



Nordic Council
of Ministers

Municipal waste statistics inconsistencies

A Nordic perspective



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Summary

This report encompasses the findings of a project conducted by environmental authorities from Denmark, Iceland, Norway, and Sweden during 2024 and the early part of 2025. The project's overarching aim is to improve understanding and interpretation of published data on municipal waste, drawing attention to the practical and administrative differences that can affect statistics.

The project is funded by the Nordic Council of Ministers. The project's findings are beneficial for EU member states, Eurostat and European policy makers to gain knowledge and insights into municipal waste data and the current challenges associated with methodology and statistics. The project's results and recommendations may contribute positively to the achievement of more accurate and comparable data on municipal waste across countries. Accurate waste data and legislation plays an essential role in facilitating a successful transition to a circular economy, thus reducing environmental impact and promoting sustainable living within our planet's boundaries. Furthermore, all EU member states are committed to the recycling targets set by the EU in the Waste Framework Directive on municipal waste. This necessitates accurate, comparable and comprehensive municipal waste data across all EU member states. The focus has been on improvements in methodology and statistics, and possible other consequences and effects have not been investigated.

The project was initiated since Denmark and Sweden's reported amounts of municipal waste are remarkably different from each other despite the economy and consumption habits being comparable. Thus, this project aimed to discover whether and how the countries' approaches to the common EU methodology on MW differ from each other resulting in different measurements. The project examined the practical application and management of the standard EU methodology for municipal waste across these Nordic countries, discovering considerable inconsistencies in the approach to the common methodology. The central differences in the participating countries' approach to the EU methodology which the project group assess has a significant effect on the municipal waste statistics:

- The national practical operation and legislative organization of data collection. For instance, actors are obligated to report and correspondence between national legislation defining waste and the European municipal waste definition
- Definition of municipal waste, specifically the delimitation of municipal waste related to the waste coming from other sources than households.

Furthermore, the report provides a set of recommendations for necessary alterations and best practices for the methodology in order to enhance the comparability of municipal waste data across EU member states. It further emphasizes the need for more precise definitions of municipal waste. The recommendations are presented in three overall categories related to methodology on municipal waste aimed at policy makers and Eurostat:

- General Recommendations Regarding the Need for Clarification on the EU Methodology on Municipal Waste;
- Recommendations Requiring Amendments to EU Legislation; and
- Recommendations that are Feasible within the Existing Legal Framework.

Lastly, the project group presents four shared recommendations for the best practices in the collection and measurement of municipal waste data. The phrase "best practices" is used here to refer to the most effective approach that should be pursued by fellow EU member states to ensure thorough, precise, and efficient reporting on municipal waste:

- One reporting system;
- Effective communication and guidance of waste reporters;
- Compositional analysis on residual waste for material breakdown of generated MW; and
- Establish additional data collection codes beyond those specified by the EU.

Reader's Guide

This report comprehensively presents the knowledge, competence, and findings of the project group. It should be noted, however, that the scope and validity of the results are inherently bound by the expertise and knowledge that the project group possesses.

The report is structured in a progressive manner with each chapter building upon the previous one. However, the structure also allows for individual chapters to be read independently, accommodating to the specific focus and interest of the reader regarding the project's results. The report consists of the following four chapters:

Chapter 1 *Comparison of Data Collection and Delimitation of Municipal Waste* shares an overview of the countries' statistics on generated municipal waste. Furthermore, the chapter presents the findings from the mapping in the Appendices highlighting the central differences and similarities in the countries' reporting practices, which the project group has identified to be relevant for and affecting the MW statistics. Additionally, including an examination of selected material fractions of MW in order to explore differences in delimitation of MW across countries affecting the MW statistics

Chapter 2 *Comparison of Reporting Practices of Recycled Municipal Waste* presents the findings from the analysis highlighting the central differences and similarities in the countries approach to EU's methodology on recycling of municipal waste. Furthermore, the chapter includes a comparison of how the countries' recycling rate has been affected by the shift from the "old" EU methodology on recycling to the "new" EU methodology on recycling

Chapter 3 *Shared Recommendations for the Methodology on Municipal Waste* presents the project group's shared recommendations for the methodology concerning municipal waste. These recommendations both highlight the project group's identification of issues related to the methodology for municipal waste, suggestions for changes in the guidance and definition that could improve the methodology and statistics. Additionally, the group shares their recommendations for best practices, when applying EU methodology on municipal waste

Lastly the project group shares their conclusive remarks about the project and relevant future studies on this subject

Appendices A–D *Description of each Countries' Waste Management and Approach to EU's methodology on Municipal Waste* provides a comprehensive insight and mapping of each participating country's waste management and approach to the EU's methodology on reporting and calculating generated and treated municipal waste. These appendices can be read independently to gain general knowledge on each country's waste management or for a deeper understanding of the individual country's methodology than provided in the report.

Introduction

Recycling and waste prevention is key to a circular economy. All EU member states must report on the generation and treatment of municipal waste and comply with binding recycling targets set in the Waste Framework Directive. Denmark, Iceland, Norway and Sweden are all at risk of not fulfilling the 2025 recycling target. The Waste Framework Directive, Recital 10 of Directive (EU) 2018/851 and Eurostat Guidance offer the definition and guidance for the delimitation of Municipal waste:

“Municipal waste is defined as waste from households and waste from other sources, such as retail, administration, education, health services, accommodation and food services, and other services and activities, which is similar in nature and composition to waste from households.” (Recital 10 of Directive (EU) 2018/851)

The Waste Framework Directive establishes that the reporting must be done using the EU's methodology. Through dialogue with Eurostat and Nordic colleagues, it has been identified that the practical operation of the harmonized methodology for measurement of municipal waste varies significantly across EU member states, including between the Nordic countries. This challenges the comparability of the countries' data on municipal waste. In 2021 it was concluded that the significant differences in waste data between Sweden and Denmark is probably due to divergent administration of the same EU methodology. The purpose of this project is to investigate this problem further across the Nordic.

This report presents the results from the project on municipal waste carried out during 2024 to the beginning of 2025 by Danish, Icelandic, Norwegian and Swedish environmental authorities. The project maps the practical operation and administration of the existing common EU methodology for reporting generated and treated municipal waste across the participating Nordic countries. The mapping is used for forming shared recommendations for best practices of the EU methodology on municipal waste and recommendations for changes to the methodology, which will improve the comparability of municipal waste statistics.

The report is aimed at fellow EU member states and other interested states (including civil service agents and policy makers) in order to enhance the understanding of data published about municipal waste and highlight some of the issues and practical solutions in the participating countries. Additionally, the report is directed at Eurostat and European politicians in order to highlight the importance of practical and administrative differences on statistics and specific needs for clarifications in the definition of municipal waste and suggestions on changes in the methodology.

This project is funded by the Nordic Council of Ministers as part of the program Vision 2030 (Nordic Council of Ministers, 2020). The project contributes particularly to the visions for "A green Nordic" by enhancing the knowledge of issues related to municipal waste statistics, increasing the future availability of securing more comparable statistics across the Nordic and possible in the EU by highlighting the current issues challenging a streamlined measuring of municipal waste. This is key to reducing our environmental footprint and remaining within the planetary boundaries.

Glossary of terms and abbreviations

Abbreviation or term	Description
ALR	<i>Average Loss Rates</i> for sorted waste It can be used to calculate further losses in order to determine the total amount of waste reported as recycled, as per the Commission Delegated Decision C (2021) 6295 final.
C&D(-waste)	<i>Construction and demolition waste</i>
EPA	<i>Environmental Protection Agency</i> For Iceland it refers to their <i>Environmental and Energy Agency</i> .
EPR (schemes)	<i>Extended Producer Responsibility.</i> "Systems set up to ensure that producers bear the financial or financial and organizational responsibility for the management of waste stage of a product's life cycle." (EUR-Lex, n.d).
EU legal framework	Refers to the Waste Framework Directive 2008/98/EC, Commission Implementing Decision (EU) 2019/1004, Commission Decision 2000/532/EC and legislation steering reporting of packaging Directive 94/62/EC, electrical and electronic equipment Directive 2012/19/EU and batteries Regulation (EU) 2023/1542.
Eurostat Guidance	Eurostat Guidance documents including "Guidance document on municipal waste data collection – methodology", "Municipal waste – special cases" and "Questionnaire on municipal waste statistics", "Questionnaire on municipal waste obligations", "Questionnaire on landfill rate", which are available on Eurostat's website "Waste methodology".
Eurostat reporting or The Joint Questionnaire	Refers to the Annual reporting of the Municipal Waste Joint Questionnaire Eurostat/OECD, the excel-file. Notice that the Questionnaire has changed during the years for instance in numbers of tables.
Generated amounts of waste	The amount of waste generated in total. Generated amount of waste on each fraction is the sum of the separately collected and the amount of the waste fraction in residual waste.
LoW codes	<i>List of Waste codes</i> given in the Annex of Commission Decision 2000/532/EC.

MW	<i>Municipal Waste</i> as defined in Article 3(2b) of Waste Framework Directive 2008/98/EC and Recital 10 of Directive (EU) 2018/851.
MW-fraction	<i>Municipal Waste fractions</i> refer to the 12 fractions of waste, that the member states are obligated to report in the Joint Questionnaire: Metals, Glass, Plastic, Paper and cardboard, Bio-waste, Wood, Textiles, Electrical and electronic equipment, Batteries, Bulky waste, Mixed waste and other.
NACE-codes	The 'statistical classification of economic activities' in the European Community, abbreviated as NACE, is the classification of economic activities in the European Union (EU) as described in regulation (EC) 1893/2006 NACE Rev. 2.
Other sources	<i>other sources</i> can be private businesses (retail shops, restaurants, etc.), and public services such as schools or elderly homes. Described in Recital 10 of Directive (EU) 2018/851.
PRO	<i>Producers' Responsibility Organization</i> . Organization in which producers collaborate to fulfil their responsibilities regarding EPR schemes.
R/D-codes	<i>Recovery and disposal operations codes</i> List of codes for disposal operations given in Annex I of Directive 2008/98/EC. List of codes for recovery operations given in Annex II of Directive 2008/98/EC.
Separately collected amounts of waste	<i>Separately collected waste</i> includes single materials collections, or multiple materials, which are collected together for recycling.
WEEE	<i>Waste of Electrical and Electronic Equipment</i> .
WFD	<i>Waste Framework Directive</i> 2008/98/EC.

About the Project Streamlined Measuring of Municipal Waste

Project Group

The Danish Environmental Protection Agency (Miljøstyrelsen), The Icelandic Environmental and Energy Agency (Umhverfis- og orkustofnun), The Norwegian Environment Agency (Miljødirektoratet), The Swedish Environmental Protection Agency (Naturvårdsverket). Additionally, the Norwegian consultants MEPEX and Swedish Statistical Bureau SCB and the Swedish Environmental Research Institute IVL have been represented in the project group.

The national experts on municipal waste from the four countries have worked together as equals to ensure the technical and professional integrity of the report's content.

Project Coordinator

The Danish Environmental Protection Agency.

Method

The project group has met three times physically during the project and additionally had frequently online workshops during the project period.

Stakeholder Observers

Finland, Greenland, The Faeroe Islands and Åland have been informed about the project.

Project Period

January 2024 to March 2025

Budget

DKK 3.7 million

Funded by the Nordic Council of Ministers

The project has studied the following:

1. A mapping of how and what data on municipal waste are collected and administered in participating countries, including:
 - a. A description of how municipal waste data is collected and how information on generation and treatment of municipal waste is reported to the national authorities
 - b. A description of delimitations to what is considered to be municipal waste, which includes a description of what types of waste are included and excluded, as well as what is considered similar in nature and composition to waste from households
 - c.
 - i. A description of how different treatment options are defined, including how each participating country administers the common EU methodology for measuring recycling
 - ii. A description of how the collection and processing of data has been changed due to the new EU methodology
 - d. An analysis of how different incentive structures shape data collection and reporting practices.

Accordingly, the analytical part of the project was started to uncover central differences and similarities in the countries' data collection and reporting practices to formulate common recommendations for clarification and changes of EU methodology on MW and best practices. This work was compiled into the report's second output:

2. A shared recommendation for how the EU common methodology should be applied, as well as recommendations for best practices on collection and administration of data on municipal waste generation and recycling.

In a collaboration between all participating countries, this final report has been prepared and approved as a common basis among several of the Nordic countries in order to ensure clarity of methods and recommendations.

During the project, Eurostat participated in selected meetings and discussions in order to maximize the potential of the project's results.

However, this report will not cover all of the above-mentioned topics. The report does not offer "A description of how different treatment options" since the project group discovered that none of the participating countries have any significant issues with regard to the EU methodology on treatment options for municipal waste. In addition, the countries' interpretation of practices of the treatment

options is considered to be straightforward. Alternatively, the project group detected the significant issue to be related to the delimitation of municipal waste and the methodology for reporting and calculating recycled municipal waste, which has therefore been the focus for this project, as reflected in this report.

Furthermore, the project group has discussed and analyzed 1d "An analysis of how different incentive structures shape data collection and reporting practices". The focus has been to investigate whether there are relevant structures that are essential to keep in mind when comparing data based on the group's existing knowledge and not exploring other possible structures. The project group concludes that there are no relevant incentive structures across countries affecting data collection and reporting practices based on the project group's existing knowledge. However, the project has identified relevant country-specific factors, structures and incentives relevant for individual countries. These are described in the country-specific remarks and are relevant to keep in mind when understanding the individual country's data collection and reporting practices.



Chapter 1: Comparison of Data Collection and Delimitation of Municipal Waste

→ [Glossary of terms and abbreviations](#)

In this chapter, statistics on generated municipal waste for the participating countries is presented, followed by an analysis highlighting the central difference in the countries' reporting practices. The project group has identified this to be relevant for understanding each of the country's MW statistics. This analysis is based on a comprehensive mapping of each country's waste management, reporting system, data collection and method for calculating generated and treated MW. This mapping is compiled for each country in the report's [Appendices A–D](#). Finally, this chapter includes an examination of selected material fractions of MW in order to explore differences in the delimitation of MW across countries affecting the MW statistics.

[Table 1.1](#) below presents the total amount of MW generated by the participating countries in 2021, as reported to Eurostat. For comparison across countries, despite population size differences, the table also displays the generated amount of MW per capita. This reveals that the average Swedish resident generates the lowest amount of MW per capita at 420 kg, while the average Danish resident generates the highest amount, nearly twice as much at 800 kg per capita. Norwegian and Icelandic residents generate almost as much MW per capita as the Danes, 740 kg and 690 kg respectively.

Additionally, [Table 1.1](#) delineates the proportion of MW originating from households, with the remainder deriving from other sources. The percentage of waste originating from households varies across countries. In Norway and Iceland, approximately 50% of their MW originates from households, indicating that the other half originates from other sources. In contrast, 69% of Denmark's and 84% of Sweden's MW originates from households, leaving respectively 31% and 16% originating from other sources.

The project's underlying assumption is that the lifestyle, consumption patterns, and thereby waste generation of the countries' populations, are comparable. However, the data suggests two primary observations: the countries report divergent amounts, and there is a substantial difference in the MW produced from other sources. The forthcoming analysis highlights that these disparities are due to variations in reporting systems and MW reporting methods, resulting in inconsistent data across countries. Therefore, what might initially appear as different waste patterns (and thereby generated amounts of MW) could be reflections of methodological differences. The data emphasizes a notable discrepancy in the application of EU's methodology for MW by the countries, specifically in defining what waste should be included from other sources such as MW and coverage by existing data sources.

Table 1.1: Information on the participating countries' MW Note: Information is from the respective countries' Eurostat reporting, data on the year 2021. It is optional for countries to report an estimate of the percentage share of Municipal waste coming from households.

	Denmark	Iceland	Norway	Sweden
Total generated MW in ton	4,696,000 ton	246,000 ton	3,982,000 ton	4,352,000 ton
Generated MW per capita in kg	800 kg	690 kg	740 kg	420 kg
Share of MW originating from households	69%	47%	52%	84%

The project group concludes that it is complex to investigate the divergences and parallels in the countries' implementation and practical execution of the EU's methodology for MW. In order to determine differences leading to the inclusion of more or less waste as MW compared to other countries, various factors have to be considered. For example, it is described in [Appendix B](#) how tourism significantly affects the amount of generated MW in Iceland. Despite this, as displayed in the preceding table, the Icelandic amount of generated MW per capita is lower than in Denmark and Norway. The subsequent analysis will illustrate how Iceland's reporting system and MW delimitation significantly deviate from those of the other participating countries. These differences can explain why the influence of tourism does not result in a higher total amount of generated MW per capita. The example

illustrates the complexity of factors influencing the estimation of MW, pulling in different directions towards either an "over"- or "underestimation" of MW, thereby complicating the determination of an accurate approach to MW. Before heading to presenting the findings of the in-depth analysis of the selected MW-fractions, the following highlights the central similarities and differences in the countries' administration and practical operation of the common EU methodology for MW, identified by the project group, based on [Appendices A–D](#).



1.1 Administration and Practical Operation of the Common EU Methodology for Municipal Waste

The project group outlines key distinctions in the reporting practices of the participating countries, which significantly affect MW statistics. An overview of each country's data collection and reporting system is provided in [Table 1.2](#).

1.1.1 Actors Involved in Data Collection

One of the differences lies in the entity responsible for waste data collection and how it is organized. In some countries, the national EPA performs the task, whereas in others, it is outsourced to statistical bureaus or consultants. Although this does not influence the methodology's output, it affects the practical administration of the method.

The obligations, methodologies and data sources used for reporting also vary among the countries, affecting the nature and detail of the data collected. For instance, Norway and Sweden utilize data reported from EPR schemes, while Iceland only uses data from EPR schemes to make corrections, this practice is absent in Denmark. In Denmark, all entities involved in waste handling, from collection to treatment, are required to report. In Sweden and Norway, calculations are made primarily based on collected amounts. Contrastingly, in Iceland, only the final waste handler, such as a national treatment facility or waste exporter, is currently reporting, leading to a singular focus on treated waste. The reported data used for MW statistics thus encompasses different levels of information across the countries.

1.1.2 Collected Data

Denmark and Iceland share more similarities in their administration of the EU methodology compared to Norway and Sweden on some parameters. Denmark and Iceland primarily use reported data from waste actors to estimate generated and treated MW. Conversely, Norway and Sweden use a combination of reported waste data, investigations on treatment facilities, waste compositional analysis and ALR for the same purpose.

