/-/publication/3d72ef00-bcac-11e9-9d01-01aa75ed71a1>

- they may alter the properties of metals in a way which affects the efficiency of their removal and subsequent recycling; and
- the effects may vary across packaging and non-packaging waste streams (where relevant material-specific recycling rates apply).

This could have implications for the calculation of the recycling rate for metal packaging that is incinerated. Although all metals will undergo transformation to some extent, aluminium is of particular interest because it is commonly used for consumer packaging and is one of the metals commonly removed from IBA for recycling.

The literature indicates that several small-scale laboratory, and site-based, tests have been conducted on how aluminium behaves through the incineration and IBA treatment process. There is still, however, a degree of uncertainty around the exact way losses may occur in the incinerator. The main transformations that aluminium can undergo are as follows:

- The presence of oxygen and high temperatures means that the exposed aluminium may undergo oxidation into aluminium oxide. Aluminium will melt at around 660°C, and this melt often gains an aluminium oxide skin that encloses it, protecting it from further oxidation.²⁰ This aluminium will form nuggets which will be present in the IBA;
- Very fine particles of aluminium/aluminium oxide can be carried up the flue of the incinerator due to convection, and will be transferred mainly into the air pollution control residues (APCR).²¹
- Some aluminium will react with nitrogen in the air to form aluminium nitride, occurring at around 900°C.²² It is not clear to what extent this is lost via the flue or whether it remains in the IBA (and if it is in the flue gas, whether it may be found in APCR).
- Some aluminium will be lost as a result of volatilisation.²³

Several of the aforementioned tests have sought to determine the influence of different factors on the rates of oxidation and loss to volatilisation/APCR. Factors, which influence these transformations include:

- The characteristics of the metal packaging itself:
 - Surface area to volume ratio. Large pieces of metal which have a small surface area relative to their total mass will experience limited oxidation, whereas small

²⁰ Bunge, R. (2015) Recovery of Metals from Waste Incinerator Bottom Ash. Institut für Umwelt und Verfahrenstechnik UMTEC, April 2015.
http://umtec.hsr.ch/fileadmin/user_upload/umtec.hsr.ch/Dokumente/News/1504_Metals_from_MWIBA__R._Bunge.pdf

²¹ Hu, Y., Bakker, M.C.M, and de Heij, P.G. (2011). Recovery and distribution of incinerated aluminum packaging waste. *Waste Management*, 31, 2422-2430.

²² Bunge, R. (2015) Recovery of Metals from Waste Incinerator Bottom Ash. Institut für Umwelt und Verfahrenstechnik UMTEC, April. 2015,
http://umtec.hsr.ch/fileadmin/user_upload/umtec.hsr.ch/Dokumente/News/1504_Metals_from_MWIBA__R._Bunge.pdf

²³ Biganzoli, L., Gorla, L., Nessi, S. & Grosso, M., (2012). Volatilisation and oxidation of aluminium scraps fed into incineration furnaces. *Waste Management*, 32, 2266–2272.

thin pieces of metal with large surface areas will experience far more pronounced, or even complete, oxidation;

- Particle size is an important factor in oxidation (the greater the particle size the lower the rate of oxidation), and some studies have found thickness to be relevant as well (the thicker the particle, the lower the rate of oxidation);²⁴
- Composition of the packaging (i.e. how much aluminium as compared to other materials such as paper). This can affect the level of oxidation as non-aluminium material can 'protect' the aluminium from oxidation;^{25, 26}
- The conditions in the incinerator:
 - There are differences in the temperature and oxygen availability in different parts of the incinerator and so not all aluminium will undergo the same level of oxidation and/or other transformations;
 - IBA processing, such as quenching of the aluminium with water in the bottom ash, can promote oxidation;²⁷ and
 - PH value and salt contamination are also thought to affect oxidation.²⁸

Oxidation is largely a problem for the recycling potential of the aluminium, because the oxide cannot actually be recovered in the secondary smelter, and it therefore results in a reduced mass of aluminium that can ultimately be recycled. There is a small evidence base relating to quantifying rates of oxidation in aluminium. According to the CEN standard on '*Packaging. Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value*' (EN 13431:2004), thin-gauge aluminium foil (up to 50 µm thick) is considered recoverable in the form of energy, suggesting that it is considered to be fully oxidised. However, it is unclear what evidence underpins this assumption. Laboratory tests have been conducted for which the oxidation level of different aluminium products in municipal waste were determined for several types of consumer products: however these tests measured the incinerator input as compared to the output of recyclate from IBA, therefore also take into account the effectiveness of bottom ash removal techniques. What this research did show is a large difference in the recovery rates between different types of aluminium packaging - thin foil, foil containers and cans (with recovery

²⁴ Biganzoli, L., Gorla, L., Nessi, S. & Grosso, M., (2012). Volatilisation and oxidation of aluminium scraps fed into incineration furnaces. *Waste Management*, 32, 2266–2272.

²⁵ López, F., Román, C., García-Díez, I. and Alg, F., (2013) Energetic Valorisation Of Semi-Rigid And Flexible Aluminium Packaging By Oxidation At High Temperature. Braga, *Wastes: Solutions, Treatments And Opportunities 2nd International Conference*.

²⁶ Biganzoli, L., Gorla, L., Nessi, S. & Grosso, M., (2012). Volatilisation and oxidation of aluminium scraps fed into incineration furnaces. *Waste Management*, 32, 2266–2272.

²⁷ Biganzoli, L., Gorla, L., Nessi, S. & Grosso, M., (2012). Volatilisation and oxidation of aluminium scraps fed into incineration furnaces. *Waste Management*, 32, 2266–2272.

²⁸ Hu, Y., Bakker, M.C.M, and de Heij, P.G. (2011). Recovery and distribution of incinerated aluminum packaging waste. *Waste Management*, 31, 2422-2430.

factors of 77, 88 and 93 wt.% respectively.) It is not known how representative these figures are.

Other studies have found similar variability between packaging types, with the average oxidation levels of the aluminium in the residues of the incineration process as equal to 9.2% for cans, 17.4% for trays and 58.8% for foils. This study also looked at compacted beverage cans, which were characterized by a low overall oxidation level (9.2%) compared to the other materials, due to the reduction in exposed surface area.²⁹

Additional studies looking at oxidation rates for different packaging types report that oxidation never exceeds 17%³⁰, and that the oxidation of aluminium limits the recycling factor to a maximum of 82.5 %, ³¹ though another study reports a third of the mass of aluminium being lost to oxidation.³²

The only available estimation of how much aluminium is lost to APCR estimates this as 10 wt.% from municipal waste.³³ However, this is likely to vary according to different waste compositions and incineration technologies, not to mention, the nature of the flue gas treatment.

A.2.7 Identifying the packaging proportion in multi-stream treatment plants

Figure A-14 provides an example of a recycling value chain for paper where the whole amount of the waste is in-scope (i.e. all the waste material is packaging). In this case, the total weight of recycling at the Calculation Point can be counted under the respective target. However, at Measurement Points further down the recycling value chain, and closer to the Calculation Point, waste from different sources may have been mixed. This means that the weight of material at the Calculation Point may not wholly relate to packaging waste.

²⁹ Biganzoli, L., Gorla, L., Nessi, S. & Grosso, M., (2012). Volatilisation and oxidation of aluminium scraps fed into incineration furnaces. *Waste Management*, 32, 2266–2272.