Furthermore, all the countries have established their own national waste codes for receiving waste data. This is partly due to the reporting systems serving other purposes besides MW reporting to Eurostat, and partly because the LoW codes and R/D-codes are insufficient on their own to obtain accurate waste data. As a result, all the participating countries must translate the collected data before reporting to Eurostat, complicating the understanding of the types of waste included in MW measurements due to the complexity in comprehending the differences in the countries' received data.

Table 1.2: Data collection and reporting to national authorities

		Denmark	Iceland	Norway	Sweden
Who collects data?	National EPA	X	X	X	X
	External organizations			X	X
Who reports the data to the national authorities or national statistical bureau?	Producer with EPR and/or PROs		X	X	X
	Actors who handle waste for instance collectors, receivers or treatment facilities of waste	X all actors who handle waste	X the final actor responsible for the waste (treatment facilities or the exporter of waste)	X similar waste from other sources	X Survey on sorting and treatment facilities
	Municipalities	X when municipalities treat or export waste	X when municipalities treat or export waste	X Waste originating from households	X
What code-systems are reported regarding generated/collected MW?		National codes and LoW codes	National codes based on EWC codes	National codes	No national standard ^(*) , but denominations of waste categories can be converted to waste categories required for MW reporting.
What code-systems are reported regarding treated MW?		R/D-codes and national treatment codes	National treatment codes	National codes	No national standard ^(*) , but denominations can be converted to waste treatment categories required for MW reporting.

Note: In the table, "data" refers to data on collected waste and treated waste. X indicates that this applies to the respective country. ^(*): In Sweden, both LoW codes and R/D-codes are used for general statistics on generated and treated waste (Regulation (EC) No 2150/2002), but not for the reporting of MW or within EPR schemes to the Swedish EPA.

The combination of differences in waste management, reporting system and available data for MW statistics results in a certain level of complexity related to comparing the countries' approaches and MW statistics. During the project, the project group identifies differences in the countries' delimitation of MW. Some of which are results of variations in interpretation of the Eurostat Guidance on the delineation of MW. Other variations are due to differences in waste management and reporting systems that result in different practical possibilities to delineate MW. In order to explore this more thoroughly, it is crucial to identify differences in delimitation of MW challenging the comparability of MW statistics. In order to do this, the project group has explored the material breakdown and specific waste flows more closely, which is presented in the following analysis.

The following analysis also illustrates that understanding the differences in each country's delimitation of MW necessitates an examination of the countries' waste management, reporting systems, interpretation of MW and the behaviors of their residents. The project group concludes that the interplay between a country's organizational structure, practical reporting and interpretation of MW significantly influences the statistical data on generated and treated amounts of MW.

1.2 Various Systems have Different Possibilities, Strengths and Weakness

As detailed above and further elaborated in [Appendices A–D](#), it is evident that the participating countries have varying reporting systems, national legislation, and waste management systems. These variations create diverse opportunities and limitations for the delimitation and measurement of MW. The data points and the level of detail provided in the reported data to the national authority set different parameters for what each country can accomplish.

Key points to consider related to the participating countries' reporting systems:

- Iceland estimates the generated amounts of MW based on reported data on treated amounts. This approach influences the data and presents a traceability issue, making it challenging to verify whether the waste source categorizes the waste as MW or not
- The Danish reporting system covers a broad range of actors and waste flow, and the systems efficiency and data quality depend on waste actors to report detailed information regarding the waste they manage. This poses a risk as the data's accuracy relies on their precise reporting and understanding of the waste codes
- The Norwegian and Swedish reporting systems heavily rely on the ability to conduct representative surveys and analyses
- Data gaps are expected in the Swedish reporting system, that will only be gradually mitigated, due to legislative changes regarding the responsibility for waste collection or treatment (in force or expected to be implemented).

1.3 Analysis of the Countries' Delimitation of Municipal Waste

The previous section has presented an overview of the country's MW reporting emphasizing their varying methods and systems. For a more detailed description of each country's MW reporting approach and waste system see Appendices A–D. In this section, the project group delves deeper into how the participating countries define what is included as MW, aiming to better understand differences in their delineations. This involves comparing material breakdown of separate collected amounts of MW compiled in kg per capita.

Firstly, in [Section 1.3.1](#) the project group has identified fractions where the countries have reported quantities per capita that deviate significantly from each other. Subsequently, in [Section 1.3.2](#) the project group offers an in-depth analysis of selected fractions examining whether these differences can be explained by a real difference in generated waste quantities or whether it is a consequence of a different method causing an "over"- or "under"-estimation of MW. Finally, the project group has examined whether the methodological differences are due to 1) different interpretation of Eurostat Guidance on what constitutes MW or 2) the result of different waste management and/or data systems in the countries.

To sum up, the following analysis' results, the project group finds and concludes that there are significant differences in the countries' method to delimit MW from the following fractions: wood, bio-waste, metals, paper and cardboard and plastic, which can explain the significant variants in the countries' separately collected amounts of MW. Especially connected to what is included as MW from other sources. The findings of this analysis will be reflected in the recommendations the project group presents in [Chapter 3](#).



1.3.1 Identification of Dissimilarities in the Amount of Waste

Based on data the countries have provided to Eurostat, the project group has calculated MW in the material breakdown compiled in kilogram per capita, in order to compare across countries despite differences in population size. In each cell the data is a result of the separately collected amounts of waste^[1] divided with the population size converted from tons to kilogram. For instance, the data provided in [Table 1.3](#), should be read as every Swedish resident produced 420 kg MW in 2021, while every Danish resident produced 800 kg in 2021.

1. Since only Sweden has reported the material breakdown of residual waste and thereby data on generated amounts. The comparison across the participating countries can therefore only be done on separately collected amounts of MW.

Table 1.3: Comparison on total generated amounts of MW and separately collected amounts of MW in material fractions com-piled in kg per capita.

	Denmark	Iceland	Norway	Sweden
Generated amounts of MW				
Total MW	800	690	740	420
Separately collected amounts of MW				
Metals	20	6	42	15
Glass	25	20	24	22
Plastic	19	15	27	10
Paper and cardboard	98	111	110	34
Bio-waste	216	53	90	109
Wood	33	122	11	14
Textiles	17	-	5	<1
Electrical and electronic equipment and batteries*	17	11	18	13
Bulky waste	64	-	-	37
Mixed waste	237	348	356	157
Other	34	-	53	3

Note: The equation for the calculation is:

$$\text{waste kg per capita} = \frac{\text{total separate collected amount (tones)} \times 1000}{\text{total population}}$$

*Due to confidentiality concerns the categories EEE and batteries are summed together as one category.

Based on Table 1.3, the project group has decided to focus on the following fractions, as the amounts of separately collected waste across countries differ considerably:

- [Bio-waste](#)
- [Wood](#)
- [Bulky waste](#)
- [Mixed waste](#)
- [Other waste](#)
- [Metals](#)
- [Plastic](#)
- [Paper and cardboard](#)

The project group has not conducted an analysis of the following fractions: glass, textiles, electronic and electric equipment and batteries. This decision was based on the assessment that reported data on these fractions do not exhibit significant variation, and therefore, do not indicate a difference in methodology. While it cannot be ruled out that there may be methodological differences in the countries' approaches to calculating these fractions, these differences do not appear to significantly impact the calculation of MW. Additionally, it is anticipated that data on textile waste will improve in the coming years due to requirements for separate collection and potential introduction of an EPR scheme on textile in EU member states.

1.3.2 In-depth Analysis of the Selected Fractions

Before presenting the analysis of the individual fractions, it is relevant to firstly highlight a general factor relevant across waste fractions for understanding Sweden's lower amount of MW.

The collection system in Sweden is still adapting to the changed waste legislation from 2020, when municipalities became responsible for the collection and reporting of all MW in Sweden, except for waste covered by an EPR scheme. Therefore, there is still a known under-coverage of collected amounts of similar MW from other sources, which is neither collected nor reported by the municipalities to the Swedish EPA. The under-coverage is assessed to be especially relevant for residual waste (mixed waste) and food waste (share of bio-waste) from other sources. Also, a stricter delimitation for municipal packaging waste seems to be applied in Sweden compared to the other countries, which is likely to affect the quantities especially according to paper packaging. This is further elaborated in [Appendix D](#).

Bio-waste

Municipal *bio-waste* includes separately collected *biodegradable kitchen and canteen waste* (LoW code 20 01 08), *edible oil and fat* (LoW code 20 01 25) and *biodegradable waste* (LoW code 20 02 01) from gardens, parks, cemeteries, or from other area accessible to the public.^[2] Bio-waste treated at the source ("home composting") may be included as MW as a separated component of the reporting. It is subject to specific reporting rules stated in Article 4 of Commission Implementing Decision (EU) 2019/1004.

The participating countries differ significantly in separately collected amount of municipal bio-waste. Denmark has a remarkable higher amount of bio-waste than the other participating countries with 216 kg per capita, which is more than twice as much as in the other participating countries. Bio-waste consists of food waste and garden & park waste. In order to examine the differences across countries it is valuable to look at each of these two subcategories separately. Furthermore, the countries differ in time of enforcing separate collection of food waste. In order to take this reasonable difference in the residents' ability to sort food waste, the project group has included data estimating food-waste including the share in residual waste. In [Table 1.4](#) below data is provided for each country on respectively bio-waste, food-waste, food-waste, including share in residual waste and garden & park waste in kilogram per capita. The data is based on separately collected amounts of waste and waste compositional analyses.



2. Regarding the manufacture of food products or beverages, it is specified in Eurostat's list of "special cases and their treatment" (October 2021) that "*Waste from the main production activities is to be excluded, even if equal in kind and composition to household waste. Waste from canteens, breakrooms etc. To be included.*" It is also specified that "*Branches, leaves etc. collected along railways, motorways, airports, from forestry etc. is not municipal waste.*"

Table 1.4: Comparison of bio-waste compiled in kg per capita (separately collected amounts)

	Denmark	Iceland	Norway	Sweden
Separately collected amounts				
Bio-waste	216	53	90	109*
Food-waste	57	27	52	43* ¹
Garden & park waste	162	26	38	50
Generated amounts (Separately collected amounts and share in residual waste)				
Generated amounts of food-waste	143	104	135	87* ¹

Note: Data is from Eurostat reporting 2021 and calculated in separately collected amounts of waste. Except for data provided on generated food-waste including share in residual waste. *In Sweden also waste from grease separators in restaurant is included as bio-waste 17 kg per person. *¹Including home composting of food waste.

Overall, Denmark has the highest amount of bio-waste per capita compared to the other participating countries, significantly standing at 216 kg per Danish resident. However, when bio-waste is broken into subcategories (food waste and garden & park waste), it becomes evident that Denmark's relatively larger amount of bio-waste primarily originates from garden & park waste. Therefore, the project group separates its conclusion for bio-waste into two parts: 1) garden & park waste and 2) food waste.

The project group concludes that in terms of garden & park waste the disparities across the countries are not identified as being caused by differences in methodology but are attributed to:

A real difference in the amount of waste produced, as it seems Danes tend to generate a higher amount of garden waste than other participating countries. The project group concludes that differences in climate, urban planning and local habits affect variation in generation of garden and park waste. Iceland is a clear example of a country with remarkable lower amount of garden and park waste, which can be explained by the country's landscape and nature, which do not provide optimal conditions for having a garden

A difference in the ways how residents and organizations dispose of their garden & park waste, and thereby whether the waste is included in the MW statistics or not. In Denmark, garden waste is mainly disposed at recycling centers and thereby reported and included in the MW statistics. In contrast, it is more common in Norway and Sweden to take care of garden waste on one's own land for instance by composting. Therefore, this waste will neither be measured nor reported in the MW statistics in Norway and Sweden. Likewise, differences in private and public organizations' handling methods for park waste, such as collecting waste from parks as MW or leaving it for natural biodegradation, thus not treating it as waste, affect the amount calculated.

[Table 1.4](#) also shows significant differences in the amount of separately collected municipal food waste per capita: In Iceland is separately collected the lowest amount, with 27 kg per capita, while in Denmark and Norway is separately collected 57 and 52 kg per capita, respectively. The Swedish separately collected amount is in between these with 43 kg of food waste per capita. As mentioned, it is plausible to expect a difference in the ability to sort food waste since these numbers are based on separately collected amounts. Therefore, [Table 1.4](#) also provides data on food waste including both the separately collected amount and the estimated share in residual waste. This data alters the perspective a bit, especially for Iceland, which now compares more closely with the amounts produced in Denmark and Norway. Iceland did not implement separate sorting of food waste until 2023, and the data used is from 2021 (before food sorting). This can explain why including food waste in the residual waste has such a significant effect on the numbers for Iceland. When comparing the participating countries on food waste including the share in residual waste, Sweden is an outlier. This leads us to the following conclusion:

The differences across the countries regarding municipal food waste are identified to be primarily a result of differences in the method for including food waste from other sources than households.

Sweden's relatively low amount of generated municipal food waste may be partially explained by the assumed general underreporting on MW from other sources than households. Furthermore, it is also plausible that Denmark, Iceland, and Norway's relatively higher amounts of generated municipal food waste is caused by an overestimation of the amounts of separately collected food waste and residual waste from other sources. Since the delimitation of MW from other sources is complex, as is securing accurate reporting and calculation of this in the measurement of MW

The participating countries have different approaches to delimit food-waste from other sources, which should be included in the measurement of MW. The solutions are (often) a result of the practical possibilities in the country's waste management and data collection system. It is the project group's assessment that differences in the countries' solutions can explain the larger differences in the measured amounts.

Summing up, the project group concludes that differences in bio-waste can be explained by 1) non-methodological differences in measuring garden & park waste and 2) methodological differences in measuring food-waste caused by differences in delimitation of municipal food waste from other sources. This is reflected in the project group's recommendations presented in [Chapter 3](#).

Wood

Municipal *wood* waste includes separately collected wood containing hazardous substances (LoW code 20 01 37*), non-hazardous wood (LoW code 20 01 38), such as wood furniture, and wooden packaging (LoW code 15 01 03).^[3]

[Table 1.3](#) shows that the countries differ significantly in amounts of wood. Additionally, according to the project group's examination of this fraction, the share of municipal wood waste originating from households and other sources respectively are varying across the countries. This could indicate a methodological difference across the participating countries in the delimitation of municipal wood waste from other sources, which potentially affects the MW statistics.^[4]

The project group has examined the countries' delimitation of wood waste more detailed and has identified these three differences in the countries' method regarding municipal wood waste:

1. *Difference in the countries' method to exclude wood waste originating from C&D*

Norway and Sweden utilize waste composition analysis to roughly estimate the amount of wood originating from C&D, also when it originates from households, which should be excluded from the MW. In Norway and Sweden, the share originating from C&D of the non-hazardous municipal wood waste from recycling centers is considered to be 13% and 30% respectively

3. Regarding "old office furniture discarded from office buildings, hospitals, retail shelves from retail stores", it is specified in Eurostat's list of "Special cases and their treatment" (October 2021) that "These are production factors and, consequently, waste from production. In cases only a single piece of office furniture is discarded via the bulky waste, this is equal to household waste and may be classified as municipal waste".

4. The participating countries' share of separately collected municipal wood waste originating from households are as follows: 86% (DK), 68% (IS), 60% (NO) and 90% (SE) leaving the rest originating from other sources.

Iceland and Denmark use reported data to identify the amount of wood waste originating from C&D and exclude this amount. Denmark uses reported data combined with industry codes to identify the wood waste from C&D and exclude it from the MW. As a result, wood from C&D-waste generated by private people may be included in the reporting and causing a slight overestimation of municipal wood waste. Iceland uses reported data to identify the wood from C&D and exclude it from the MW. Iceland has separate wood waste categories for wood waste from C&D (both hazardous and non-hazardous)

Summing up, all the participating countries exclude wood waste originating from C&D from other sources, as it should accordingly to the WFD; however, the countries have different methods to do this. It seems reasonable, that these variations in methodology of exclusion of C&D-waste results in differences in what is actually included in the measuring of MW.

2. *Difference in whether impregnated wood waste, LoW code 20 01 37*, is included or excluded in the measurement of MW*

LoW code 20 01 37* is mentioned in the Joint Questionnaire and should be included in MW. However, according to Sweden and Denmark's assessment it is only a smaller amount of the impregnated wood that fulfils the criteria for being MW like outdoor furniture. Thus, *Sweden and Denmark*, after bilateral guidance from Eurostat, exclude all waste reported as LoW code 20 01 37* from their measurement of MW since the countries' data does not enable the necessary level of details. *Iceland* also excludes waste reported as LoW code 20 01 37*, since Iceland excludes all hazardous waste from their measurement of MW.

In contrast to Denmark, Iceland and Sweden, waste reported as LoW code 20 01 37* is included in *Norway's* measurement of MW. However, it should be noted, that it is not included in the "Wood" fraction, but in the fraction "Other", since Norway include all hazardous waste in this fraction. This difference is therefore not explanatory for the differences across Norway and the other countries on the fraction "Wood" but relevant when comparing the fraction "Other" and the total amount of MW.

Summing up, waste from impregnated wood (LoW-code 20 01 37*) is excluded from Sweden's, Iceland's and Denmark's measurement of MW. In contrast, it is included in Norway's measurement of MW as "Other" waste.

Difference in whether wood packaging waste from other sources is included or excluded in the measurement of MW

Iceland and Denmark include wood packaging from other sources such as wood pallets and cable drums into their calculation of MW. This results in a slightly overestimation of MW in Denmark and Iceland, since wood pallets and cable drums are explicitly categorized as transport packaging. According to Eurostat Guidance, transport packaging waste should not be considered as similar waste from households and thus, transport packaging waste should be excluded from MW. *Norway and Sweden* exclude wood packaging from other sources in their measurements of MW.

Throughout the project, Denmark has acknowledged this discrepancy to the Eurostat Guidance and intends to correct it in their future delineation of MW. However, Denmark does not anticipate a significant change in the generated MW as packaging wood only comprises 4% of the total municipal wood waste. Conversely, Iceland includes wood pallets and cable drums in their measurement of MW due to the organization of their data-system and making error correction a complex process. Iceland expects that the inclusion of wood pallets explains the high amount of wood waste due to the fishing industries' use of single-use wood pallets. However, the impact of this on the calculation of MW remains uncertain.

Summing up, Iceland and Denmark's higher amount of wood waste can partly be explained by the fact, that the countries, in contrast to Sweden and Norway, includes wood packaging from other sources. It should be noted that wasted transport wood packaging like wood pallets or cable drums should not be considered MW as it is stated in the Eurostat Guidance.

Bulky Waste

Bulky waste, LoW code 20 03 07, includes large dimension waste items, which require specific collection and treatment such as furniture and mattresses. Bulky waste generated and treated encompasses waste components that are not decomposed into their material specific components, thus remaining unrecorded.^[5] The interpretation of the project group is that it is the bulky mixed fraction collected at recycling center.

Norway and Iceland do not report any amounts in the category bulky waste, since they do not use this category in their data reporting systems. The waste that could

5. Definition of bulky waste is from "Guidance document on municipal waste data collection – methodology" A 2.2.9 and the footnote in the "Annual reporting of Municipal Waste Joint Questionnaire Eurostat/OECD".

be categorized as bulky waste is instead sorted according to material at the recycling centers. The waste that cannot be sorted by material will be categorized as mixed waste (reported under the component mixed waste LoW code 20 03 01). Sweden has a similar system for larger dimension waste items not collected within the residual waste collection system. However, the waste that cannot be sorted according to material, and instead sorted as a mixed fraction will be categorized as a bulky-waste component (and not mixed waste component as in Norway and Iceland). In Denmark, the amount reported as bulky waste is the amount waste actors report with the LoW code 20 03 07. Denmark does not allocate the amount to other LoW codes.

Summing up, this difference in use of "bulky waste" as a category can explain the difference in amount of waste counted as bulky and partly mixed waste. Therefore, the difference in the countries' approaches to the methodology is relevant when comparing the countries to the amount of bulky and mixed waste. However, the difference does not influence the total amount of measured MW since the waste is included in the total amount of MW in all the countries – just under different MW-fractions.



Mixed Waste

EU legislation defines *Mixed Waste* (LoW code 20 03 01) as waste not separately collected, including unsorted waste and misplaced sorted waste. Despite its clear definition, it overlaps with categories like *bulky waste* and *other waste*, leading to variations in reporting methodology across countries. The inclusion of similar waste from other sources also adds complexity to the conceptualization. The project group interprets it as residual waste, which is the mixed waste remaining after a household or organization has separated waste into distinct fractions to the best of their ability.

[Table 1.3](#) reveals Sweden's amount of mixed waste (157 kg per capita) to be significantly lower than Denmark's (237 kg per capita), Norway's (356 kg per capita) and Iceland's (348 kg per capita). Additionally, in order to take the differences in the countries' use of the category bulky waste into account, these amounts can be added to Sweden and Denmark's figures. The sum of Denmark's municipal bulky and mixed waste is 301 kg per capita and for Sweden the sum is 194 kg per capita.

When taking into account the difference in methodology regarding bulky waste Iceland, Norway and Denmark's figures are more comparable. However, Iceland and Norway still report higher amounts. For Iceland, an explanation can be the large share of food waste in mixed waste, as described in the section on bio-waste. Additionally, the methodological differences like Iceland using treated amounts for reporting on generated and Norway's scaling on NACE for other sources, might explain the relatively higher amounts. However, this is merely conjectures than qualified connections, so it is hard to identify whether the differences are caused by methodological differences or actual amount of waste.

The amounts of mixed waste for Sweden are still significantly lower than the other participating countries even when taking bulky waste into account. The project group's best possible explanation for this is the general underreporting of MW from other sources as described in the introduction of [Section 1.3.2](#).

Other Waste

Municipal other, referred to as "other waste," includes 20 diverse LoW codes. These encompass waste from markets (LoW code 20 03 02), street cleaning (LoW code 20 03 03), medicines (LoW code 20 01 31* and 20 01 32), composite packaging (LoW code 15 01 05), and hazardous packaging waste (LoW code 15 01 10*). It also includes various hazardous wastes (LoW codes 20 01 13* to 20 01 29*) such as solvents, pesticides, oils, fats, paints, or detergents, along with non-hazardous paints (LoW code 20 01 28) and detergents (LoW code 20 01 30). The project group interprets that this fraction should include municipal hazardous waste (discrepancies related to impregnated wood), and other waste.

Firstly, Iceland excludes all hazardous waste from their measurement of MW and does not use the "other" category in their reporting, thus nothing is reported in this fraction from Iceland. Secondly, Norway, on the other hand, reports a higher amount of municipal "other" waste than the other participating countries, attributable to the inclusion of impregnated wood (LoW code 20 01 37*) in this fraction, as previously detailed in the wood waste section. There may be further differences in Denmark, Norway and Sweden's approach to this fraction, but the project group has not conducted a further detailed exploration.

Metals

Municipal *metals* waste encompasses separately collected metallic packaging (LoW code 15 01 04) and may include aluminum from composite packaging such as beverage cartons (if not reported under LoW code 15 01 05). It also includes other separately collected metallic items that are not packaging (LoW code 20 01 40 "Metals"), sometimes referred to as "metal scrap," and LoW code 15 01 11*.^[6] Metals sorted out of residual waste before incineration are also part of this component. Metals sorted from bottom ashes and recycled post-incineration are reported separately, governed by specific rules (Article 5 and Annex III of (EU) 2019/1004), and are not discussed in this report.

Norway and Iceland differ significantly in their amounts of metals. This can be explained by methodological differences in their approach to delimiting municipal metal waste due to practical possibilities in their systems:

Norway includes more metal waste in their measurement of MW than the other participating countries, since Norway includes all scrap metal from households collected at the recycling centers and the similar waste originating from other sources without withdrawal of the share of C&D-waste. Norway does not (at the moment) have the sufficient information to exclude C&D-waste from mixed metals from recycling centers. Metals from the C&D-sector is kept out of the Norwegian MW-reporting according to EU legislation. In contrast, neither Iceland, Sweden nor Denmark includes metal waste from C&D in their measurement of MW

Iceland includes less metal waste in their measurement of MW compared to the other participating countries, since Iceland only includes metal packaging from households in the metal fraction. The Icelandic data collection system does not have the capacity or proper

6. "Metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers"

know-how to distinguish the origin of non-packaging metal waste. The Icelandic EPA assess that the main amount of non-packaging metal waste in Iceland is not MW, so therefore it has been decided to exclude non-packaging waste entirely from MW reporting

In contrast to the Icelandic approach, Denmark, Norway and Sweden includes packaging and non-packaging waste of metal from both households and other sources. However, the amounts of metals included in the measurement of MW does vary across Denmark, Norway and Sweden, as shown in [Table 1.3](#).

Plastic and Paper & Cardboard

Municipal plastic waste includes separately collected plastic packaging (LoW code 15 01 02) and can include plastic-material from composite packaging such as beverage cartons. Plastic also includes other discarded articles made of plastic that are not packaging (LoW code 20 01 39 "Plastics").

Municipal paper and cardboard include separately collected paper and cardboard packaging (LoW code 15 01 01) and can include paper-material from composite packaging such as beverage cartons. Paper and cardboard also include other paper-waste such as office paper, newspaper or advertising (LoW code 20 01 01 "paper and cardboard").

The analysis of plastic and paper & cardboard from the participating countries reveals significant variations in the countries approach to delimitating MW related to packaging waste from other sources. These discrepancies largely stem from two major issues. Firstly, the way countries incorporate municipal packaging waste from other sources into their calculations of MW. Secondly, the difficulty in obtaining sufficient data on packaging from other sources would allow a clear distinction between municipal and non-municipal packaging waste. This differentiation might not have any practical significance for those handling packaging waste, as the nature of the waste, such as cardboard, is often similar regardless of whether it is classified as MW or waste from production, which is not considered MW.

In this context, Sweden's reported quantities of plastic, and paper & cardboard waste are remarkably lower than those of the other countries. This is due to the countries' approaches to classify packaging waste as either MW or non-MW. While some countries pragmatically include all packaging waste as MW, Sweden only incorporates a small proportion of all packaging waste from other sources in its municipal packaging waste reporting. This accounts for Sweden's significantly lower reported amounts of packaging waste from other sources.

Looking more closely at paper & cardboard waste, the largest discrepancy can be seen between Sweden and both Norway and Iceland. Sweden does not include any

office wastepaper, and not all cardboard packaging waste from other sources in their MW calculations (only a share of it), potentially leading to an underestimation of MW. On the contrary, Norway includes all packaging from other sources, potentially overestimating MW. Similarly, Iceland includes all packaging and non-packaging paper and cardboard from other sources, potentially leading to an overestimation of MW. Denmark's approach falls between these two polarities; the Danish method includes packaging from business but excludes packaging paper from the paper industry and packaging metal from the metal industry since this is considered as waste from production and therefore not MW.

Regarding plastic waste, Sweden does not include all plastic packaging waste from other sources in their measurement of MW (only a share of it), potentially leading to an underestimation of MW. Norway, by contrast, includes all packaging from businesses except for agricultural plastic, possibly resulting in an overestimation of MW. Denmark has implemented a method for excluding plastic packaging from the plastic and rubber industry, but includes other plastic packaging from other sources, just like Denmark does with paper and cardboard packaging waste. Iceland includes all plastic packaging from other sources, including from agriculture, potentially overestimating MW.

The project group has come to realize that there is an overall challenge in obtaining reliable statistics on MW packaging waste, as existing Packaging Statistics do not differentiate between non-MW and MW. This issue also extends to the LoW Chapter 15, which does not distinguish between, whether the packaging is MW or not, or whether it originates from households or other sources. In the absence of a common view on the delineation of MW and the method for reporting, it can sometimes be difficult to state whether or not countries are over- or underreporting MW, in which case only relative differences can be pointed out.



Chapter 2: Comparison of Reporting Practices on Recycled Municipal Waste

[→ Glossary of terms and abbreviations](#)

The following chapter includes two overall parts:

[2.1 Comparison of the participating countries' calculation of recycling](#)

[2.2 Analysis of changes due to the new EU methodology on recycling](#)

2.1 Comparison of the Participating Countries' Calculation of Recycling

The countries are all aiming at measuring recycled MW according to the WFD and related delegated acts. However, there are differences in how the participating countries calculate recycled amounts of MW and estimate the recycling rate of it. Furthermore, there are also differences in whether each country is able to calculate the recycling rate of each MW-fraction. It is fruitful to compare recycling of MW and the MW-fractions between countries since it can provide insights on which improvements are possible in the various countries. It may possibly address whether the quality of waste collection and sorting can be improved or if a single country uses more efficient recycling technology. In order to clarify whether it is possible to compare the countries' recycling of MW and at what level it is possible, the countries' approach to estimate recycled MW will be explained in the following and compared in order to identify possible methodological differences.

2.1.1 Comparison of the Participating Countries' Calculation of Recycling

The countries have different data points available in the waste flow for calculating recycling of MW. [Figure 1](#) illustrates a simplified waste flow of waste management: The process starts when the waste is generated and disposed of in the bins by its producer, such as a household or a business. A collector then picks up these bins and transports the waste to sorting facilities. Finally, the sorted waste is sent to a treatment facility, where the waste is either recycled, incinerated etc.

The amount of produced MW consists of the sorted MW-fractions and the residual waste. The residents do not sort their waste perfectly, meaning that the residual waste consists of some of the fractions that should have been sorted out. By performing waste composition analysis, it is possible to estimate the amounts of missorted waste in the residual waste bin. However, not all countries do these waste compositional analyses, and without these, the generated amount of each MW-fraction cannot be known, only the separately collected amount of each MW-fraction. Consequently, it is not possible for all countries to report on the material breakdown of generated amounts of each fraction to Eurostat.

Figure 1: Data points (illustrated as dark blue boxes with country codes) in the waste flow. NO* indicates that Norway differs from the other countries in methodology to measure MW from households and MW from other sources (see [Appendix C](#)).



In [Figure 1](#), the countries' different data points are illustrated: In Denmark, Norway and Sweden, data exists on the separately collected amounts of the MW-fractions and the amount of residual waste. Sweden and Norway are also able to estimate the generated amount of each MW-fraction for material breakdown since the results from waste compositional analysis of the mixed waste is available. Sweden has implemented reporting on generated amounts already, while Norway only has reported separately collected amounts so far. In Denmark, private and municipal collectors report the separately collected amounts to the Danish Waste Data System. In Sweden and Norway, there are three reporting systems respectively for reporting the separately collected amounts to the authorities. The PROs report to one system and municipalities and collectors of MW report to two other systems. This implies a difference in received data in Norway and Sweden compared to Denmark, which depends on whether the waste is covered by an EPR scheme or not.

In contrast to the other participating countries, Iceland does not have data on neither generated nor separately collected amounts of MW. As [Figure 1](#) illustrates Iceland only has one data point in the waste management flow, which is at the treatment facility. As described in [Appendix B](#) Iceland estimates generated amounts of MW based on data on treated amounts, and it is estimated/calculated as the sum of all reported treated amounts of MW.

Denmark and Iceland collect data on the waste received at the final treatment facilities, e.g. recycling facilities, incinerations plants etc., meaning that data for the received amounts to the final treatment facility exists both in Denmark and Iceland. This also applies to the fractions that are covered by EPR schemes in Sweden and Norway, as these amounts are registered and reported by the PROs.

2.1.2 Calculation of Recycling Rate

In the following, it will be explained how the calculation of the recycling rate of MW should be done in principle. This will be linked to the data points that each country is in possession of, which are explained in the waste flow in [Figure 2](#).

In the WFD, targets are set on the recycling rate of the total amount of MW generated. The rate is calculated for each country by Eurostat, and is assumed to be calculated like this:

$$\text{Recycling rate of MW \%} = \frac{\text{Total amount of recycled MW} + \text{total amount of MW prepared for reuse}}{\text{Total amount of generated MW}}$$

The same equation would in principle apply for a specific MW-fraction. For instance, the recycling rate for plastic in MW would be:

$$\text{Recycling rate of plastic in MW \%} = \frac{\text{Total amount of recycled plastic in MW} + \text{total amount of plastic in MW prepared for reuse}}{\text{Recycling rate of plastic in MW}}$$



This type of calculation, which estimates the recycling rate of a specific MW-fraction, is in practice only applicable to Sweden and Norway. The reason being that Sweden and Norway are the only countries, which possess the knowledge of the generated amounts of each MW-fraction due to compositional analysis on residual waste. Since, Sweden and Norway are the only countries able to calculate the recycling rate of each MW-fraction, another measure is introduced that enables comparisons between all the countries in the project group: *recycling efficiency*. The project group has identified that the measure recycling efficiency, should be available for most countries despite differences in data gathering and methodology. This assessment is based on the assumption that most countries report separately collected amounts as generated amounts, since reporting on generated amounts necessitates waste compositional analysis of the waste. Furthermore, the introduction of this term does not necessitate the submission of additional data to Eurostat beyond what the member states currently provide. This indicates that the recycling efficiency for each MW-fraction can be calculated for most EU member states.

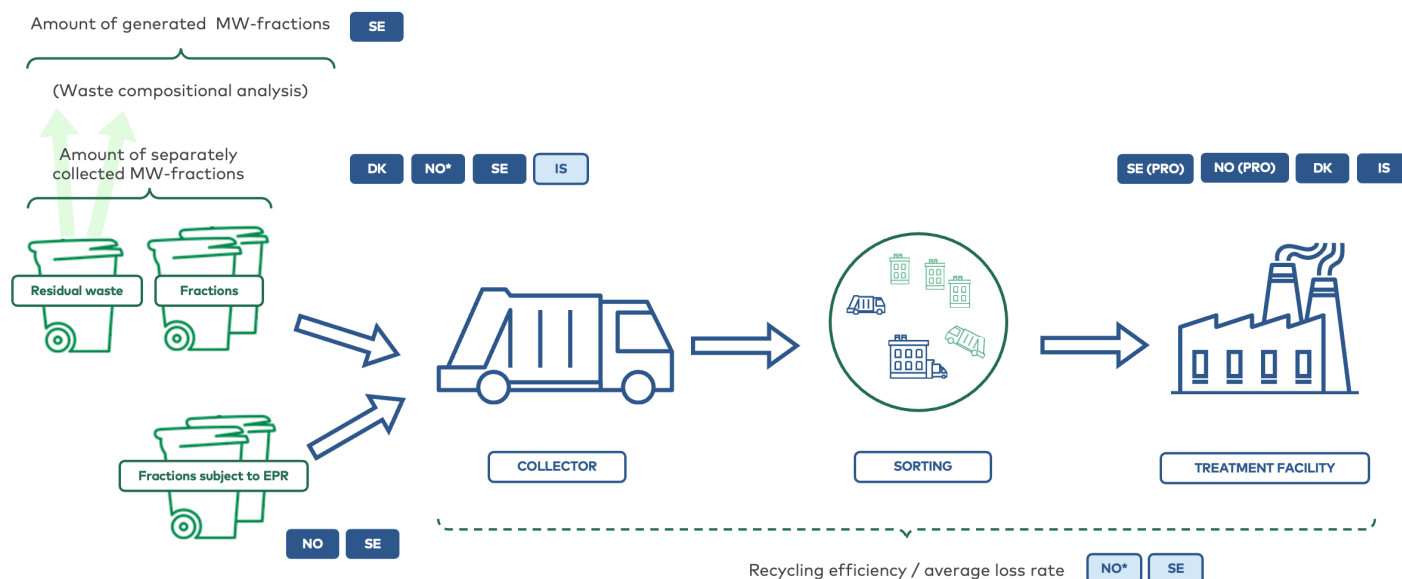
Recycling efficiency is a measurement of the share of recycled amount out of the separately collected amounts. In contrast *recycling rate* is a measurement of the share of recycled amount out of the generated amount, which includes separately collected amounts and missorted waste in the residual waste. The amount of MW prepared for reuse is included in both rates.

For instance, the calculation of the recycling efficiency for plastic in MW reads:

$$\text{Recycling efficiency of plastic \%} = \frac{\text{Total amount of recycled plastic in MW} + \text{total amount of plastic in MW prepared for reuse}}{\text{Recycling efficiency of plastic}}$$

For all MW-fractions in Denmark and for the MW-fractions subject to EPR in Norway and Sweden, the separately collected and actual recycled amounts received at the treatment facilities are known. See the illustration again in [Figure 2](#) of the waste flow below.