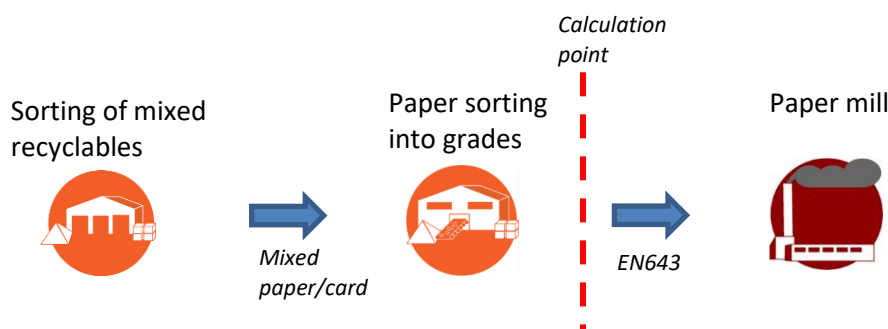
³⁰ López, F., Román, C., García-Díez, I. and Alg, F., (2013) Energetic Valorisation Of Semi-Rigid And Flexible Aluminium Packaging By Oxidation At High Temperature. Braga, *Wastes: Solutions, Treatments And Opportunities 2nd International Conference*.

³¹ Claassens, H.J.P. CO2 emissions in the recovery and recycling of aluminium from MSWI bottom ash. <https://dspace.library.uu.nl/handle/1874/310195>

³² Bunge, R. (2015) Recovery of Metals from Waste Incinerator Bottom Ash, Institut für Umwelt und Verfahrenstechnik UMTEC, April 2015, http://umtec.hsr.ch/fileadmin/user_upload/umtec.hsr.ch/Dokumente/News/1504_Metals_from_MWIBA__R._Bunge.pdf, p. 15/16

³³ Claassens, H.J.P. CO2 emissions in the recovery and recycling of aluminium from MSWI bottom ash. <https://dspace.library.uu.nl/handle/1874/310195>

Figure A-14: Example with total plant input being MSW or packaging



In such circumstances, the total plant output cannot be used to calculate the amount of material contributing to the specific recycling targets at the Calculation Point because this amount would include out of scope material, and therefore, overestimate the recycled amounts for a given target. Therefore, some approach(es) are needed in order to identify the proportion of the total material that should be counted as packaging.

If the plant operators cannot easily determine whether the entirety of the waste entering their plant is packaging, periodic surveys (e.g. at least every 1-2 years) of the supply chain could be carried out to determine average proportions of in-scope wastes in plant inputs, or to develop nationally applicable protocols for individual materials, that could be applied to the total tonnage of all material at the Calculation Point.

It is important, however, that the nature of the classification of packaging wastes and the approaches for identifying the in-scope material are fit for purpose, recognising that packaging is a part of most waste streams and the targets are material specific.

In order to ensure sufficient funding for these activities, it may be appropriate for financing to be sought from packaging EPR schemes in accordance with the new requirements around EPR in Article 8a of the Waste Framework Directive.

Utilising approaches that are based upon the proportion of in-scope waste inputs to plants only assumes that the overall plant losses are equivalent to the losses that may occur if the plant was treating only a packaging stream, in isolation. However, in cases where the losses associated with packaging wastes are different to those of the other waste streams, this may lead to inaccurate data being reported. Consequently, a more detailed approach may be needed to produce reliable data.

Figure A-15 below provides a concept diagram for the situation when the waste is mixed prior to a subsequent sorting/treatment phase, and the proportion of non-target material is different between the 'in-scope' and 'out of scope' waste streams. In the diagram 'in-scope' wastes refer to packaging waste, and 'out of scope' refers to non-packaging wastes, respectively. To calculate the quantity of in-scope wastes recycled, two Source Factors (SFs) are needed:

- SF1: is a factor that describes the proportion of input waste that comes from in-scope sources. As noted above this may be able to be derived from the national waste

statistical system (or from improvements to it) in a straightforward way by sorting plant operators submitting the total inputs to the system from in and out scope sources. However, in some situations the in and out scope waste might have been collected together or mixed prior to arrival at the site. In this case, periodic surveys of upstream waste handling processes may need to be carried out in order to determine the factor. For packaging, including biodegradable plastic packaging, sampling of the waste stream may need to be carried out to determine the proportion at the input — further consideration of sampling methodologies is given below.

- SF2: is a factor that would be applied to the total stream of non-target material leaving the plant. It would not be possible to identify the source of the material at this point. Firstly, periodic sampling (PS) would have to be carried out at point PS1, in order to determine the characteristics of the waste material in the output non-target stream. Sampling at the input, point PS2, for both in and out of scope wastes would then need to be carried out to estimate the proportion of non-target in both streams. These data would then be used to calculate SF2, assuming that the relative proportions of non-target material at the input were the same as at the output. Sampling would be carried out in accordance with standards and to provide an appropriate level of statistical accuracy (e.g. 95% confidence that results are accurate to within +/- 10%).

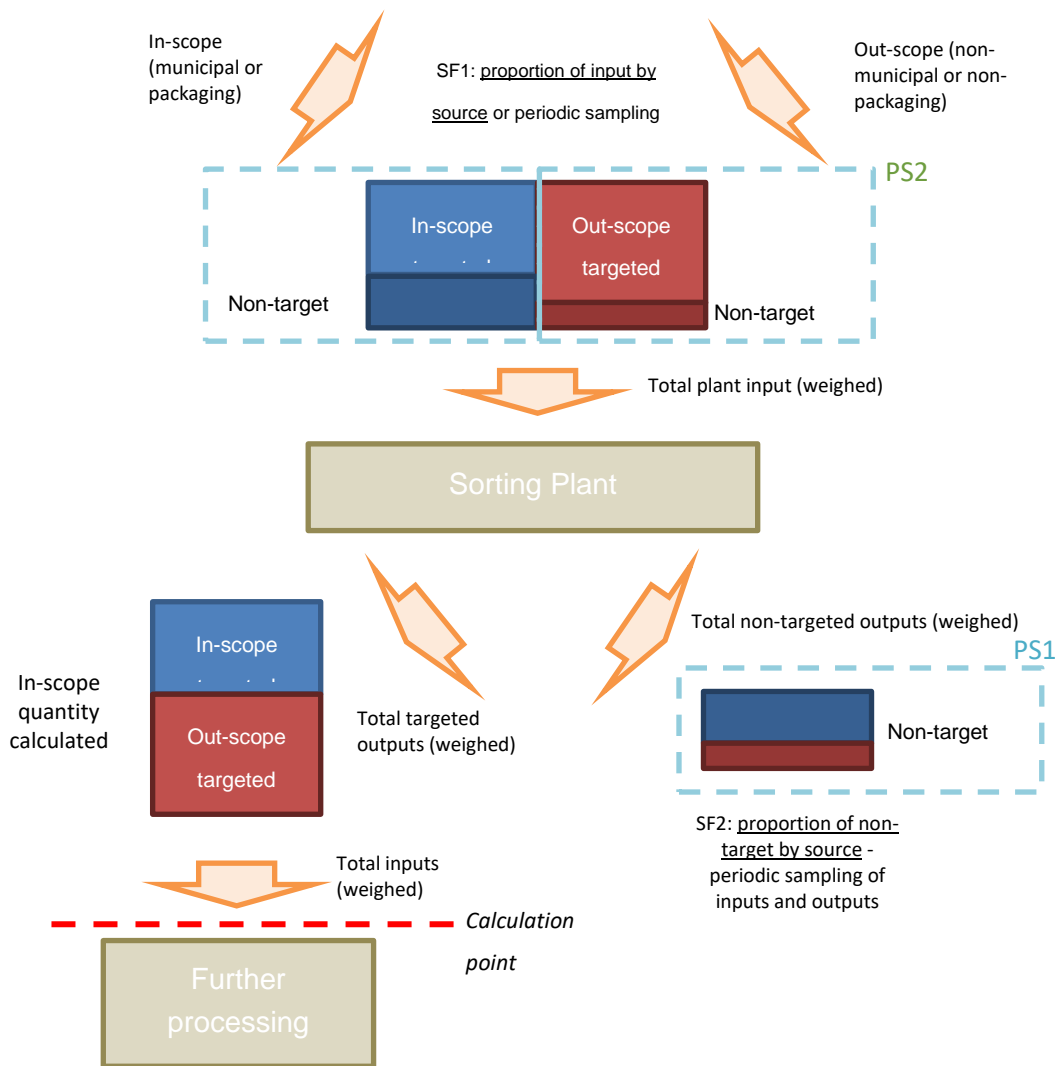
If it were not possible to accurately identify the type of waste (packaging) in the waste streams, batch sampling of each type of wastes may have to be carried out to estimate the relative proportions of non-target material in each type; i.e. a batch of waste from a known source, which was wholly packaging, would be run through the plant and total inputs and outputs measured.