Figure 2: Data points (illustrated as dark blue boxes with country codes) and estimation points (illustrated as light blue boxes with country codes) in the waste flow. NO* indicates that Norway has different ways to measure MW households and MW from other sources (see [Appendix C](#)).



For the MW-fractions in Sweden and Norway that are not covered by EPR, the recycled MW amount at the final recycling facility is not reported by the treatment facilities. Instead, the ALR is estimated by the respective authorities and consultants in each country for each waste fraction. The estimation in both countries is based on surveys and interviews conducted with various waste management actors and recycling facilities, who provide insights into their respective losses as described in detail in [Appendices C](#) and [D](#). These losses are used for calculating the recycled amounts from what is collected and intended for recycling. The ALR states the share of waste intended for recycling that has been lost before it is actually recycled. The recycling efficiency states the share that is actually recycled from the separately collected amount. Thus, the same calculation point is used, the countries' approach to estimating recycling of MW is done in different ways due to their different data points in the waste flow as illustrated in [Figure 2](#).

Recycling efficiency – exemplification of the method

The project's aim is to identify potential differences in methodology and reporting practices affecting data on MW. Thus, it is slightly out of scope of the project to analyze the recycling potential. However, the project group will in the following give a few examples of the recycling efficiency for the participating countries. This is in order to illustrate how estimating recycling efficiency can be a helpful tool to compare countries for identifying methodological differences and recycling potential. The following does not constitute an exhaustive study of the countries' recycled MW, therefore further investigation is needed for more conclusive results.

Indication of issues with the country's used methodology

For instance, Iceland had a 100% recycling efficiency for multiple material fractions (Metal, paper and cardboard, batteries). It does not seem accurate and valid that 100% of the separately collected amounts are recycled. There will always be some loss during the process between collection and recycling. The project group assesses that this highlights two facts within the Icelandic approach to measure generated and treated amounts of MW, which are significant for the Icelandic outcome:

1. Iceland uses data on treated amounts of waste to provide data on generated amounts.
2. When waste is exported for treatment the total amount of exported waste is reported as being recycled without taking losses in the process into account.

Indication of potential improvement

In [Table 2.1](#) below the recycling efficiencies of selected MW-fractions for the participating countries are shown.

Table 2.1: Recycling efficiencies of selected MW-fractions for the countries

	Denmark	Iceland	Norway	Sweden
Paper and cardboard	98%	100%	89%	85%
Wood	86%	16%	14%	0%
Glass	99%	0%	92%	96%

Among the countries in the project, excluding Iceland, Denmark has the highest recycling efficiency for paper and cardboard. This is likely due to Denmark's dryer and cleaner sorting of this fraction, as they sort liquid packaging board like Tetra Pak together with plastic unlike Norway and Sweden, who sort it together with paper and cardboard. As described earlier, Iceland export paper and cardboard for treatment, which explains their recycling efficiency of 100%.

Denmark has a significant higher recycling efficiency for wood than the other participating countries. The other countries primarily utilize municipal wood waste for energy recovery or other recovery methods. This highlights, according to the project group's assessment that these countries could potentially benefit from exploring the treatment methods employed by Denmark. However, a more detailed investigation is needed to clarify why the treatment methods used in Denmark are not currently adopted by the other Nordic countries.

All the participating countries, except for Iceland, have a remarkable high recycling efficiency for glass. This could therefore present a considerable opportunity for improving recycling in Iceland in light of the fact that Iceland does not recycle glass.

In order to calculate the recycling efficiency based on the Eurostat reporting it is essential that the cells "Municipal waste generated (tons)" and "Separate collection (tons)" are reported accurately by the countries in the Joint Questionnaire for Material Breakdown. It is now voluntary to provide data on separate collection in the Joint Questionnaire for Eurostat reporting. However, it is assessed that some countries report separately collected amounts in the material breakdown of generated amounts. This issue is elaborated in [Chapter 3, Section 3.1.2](#) in which the project group presents its recommendation on modifying the reporting requirements for generated and separately collected MW.

2.2 Analysis of Changes due to the New EU methodology on Recycling

The following section refers to an "old" and a "new" EU methodology on recycling. The methodology and conceptualization of recycling changed with the revision of the WFD in 2018 and attendant Commission Implementing Decision (EU) 2019/1004. The "old methodology" refers to Article 11, 2(a) in the WFD, which specify the recycling target on 50% of household waste and waste from other sources. The target was already specified in the WFD from 2008 and the delegated act from the Commission Decision 2011/753/EU establishes the calculation rules for verifying compliance with the target. The old methodology on recycling was widely interpreted, as the amount collected for recycling (sometimes referred to as "input approach"). With the revision of the WFD in 2018 new recycling targets for 2025, 2030 and 2035 were formulated for MW in Article 11(2), points (c), (d) and (e). Furthermore, the definition of *recycling* can be found in Article 3 number 17 of the WFD. The calculation rules are stipulated in Article 11a(1) point (c), and 11a(2) of the WFD. Additionally, the calculation points are specified in Article 3(2) and Annex I of Decision (EU) 2019/1004. Collectively, these references establish a comprehensive definition of what is to be considered as recycling.

The calculation rules to verify compliance with the recycling targets for 2025, 2030 and 2035 are laid down in Article 11a, which was introduced in the same revision of the WFD. The calculation rules are further specified in the Commission Implementing Decision (EU) 2019/1004. With this "new methodology" the recycled amount is to be understood as the amount of sorted waste which, without further preparatory measures, is brought into the recycling process. This means that the losses that occurs in the sorting and treatment process (before the "calculation point") cannot be counted as recycled amounts, while eventual losses occurring after the calculation point, during the recycling process, are counted as recycled.

In accordance with the old EU methodology on recycling and the Commission Decision 2011/753/EU, it was optional to choose between four different methods, which meant that the recycling rate could be calculated on a selection of MW-fractions only, all MW from households or all MW from both households and other sources.

As it is now, the countries are obliged to report recycled amounts on all MW originating from both households and other sources according to the new methodology in table 1 and 2 of the Municipal Waste Joint Questionnaire, since the reporting must be based on the Implementing Decision (EU) 2019/1004. It is optional for the country to report according to the old methodology in Commission Decision 2011/753/EU in Table 3 from the then-current Joint Questionnaire, if the

country wants to show compliance with the old recycling target for 2020. This target applies until the MW data for 2025 is submitted.

The following subsections analyze the data shifts due to the change of the EU methodology on recycling and reporting rules as of the revision of the WFD in 2018 and attendant decisions.

2.2.1 Main effects

The project identifies three changes (effects) related to the change in EU methodology on recycling:

1. the calculation point for calculating recycling: overall a change from "collected aimed for recycling" to "actual recycled waste";
2. the definition of MW: overall all countries have expanded, what is included as MW, however also some restrictions has occurred (e.g. Sweden has excluded C&D-waste); and
3. the change in the definition of MW also has a "side"-effect on the recycling rate since "new" included fractions of MW may have either a better or a worse recycling potential than before and thus influence the aggregated recycling rate significantly. This effect can explain the difference in size of the countries' change in recycling rate since the recycling potential varies across materials varies; and
4. the change to only allow calculating on all MW originating from households and other sources (previous method 4 according to the old methodology), meant a larger change for those countries using alternative methods (previous method 1–3 according to the old methodology) than for the countries who applied method 4 according to the old methodology.

The project concludes that changes in methodology on how to calculate recycling and, which MW-fractions to be included, influence the estimated recycling rates. Therefore, methodology has an impact on target attainment. For most of the Nordic countries in this project, the ambition of the new targets set in the revised WFD was especially difficult to attain with the new methodology.

The recycling rate for all the participating countries dropped with the change of the calculation method, but it is mainly a result of the change in methodology and not a major drop in the countries' ability to recycle MW, so without considering the change in methodology the data can be misleading.

In [Chapter 1](#) of the report, the project concluded that the countries differ in their delimitation and therefore also operationalization of MW. So, despite the countries being obligated to use the same method in the new EU methodology, their use of this method differs significantly causing different measurements. In the following, it is described that the countries also differ in their delimitation of MW and choice of method (1–4) according to the old methodology before the WFD revision in 2018.

In other words, the participating countries have all, except for Iceland, changed their operationalization of MW but what they have changed from and to are not, in practical terms, the same. So, neither their “starting point” nor their “ending point” of the conceptions of MW is similar. This is relevant to keep in mind when studying the following results.

2.2.2 Analysis of the Changes in Recycling Rate

[Table 2.2](#) shows an overview of changes due to the new EU reporting obligations on recycling across the Nordic participating countries. The table presents a simplification of the countries’ “old” and “new” method and the change in recycling rates.

The project group concludes that for Denmark, Norway and Sweden the new methodology on recycling has resulted in a remarkable change in the countries’ method to delimit MW and calculate recycling which also has resulted in a drop-in the recycling rates compared to using the old methodology. Norway has experienced the lowest drop-in the recycling rate with 4%, Denmark a drop-in recycling rate with 6% and Sweden with the largest drop-in recycling rate with 23%. As should be noted Iceland has not found it necessary to change their method in order to apply to the new methodology, which explains why Iceland as the only country does not experience a change in recycling rate.

As can be seen in [Table 2.2](#), the drop in the recycling rate differs in size across countries. This is partly because it differs across countries to what extent it was necessary to change their method in order to apply to the new method. This is most evident when looking at Sweden’s drop in its recycling rate, which also had to make the most significant changes to their methodology changing from method 2 (including only paper, metal, plastic, glass, bio-waste, batteries and WEEE from households and other sources) that is allowed due to the old methodology for calculating all MW from households and other sources.

However, as mentioned earlier in this section, changes to the delimitation of MW, are changing the material fractions included, and some “new” included fractions may have better or worse recycling potential. Therefore, new included fractions may either increase or decrease the recycling rate and the change in recycling is an aggregation of this – see [Table 2.2](#).

Table 2.2: Changes due to the new EU methodology on recycling – comparison across countries

	Method for delimiting MW	Included MW-fractions	Calculation point	Recycling rate 2011/753/EU	Recycling rate (EU) 2019/1004	Change in recycling rate
Denmark 2011/753/EU	4	All MW from household and the service industry	Collected aimed for recycling	54% (2021)		-6%
Denmark (EU) 2019/1004		All MW generated from households and other sources	Actual recycled waste		48% (2021)	
Iceland 2011/753/EU	4	All MW (treated amounts instead of generated amounts)	Actual recycled but compared to treated instead of generated	26% (2020) 27% (2021) 24% (2022)	N/A	N/A
Norway 2011/753/EU	3	All MW from households	Collected aimed for recycling	41% (2018), 42% (2019)		~-4%
Norway (EU) 2019/1004		All MW generated from households and other sources	Actual recycled waste (reported or estimated with ALRs)		38% (2020) 37% (2021)	
Sweden 2011/753/EU	2	Paper, metal, plastic, glass, bio-waste, batteries and WEEE	Collected aimed for recycling	61% (2020)		-23%
Sweden (EU) 2019/1004		All MW generated from households and other sources	Actual recycled waste (reported or estimated with ALRs)		38% (2020)	

Note: For an elaborative description of the countries application of the methodology according to 2019/1004/EU is referred to Appendices A–D. Available data is used to show change in recycling rate in order to compare. Thus, differences in the years during which the data originates from, will occur. The year is in parentheses.

2.2.3 Elaboration on the Individual Country

Sweden's recycling rate dropped 23% when using the new methodology on recycling compared to the previous one. The drop can be explained as follows: Firstly, by the fact that Sweden used to only base their calculation on a subset of MW-fractions choosing method 2 and now, due to the new rules in place, is required to base data on all MW according to the previous method 4. Secondly, Sweden changed its method from an input-oriented approach (collected aimed for recycling) to an output approach, where losses (non-target material) in the recycling process are taken into account. Thirdly, since some waste flows with a poorer degree of separate collection and recycling efficiency were additionally included in the calculation of the recycling rate for MW, such as wood, textiles, hazardous waste and street cleaning waste, it also affected the recycling rate negatively. Similarly, waste that is highly source-sorted and recycled is no longer classified as MW, such as bulky metals considered to be C&D-waste. Sweden will continue to report according to method 2 in table 3 in the Joint Questionnaire, to comply with the recycling target for 2020.

Norway experienced a drop in its recycling rate after implementing the new EU methodology and calculation points on recycling. However, a greater reduction rate was expected.

Before 2020, Norway reported, due to method number 3, on recycling of only waste from households, and the recycling rate was based on waste collected as aimed for recycling. The method used to select the waste data that was included in the reporting was highly simplified. As for the reference year 2020 (reporting year 2022), the reporting also includes similar waste from other sources from the NACE-codes B–S. In addition, the methodology regarding calculating the relevant waste materials to be included in the reporting has undergone changes in order to meet the definitions and guidelines laid out. In addition, ALRs are used to calculate the losses that occur in the treatment processes to calculate the actually recycled amounts. Due to these significant changes in the methodology, and the reduction in the recycling rate due to the new calculation point, it was expected that the reduction of the recycling rate would be higher than what the results show. It seems that some of the changes must have resulted in an increased recycling rate that compensates the reduction due to the new calculation point. It has not been possible to explain the relatively lower drop in the recycling rate for Norway within this project. A speculation is that the net recycling potential in the included waste materials probably is higher in the recent reporting model, than in the previous.

Denmark used a different definition of MW before the revision of the WFD. Denmark only used their own national waste codes to calculate MW and only included waste from households and the service industry. The definition has since changed and now Denmark defines MW through a combination of LoW codes and

the national waste codes. Consequently, Denmark, applying the new method, estimates the amount of MW stemming from *all* industries, instead of only the service industry (as was the case before the WFD from 2018). This is a significant change in delimitation of MW, so even though it appears from Table 2.2 like Denmark did not change methods, there has been a significant change in the Danish delimitation of what constitutes MW. The generated amount is calculated as the separately collected amounts including mixed waste and it applies for both the old and the new method (before and after the revision of the WFD in 2018).

Before the revision of the WFD in 2018, Denmark reported *collected amounts aimed for recycling* as this was interpreted as the recycled amount. The loss in the treatment process was not taken into account. These amounts 'collected for recycling' is still reported in table 3 in the Joint Questionnaire in order to comply with the recycling target for 2020, which is based on the previous methodology. To be able to report in table 1 and 2, which must be based on the new methodology on calculating recycling, Denmark makes use of a newly developed dynamic calculation model, which makes use of the reporting to the Danish Waste Data System. Simply put, the new method calculates the recycling rate as the recycled amount of MW reported to the Danish Waste Data System in a given year, as a proportion of the collected primary MW amount in the same year. This is further elaborated in [Appendix A](#).

Iceland has not yet reviewed its methodology in relation to the changes made to the new methodology, and Iceland thus refers to the Commission Decision 2011/753/EU. Iceland is familiar with the changes and has done a brief review of its methodology. Generally, Iceland assesses that its collected data is in compliance with the changes in calculation points, since Iceland primarily collects its data at the end point for treatment (from final waste actors/treatment facilities) as described in [Appendix B](#).

Chapter 3: Shared Recommendations for the Methodology on Municipal Waste

[→ Glossary of terms and abbreviations](#)

In this chapter, the project group will present shared recommendations for the methodology concerning MW. The chapter is divided into two primary focuses and objectives of these recommendations:

3.1 The first section delivers recommendations on the delineation of MW, targeting policy makers in the EU (Directorate-General for Environment) and Eurostat. It provides the participating countries' shared insights into the main challenges faced by the current methodology, along with concrete suggestions for improvement.

3.2 The second section offers recommendations on best practices for the collection and administration of data on generated and recycled MW. These recommendations are aimed at fellow EU member states reporting to the EU, including other countries interested in advancing their MW statistics.

3.1 Recommendations on the Delimitation of Municipal Waste

The project group has evaluated issues related to the delineation of MW, which pertain to both the Eurostat Guidance on the delimitation of MW and, more broadly, to the purpose of the current MW definition. Consequently, the focus of the recommendations varies. Some of the recommendations primarily target Eurostat and the Commission,^[7] advocating for clearer guidance and modifications in the guidelines for the delimitation of MW. These recommendations are formed in consideration of the current MW definition in the EU legal framework, EU reporting obligation, and legally binding recycling targets in the WFD. Other recommendations primarily address political levels, necessitating amendments to

7. According to Article 38 in the WFD "The Commission shall develop guidelines on the definitions of municipal waste and backfilling."

EU legislation or considerations for developing new regulations, particularly for future waste reduction or recycling targets. The project group acknowledges that these distinctions are made to the best of our knowledge, and thus, the possibility that the full implementation of the recommendation may require both an EU legislative change and an adjustment to the Eurostat Guidance cannot be dismissed.

The recommendations are presented in the following three overall parts:

3.1.1 General Recommendations Regarding the Need for Clarification on the EU Methodology on Municipal Waste

- *Clarify the Purpose of Measuring of Municipal Waste and of including Waste from Other Sources*
- *Adopt a more Pragmatic Approach to Measuring Municipal Waste*
- *Consolidate Eurostat's Municipal Waste Reporting Guidance into one Single Document*

3.1.2 Recommendations Requiring Amendments to EU Legislation

- *Exclude Garden and Park Waste from the Scope of the Municipal Waste Reporting*
- *Modify Reporting Requirements for Generated and Separately Collected Municipal Waste*

3.1.3 Recommendations that are Feasible within the EU Existing Legal Framework

- *Distinguish Between Food Waste and Garden & Park Waste in the Municipal Waste Reporting*
- *Clearer Guidance on Waste Streams Largely Dominated by Construction and Demolition Waste from the Municipal Waste Reporting*
- *Clearer Guidance on Definition and Reporting of Municipal Street-cleaning Residues*
- *Clarify Criteria for Packaging Waste in the Municipal Waste Reporting*
- *Use LoW Codes and NACE-Codes to Clarify Municipal Waste from Other Sources*

As outlined in [Chapter 1](#), the project group asserts that one significant cause of discrepancies in countries' MW reporting stems from the Eurostat Guidance on the delimitation of MW. The group's assessment suggests that clearer guidelines and more harmonized delimitation of MW could significantly improve the comparability of generated, treated and recycled MW. Consequently, the project group has concentrated its efforts on recommendations for the delimitation of MW.