Using this approach, where it proved difficult to sample the output directly (in which case, sampling of the waste at the Calculation Point would indicate the quantity directly), the following calculation could be developed to provide data relating to the amount of in-scope waste recycled at the Calculation Point for submission against packaging waste targets:

$$\text{Recycling (in scope)} = \text{Weight plant input} \times \text{SF1} - (\text{Weight non-target} \times \text{SF2})$$

Further information on sampling standards and methodologies is given in the following section.

Figure A-15: Concept Diagram for Source Calculations



A.2.7.1 Sampling standards and methodologies

Waste sampling needs to be undertaken to a high quality using a consistent minimum standard and accepted procedures in order to ensure valid results. For example, several standards and technical reports already exist at an EU level regarding sampling and analysis of waste, these are:

- EN 14899: Framework for the preparation and application of a Sampling Plan;
- CEN/TR 15310-1: Characterization of waste. Sampling of waste materials – Part 1: Guidance on selection and application of criteria for sampling under various conditions;
- CEN/TR 15310-2: Characterization of waste. Sampling of waste materials – Part 2: Guidance on sampling techniques;
- CEN/TR 15310-3: Characterization of waste. Sampling of waste materials – Part 3: Guidance on procedures for sub-sampling in the field;
- CEN/TR 15310-4: Characterization of waste. Sampling of waste materials – Part 4: Guidance on procedures for sample packaging, storage, preservation, transport and delivery;

- CEN/TR 15310-5: Characterization of waste. Sampling of waste materials – Part 5: Guidance on process of sample defining the sampling plan; and
- BDS EN 15002: Characterization of waste. Preparation of test portions from the laboratory sample.

These standards cover the entire process of waste sampling, from initial planning and preparation of a sampling plan through to final testing of collected samples.

In addition to the European CEN standards, Eurostat publishes a comprehensive Manual on Waste Statistics, which was developed over several years and utilising the experience of multiple stakeholders to develop the methodology. The aim of the handbook is to ensure that waste statistics are comparable and harmonised across Member States due to their importance in EU law. The manual covers the whole process of data collection and statistical distribution: including waste generation and treatment; data collection; data processing as well as guidance on approaches to statistical surveying to generate waste statistics.

In addition, in the UK, there is a compulsory testing and reporting scheme in place for Material Recovery Facilities (MRFs) which sort mixed recyclable waste. The Environmental Permitting (England and Wales) (Amendment) Regulations 2014 contain requirements for MRFs to routinely sample and test:

- the composition of their input streams by individual supplier; and
- their main outputs by material stream e.g. cardboard, paper, etc. (in order to understand the level of not-target materials therein).

MRF operators must report the average (or arithmetic mean) percentage composition of target material, non-target material and non-recyclable material every quarter. The organisation, WRAP, has produced guidance regarding how the samples should be taken and tested.

Finally, initial input from EPR schemes suggests that the use of waste sampling protocols in order to identify the packaging waste proportion for reporting recycling is already underway in several Member States. These protocols vary between Member State EPR schemes, depending on the existing collection and treatment systems, and also by material. However, they are designed to be aligned with Article 4 of the Commission Decision 2005/ 270/EC:

“The weight of recovered or recycled packaging waste shall be the input of packaging waste to an effective recovery or recycling process. If the output of a sorting plant is sent to effective recycling or recovery processes without significant losses, it is acceptable to consider this output to be the weight of recovered or recycled packaging waste.”

A.2.8 Measuring the amounts of packaging composted

According to the calculation rules in Article 6a of the PPWD, biodegradable packaging waste entering composting or anaerobic digestion processes can be counted as recycling under certain circumstances:

“4. For the purposes of calculating whether the targets laid down in points (f) to (i) of Article 6(1) have been attained, the amount of biodegradable packaging waste that enters aerobic or anaerobic treatment may be counted as recycled where that treatment generates compost, digestate, or other output with a similar quantity of recycled content in relation to input, which is to be used as a recycled product, material or substance. Where the output is used on land, Member States may count it as recycled only if this use results in benefits to agriculture or ecological improvement.”

Thus, in practice, in order to include only the amount of biodegradable waste in the calculation, the non-biodegradable part of the waste that may be removed within or after the composting/ anaerobic digestion (AD) process has to be subtracted from the amount of packaging waste measured at input to the process. This can be done by subtracting the amounts sent off site for recovery or disposal from the amount of material entering the plant. Therefore, the Calculation Point should be the entry to a biowaste treatment facility, provided that all materials sent to other treatment options by the facility are subtracted.

Furthermore, although the term ‘biodegradable’ is used in the applicable terminology, it would seem sensible in the case of packaging to link this to the term ‘compostable’ as currently indicated in CEN 13432, thereby discounting material that does not meet the standard, though it may be difficult to estimate this separately.

Relating to the condition requiring benefits to agriculture or ecological improvement, the use of compost standards or end of waste criterion could be used to ensure high quality recycling. The source of the compostable packaging could also be considered. For example, compostable packaging from source segregated sources would be much more likely to lead to higher quality outputs. Indeed, only recycling of source segregated biowaste should be counted under the targets after 2027.

Concerning compostable plastic packaging, a recent study by the Commission found inconclusive evidence regarding the ecological benefit or otherwise of composting this material.³⁴ Consequently, the abovementioned rules alone provide the basis for whether compostable packaging can be counted under the recycling targets or not. **If Member States include any compostable plastic packaging in the amounts recycled, evidence of benefits to agriculture or ecological improvement where the output is used on land must be provided along with the Quality Report.** The amounts of compostable plastic packaging that are included in the total plastic recycling and total plastic waste generation

³⁴ “Relevance of biodegradable and compostable consumer plastic products and packaging in a circular economy” (<https://op.europa.eu/s/n3Rv>)

figures must also be stated separately in tonnage terms in the Quality Report. Details can be provided under question 3.2.3.

However, identifying the amount of compostable packaging waste entering a biowaste treatment facility separately from other types of waste may be challenging if the compostable packaging waste arriving at the site is not separate from other wastes arriving at the facility. Finally, the amount of compostable packaging in the waste stream may change over time, particularly given the increase in the use of compostable plastic packaging. Ensuring these wastes are included in the packaging recycling rates may, therefore, become more important over time.

Surveys could be carried out on plant inputs to estimate the amount of compostable packaging entering the plant. Given the rapid changes in the amount of compostable plastics on the market, the surveys should be carried out on a relatively frequent basis. Indeed, Article 6c(d) of Commission Decision 2005/270 as amended by Commission Implementing Decision 2019/665 states that:

“Where biodegradable packaging that is subject to aerobic or anaerobic treatment is included in the recycled amounts for the respective packaging material, the amount of biodegradable packaging in biodegradable waste shall be determined by performing regular composition analyses of the biodegradable waste entering those operations.”