3.1.1 General Recommendations Regarding the Need for Clarification of the EU Methodology on Municipal Waste

The following three recommendations address issues with the methodology on MW that the project group has identified as significant for accomplishing comparable and meaningful statistics on MW. The first two general recommendations should be read as more general in nature while the following recommendations encompass the project group's more concrete suggestions for possible solutions to address these issues. The last recommendation in this section is more practical in nature, however, it applies to the methodology as a whole.

Clarify the Purpose of Measuring Municipal Waste and of including Waste from Other Sources

The project group is of the opinion that the challenges identified in the comparability of the participating countries' reporting practice for MW surpass mere "statistical methodology" issues, as many stem from ambiguities and difficulties related to the definition of MW, i.e. the EU legal framework. Most of these issues cannot be resolved solely by applying methodological modifications. Thus, the project group suggests that a clear statement is needed regarding what the member states should aim to measure with the current MW definition. Stating a clear purpose of what MW should measure will contribute to resolving many issues related to ambiguous guidance and the interpretation of which waste should be included in the calculation of MW.

These challenges undermine the ability to compare the amount of generated waste and recycling rates of MW between member states, as well as their achievements of the recycling targets set in the WFD. The primary issue and cause of major differences in generated amounts is the delimitation of MW from other sources. It is the project group's assessment, that LoW codes are not sufficient for the delimitation of MW from other sources. To streamline the definition of MW from other sources across all member states, a clear statement of the purpose of the MW measurement is needed. Furthermore, the project group recognizes that MW from other sources present consumption patterns, and thus recognizes the importance of its inclusion in the MW reporting. However, in order for it to be an effective element in the MW reporting, accuracy and consistency is paramount. Therefore, in order to create a more streamlined and comparable reporting amongst all member states, the project group also calls for a set of clear criteria and guidance on what MW from other sources should be included in the reporting. The project group assesses that certain modifications and adjustments to the current Eurostat Guidance on MW methodology are sufficient in order to achieve clarity within the existing EU legal framework. However, other changes necessitate legislative amendments some of which will be elaborated on further in the following subchapters.

Finally, the project group emphasizes that the current measurement and targets for MW overlap other reporting commitments, creating apparent redundancy without a clear purpose. With the emergence of new regulations and waste targets, it seems essential to coordinate with the existing measurements and reporting obligations. For instance, recycling of packaging waste is covered by both recycling targets for MW (the amount of municipal packaging waste) and specific targets for all packaging waste.

Adopt a more Pragmatic Approach to Measuring Municipal Waste

Aligned with the first recommendation, the project group suggests focusing on a simple, pragmatic definition and measurement approach to MW to enhance comparability across countries. The group believes that adding more details to the MW concept complicates data comparability. Therefore, it is recommended to simplify the interpretation of the MW definition, focusing only on relevant waste streams for measurement, consistent with the purpose of comparing MW across EU countries. Obtaining data related to exceptions is often challenging. Consequently, the project group suggests prioritizing comparable data based on content criteria, focusing solely on economic sector (NACE-codes) and LoW codes rather than adhering to the current approach, which is based on a broader, more detailed definition of MW, which includes individual exceptions on a case-by-case basis.

Given the current EU's methodology for calculating MW and Eurostat guidelines, the project group assesses those differences in approaches and practical issues with obtaining data result in poor comparability across countries' MW-statistics. An alternative focus could be the individual country's progress over time, which in turn make comparability less essential. However, considering the common and legally binding targets, the statistical foundation for measuring one country's progress towards recycling should be similar and comparable.

The project group emphasizes that any changes altering the MW definition or scope require a reassessment of recycling rate targets. As illustrated in [Chapter 2](#) in [Section 2.2](#), changes to the MW definition and the calculation rules have an impact on the estimated recycling targets and have implications for the ability to meet these targets. In terms of potential future targets, such as waste reduction, it might be appropriate to decide on a different scope than the one used for the recycling targets to improve comparability among member states. For instance, this could involve measuring the reduction of waste only from households. It is also crucial to ensure that all targets incentivize environmentally sound waste management and promote better consumption patterns. The current paradox is that while reducing the total amount of waste generated can benefit the environment, it lowers the recycling rate (if the waste streams for which the generated waste is reduced are streams with a high collection and recycling rate,

such as paper). Similarly, increasing compostable garden and park waste collection can improve the recycling rate, but may not always be environmentally beneficial compared to composting on site (at the source).

Consolidate Eurostat's Municipal Waste Reporting Guidance into a Single Document

The project group recommends consolidating all relevant guidance documents and related materials (like the document for special cases) into one single document. Currently, the multitude of guidance documents, websites, and references to previous decisions and legal acts, creates a complex landscape that can be difficult to navigate.

If it proves unfeasible to consolidate all materials into one document, the project group suggests, at the very least, creating an appendix. The appendix should contain links to all pertinent documents, each accompanied by a brief description of its content.

3.1.2 Recommendations Requiring Amendments to EU Legislation

According to the WFD and Recital 10 of Directive (EU) 2018/851, certain waste streams are specified within the definition of MW. Any changes to the definition or scope would necessitate legislative alterations. A revised scope on generated waste could be particularly relevant for future waste reduction targets or revised recycling targets, to avoid any ambiguity regarding the definition's inclusion criteria.

The project group considers the following recommendations to necessitate amendments to existing EU legislation for feasibility. Implementing these recommendations will simplify the delineation of MW and enhance the comparability of MW statistics across member states, leading to a more meaningful measurement of MW.

Exclude Garden and Park Waste from the Scope of the Municipal Waste Reporting

In [Chapter 1](#), comparing the participating countries' delimitation of MW, the project group identified substantial differences in bio-waste amounts, largely due to variations in garden and park waste. As described earlier in this chapter, the project group has identified a lack of clarity in how MW is currently defined. The project group believes garden and park waste, which includes uncontrollable factors like leaves in parks, falls outside the purpose of MW measurement as is not tied to consumption patterns and thereby not essential to be included in the MW statistics for developing policy on reduction of environmental footprint. Therefore, it is recommended to exclude garden and park waste for reporting MW, and when

setting future reduction and recycling targets. The project group attributes the differences in measured amount of garden and park waste to landscape and cultural habits of disposing waste as elaborated in Chapter 1, [Section 1.3](#).

Modify Reporting Requirements for Generated and Separately Collected Municipal Waste

Currently, provision of generated amounts of the MW-fractions is required, while separately collected amounts of MW is optional to report in the Joint Questionnaire table 2 – Material breakdown. No EU member states possess directly measured data in material breakdown on generated amounts of each MW-fraction. These estimates need to be derived from waste compositional analysis of municipal residual waste. If a member state is unable to estimate generated amounts and does not regularly update compositional analysis of MW, the separately collected amounts of the MW-fractions can be reported as generated amounts.^[8] Given that separately collected amounts can be reported as generated amounts, it remains unclear which data each member states truly provides. Consequently, when comparing data on MW-fractions between countries, it is currently done on an uneven basis. To make data on MW across the member states more comparable and aligned, it is recommended that the data provision of separately collected amounts be made mandatory. Implementing this recommendation will clarify which member states can and cannot be compared on material breakdown of generated amounts.

Furthermore, the project group assesses that there is a need for clarification regarding the interpretation of separate collections. It is recognized that separate collection is clearly defined in Article 3(11) of the WFD, but the guidance document^[9] from Eurostat is not phrased in the same way.^[10] Thereby posing a risk for separate collection being interpreted in two different ways: as the total amount of MW that has been collected in a separate waste stream to undergo a specific treatment or, as the separately collected amount of MW collected aimed only for recycling. The project group has identified that this has made a big difference in the reporting and assumes this might be the case for several other member states. The project group recognizes the WFD's legal status. However, Eurostat Guidance appears to favor a pragmatic approach, allowing jointly collected waste streams aimed for recycling to be reported as separate collection. Discrepancies between the WFD and Eurostat Guidance require examination and discussion to clarify the intent behind the definition of separate collection and its reporting.

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8. Guidance for the compilation and reporting of data on municipal waste according to Commission Implementing Decisions 2019/1004/EC and 2019/1885/EC, and the Joint Questionnaire.
 9. Guidance for the compilation and reporting of data on municipal waste according to Commission Implementing Decisions 2019/1004/EC and 2019/1885/EC, and the Joint Questionnaire.
 10. "Separately collected wastes includes single materials collections [...], or multiple materials which are collected together for recycling".

3.1.3 Recommendations Feasible within the Existing EU Legal Framework

The project group assesses that some recommendations can be implemented within the existing regulatory framework and in the scope of Eurostat Guidance. This is the case when the waste stream in question is not explicitly mentioned in neither the WFD nor Recital 10 of Directive (EU) 2018/851, or because they are closely related to other wastes that the applicable legislation excludes. The project group asserts that clear and, in some instances, pragmatic guidance from Eurostat is necessary in order to enable member states to align their interpretations of what should be reported as generated MW amounts. This also implies a consistent interpretation of which waste streams may contribute towards recycling targets.

Distinguish Between Food-Waste and Garden & Park Waste in the Municipal Waste Reporting

The project group acknowledges there are huge differences in the amount of garden and park waste primarily due to climatic, demographical, and cultural differences between the countries as identified in [Chapter 1](#). Differences in the amounts of food-waste are more prone to reflect consumption patterns, thus underscoring the importance of reduction measures. The large amounts of garden and park waste affect the bio-waste statistics clouding the municipal food-waste statistics. Hence, the project group recommends that Eurostat encourages member states to report municipal bio-waste as two separate reports of respectively food-waste (including edible oils) and garden and park waste instead of the currently single joint reporting of bio-waste.



Clearer Guidance on Waste Streams Largely Dominated by Construction and Demolition Waste from the Municipal Waste Reporting

The project group proposes clearer guidance especially related to impregnated wood (LoW code 20 01 37*) and other hazardous waste categories primarily consisting of C&D-waste, which at least will apply to paint, inks, adhesives and resins containing hazardous substances (LoW code 20 01 27*). The project group's assessment indicates, as previously mentioned, that the vast majority of these waste categories can be categorized as C&D-waste and therefore not MW by definition. Furthermore, the project group experiences that the countries in the current MW reporting either include or exclude all C&D-waste, which leads to significant variance and disturbance in the MW-statistics.

The project group recommends that countries determine whether to report these fractions based on assessments regarding the C&D-waste proportion. If the share of MW in a fraction is less than a predetermined percentage defined by Eurostat, the whole waste fraction can be excluded from the reporting; otherwise, necessary measures should be taken to provide data in the report. Preferably, this predetermined percentage should be included in Eurostat Guidance in order for the countries' methodology to be streamlined.



Clearer Guidance on Definition and Reporting of Municipal Street-cleaning Residues

In accordance with Recital 10 of Directive (EU) 2018/851 only waste from litter bins should be reported as MW, not gravel and stones. This indicates that gravel and stones should not be reported under LoW code 20 03 03 and is not included in the MW definition. However, the project group has identified that some of the participating countries use the LoW code 20 03 03 for stone and gravel from street cleaning, and thus, since this is understood as a part of "street-cleaning", the countries include this in their measurement of MW. Sand and gravel, indeed used for winter maintenance for avoiding icy roads, may result in larger amounts being collected, particularly when the streets are cleaned after the winter season. For this reason, the project group highlights the need for clearer guidance on the definition and reporting of the municipal street-cleaning residues. Additionally, the project group suggests that the Eurostat Guidance is amended, so the content of the litterbins is reported as the material contained in the bin (mixed, paper, food-waste, metal, plastic etc.) with the corresponding LoW codes for the respective streams. If this is applied, the LoW code 20 03 03 is not relevant for MW reporting.

Clarify Criteria for Packaging Waste in the Municipal Waste Reporting

In [Chapter 1](#), the project group has identified a significant difference in the countries' approaches to distinguishing packaging waste from other sources that should be included in the MW reporting. Consequently, the project group recognizes a need for clear criteria defining which types of packaging waste should be included as MW.

Packaging waste statistics reported to EU according to Directive 94/62/EC on packaging and packaging waste includes all packaging waste, but according to Eurostat Guidance on MW, an exclusion of at least transport packaging waste from the monitoring systems of packaging should be made. Specific transport packaging, such as drums, crates, pallets, hooks, etc. is also highlighted as non-MW. To avoid different interpretations and to achieve comparable data, the criteria for excluding packaging waste from the MW statistics need to be clarified.

It needs to be made clear in the Eurostat Guidance if similarity to packaging waste from households or, alternatively, the sector where it was generated should be prioritized when using data from the monitoring systems of packaging in the MW reporting. In the current Eurostat Guidance, primary content criteria and similarity are highlighted. However, this may lead to ambiguity when the guidance requires an estimation for distinguishing packaging waste not used by households, even when the content is similar.

The project group therefore recommends Eurostat to instruct member states to include all packaging waste without any specific categorization if it meets "content

criteria", which means *similar in nature and composition to waste from households*.^[11] This is done in order to make it clear what packaging waste from other sources is to be reported as MW. This would mean that for instance all cardboard boxes (corrugated cardboard) from other sources should be included as MW, including cardboard boxes waste arising in production facilities and other excluded industries mentioned in Article 3(2b)(b) of the WFD, prioritizing its content over its origin.

An alternative to further refine the statistics is a system of categorization based on a combination of NACE- and LoW codes (see the next recommendation). However, the project group believes that the simplification described above would be more feasible to implement in the MW reporting in the short term for all member states. This approach would also improve comparability among the member states. Waiting for a potential future delimitation based on NACE-codes, the issue of lack of comparability will likely persist over time. Also, this would require a detailed review to ascertain whether countries include packaging waste as MW to the same extent.

To sum up, clearer guidance is needed on whether the priority should be the similarity to household waste or the origin of the waste, especially when (packaging) waste from production and other excluded industries is identical or similar to packaging waste from households.

Use LoW Codes and NACE-Codes to Clarify Municipal Waste from Other Sources

In comparison of the participating Nordic countries, the project group has identified a significant difference in the countries' approach to defining and calculating MW from other sources. The countries both differ in their understanding of the "content criteria", which means *where such waste is similar in nature and composition to waste from households*,^[12] and achieving accurate data on this as well.

According to Recital 10 of Directive (EU) 2018/851 MW is to be understood as corresponding to the types of waste included in LoW Chapter 15 01 and Chapter 20, with the exception of LoW codes 20 02 02, 20 03 04 and 20 03 06.^[13]

It is also stated in Recital 10 of Directive (EU) 2018/851 that member states should exclude waste from *large commerce and industry*, which is not similar to waste from households in the scope of MW. Specific waste flows that should be excluded as from large commerce are not defined either in legislation or guidance.

In the Eurostat Guidance document for special cases, Eurostat also elaborates potential exceptions to be made from LoW Chapter 20 due to waste being seen as production factors or entrepreneurial risk and therefore not to be defined as MW.

11. Article 3(2b)(b) of the WFD.

12. Article 3(2b)(b) of the WFD.

13. The LoW codes established by Commission Decision 2014/955/EU in the version in force on 4 July 2018.

This type of demarcation from case to case is very unclear, and almost impossible to reproduce in practice when compiling waste statistics.

In some cases, there is a suitable code within another chapter of LoW codes, whereas in some cases there is not. In these cases, clarification needs to be made in the Eurostat Guidance. Thus, the project group assumes that there might be waste flows from other sources, correctly classified within LoW Chapters 20 or 15, which, through other criteria for exception, should not be reported as MW. In other words, one cannot exclude mismatches between the delineation of the MW chapter in the Commission Decision 2000/532/EC (LoW codes) and the definition of MW in the WFD, as the latter does not steer the interpretation of the Commission Decision 2000/532/EC.

Therefore, the project group has identified a need for clearer guidance of the definition of what should be understood as "similar in nature and composition to waste from households"^[14] and suggests that Eurostat uses a combination of LoW codes and NACE-codes whenever appropriate. This will result in a clearer guidance of the definition of MW aiming to increase the comparability of the countries' measurement of MW.

The approach of using a combination of LoW codes and NACE-codes in order to define MW from other sources offers a systematic approach to correctly exclude non-MW from LoW codes, cf. Chapters 20 and 15. Such an approach has the potential to make the statistics robust to cases where waste from large commerce, production, agriculture or C&D activities is classified with a 20- code, or to the fact that 15-codes are used by all economic sectors for packaging waste. The reliance on a combination of LoW codes and NACE-codes could potentially eliminate the subjective judgement related to the classification of waste from "other sources", their "nature and composition", or if waste is generated *"by natural persons in their own interest"*.

LoW codes are already used to identify waste categories that are *"similar in nature and composition to waste from households"* (Directive (EU) 2018/851, Recital 10). NACE-codes can be used as a complement to reliably identify economic activities expected to primarily generate such waste. Even in countries where there is no traceability of the waste origin (NACE-code), the use of NACE-codes could potentially make it possible, in the long run, to clearly identify what type of activities or businesses generate MW.

14. The Commission's initial proposal for a Directive COM/2015/0595 was formulated as follow: *"comparable to household waste in nature, composition and quantity"*, but the *"quantity"*-criteria was not retained in the final version of the directive ((EU) 2018/851), after European Parliament's opinion on the first reading (Report A8-0034/2017).

3.2 Recommendations for Best Practices for Municipal Waste Statistics

The forthcoming section highlights the project group's well-considered recommendations for best practices in collecting and administering MW data from a reporting and statistical perspective. The term "best practice" is employed here to denote optimal methodologies and approaches worth striving for to achieve robust, accurate and efficient reporting on MW.

It is important to note that while these recommendations are agreed upon as being the most effective, none of the participating countries have yet fully implemented them. However, it is confirmed that several countries have adopted and are fulfilling one or more of these recommendations to some degree.

The project group strongly advocates these practices as they may significantly enhance the quality and relevance of MW reporting. For this purpose, they should be considered pivotal when planning and structuring a reporting system. Additionally, these best practices could offer practical solutions for countries struggling with reporting on MW, thus promoting more efficient and accurate reporting systems. Still, the consequences of the implementation in terms of costs and added reporting burden for respondents need to be thoroughly investigated in each country.