By way of example, there has been a survey in Italy carried out by the Italian Composting Association (CIC), in cooperation with the PRO for plastics (COREPLA), which included a comprehensive sampling programme of input materials at compost sites. This programme was able to identify a) the amount of fossil-derived plastics (and how much thereof, were bags or packaging); and b) the amount of compostable plastics ending up in compost sites. The survey found that the proportion of compostable plastics in the total weight of material collected through separate food waste collections entering the plants was 1.4%.

In establishing a measurement method for compostable plastic packaging recycled, a key consideration is the total inherent losses, i.e. the weight of inherent losses, such as moisture³⁵ and carbon losses from composting processes. The approach would need to take account for the fact that the moisture content in the waste at the Calculation Points should be what it should be in its normal state and consistent with what is reported for the denominator i.e. waste generated. Therefore, it would need to ensure only moisture relating to the clean and dry weight is deducted from the weight of material counted as being recycled at the Calculation Points, not any further moisture that is removed as an inherent loss in the composting process.

³⁵ Unlike mechanical recycling, in which recycling data must be adjusted to account for the humidity rate of packaging waste relative to the natural humidity rate of the associated packaging (see Section 7.1.3), moisture is considered an inherent loss from the composting process and therefore need not be deducted from any compostable packaging recycling data submitted.

Moreover, it is important that compostable plastic packaging that is not fully composted is not included in the amounts recycled. This is consistent with Article 6c (d) of 2005/270, which states that:

“Biodegradable packaging waste that is removed before, during or after the recycling operation shall not be included in the recycled amounts.”

A.2.8.1 Processes where recycling and energy recovery of biowaste are combined

There are processes, which treat separately collected biowastes, or materials derived from biowaste, in which the treatment process from which the output materials are derived leads to the derivation of energy carriers. One example already discussed above is anaerobic digestion (AD), where the anaerobic degradation of biomass leads to the generation of methane, which can be used for various purposes (in combined heat and power generation, or after further cleaning, for use as vehicle fuel, or for injection into the gas network, typically for use as heating fuel). In this case, subject to the output material being used as a product, material or substance, then the input material, net of non-biodegradable rejects, is deemed to be recycled.

As noted above, it is not the intention of the Directive (Art. 6a(5)) to count material as being recycled where end-of-waste materials are used as fuels or other means to generate energy:

“However, end-of-waste materials to be used as fuels or other means to generate energy, or to be incinerated, backfilled or landfilled, shall not be counted towards the attainment of the recycling targets”

Where compostable packaging waste is concerned, therefore, it is clear that sending the residues from biological treatment for incineration (including pyrolysis and gasification) would mean that the material could **not** be considered to have been recycled.

A.2.9 Guidance on proving compliance with requirement to ensure all waste outside the EU is treated under broadly equivalent conditions

Article 4 of Decision 2005/270 states that:

“1. For the purposes of calculating and verifying attainment of the targets set in points (a) to (e) of Article 6(1) of Directive 94/62/EC, packaging waste exported out of the Union shall be counted as recovered or recycled only if there is sound evidence that the recovery and/or recycling took place under conditions that are broadly equivalent to those prescribed by the relevant Union legislation.”

In considering how Member States can provide evidence that waste is being exported to facilities where broadly equivalent conditions apply, it was noted that there is currently no “off the shelf” standard or certification that a facility can obtain that would show that it meets the test of broad equivalence.

Member States previously expressed interest in the Commission preparing an approved list of facilities and/or countries where broadly equivalent standards were in place, recognising that it makes little sense for each Member State to make its own individual assessment if the standard is to be applied in a consistent manner, and an EU-wide approach could reduce administrative costs (e.g. around the translation of documents received from receiving countries) and produce greater harmonisation. However, there was also concern regarding whether this was an appropriate role for the Commission, whether the Commission was resourced to undertake such assessments, and whether an EU-wide approach might give rise to problems in relation to WTO rules on non-discrimination.

Accordingly, the guidance in the following sections has been provided for Member States to assist them in meeting their obligations under Art. 6a(8) of Packaging and Packaging Waste Directive regarding recycling exports and proving compliance with this requirement. This includes the interpretation of the term “broadly equivalent”, establishing whether broadly equivalent conditions are in place, and addressing potential statistical issues.

A.2.9.1 A definition of “broadly equivalent conditions”

An appropriate definition might be as follows:

“A receiving facility that operates under ‘broadly equivalent conditions’ to those in place within the EU is one that operates under a system of rules that broadly replicates the requirements of the acquis that help guard against, or limit, negative environmental impacts arising from the facility.”

While the language used varies slightly between different pieces of legislation, there is no significant difference between formulations such as “broadly equivalent conditions” and “broadly equivalent standards”, not least since, apart from in the case of WEEE, codification of the implied conditions within a set of standards has not taken place.

It is noted that the relevant standards that must be met in order to achieve broad equivalence are the laws on:

- The licensing and operation of waste facilities;
- Emissions to air; and
- Emissions to water,

Therefore, the standards that are relevant are those that relate to the environment, including environmental laws focused on human health. These include:

- The receiving facility should be subject to a permitting system, in line with Chapter IV of Directive 2008/98/EC;
- The receiving facility should be subject to an inspection, record-keeping and enforcement system, in line with Chapter VI of Directive 2008/98/EC;
- For processes that fall under Annex I of Directive 2010/75/EU (e.g. the processing of metals, and the handling of any residues that may not be suitable for recycling), the

facility should conform with the requirements of Directive 2010/75/EU³⁶ on industrial emissions regarding permits, inspections, record keeping and enforcement; and

- The receiving facility should maintain adequate records to demonstrate the fate of the material it receives (e.g. the proportion that is recycled (and who purchases the material), the quantity that is rejected or lost through processing (and how such material is managed).

In line with the requirements of Article 27 of Directive 2008/98/EC, these requirements shall also take account of the standards set out in any relevant Best Available Techniques reference document, in particular the Best Available Techniques (BAT) Reference Document for Waste Treatment³⁷ and any sections of BAT Reference Documents for the production of materials insofar as they relate to techniques specific to the use of waste material as feedstock, such as the BREFs for:

- Pulp, Paper and Board³⁸;
- Iron and Steel³⁹; and
- Non-ferrous Metals⁴⁰.

Where receiving facilities would, if within the EU, be subject to Directive 2010/75/EU, the permitted limit values for emissions should be in line with any relevant BAT Reference Documents, as required by Article 14 of the Directive. A key example would be facilities that process secondary metals.

The use of the term “broad equivalence” rather than “equivalence” implies that the standards met by receiving facilities need not be identical to those in the EU, or achieve exactly the same results. However, it would be difficult to demonstrate broad equivalence if any of the issues covered by EU law are entirely unaddressed in the standards that the facility must meet, or if those standards (or the performance achieved) are substantially lower than would be required in the EU.

Recycling facilities that meet these requirements – not necessarily exactly as specified in EU law, but achieving the same or very similar effect – should be regarded as operating under conditions that are broadly equivalent to the requirements of the relevant Union environmental law.”