The project group has the following recommendations for best practices concerning the data collection and administration of MW statistics:

[3.2.1 One reporting system](#)

[3.2.2 Effective communication and guidance for waste reporters](#)

[3.2.3 Compositional analysis on residual waste for material breakdown of generated MW](#)

[3.2.4 Establish additional data collection codes beyond those specified by the EU](#)

3.2.1 One Reporting System – the Importance of a System with Traceability

As previously highlighted, achieving high-quality data is challenging, especially given some of the existing data collection systems. The project group recognizes that from a reporting and statistical perspective consolidating waste reporting into a singular data system would be advantageous for both the waste collectors submitting the data and the authorities receiving it. High-quality data necessitate consistent and precise reporting, which is more effectively achieved through a unified system than multiple ones. A centralized national system, managed by a

single entity responsible for its structure, maintenance, and data collection, offers a more comprehensive overview of which data to report and how. This is in contrast to multiple reporting systems where overlapping data, or gaps between reports, and varying reporting frameworks are likely.

Further, digitalizing the reporting process may significantly enhance the efficiency. Adapting the data collection system for automatic data uploads from the waste collectors' waste databases could streamline the reporting, improving the waste collector's ability to focus on high-quality weighting procedures and enhanced registration systems. By aligning waste collectors' data bases – which store information such as waste origin (by customer names and codes), time of weighing, weight, waste types (by codes), and treatment methods (by codes) – with the reporting system, a high-traceability framework could also be established. This would simplify the extraction of relevant data, not only for MW reporting but also for tasks like developing national waste strategies and measuring their outcomes. Additionally, establishing a more detailed coding system, as outlined below, could improve traceability.

All stakeholders could benefit from access to this data. Waste producers like municipalities, businesses and public institutions would gain insight into their own waste generation and its treatment; also, municipalities could access data relevant to their responsibilities. Despite all the advantages associated with one reporting system, substantial investments are needed for the development of these types of digital systems and may affect the reporting burden for waste reporters. This is a crucial reason for member states to continue using the existing and available data sources for tracking and reporting on MW. The consequences of a transition to a new waste data system in terms of costs and reporting burden therefore need to be thoroughly investigated in each country.

3.2.2 Effective Communication and Guidance for Waste Reporters

Effective communication and guidance to waste reporters is crucial. The quality of the waste data system depends on the reporters' abilities, regardless of how good the system is. Thus, to get the best possible waste data, it is important to keep good communication and collaboration between the people collecting the waste data and the waste reporters. This applies to both how the waste data should be reported and what information is reported.

3.2.3 Compositional Analysis on Residual Waste for Material Breakdown of Generated Municipal Waste

In order to track the waste flow per material type, it is preferable to have the material breakdown of generated amounts, including the breakdown of mixed waste. This breakdown can be done based on knowledge from compositional

analysis of the residual waste. The compositional analysis of residual waste is critical in measuring the "sorting efficiency" of recyclable waste. The "sorting efficiency" denotes how well the separate sorting process is functioning. In conjunction with "recycling efficiency"^[15] as presented in [Chapter 2](#), "sorting efficiency" is a key parameter of the recycling rate. Without a compositional analysis of the residual waste, member states will be unable to identify the most effective measures to enhance the recycling rate of MW. However, the significant costs associated with conducting this kind of national compositional analysis of residual waste may lead to a hesitancy to conduct these kinds of analyses in some member states.

3.2.4 Establish Additional Data Collection Codes beyond those Specified by the EU

The project group recommends member states to incorporate additional waste codes to the existing LoW codes and R/D-codes for MW reporting.

The LoW codes are tied to both the origin of the waste and the material itself in the same code,^[16] which poses challenges for waste traceability. The traceability is essential for determining whether or not the waste qualifies as MW. After sorting operations, MW is no longer classified with a LoW Chapter 20- or 15- code, which defines MW, and is instead classified with a LoW Chapter 19-code, which covers waste from waste management facilities. This makes tracing MW by using LoW codes practically impossible. Consequently, the project group identifies the need for additional codes that enhance the traceability of the data.

The project group recommends the member states to complement the R/D-codes. The R/D-codes are not sufficient to specify all the treatment forms that must be reported to Eurostat. For instance, none of the R/D-codes are suited for reporting preparing for reuse.^[17]

The project group has discovered that all the participating countries utilize their unique set of national waste codes (in varied degrees) in addition to the LoW codes and R/D-codes for the MW reporting. The project group thus agrees that the waste and treatment codes need to be complemented by the EU and/or the member states. It would be advantageous if the EU could clarify how the existing codes could be complemented in order to make the data more comparable across member states.

15. *Recycling efficiency* is a measurement of the share of recycled amount out of the separately collected amounts.
16. Except for special cases such as Chapter 15, which focuses solely on the material, for example, packaging glass. The issues regarding packaging waste are described further in the recommendation for packaging waste.
17. Section 2.3 "Waste treatment: data set 2" in Eurostat (2024) "Manual for the Implementation of Regulation (EC) No 2150/2002 on Waste Statistic" provides a detailed description of how R/D-codes can be translated into WStatR treatment-categories. For example, it addresses the issues with preparation for reuse by stating that it should be reported as a pre-treatment R12. However, this still does not solve the issue of how to identify preparing for reuse without applying an additional set of treatment codes.

Conclusive Remarks

This project was launched in order to examine why a Dane generates twice as much MW as a Swede. Based on the project findings, the project group can conclude that the speculations attributing this difference to variations in methodology, rather than actual waste production, are indeed accurate. There are key differences in the countries' methods that can explain the discrepancy in the calculation of waste quantities. The identified discrepancies across the participating countries strongly indicate a need to reassess the comparability of MW reporting across EU member states.

The findings of the Municipal Waste project have brought the Nordic countries one step closer to streamlining the measurement of MW by contributing with:

- a clear understanding of the specific parameters where the countries' approaches to the methodology on MW differs from each other significantly;
- an acknowledgement of the importance of recognizing each country's structural and organizational differences when comparing MW statistics;
- knowledge on the need for clearer and simpler guidance from Eurostat on the delimitation of MW; and
- highlighting the need for a more pragmatic approach to defining MW, as the current method is too complex for practical application and complicates the comparability of MW statistics across various countries.

The project's findings and recommendations are of utmost importance, as MW statistics are used for legally binding recycling targets and policy development aimed at reducing the EU's environmental footprint. More accurate data will provide a clearer picture of MW in the EU and the potential for improving recycling rates. The project thereby contributes to the Nordic Council of Ministers' Vision for 2030 for a green Nordic region.

The participating countries intend to use the project's results to review their approach to MW reporting and make any necessary adjustments based on the

findings. Potential effects and consequences, such as the need for financial investments or an increased reporting burden for companies acting as respondents, must be considered in each country prior to making decisions. This project also highlights the benefits and necessity of cross-country collaboration in examining waste statistics.

Additionally, the project group would like to point out that an implementation of the recommendations, as in data collection or calculation, related to the definition of MW could have provided significant insights. Such an approach would have enabled a practical assessment of whether the project group's proposed modifications to the methodology could streamline the participating countries' MW statistics. Unfortunately, testing these recommendations in a practical context was beyond the scope of this project.

Lastly, the project group would like to suggest several areas for future studies based on the project's findings, which could bring us closer to streamlining the measurement of MW in the Nordic countries. These areas include identifying unused treatment possibilities to reach recycling targets, extending comparisons beyond just the recycling rate to include factors such as recycling and sorting efficiency, and devising simple and pragmatic solutions for delimiting municipal packaging waste in compliance with the packaging waste directive. This project was unable to identify a complete solution for this issue, highlighting the need for further exploration in this area.



Bibliography

Affaldsbekendtgørelsen, 2024. Bekendtgørelsen om affald BEK nr. 1749 af 30/12/2024. Available at: <https://www.retsinformation.dk/eli/lta/2024/1749>. (Accessed: 7 February).

Amland, E. N., Sørensen, G. A., & Syversen, F. (2017). Private næringsaktørers innsamling av husholdningsavfall. Miljødirektoratet.

Avfallsforskriften (2004). Forskrift om gjenvinning og behandling av avfall(avfallsforskriften). Klima-og miljødepartementet. Available at: [Forskrift om gjenvinning og behandling av avfall \(avfallsforskriften\) - Lovdata](#) (Accessed: 21 February 2025)

Avfallsförordning SFS nr 2020:614. Klimat- och näringslivsdepartementet. Available at: https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/avfallsforordning-2020614_sfs-2020-614/ (Accessed: 21 February 2025).

Bekendtgørelse om Affaldsdatasystemet, 2021. BEK nr. 2078 af 10/11/2021. Available at: <https://www.retsinformation.dk/eli/lta/2021/2078> (Accessed: 7 February).

Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (notified under document number C(2000) 1147). European Commission. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02000D0532-20231206> (Accessed: 6 February 2025).

Commission Decision 2011/753/EU of 18 November 2011 establishing rules and calculation methods for verifying compliance with the targets set in Article 11(2) of Directive 2008/98/EC of the European Parliament and of the Council (notified under document C(2011) 8165). Available at: <https://eur-lex.europa.eu/eli/dec/2011/753/oj/> (Accessed 20 February 2025).

Commission Decision 2014/955/EU of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council. The Commission. Available at: <https://eur-lex.europa.eu/eli/dec/2014/955/oj/eng> (Accessed: 7 February 2025)

Commission Implementing Decision (EU) 2019/1004 of June 2019 laying down rules for the calculation, verification and reporting of data on waste in accordance with Directive 2008/98/EC of the European Parliament and of the Council and repealing

Commission Implementing Decision C(2012) 2384 (notified under document C(2019) 4114). The Commission. Available at: https://eur-lex.europa.eu/eli/dec_impl/2019/1004/oj/eng (Accessed: 7 February)

Commission Implementing Decision (EU) 2019/1885 of 6 November 2019 laying down rules for the calculation, verification and reporting of data on landfill of municipal waste in accordance with Council Directive 1999/31/EC and repealing Commission Decision 2000/738/EC (notified under document C(2019) 7874). The Commission. Available at: https://eur-lex.europa.eu/eli/dec_impl/2019/1885/oj/eng (Accessed 17 February).

Directive (EU) 2018/851 of 30 May 2018 amending Directive 2008/98/EC on waste. The European Parliament and the Council. Available at: <https://eur-lex.europa.eu/eli/dec/2018/851/oj/eng> (Accessed: 7 February 2025).

Directive 2008/98/EC on waste and repealing certain Directives of 19 November 2008. The European Parliament and the Council. Available at: <https://eur-lex.europa.eu/eli/dir/2008/98/2024-02-18> (Accessed: 6 February 2025).

Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment (WEEE). The European Parliament and the Council. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02012L0019-20240408> (Accessed: 6 February 2025).

Directive 94/62/EC of 20 December 1994 on packaging and packaging waste. European Parliament and the Council. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A01994L0062-20180704> (Accessed: 6 February 2025).

EUR-Lex (n.d). *Summary of Directive 94/62/EC on packaging and packaging waste*. European Union. Available at: <https://eur-lex.europa.eu/EN/legal-content/summary/packaging-and-packaging-waste.html> (Accessed: 6 February 2025).

Eurostat (n.d). Waste methodology. Access to guidance documents for Municipal Waste: "Guidance document on municipal waste data collection – methodology", "Municipal waste – special cases" and "Questionnaire on municipal waste statistics", "Questionnaire on municipal waste obligations", "Questionnaire on landfill rate". Available at: <https://ec.europa.eu/eurostat/web/waste/methodology> (Accessed: 6 February 2025).

Forurensningsloven (1981). Lov om vern mot forurensninger og om avfall(forurensningsloven). Klima-og miljødepartementet. Available via: [Lov om vern mot forurensninger og om avfall \(forurensningsloven\) - Lovdata](#) (Accessed: 21 February 2025).

Lög um meðhöndlun úrgangs, 2003. 2003 nr. 55 20. Mars. Alþingi. Available at: <https://www.althingi.is/lagas/nuna/2003055.html> (Accessed: 7 February 2025)

Miljodirektoratet (n.d). *Returordninger for avfall*. Available at: [Returordninger for avfall - miljodirektoratet.no](https://miljodirektoratet.no) (Accessed: 21 February 2025).

Miljöbalk SFS nr 1998:808. Klimat- och näringslivsdepartementet. Available at: https://www.riksdagen.se/sv/dokument-och-lagar/dokument/svensk-forfattningssamling/miljobalk-1998808_sfs-1998-808/ (Accessed: 21 February 2025).

Nordic Council of Ministers (2020). The Nordic Region - towards being the most sustainable and integrated region in the world. Available at: <https://www.norden.org/en/publication/nordic-region-towards-being-most-sustainable-and-integrated-region-world> (Accessed: 6 February 2025).

Proposal of a Directive COM/2015/0595 amending Directive 2008/98/EC on waste. The European Parliament and the Council. Available at: [EUR-Lex - 52015PC0595 - EN - EUR-Lex](https://eur-lex.europa.eu/eli/dir/2015/0595/oj/eng) (Accessed: 21 February 2025).

Regulation (EC) No 1893/2006 of 20 December 2006 establishing the statistical classification of economic activities NACE Revision 2 and amending Council Regulation (EEC) No 3037/90 as well as certain EC Regulations on specific statistical domains. The European Parliament and of the Council. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02006R1893-20250101> (Accessed: 21 February 2025).

Regulation (EU) 2023/1542 of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC. The European Parliament and of the Council. Available at: <https://eur-lex.europa.eu/eli/reg/2023/1542/oj/eng> (Accessed: 21 February 2025).

Report – A8-0034/2017. Report on the proposal for a directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste. Committee on the Environment, Public Health and Food safety. Available at: [REPORT on the proposal for a directive of the European Parliament and of the Council amending Directive 2008/98/EC on waste | A8-0034/2017 | European Parliament](https://www.europarl.europa.eu/doceo/document/a-8-2017-0034_en.html) (Accessed: 21 February).

Statistics Sweden (n.d). Population desity per sq. km, population and land area by region and sex. Year 1991-2024. Figures for 2023. Statistical Database. Available at: https://www.statistikdatabasen.scb.se/pxweb/en/ssd/START_BE_BE0101_BE0101C/BefArealTathetKon/ (Accessed: 21 February 2025).

The Danish EPA (2022) *Bilag 8. Redegørelse for beregning af reel genanvendelse på kommunalt niveau, 2022*. Available at: [https://mst.dk/media/zxlgfyr/til-as2022- - miljoestyrelsen-opgoerelse-af-reel-genanvendelse.docx](https://mst.dk/media/zxlgfyr/til-as2022-miljoestyrelsen-opgoerelse-af-reel-genanvendelse.docx) (Accessed: 17 February 2025).

Appendices: Description of each Countries' Waste Management and Approach to EU's methodology on Municipal Waste

The following appendices present an in-depth analysis of each participating country's approach to data collection on municipal waste, along with information pertinent to understanding the potential and limitations of their approach to the EU's common municipal waste methodology. To ensure clarity and consistency, each country-specific appendix follows the same structure:

1. Country specific remarks
2. Waste management in the respective country
3. Producer responsibility schemes in the respective country
4. Collection of data on municipal waste in the respective country
 - a. Brief description of the country's waste register and relevant actors for data collection in the respective country
 - b. Overview of collection information for calculating generated and treated amounts of municipal waste in the respective country
 - c. Specifications on data on generated municipal waste
 - d. Specifications on data on treated municipal waste
 - e. Description of quality assurance of the data
5. Overall description of the country's approach to delimitation of municipal waste
 - a. Specifications on the country's method for calculation of municipal waste from other sources
6. The country's approach to the EU methodology on recycling

Appendix A: Denmark



A.1 Country Specific Remarks

Denmark's country-specific remarks are explained in the technical sections where relevant.

A.2 The Waste Management in Denmark

In Denmark, municipalities are responsible for handling household waste and they are obligated to sort the waste into the following ten fractions: glass, metal, plastic, paper, food and drink cartons, cardboard, textiles, food waste, hazardous waste and residual waste. The municipalities are also obligated to establish collection schemes for these fractions as a direct curb side pick-up service from all households. The ten fractions must be collected separately. However, the following combinations are permitted (Affaldsbekendtgørelsen, 2024):

- Paper and cardboard
- Metal and glass
- Metal and plastic
- Plastic and food and drink cartons
- Plastic, metal and food and drink cartons

Some municipalities have had issues setting up the new collection schemes, due to practical issues, such as waste containers being on back order or contracts with waste collectors, which cannot be changed in time. The last municipalities are expected to have collection schemes set up for all 10 fractions during 2025.

Other waste from households, such as construction waste and garden waste, is collected at municipally owned recycling centers. The municipalities operate about 320 recycling centers across Denmark where they primarily receive waste from households but also from smaller businesses. It is up to the individual municipality to determine which fractions should be available at recycling centers in order to ensure recovery of suitable waste materials from households. Denmark regards all waste from recycling centers as household waste, including construction and demolition waste. In this way, the Danish definition of household waste differs from the EU definition of MW.

The municipalities are also responsible for the collection and treatment of MW suitable for incineration from companies. The companies themselves are responsible for their MW suited for recycling. They are obligated to sort their MW in the same way as the curb side collections schemes for households and they have the same options for combination of fractions.

Finally, the municipalities have had the duty to classify all waste in the municipality. This also includes non-MW. However, from as of 1 January 2025 this practice has changed, which means that now the classification of waste is centralized at the Danish Environmental Protection Agency.

In general, all waste is collected by private waste collection companies. For recyclable household waste, the municipalities have tenders for the collection and treatment. In a few instances, household waste is collected by waste collection companies owned by municipalities – this practice changed starting from 2023 when all collection had to be done by tenders. Waste from municipal institutions (e.g. municipal administrations, schools, day-care centers, sports halls and nursing homes) may still be collected by companies owned by municipalities.

The companies, in charge of the treatment of waste, are obligated to report to the Danish Waste Data System and they must be registered in the Danish National Waste Register as only companies that are registered in the Waste Register are legally authorized to handle waste in Denmark (Bekendtgørelse om Affaldsdatasystemet, 2021).