There is a separate point, which relates to the processes that may handle residues from recycling operations that receive waste from EU Member States. Any recycling operation

³⁶ Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334, 17.12.2010, p. 17–119)

³⁷ European Commission (2018) Best Available Techniques (BAT) Reference Document for Waste Treatment, 2018, http://eippcb.jrc.ec.europa.eu/reference/BREF/WT/JRC113018_WT_Bref.pdf

³⁸ DG JRC (2015) Best Available Techniques (BAT) Reference Document for the Production of Pulp, Paper and Board, 2015, http://eippcb.jrc.ec.europa.eu/reference/BREF/PP_revised_BREF_2015.pdf

³⁹ Joint Research Centre (2013) Best Available Techniques (BAT) Reference Document for Iron and Steel Production, January 2013, http://eippcb.jrc.ec.europa.eu/reference/BREF/I&S/IS_Published_0312.pdf

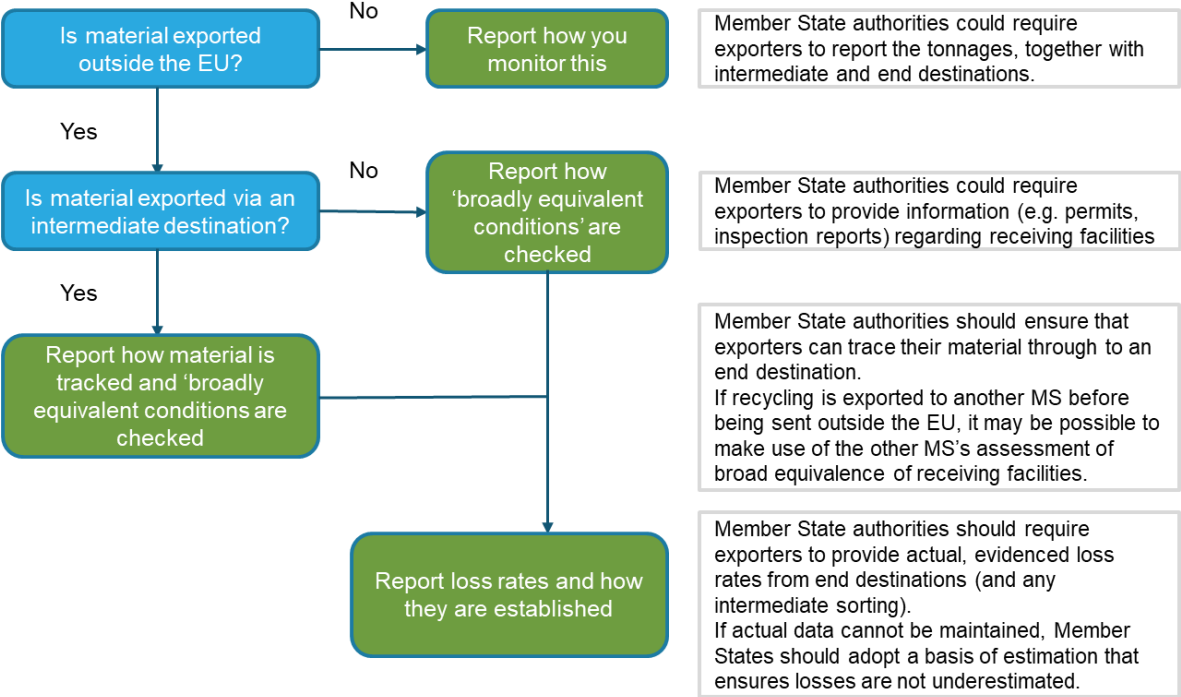
⁴⁰ Joint Research Centre (2017) Best Available Techniques (BAT) Reference Document for the Non-Ferrous Metals Industries, 2017, http://eippcb.jrc.ec.europa.eu/reference/BREF/NFM/JRC107041_NFM_bref2017.pdf

leads to the generation of some, hopefully small, quantities of residues, and these may be subject to treatment / disposal operations as opposed to recycling operations. There is an argument that the 'broadly equivalent conditions' should extend not only to the receiving facility itself, but also those facilities used to deal with residues. Indeed, there are reasonable economic and environmental arguments for requiring this.

A.2.9.2 Guidance on establishing whether broadly equivalent conditions are in place

In order to evidence that they have established that broadly equivalent conditions are in place in receiving countries/facilities, Member States (and the responsible bodies within them) will need to make more consistent assessments as currently done in practice of whether broadly equivalent conditions are in place at potential receiving facilities. A proposed process for doing so is shown in Figure A-16.

Figure A-16: Outline Monitoring and Reporting Process



This is supplemented by the following guidelines:

- Regarding materials that may be of greater or less significance from the point of view of exports, examples include:
 - glass and biowaste will rarely be exported from the EU, and it may be appropriate to take a proportionate approach to seeking to validate that no such material has been exported;
 - exports of plastic and paper are commonplace, and associated with concerns regarding quality, loss rates and leakage. Exports therefore require more careful scrutiny;

- metal recycling operations can give rise to high levels of industrial emissions, and processes that within the EU would be subject to the Industrial Emissions Directive, and therefore require scrutiny focussed on the emissions from facilities; and
- any recycling operation may give rise to residues and losses that require disposal and Member States should require information regarding the treatment of these materials – which must also take place under broadly equivalent conditions.
- Regarding the types of positive evidence that might demonstrate whether, in general, exports to a particular country may be permissible, examples might include:
 - Documentary evidence of the existence of an effective system of permitting that applies similar operating requirements and emissions limit values for emissions to those in force in the EU;
 - Documentary evidence of the existence of an effective system of inspection and enforcement, including steps being taken to deal with non-compliant facilities; and
 - Documentary evidence regarding the disposal/treatment arrangements for residues and losses.
- Regarding the types of evidence positive evidence that might demonstrate whether, in particular, exports to a particular facility may be permissible, examples might include:
 - The facility's operating permit, showing that it is required to meet appropriate standards regarding site operations, emissions and the handling of residues/losses;
 - The facility's inspection and compliance record, demonstrating that the required standards are in fact being met; and
 - Independently audited quality standards met by the facility, potentially providing additional assurance that appropriate procedures are being followed.
- On the use of negative evidence that might indicate that, irrespective of other evidence, a country or facility is not applying broadly equivalent conditions, examples might include:
 - Inspection or enforcement records that indicate that the facility is failing to meet the required standards;
 - Credibly sourced NGO and/or news reports highlighting poor practice in a country, which may undermine the plausibility of documentary evidence regarding the country's permitting system;
 - Concerns regarding specific facilities that may undermine the plausibility of their inspection record, including evidence of:
 - The absence of appropriate perimeter fencing to ensure that only authorised persons enter the facility;
 - A lack of proper storage arrangements to prevent waste materials escaping the facility, e.g. as a result of wind or rain;
 - The use of uncontrolled burning at the facility;
 - Unabated discharges to the atmosphere from controlled combustion;
 - Discharges of chemical effluent to local watercourses; and

- The use of uncontrolled dumpsites or fly-tipping to dispose of residues and material removed from the recyclate through sorting.

Where concerns arise, it may be appropriate to undertake steps such as seeking additional information from the country or facility, or undertaking a site visit (if the facility or country is of particular importance in terms of scale).

If the evidence gathered provides good reason to believe that the receiving facility is not carrying out recycling operations under broadly equivalent conditions to those that apply within the EU, the Member State should ensure that no further exports to that facility are counted as recycled until evidence is obtained that broadly equivalent conditions have been reinstated reliably.

A.2.9.3 Guidance on common statistical issues

The following guidance relates to addressing common statistical issues.