A.3 Producer Responsibility Schemes in Denmark

Denmark has implemented extended producer responsibility on batteries, electrical and electronic equipment and, most recently, Single-Use Plastics, as of January 2025. The introduction of EPR on waste fractions, which are included in the measurement of MW, has not significantly affected the practical administration or data collection pertaining to statistics on MW. This is primarily because all waste actors are obligated to report waste data to the Danish EPA, regardless of whether the waste falls under an EPR scheme or not. Additionally, according to the Directive 94/62/EC on packaging and packaging waste, Denmark partially introduced EPR on packaging by the end of 2024 and the rest will be implemented by 1 October 2025. Packaging waste will continue to be collected alongside non-packaging waste in separate waste fractions. The amount of packaging waste will be determined based on waste sorting analysis carried out on both MW and business waste.

A.4 Collection of Data on Municipal Waste in Denmark

A.4.1 The Danish Waste Register, the Danish Waste Data System and Waste Actors

The Danish Waste Data system is a comprehensive system designed to manage and record waste data in Denmark and has existed since 2011. It is a digital platform that facilitates the collection, processing, and analysis of waste-related data, providing insights for both government bodies, waste producers and waste management companies.

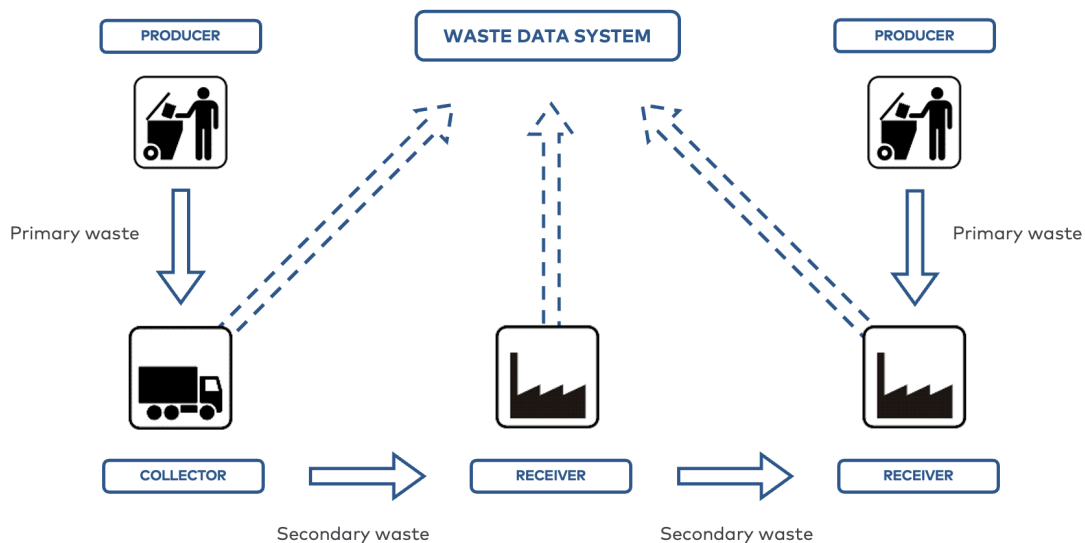
All entities involved in the handling of waste, including collectors, receivers, exporters, and importers, are obligated to report waste data to the Danish Waste Data System. Each report must include details about the waste's origin (meaning who generated the waste), type, quantity and treatment. Exporters are also required to specify the recipient of the waste and the percentages recycled. In the case of waste generated by companies and public institutions, the reporting should include the company/institution's CVR (Central Business Register/VAT no.) and P-number^[18] as the waste producer. Similarly, the CVR and P-number of the receiving company must be provided. The type of waste is reported by a combination of the Danish waste codes and LoW codes. The treatment is reported by a combination of the Danish Treatment codes and the R/D-codes. The quantity is always reported in tons.

18. The P-number (Production Unit Number) serves as a unique identifier for physical locations where economic activities are conducted.

Municipalities are only obligated to report to the Waste Data System, if they treat the waste themselves (e.g. composting garden waste at recycling centers) or export the waste directly.

During the waste flow different actors report the same waste since the responsibility of the waste changes from the collection of the waste to treatment. This does not present an issue regarding double counting since the data system is able to recognize whether the waste is already in the system. The first time the waste is reported (typically by a collector) it is seen as primary waste. When the same waste is then reported respectively by a sorting facility and by a treatment facility the waste is seen as secondary waste (see Figure A1). Only the primary waste is counted as generated waste. This is done by using the information from the Danish Business Register as described above.

Figure A1: Visualization of reporters to the Danish Waste Data System. Waste Flow (arrows). Reporters (collector and receiver) reports to the Waste Data System (dotted arrows)



Even though the waste data system gets several reports for the same waste during its flow, there are issues when it comes to tracking the waste streams. The waste codes may change throughout their journey from collection to final treatment, as the waste undergoes further sorting, pre-treatment and is mixed with waste from other sources. The change in waste codes is not necessarily an error, for example, when LoW codes from Chapter 19 are applied. However, this makes tracking specific waste streams through the waste system difficult.

The reporters also find it difficult to accurately indicate whether or not the waste is undergoing final treatment. The Danish EPA are planning a communication effort

aimed at giving the reporters a better understanding of how to use the R/D-codes to indicate pre-treatment and final treatment.

The waste actors report annually to the Waste Data System. It is possible to report to the Waste Data System using a manual report, by uploading a csv template or directly transferring data from the waste actor/reporters' system to the waste data system via an API.

The Danish Waste Data System sees an annual average of 800 companies reporting, which collectively describe waste from approximately 100,000 waste producers. Reports are made annually by March 1st for the previous calendar year and must be submitted electronically via the online platforms in the Waste Data System. The above is stipulated in the Danish Bekendtgørelse om Affaldsdatasystemet (2021).

Data reported to the Danish Waste Data System is managed by the Danish EPA. Before the data can be reported to Eurostat by the Danish EPA it is quality assured and remodeled by means of different data programs to achieve the correct delineation of MW. This is explained in the following sections.

A.4.2 Information Collected for Calculating the Generated and Treated Amounts of Municipal Waste in Denmark

The waste actors who report to the Danish EPA report the following information:

Type of waste	LoW codes and Danish waste code
Quantity of waste	Weighed or estimated in ton
Origin of waste	• Municipality (Name) • Producer type • The legal registration number of the company from which the waste is received. Both overall legal number and specific site number. If the waste is received directly from the original waste producer, the waste will be "primary waste". If the waste is received from another waste company that has collected or received the waste itself, it will result in "secondary waste".
Type of waste treatment	R/D-codes and Danish treatment codes
Additional information	In addition, the Danish EPA collects NACE codes from the National Central Business register.

A.4.3 Specifications on Generated Municipal Waste

For Denmark, the data reported as generated amounts equals the data for separately collected amounts. The separately collected amounts are solely the amounts reported to the Waste Data System as having been collected. All fractions, within MW, are separately collected. In the event that two fractions are collected in the same bin, the reporter is advised to report the two amounts separately.

When we need to determine how much waste is MW, we extract data from the Waste Data System delimited by LoW codes. However, when we need to determine how much waste has been treated, this is done using the Danish waste codes, as it is possible to determine the treatment of specific materials via them, which is actually not possible with LoW codes, as they are linked to the origin of the waste more than the material itself. We calculate final treatment percentages on the Danish waste codes, which we then transfer to the LoW codes. The connection between LoW codes and Danish waste codes can be seen in the table below.

Table A1: Overview showing the compliance between Denmark's collected data and the data reported to Eurostat

Data reported to Eurostat / LoW codes			
National code	Description in the national data system	LoW code	Municipal waste
E19/E19	- Iron and metal	20 01 40	Metals
H12/E12	- Packaging metal	15 01 04	
H12/E12	- Packaging metal	15 01 11	
E07/H07	- Glass	20 01 02	Glass
E11/H11	- Packaging glass	15 01 07	
E08/H08	- Plastic	20 01 39	Plastics
E13/H13	- Packaging plastic	15 01 02	
H05/E05 H06/E06	- Paper incl. Newspapers - Cardboard	20 01 01	Paper and cardboard
H09/E09 H10/E10	- Packaging paper - Packaging cardboard	15 01 01	

H02/E02	-	Food waste	20 01 08	Bio-waste
H02/E02	-	Food waste	20 01 25	
H38/E38	-	Bio-waste, where no other code is more accurate		
H17/E17	-	Garden waste	20 02 01	
H15/E15	-	Wood	20 01 37	Wood
H15/E15	-	Wood	20 01 38	
H30/E30	-	Packaging wood	15 01 03	
E39/H39	-	Textiles	20 01 10	Textiles
E39/H39	-	Textiles	20 01 11	
E39/H39	-	Textiles	15 01 09	
H40/E40	-	Light sources	20 01 21	Electrical and electronic equipment
H41/E41	-	Solar panels	20 01 23	
H42/E42	-	Large WEEE	20 01 35	
H43/E43	-	Equipment for temperature exchange	20 01 36	
H44/E44	-	Small WEEE		
H45/E45	-	Screens, monitors		
H46/E46	-	Small IT equipment		
H48/E48	-	Portable batteries	20 01 33	Batteries
H49/E49	-	Industrial batteries		
E50/H50	-	Car batteries		
H48/E48			20 01 34	
H49/E49				
E50/H50				
H03/E03	-	Combustible waste, where no other code is more accurate	20 03 07	Bulky waste
H27/E27	-	Bulky waste or alike		
H01/E01	-	Residual waste	20 03 01	Mixed waste
H36/E36	-	Mixed packaging waste	15 01 06	
H26/E26	-	Hazardous waste, where no other code is more accurate	20 01 13*, 20 01 14*, 20 01 15*, 20 01 17*, 20 01 19*, 20 01 21*, 20 01 23*, 20 01 26*, 20 01 27*, 20 01 28, 20 01 29*, 20 01 30, 20 01 21*, 20 01 32, 20 01 41, 20 01 99, 20 02 03, 20 03 02, 20 03 03, 20 03 99, 15 01 05, 15 01 10*	Other
H29/E29	-	Other waste		

A.4.4 Specifications on Treated Municipal Waste

On the basis of reports to Danish Waste Data System, the Danish EPA calculates treated amounts of MW. Both the quantities that have been collected for a certain treatment form is calculated and the actual amount that undergoes final treatment (see [Table A2](#) below).

Reporting to the Danish Waste Data System

When reporting to the Danish Waste Data System, the reporter must state the intended treatment, for which the waste is collected, received or exported/imported. They must report both a Danish treatment code as well as the R/D-codes. In addition, the reporter must state whether the waste is undergoing a final treatment or not.

If the waste actor (the reporter) exports waste, meaning the recipient is a foreign company, the waste actor needs to report this and include information on the foreign company receiving the waste. The reporter is obligated to obtain information from the receiving foreign company on the distribution on waste undergoing the following final treatments: recycling, preparing for reuse, incineration or landfill (Bekendtgørelse om Affaldsdatasystemet, 2021).

Many waste actors do not understand the recovery and disposal codes, since there are many codes and the difference is not clear. The Danish treatment codes are more intuitive, which is why the quality of the Danish treatment code use is better. This does, however, present a problem in determining final treatment as the Danish treatment codes do not differentiate between pre-treatment and final treatment.

Calculation of treatment form

Since multiple actors report to Danish Waste Data System, the waste flow for a particular fraction of MW, the obligation to report both the Danish treatment codes and the R/D-codes inform the Danish EPA which treatment form the waste is collected for and the amount of the waste that has actually been finally treated. The combination of the treatment codes is used in the estimation of the total amounts of MW that have actually been recycled, incinerated, etc.

[Table A2](#) below shows how the Danish EPA defines waste that is collected for different treatment operations and how waste is defined that is actually treated by different treatment forms. The treatment form 'Other recovery' is not defined, and no treatment codes exist for this form. MW collected for a treatment operation is defined according to the Danish treatment codes and the actual treated amounts are defined by a combination of the Danish treatment codes and the R/D-codes. For some of the subcategories, this is optional to report on, thus complete data do not exist – see explanation in [Table A2](#).

Table A2: Overview showing the compliance between Denmark's collected data on treatment options, the actual treated amounts and what is reported in table 1 and 2 as the treatment forms defined by EU

Waste collected for a treatment form			Actual treated waste amounts			Data reported to EUROSTAT in table 1 and table 2		
Definition of treatment form	National codes	R/D-codes	Definition of treatment	National code, description in the national data system	R/D-code	Definition of category/ treatment form	Comments	
<i>Collected for preparing for reuse</i>	10 preparing for reuse		<i>Actual amount prepared for reuse</i>	10 preparing for reuse	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, D1, D2, D3, D4, D5, D6 D7, D10, D11 and D12	<i>Preparing for reuse</i>	Equals 'Actual amount prepared for reuse'	RECOVERY
<i>Collected for recycling</i>	01 recycling		<i>Actual recycled amount</i>		R2, R3, R4, R5, R6, R7, R8, R9, R10 and R11	<i>Recycling material</i>	Equals 'actual recycled amount'	
						<i>(of which Metal recycling from incineration bottom ash)</i>	Data is not available	
						<i>Recycling composition and digestion</i>	The amount of garden waste that is 'actual recycled'	
						<i>(of which Separate collection and recycling of biowaste at source)</i>	Data is not available, since home composting is not used widely	
<i>Collected for incineration</i>	02 incineration, 07 incineration exemption from dues		<i>Actual incinerated amount</i>		R1 and D10	<i>Energy recovery</i>	Equals 'actual incinerated amount' since all incineration facilities use energy recovery	

<i>Collected for backfilling</i>	11 backfilling	<i>Actual backfilled amount</i>	11 backfilling	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, D1, D2, D3, D4, D5, D6 D7, D10, D11 and D12	<i>Other recovery</i>	Equals 'actual backfilled amount'	DISPOSAL
					<i>Incineration</i>	Data is not available, since all incineration facilities use energy recovery	
<i>Collected for landfill</i>	03 landfill, 08 landfill exemption from dues	<i>Actual landfilled amount</i>		D1, D2, D3, D4, D5, D6 D7, D11, D12	<i>Landfilled</i>	Equals 'actual landfilled amount'	
					<i>Other disposal</i>	Data is not available	

As mentioned above, when reporting to the Danish Waste Data System the reporter must state whether a certain waste fraction undergoes final treatment or not. In practice, final treatment is indicated by clicking yes or no for final processing. Lots of waste handlers/actors do not understand the meaning of the term "final treatment" and the level of guidance varies across municipalities. Therefore, the Danish EPA assesses which facilities perform final treatment in Denmark. Final treatment facilities are understood to be facilities that carry out the final processing of all or part of the waste they receive. At the final processing (=final treatment), the waste ceases to be waste. The facilities are assessed on the basis of Danish Waste Data System reports and industry knowledge. The list contains for instance over 350 recycling facilities in Denmark.

A.4.5 Quality Assurance of the Data

The actors responsible for reporting to the Danish Waste Data System are responsible for the correctness of the reported data. The Danish EPA is responsible for supervising the reported waste data, which is why, when the Danish EPA receives the data, it undergoes a quality assurance process. The Danish EPA's quality assurance can be divided into three parts, of which the two first assurances are electronic and automatic, and the last one is manual. The data first undergoes an immediate quality assurance when the reporter tries to upload the csv file or presses submit in the manual report. The reporter will be notified about any errors before submitting. Secondly, the report undergoes a more thorough automatic validation overnight. If the system detects any errors, the entire report is rejected and the reporter is informed that the report has been rejected and on what grounds, so that the reporter can correct the errors and file the report again. After the reporting deadline, the third and final quality assurance takes place: a team in the EPA quality assures the data manually. The team reviews fluctuations in quantities at fraction, LoW Codes, company and treatment level and unlikely code combinations. If large fluctuations are detected, the reporting actor is contacted, and it is clarified whether there is a natural explanation, or an error occurred. Errors are often found by comparing specific data over an extended time period.

A.5 The Danish Delimitation on Municipal Waste

As all kinds of waste from industry and households in Denmark is reported to the national Waste Data System, the amount of MW needs to be delimited and determined. Since LoW codes and Danish waste codes are used in each reporting, these codes can be used to determine the amount of MW. Specifically, the LoW codes in Chapters 20 and 15 01 are used. However, the LoW codes reported to Danish Waste Data System are not sufficient to determine whether or not the waste is MW, since a lot of waste is reported using an MW LoW code, despite not being MW. This is mainly due to the fact that reporters find the LoW codes difficult

to understand and overwhelming in number. The LoW codes in Chapter 20 have the simplest titles and are therefore used more often than they should. The Danish EPA is continually working on ways to make it easier for reporters to identify the correct LoW codes, and a lot of resources are spent on quality assurance to address this issue. However, the problem is so prevalent that the data undergoes a transformation process before it is reported to Eurostat. This is mainly done to eliminate non-municipal waste, but also to look for waste that should be reported as municipal waste but is listed incorrectly for various reasons. Finally, there are cases where non-municipal waste is correctly reported with an MW LoW code, e.g. non-municipal packaging waste like wooden pallets. These can be difficult to identify, but when it is possible, they should be excluded from the municipal waste reporting. The Danish EPA believes these issues with the LoW codes result in a significant overestimation of the total Danish MW.

In the data transformation, specific combinations of the company's legal identification number and Danish waste codes/waste type are determined to be household waste in the Danish Waste Data System despite not being reported as such. The Danish EPA does this because it is a known issue for these specific reporters to report incorrectly on such code combinations.

In addition, the Danish EPA also determines some combinations of reported household waste codes by using the Danish waste codes in combination with a specific company number to be industrial waste because it is known that precisely these reporters are reporting incorrectly.

A.5.1 The Danish Method for Calculating Municipal Waste from Other Sources

In the data transformation, the Danish EPA uses the reported waste data under LoW Chapters 20 and 15 as a starting point and then uses the Danish waste codes to exclude non-MW from other sources according to the Danish interpretation. For instance, the Danish waste codes are used to exclude paper and cardboard from the paper and cardboard industry by deducting all "E05", "E06", "E09", "E10" (these Danish waste codes are non-household "paper incl. newspapers", "cardboard", "package paper" and "packing cardboard ") in combination with Industry Divisions 17 and 18 (which are the ID codes for the manufacture of paper/cardboard and paper/cardboard products).

Historically, waste analyses have been carried out on waste from other sources than households. On the basis of these analyses, our consultants have estimated that 90% of what is reported to the Waste Data System as waste corresponding to residual waste and suitable for incineration from other sources (except the service sector) have arisen in connection with production and other non-household-like activities. Only 10% of this type of waste are therefore included as MW for all industries apart from the service sector. This is the final exclusion of data.