- A Member State that asserts that it does not export any recyclate outside the EU should provide an evidence trail that supports this claim – especially where recyclate may be transported to another Member State as an interim destination before being sent to its final treatment destination.
 - It remains the responsibility of the originating Member State to evidence that material it claims towards its recycling target has been recycled.
 - It is difficult to demonstrate conclusively a negative claim (i.e. that no exports took place). So, such Member States should provide evidence that their material was sent to recycling operations within the EU, for example by providing a comprehensive list of the end destinations for each material stream, the approximate tonnage treated at each, and the means by which they validated that this was in fact the end destination.
- Where recyclable waste is transported between Member States prior to export outside the EU, this can give rise to tracking issues. A review of the implementation of the Waste Shipment Regulations⁴¹ found that there were significant misreporting. For example, where one Member State's estimate of exports of waste to another Member State do not match the latter's estimate of imports from the former. Poor traceability undermines the ability of Member States to demonstrate that exported waste is recycled under broadly equivalent conditions, and will need to be addressed if Member States are to be able to do so in future.

Therefore, Member States are likely to need to monitor the tonnage and destinations (both intermediate and end) of 'green list' wastes in order to demonstrate that such material is being recycled under broadly equivalent conditions.

- Wherever possible, Member States should obtain from exporters actual data on the quantity of material that is ultimately recycled. Where this is done, Member States should describe how actual data from the overseas facilities receiving the material was obtained. However, where material passes through intermediate destination and perhaps becomes mixed with similar material from other sources, it can become more

⁴¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02006R1013-20180101>

difficult to calculate the quantity of material originating in a particular Member State that is ultimately recycled.

- Where direct information on rejects, residues and losses cannot be obtained, Member States should adopt an approach to estimating losses. Any such approach should be based on a clear rationale that ensures that the proportion that is recycled is not overestimated.
- The loss rate for exported waste should not be:
 - Lower than the estimated percentage of contamination found in material of a particular type that is exported from the Member State;
 - Lower than the loss rate for material reprocessed domestically, or in neighbouring Member States.
- Where an estimated or default loss rate is used, Member States should explain the basis on which it has been selected and provide a rationale for its use. Further guidance on applying average loss rates is provided in the next section.

A.2.9.4 Information sharing

In order to minimise duplication of effort, the sharing of information regarding broadly equivalent conditions is encouraged. In practice, some Member States already make use of assessments carried out by others.

While having regard to the commercial confidentiality of contracts that exporters may have entered into, Member States should publish their assessments of countries and facilities – including those deemed not to have broadly equivalent standards in place – and respond positively to requests from other Member States’ authorities to share the evidence on which their assessment has been based.

The Commission may consider collating and publishing Member States’ assessments; and may wish to highlight where there are inconsistencies between assessments so that Member States can review whether an appropriate assessment has been made. The Commission could also include details regarding the date on which assessments were made, so that other Member States can decide whether they are sufficiently up to date to be able to be relied upon. Further details will be provided in the case such as system of information sharing is setup.

A.2.10 Applying the average loss methodology (to be completed once delegated act is finalised)

A.2.10.1 Application of the average loss rate (ALR)

Under Article 6a(3) of the Packaging and Packaging Waste Directive, ALR may be applied in certain circumstances:

“By way of derogation from the first subparagraph, the weight of packaging waste recycled may be measured at the output of any sorting operation provided that:

(a) such output waste is subsequently recycled;

(b) the weight of materials or substances that are removed by further operations preceding the recycling operation and are not subsequently recycled is not included in the weight of waste reported as recycled.

3. Member States shall establish an effective system of quality control and traceability of municipal waste to ensure that the conditions laid down in point (c) of paragraph 1 of this Article and in paragraph 2 of this Article are met. To ensure the reliability and accuracy of the data gathered on recycled waste, the system may consist of electronic registries set up pursuant to Article 35(4), technical specifications for the quality requirements of sorted waste, or average loss rates for sorted waste for various waste types and waste management practices respectively. Average loss rates shall only be used in cases where reliable data cannot be obtained otherwise and shall be calculated on the basis of the calculation rules established in the delegated act adopted pursuant to Article 11a(10) of Directive 2008/98/EC.”

Recital 15 of the Waste Framework Directive provides further guidance:

“(15) The calculation of the recycling targets should be based on the weight of packaging waste which enters recycling. As a general rule, the actual measurement of the weight of packaging waste counted as recycled should be at the point where packaging waste enters the recycling operation. Nevertheless, in order to limit administrative burdens, Member States should, under strict conditions and by way of derogation from the general rule, be allowed to establish the weight of packaging waste recycled on the basis of measuring the output of any sorting operation. Losses of materials which occur before the waste enters the recycling operation, for instance due to sorting or other preliminary operations, should not be included in the waste amounts reported as recycled. Those losses can be established on the basis of electronic registries, technical specifications, detailed rules on the calculation of average loss rates for various waste streams or other equivalent measures. Member States should report on such measures in the quality check reports accompanying the data which they report to the Commission on waste recycling. The average loss rates should preferably be established at the level of individual sorting facilities and should be linked to the different main types of waste, different sources (such as household or commercial), different collection schemes and different types of sorting processes. Average loss rates should only be used in cases where no other reliable data are available, in particular in the context of shipment and export of waste. Losses in weight of materials or substances due to physical or chemical transformation processes inherent in the recycling operation where packaging waste is actually reprocessed into

products, materials or substances should not be deducted from the weight of the waste reported as recycled.”

ALRs should only be used when there is no other reliable data available on material losses that occur before the Calculation Point, such as data from electronic registries. The main instance in which ALRs might be applied is where waste is exported for recycling and reliable data on such losses cannot be obtained from the operators in the receiving country. In this case, further conditions as specified under section A.2.11.2 should be applied.

ALRs can be applied at different outputs of sorting processes in the waste management chain, and are dependent upon the source and type of packaging material. After initial sorting, different materials are subject to a range of down-stream processes before the recycling Calculation Point, each with varying loss rates. This is especially true for plastics as different polymer types can follow different recycling processes. It is reported that mixed plastic polymers have high levels of material rejects that are sent for disposal or energy recovery. In comparison, materials that are easier to sort, such as steel cans, typically have much lower reject rates. As such, ALRs for mixed plastic packaging should ideally only be applied after the plastics are separated into different polymer types.

A.2.10.2 Approaches to calculating ALR

Note: the text in this section refers to a draft version of the Delegated Decision on ALR. This section will be updated when the final version is available.

The average loss rate is calculated as the weight of the average losses from sorted packaging waste up until the Calculation Point, in relation to the weight of the sorted packaging waste.

Specifically, under Article 2 of the **Draft Delegated Act on ALR**:⁴²

“3. The amount of average losses is calculated as the sum of the amount of targeted and non-targeted materials that are likely to be removed from sorted waste or from fractions of sorted waste before the calculation point by virtue of practices in preliminary treatment that are used to process significant shares of sorted waste originating from a given Member State (“common preliminary treatment practices”).

The calculation of average losses resulting from common preliminary treatment practices shall take account of the underpinning technology, infrastructure, and, where feasible, of operational aspects of waste treatment.”

ALR can be defined and calculated in different ways. For instance, it can be defined at the national level, by plant type, or on a plant by plant basis. Calculating ALR can be based on data collected in the following ways: periodic surveys to sample losses throughout the chain

⁴² Commission Delegated Decision of XXX laying down the rules for the calculation, verification and reporting of average loss rates for sorted wastes.

from output of sorting to the Calculation Point, using technical specifications regarding the allowable levels of non-target material in certain material streams at the output of sorting, and extrapolating loss rates provided in other Member States.

As stated in the **Draft Delegated Act on ALR** laying down rules for the calculation, verification and reporting of average loss rates for sorted waste, the surveys referred to above should include data from at least one of the following methods:

- sampling of the input and output of preliminary treatment of batches of sorted packaging waste originating from a Member State in waste treatment facilities;
- representative samples from the total input and output of waste treatment facilities carrying out preliminary treatment;
- data on the total annual input and output of waste treatment facilities carrying out preliminary treatment which may be calculated as an average of up to three consecutive years.

The most appropriate approach depends upon a number of factors including:

- The variation in non-targeted material for in-scope waste streams;
- The proportion of input to facilities that is from in-scope waste streams; and
- The variation in overall loss rates for different configurations of sorting operation.

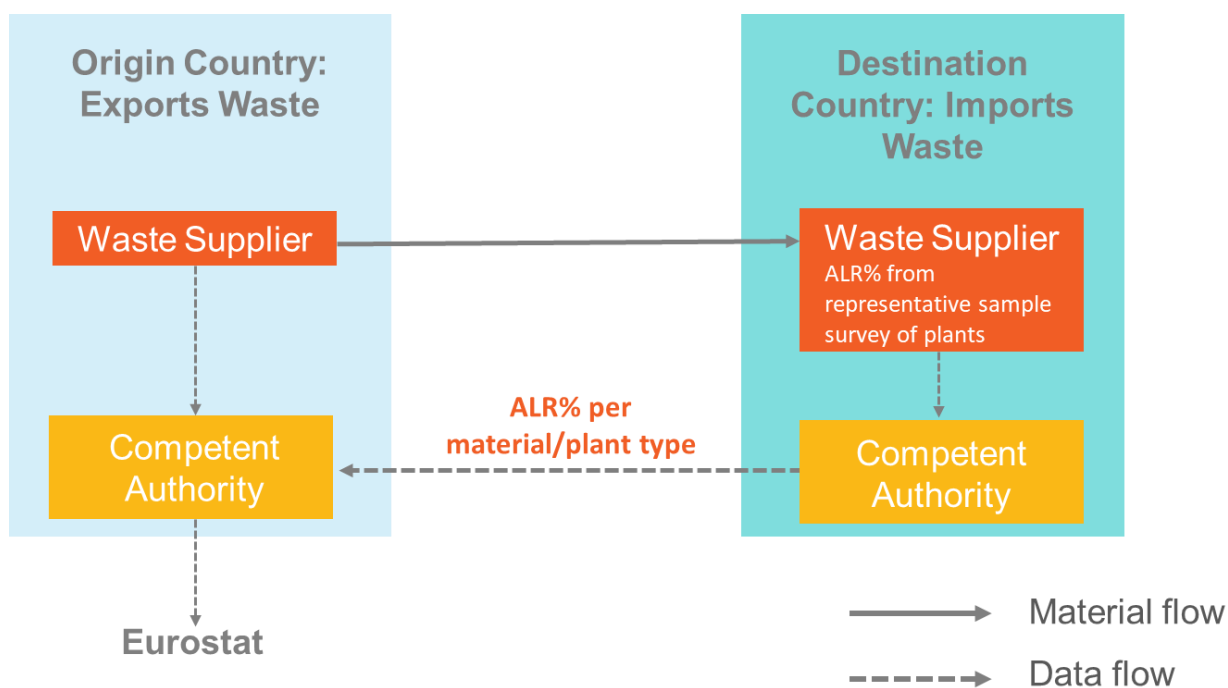
A.2.10.3 Tracking ALR through the recycling chain

Where ALRs are to be applied to packaging waste sent for further treatment in another country, an appropriate mechanism needs to be defined in order to transfer an ALR from the destination country back to the country of origin. This is necessary in order to report the total weight of packaging waste exported, along with a relevant ALR, to the competent authorities in the country of origin of the waste.

Figure A-17 demonstrates the approach to transferring ALRs between Member States. The ALR data is passed between the competent authorities of each Member State – the exact mechanism still needs to be developed, and direct transfer between operators is still within scope of the DA. Requests for ALRs would need to be made by the competent authority and a common categorisation of treatment plant types would need to be developed. Indeed, under Article 6 of the **Draft Delegated Act on ALR**, requirements for administrative cooperation between Member States are set out.

However, it is noted that there are a number of challenges in applying ALRs to exported waste, particularly outside of the EU. The systems described above require other countries and operators to partake in the system, potentially requiring legislation in the destination countries. If such approaches were not feasible, a method for ensuring that non-target material was deducted from the amount of waste reported as exported for recycling would be required. For example, the highest ALR for a given material and process type used anywhere in the EU could be applied to any exports of that type. Alternatively, further studies could be carried out to develop ALRs for various countries to which certain types of packaging waste are exported for recycling. [APPROACH STILL TO BE CONFIRMED – FURTHER GUIDANCE TO BE ADDED]

Figure A-17: ALR Reported between Competent Authorities



A.2.10.4 Data collection and verification

In order to ensure that the ALRs used are accurate, measures should be taken to verify the data used for calculating the ALR and to ensure that the sampling methods used are highly accurate. Under Article 4 of the **Draft ALR Delegated Act**, the following is required:

2. The surveys and other sources of data referred to in the third subparagraph of Article 2(3) shall be carried out at least:

- (a) for the first reporting year for which average loss rates are applied;
- (b) for reference year 2025 and every 5 years thereafter;
- (c) for other years whenever there are reasons to expect significant changes in the amount of materials that are removed due to common preliminary treatment practices

Member States should also take measures to ensure that the sorted waste from the various facilities surveyed is of comparable quality. Member States should conduct verification of the evidence from waste recycling operators at least annually.

Appendix 3 List of relevant documents

The relevant legal acts constitute:

European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Commission Decision 2005/270/EC of 22 March 2005 establishing the formats relating to the database system pursuant to Directive 94/62/EC of the European Parliament and of the Council on packaging and packaging waste

Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste

Commission Implementing Decision (EU) 2019/665 of 17 April 2019 amending Decision 2005/270/EC establishing the formats relating to the database system pursuant to European Parliament and Council Directive 94/62/EC on packaging and packaging waste (notified under document C(2019) 2805)

Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (Text with EEA relevance)

Appendix 4 Suggestion for detailed questionnaire for reusable packaging to be sent by the Member States to the economic operators in the sector.

Detailed disaggregated questionnaire to economic operators for data on reuse of packaging for a given year

1. General information on reporter

Reporting economic operator or EPR scheme	
Company name	
Contact person	
Contact details	
Reporting period	

2. Detailed information

Index	Relation		Unit	
		Confidential	Y/N	
(a)		System for reuse type	Select from given categories	
(b)		Packaging	Free text	
(c)		Packaging material	Select from given categories	
(d)		Category of packaging	Select from given categories	
(e)		Average specific weight per unit (kg)	kg	
(f)	(h)/(k)	Reusable packaging placed on the market for the first time in the reporting period (reporting year)	Tonnes	
(g)	(i*)*(j)	Total number of uses in the system for the reporting year	Number	
(h)	(g)*(e)/1000	Reusable packaging filled or used in the reporting year	Tonnes	
(h*)	(g)*(o)/1000	Reusable packaging filled or used, other unit than tonnes e.g. 'packed volume' in the reporting year	e.g. 1000 litres	
(i)	(g)/(j)* (o)/1000	Population of reusable packaging (unit)	Tonnes	
(i*)	(g)/(j)	Population of reusable packaging (unit)	Number	
(j)	(g)/(i*)	Average number of rotations <u>per year</u> of a <u>single packaging unit</u>	Number	

3. Possible additional information (e.g. relevant for life cycle assessment)

(k)	(h)/(f)	Average number of rotations <u>during lifetime</u> of a <u>single packaging unit</u>	Number
(l)	((h)-(f))/(k)	Reuse ratio	%
(m)		More detailed description of the packaging material like specific plastic used (PE-LD, PE-LLD, PE-MD, PE-HD, PP, PET, ...) or white/ green / brown glass	Free text
(n)		Average transport distance per rotation	km
(o)		Volume of products/ transport provided by one single reusable packaging	Litre

4. Comments to the table above

(a) 'System for reuse': established arrangements (organisational, technical and/ or financial) which ensure the possibility of reuse including open-loop systems and closed-loop systems. Please select one out of the two different types:

- 1 'Open-loop system': system in which reusable packaging is circulated amongst unspecified companies or
- 2 'Closed-loop system': system in which reusable packaging is circulated by a company or a co-operating group of companies.
- 3 'Hybrid system' shall not apply for consideration of reusable packaging.

(b) Please describe the kind of packaging. Typical types of reusable packaging include beer bottles; water and/ or soft drink bottles; milk bottles or other containers for dairy products; crates, boxes, and/ or containers for fruit and vegetables. These typical kinds of reusable packaging might have different characteristics, for instance regarding their specific weight or the number of rotations during their lifetime.

(c) Please select exclusively from the following materials: glass, plastic, paper/ cardboard, ferrous metal, aluminium, wood, others.

(d) Please select exclusively from the following categories: sales packaging, grouped packaging, or transport packaging.

(g) 'Number of uses' is measured at the point of filling or packing by the claiming company. It includes the use of all reusable packaging passing the measurement point (CEN/TR 14520:2007: definition 2.7) regardless if newly manufactured (CEN/TR 14520:2007: definition 2.8) or reused. The claiming company (CEN/TR 14520:2007: Definition 2.4) is the packer/ filler who makes a claim of 'reusable' for a type of packaging, in the circumstances of its intended use.

(h) This means the number of rotations that reusable packaging completes in a given year multiplied by its mass or, in other words, 'the mass of reusable packaging filled with goods' in one year. The definition is equivalent to that in reporting Table 3 columns #8 and

#10 (see Section 4.4). The sum of the masses of the various kinds of reusable packaging filled with goods in one year as reported by the economic operators via the detailed questionnaire equals the aggregated value to be reported to the Commission by the MS (reporting Table 3 column #8; the same sum for only sales packaging equals the value in reporting Table 3 column #10).

(h*) Operators might have data available in units other than tonnes. Not all national reporting systems refer to tonnes of reusable packaging material. For instance, some MS report on beverages only and report the unit as a 'litre of packed beverage'. This reporting unit is most appropriate if the target is also in line with the unit, as the unit better reflects the environmental impact than the tonnage of packaging used. For instance, when conducting a life cycle assessment, the functional unit is the volume of packed beverage and not the tonnes of packaging material.

(i*) 'population': total number of a packaging type, empty or filled, in that whole reuse system (CEN/TR 14520:2007, definition 2.3).

(i) 'population', expressed in tonnes

(j) 'rotation': cycle undergone by reusable packaging from filling/ loading to filling/loading (CEN/TR 14520:2007, definition 2.2).

(l) The 'reuse ratio of reusable packaging' is the reused packaging filled divided by reusable packaging filled (the last including newly manufactured) at the measurement point, over the calculation period. With other words expressed: it is the effectively reused packaging in relation to the total reusable packaging (which included the newly produced reusable).

It is measured by the claiming company. The claiming company (CEN/TR 14520:2007: Definition 2.4) is the packer/ filler who makes a claim of 'reusable' for a type of packaging, in the circumstances of its intended use.

Some of the items in the detailed questionnaire above can be calculated in theory from other items, as displayed in the second column ('relations'). However, a precondition for such calculations is a steady state system. Under conditions when a system is growing, the indicated relations might not be correct.

Depending on the operator and the reuse system in place, the quality of the data might vary. Therefore, we propose asking the economic operators to indicate if the figures result from monitoring/ counting, have been calculated/ derived using the formula for 'relation', or have been estimated from other sources.

Although the data for life cycle assessments are not yet required for the reporting, they will be relevant for the assessment and in particular, when targets for reuse are implemented. Therefore, we recommend that MS aim to collect such information as well in order to provide input for future assessments on targets for the reuse of packaging. Ideally, MS might even derive national conclusions from this information that should be shared with other MS and the EC.

As demonstrated, some MS currently report on packed volume in litres for beverages only. As mentioned, this unit is more meaningful for comparing packaging for beverages than the weight of the packaging, as reusable packaging is typically heavier than one-way packaging. Recalculating between weight and volume would be advantageous, as with information on volumes the market share of total amounts of respective packaging streams can be better illustrated. This might be of special interest for the planned target setting on the reuse of packaging in the future.

However, as reporting of packaging currently needs to be in tonnes it is necessary to be coherent, especially since recycling targets are partly affected by amounts reported on the reuse of sales packaging according to Article 5(2) of the PPWD.

Example of how to complete the proposed detailed questionnaire by economic operators on data on reuse of packaging for a given year

Index	Relation	Unit	Reporter 1		Reporter 2		Reporter 3		Reporter 4		Reporter 5		Reporter 6		
			Y/N	Y	Y	Y	Y	N	N	Y					
		Confidential	Y/N	Y		Y		Y		N		N		Y	
(a)		System for reuse type	Select from given categories	Closed loop		Closed loop		Closed loop		Open loop		Closed loop		Closed loop	
(b)		Packaging	Free text	Beer bottles		Beer/ soft drink crates		Beer casks		Pallet		Containers for vegetables and fruit		Gas bottles	
(c)		Packaging material	Select from given categories	Glass		Plastic		Aluminium		Wood		Plastic		Ferrous metal	
(d)		Category of packaging	Select from given categories	Sales		Sales		Transport		Transport		Transport		Sales	
(e)		Average specific weight per unit (kg)	kg	0.345	m	2.2	m	10	m	25	m	1	m	10	m
(f)	(h)/(k)	Reusable packaging placed on the market for the first time in the reporting period (reporting year)	Tonnes	3 680	m	460	m	235	m	120 000	m	900	m	500	m
(g)	(i*)(j)	Total number of uses in the system for the reporting year	Number	266 428 000	m	12 000 000	m	1 560 000	m	48 000 000	e	52 000 000	m	3 000 000	m
(h)	(g)*(e)/1000	Reusable packaging filled or used in the reporting year	Tonnes	92 000	m	27 500	m	16 400	m	1 200 000	e	67 500	m	30 000	m
(h*)	(g)*(o)/1000	Reusable packaging filled or used, other unit than tonnes e.g. 'packed volume' in the reporting year	1000 litres	133 300	m	n/a	m	47 000	m	n/a		1 250 000	m		
(i*)	(g)/(j)	Population of reusable packaging (unit)	Number	63 435 238	c	2 643 135	c	120 000	m	9 600 000	e	3 465 000	e	750 000	m
(j)	(g)/(i*)	Average number of rotations per year of a <u>single packaging unit</u>	Number	4.2	e	4.5	e	13	m	5	e	15	e	4	e
(k)	(h)/(f)	Average number of rotations during the lifetime of a <u>single packaging unit</u>	Number	25	e	60	e	70	e	10	e	60	e	60	e

Index	Relation		Unit	Reporter 1		Reporter 2		Reporter 3		Reporter 4		Reporter 5		Reporter 6	
(l)	((h)-(f))/(h)	Reuse ratio		96.0%	c	98.3%	c	98.6%	c	89.6%	c	98.7%	c	98.3%	c
(m)		More detailed description of the packaging material like specific plastic used (PE-LD, PE-LLD, PE-MD, PE-HD, PP, PET, ...) or white/ green/ brown glass	Free text	Brown glass		PP		Aluminium		Wood		PP		Steel	
(n)		Average transport distance per rotation	km	55	e	60	e	40							
(o)		Volume of products / transport provided by one single reusable packaging	Litre	0.5				30				24			
m = monitored															
e = estimate															
c = calculated as mentioned in 'relation'															