A.6 The Danish Approach to the EU Methodology on Recycling

The estimation of the actual recycled amount of MW is made by the Danish EPA and it is calculated on the basis of reports to ADS. The calculation takes place in several steps (Danish EPA, 2022):

Data reported to the Danish Waste Data System is used to estimate the total amount of recycled MW. The collectors of waste and treatment facilities report the type of waste they have collected/received with the combination of the LoW codes and the "Danish waste codes". As mentioned above, the treatment form of the waste is reported with the combination of the R/D-codes and the "Danish Treatment Codes".

The actual recycled amount of MW needs to be summed up on the LoW codes, which MW consist of. The amount is not directly reported to ADS but needs to be estimated. For the estimation, the Danish waste codes is used. It would be optimal directly to use the LoW codes for MW, however, this is not possible since it is not feasible to trace the LoW codes through the waste flow: The LoW codes are based on the origin of the waste (the industry from which the waste originates). This means that the LoW codes change during the waste flow and therefore it is not possible to trace the LoW codes through the waste flow. In contrast, the Danish waste codes are based exclusively on material fractions, which explains why the waste can be followed through the waste flow.

The actual recycled amount of each MW fraction (LoW Codes) is estimated by multiplying the amount collected for recycling, which is reported to the Danish Waste Data System, with the calculated final treatment percentage:

Equation A1:

$$MW_{actual\ recycled} (LoW)(ton) = MW_{collected\ for\ recycling} (LoW)(ton) \ast \overbrace{\frac{Final\ treated\ by\ recycling\ (Danish\ waste\ codes)(ton)}{Collected\ for\ recycling\ (Danish\ waste\ codes)(ton)}}^{Final\ treatment\ percentage\ (Danish\ waste\ codes)\%}$$

$$MW_{actual\ recycled} (LoW)(ton) = MW_{collected\ for\ recycling} (LoW)(ton) \ast \frac{Final\ treated\ by\ recycling\ (Danish\ waste\ codes)(ton)}{Collected\ for\ recycling\ (Danish\ waste\ codes)(ton)}$$

- The final treatment percentage for the individual MW fractions indicates the percentage of the waste that is actually recycled as a proportion of the amount collected in the schemes for recycling.
- The final treated recycled amount (numerator in the formula) is calculated, as previously mentioned, on the basis of waste data reports to the Danish Waste Data System from facilities that have been assessed by the Danish EPA as final treatment facilities. If the waste is exported for recycling, the exporter reports the final recycled amounts to the Danish Waste Data System, which they are obliged to acquire information on.
- The amount of MW collected for recycling, including both LoW codes and the national waste codes, is directly reported to Danish Waste Data System as primary amounts.
- The actual recycled amount of each MW fraction thus contains both waste fractions collected from their intended waste scheme, as well as from missorting in other waste schemes, which are later sorted for recycling.
- The actual recycled amount of each MW-fraction is summed up, and then you have the total amount of all MW, which has been actual recycled.

When the Danish EPA calculates the total amount of recycled MW and the recycling rate, the amount prepared for reuse may either be included or excluded. In the report to Eurostat, the amount is reported separately. It is not possible to calculate the recycling rate of each MW-fraction since the total generated amount of each fraction is unknown. In fact, it is unknown since the missorted amount in the residual waste is not known. Only the collected amount of each MW-fraction is known.

Appendix B: Iceland



B.1 Country-Specific Remarks

The magnitude of tourism in Iceland, relative to its population size, could be a significant factor in assessing the volume of MW in the country. Since 2010, tourism has been rising in Iceland and peaked in 2018 with 2.3 million tourists. This is a high amount seen in the light of the Icelandic population being approximately 380,000. The waste that tourists generate is primarily MW. The correlation between tourism and MW was made evident during the Covid-19 pandemic when a decline in tourism led to a 12% drop in MW per capita in 2020 compared to 2019, the year before the pandemic. As tourism bounces back to pre-pandemic levels, this factor becomes significant when benchmarking Iceland's MW against other countries. Tourism has an effect on the generated waste in the other countries to some extent, as they are also popular vacation destinations, but their generated waste did not show such a clear impact during the Covid-19 pandemic as it did for Iceland.

Due to Iceland being an island the import and export of waste is easily traceable as it goes through customs. There is no reported import of MW into Iceland, but considerable amount is exported for treatment. A large majority of recyclable waste is exported for recycling.

B.2 Waste Management in Iceland

Waste in Iceland is sorted and collected accordingly:

- Separately collected at households: Mixed waste, paper and cardboard, plastic and bio-waste.
- Waste producers bring to a neighborhood collection station: glass, metals, textile and single-use beverage packaging.
- Waste producers bring to a recycling station for waste: All other waste that is not separately collected or brought to neighborhood collection stations.

Legally, the Icelandic municipalities are responsible for waste collection and waste management within their jurisdiction, which commonly is outsourced to private waste entities (Lög um meðhöndlun úrgangs, 2003). However, this arrangement has led to an information gap in waste generation and origin. The private waste actors, responsible for reporting to the Icelandic Environmental Protection Agency's waste data portal, often neglect to report collected waste data. This issue is amplified when waste collection is outsourced to entities that service multiple municipalities, as data on waste origin often gets lost. Consequently, this creates reporting challenges for final waste actors to the Icelandic EPA.

Only gathering data from the final waste actors, thus effectively only gathering data on treated waste, has created significant weaknesses in the Icelandic waste data. Two main weaknesses can be highlighted as follows:

1. The traceability of waste is challenged, which causes issues in identifying the origin of the waste, whether it was produced by households or other sources. In addition, the municipality the waste originates from is also unclear.
2. The Icelandic EPA is effectively using treated amounts of waste to calculate generated waste. This is an issue since it makes correct calculations of recycling rates according to EU Commission Implementing Decisions, impossible as well as compliance with the targets. It also makes it unclear what the loss is between generated waste and treated waste in Iceland.

In 2024, a total of 94 waste actors reported waste to the Icelandic EPA and those are only the final waste actors. The waste law in Iceland states that all waste actors, e.g. collectors, sorting facilities etc., must report waste data to the Icelandic EPA. However, the Icelandic EPA has not had the capacity to enforce this law and thus has focused on collecting data from the final waste actors.

It is the future vision of the Icelandic EPA to address these issues by collecting all waste data nationwide, intending to provide municipalities with accurate data on collected waste in their areas, and to improve the national waste data on the origin of the waste.

B.3 Producer Responsibility Schemes in Iceland

In Iceland, the EPR schemes is overseen by the Icelandic Recycling Fund (IRF) and not individual producer responsibility organizations. The Icelandic Recycling Fund collects recycling fees directly at import (through customs) and from domestic producers of EPR goods (through tax authorities). It then pays the waste actor to deliver the waste to the final treatment of waste, upon receipt of confirmation of the final treatment. The MW fractions that are currently covered by the EPR schemes are: plastic-, paper-, cardboard-, glass-, metal and wood packaging, single use beverage packaging, electric- and electronic waste and batteries and accumulators. There are also some hazardous waste streams under EPR (acids, bases, solvents) that should be reported as MW, but since all hazardous waste is currently excluded as MW in Iceland, it is not reported as MW data. Hazardous waste is excluded from MW in Iceland due to how the waste fractions for Iceland were defined and the hazardous waste fractions were deemed to be mostly from other sources and not households. This situation is not optimal and will be sought to be corrected in future improvements.

EPR packaging fractions collected at source (either households or from other sources) are mixed with other MW fractions of the same material. Plastic packaging is sorted and collected with other plastic MW and paper- and cardboard packaging with other paper- and cardboard MW. Wood packaging is also mixed with other wood waste at the recycling stations. The Icelandic Recycling Fund uses estimates to produce data on how much packaging waste there is within the collection at source of plastic and paper and cardboard waste. Regarding plastic packaging waste, the IRF pays the waste actor once the confirmation on actual recycling rate arrives from the facility. Regarding paper and cardboard packaging, IRF pays the waste actor for packaging based on estimates from mixed paper and cardboard waste collection ratio. That data is handed to the Icelandic EPA by the Icelandic Recycling Fund.

In January 2023, metal-, glass- and wood packaging became a part of the EPR scheme so the effects on that are not yet present in the Icelandic waste data.

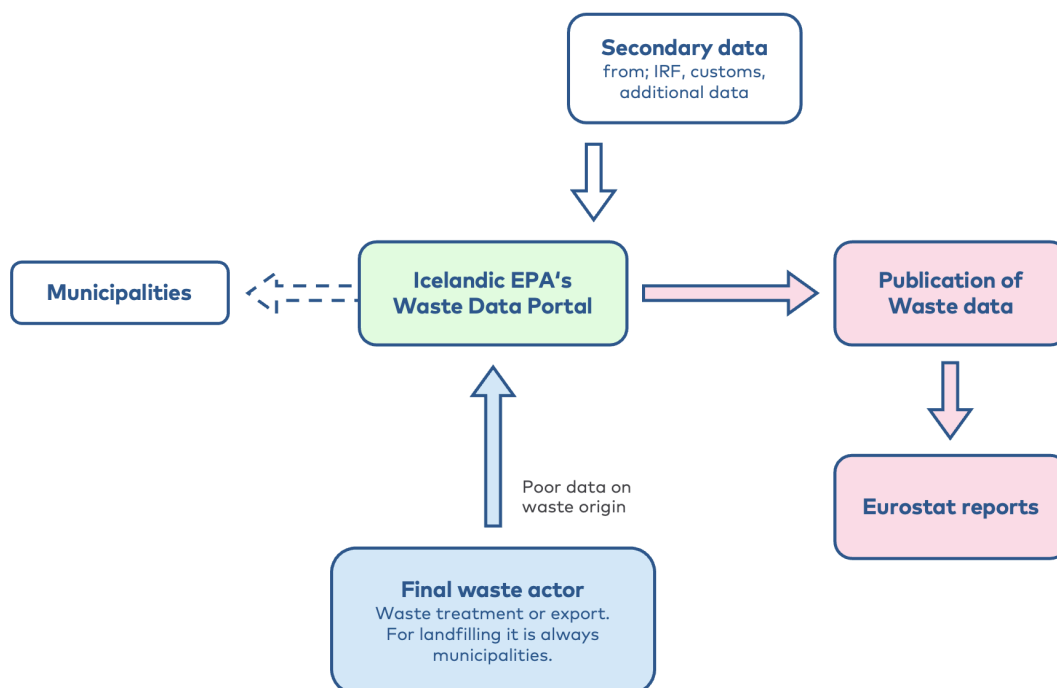
B.4 Collection of Data on Municipal Waste in Iceland

B.4.1 The Icelandic Waste Register, the Icelandic Waste Data Portal and Waste Actors

The Icelandic EPA collects data on all waste in Iceland, industrial waste and MW. The Icelandic EPA has a digital platform for collecting data referred to as the waste data portal. The Icelandic waste data portal receives reports from:

- The final waste treatment facilities,
- Actors responsible for recycling of waste (including composting),
- Actors responsible for the final disposal of waste (landfill or incineration), and
- Exporters of waste for further treatment (recycling, other recovery such as incineration with energy recovery).

Figure B1: An overview of the Icelandic system and actors involved in reporting waste data on MW.



In other words, the "final" actor is responsible for the waste in Iceland and will therefore hereafter be referred to as the *final waste actor*. Thus, the final actor makes the final treatment or exports the waste for further treatment.

The final waste actors report annually to the Icelandic EPA's waste data portal. It is possible to report by manually filling out a digital form or by uploading a csv file. Currently the Icelandic EPA is working on the option to transfer data automatically and digitally from the waste actor to the portal through an API connection. Most waste actors report with a digital form, as many are relatively small entities and have simple reports. Others hand in csv-files that may cover all transactions over the year spanning many tens of thousands of lines. The 10 largest waste actors in Iceland report around 80–90% of all treated waste.

The collection of waste data is both for the purposes of informing the public, municipalities and other interested parties, on waste in Iceland as well as to fulfill legally required reporting to Eurostat.

B.4.2 Information Collected for Calculating the Generated and Treated Amounts of Municipal Waste in Iceland

The waste actors report the following information to the Icelandic EPA's digital reporting system:

Type of waste	In EWCstat4 waste code (or WStatR code) through a corresponding Icelandic item number.
Quantity of waste	Weighted or estimated in ton
Origin of waste	• Municipality source • Industry source (NACE, 2008)
Type of waste treatment	In Iceland's own 7 categories for treatment
Additional information	It should be noted that the data collected by the waste actors varies from an advanced digital system to handwritten notes.

B.4.3 Specifications on Generated Municipal Waste

The Icelandic EPA collects data from the waste actors in Icelandic Item number, which corresponds to EWCstat4 codes. As described earlier, Iceland does currently only collect data on treated MW and not generated amounts of MW.

Iceland estimates the generated amount of MW by summing up the total amount of treated MW.

The total amount of MW treated (same as generated) is based on the reported fraction codes, that is, certain fractions codes have been defined as MW codes. All waste reported as the predefined fractions codes are what the total amount of MW consists of. Iceland implemented 72 fraction codes, adding 21 codes to the 51 from the EWCstat4 codes, to better represent specific Icelandic circumstance. From the 72 fraction codes, 13 of them were defined as MW and are listed in Table B1 below, along with the relevant LoW codes. The Icelandic EPA is aware that the defined MW codes do not account for all LoW codes in Chapters 20 and 15. The missing LoW codes are also represented in Table B1, with N/A as the national code number. They do, however, in most cases, have a specific national code number, but they are not included as MW in the Icelandic waste management system. The reason being that they were concluded to include mostly waste from other sources, and currently there are no means of distinguishing between the origin (knowing how much comes from other sources and from households) of the specific waste fractions. However, in some cases, the waste is correctly reported as a MW fraction code, as no waste actor reports into the system through LoW codes but reports directly into the specific Icelandic fraction codes (with corresponding EWCstat4 codes). Another aspect of how MW is defined in the Icelandic system that needs to be revised is all the waste from other sources that is within the MW codes and thus is reported as MW even though it should be excluded. Examples include wood pallets (transport packaging) under wood packaging and agricultural haybale plastic under plastic packaging.

Table B1: Overview showing the compliance between Iceland's collected data and the LoW-codes reported to Eurostat.

Collected data			Data reported to Eurostat / LoW codes	
National code Item number	Description in the national data system	Comments (EWCstat4 code)	LoW code	Municipal waste
N/A			20 01 11	Metals
15	Metal packaging	06.31	15 01 04	
N/A			15 01 11	
N/A			20 01 02	Glass
17	Glass packaging	07.11	15 01 07	

N/A			20 01 02	Plastic
23	Plastic packaging	07.41	15 01 02	
21	Paper and cardboard, not packaging	07.23	20 01 01	Paper and cardboard
20	Paper and cardboard packaging	07.21	15 01 01	
41	Food waste from kitchens and stores	09.12	20 01 08 20 01 25	Bio-waste
42	Garden waste, horticultural and forestry waste	09.21	20 02 01	
N/A			20 01 37	Wood
26	Wood waste, not packaging	07.53	20 01 38	
25	Wood packaging	07.51	15 01 03	
30	Textile waste	07.6	20 01 10 20 01 11 15 01 09	Textiles
34	Electric- and electronic waste	08.2	20 01 36	Electrical and electronic equipment
N/A			20 01 21 20 01 23 20 01 35	
N/A			20 01 33	Batteries
36	Batteries and generators	08.41	20 01 34	
N/A			20 03 07	Bulky waste
44	Mixed MW - waste collection, waste collection centers, bulky waste	10.11	20 03 01	Mixed waste
N/A			15 01 06	
N/A			20 01 13*, 20 01 14*, 20 01 15*, 20 01 17*, 20 01 19*, 20 01 21*, 20 01 23*, 20 01 26*, 20 01 27*, 20 01 28, 20 01 29*; 20 01 30, 20 01 21*, 20 01 32, 20 01 41, 20 01 99, 20 02 03, 20 03 02, 20 03 03, 20 03 99, 15 01 05, 15 01 10*	Other

B.4.4 Specifications on Treated Municipal Waste

It is the final waste actors who are responsible for the actual final treatment of the waste, or the exporters of the waste, who report waste data to the Icelandic EPA's waste data portal. Besides reporting on the EWCstat4 codes as described, the reporter also has seven options for reporting treatment based on R and D codes, which means that the Icelandic EPA has pooled some of the R&D codes together in order to have 7 categories for reporting on treatment. The connection between the R&D codes and the Icelandic codes can be seen in [Table B2](#).

Two treatment options worth mentioning that are missing from the Icelandic treatment methods are preparation for reuse and other disposal. For this reason, it is not an option to report these treatments into the system. Originally, they were not considered sufficiently important when the system was implemented, but work has already begun on how to include them.

The data reported is all treated amounts, gathered (mostly) at the correct calculation points according to (EU) 2019/1004. This is because domestically the data is reported by the final waste actors at their site where the waste undergoes final treatment, recovery or disposal. For exported EPR waste fractions the exporters report the exported amount to the Icelandic EPA, and then the Icelandic EPA gets confirmation on actual treatment through the Icelandic EPR scheme (the IRF). Corrections are made on "sent to recycling" vs. "actually recycled" and other treatment. Non-EPR fractions exported are expected to end up in incineration with energy recovery.

The Icelandic EPA uses reported data on treated amounts without any adjustment unless there are some corrections needed (if the amount is in kg instead of tons or if the treatment option is obviously wrong). As the Icelandic EPA doesn't gather any data on collected waste (even though the IRF does) they do not directly make any corrections using average loss rates, but data reported from the IRF might include ALR. Some data from other reporting waste actors might also include ALR but this is not systematically logged.

In Iceland, the waste actors who report waste data, have no other option than to fill it in using the waste categories from regulation (EC) No 2150/2002, previously mentioned as EWCstat4 codes or WStatR codes. Each one of those codes is connected to an Icelandic item no, from 1–72, and is really that item no that is used when a reporter uses the option of a csv-file upload. There is a simplification reason for this Icelandic 1–72 item no system. Because the EWCstat4 codes can be the same for hazardous and non-hazardous and therefore need that clarification but the Icelandic item no is only one number option. For example, End of life vehicles are both 08.12 (one containing 16 01 06 the other 16 01 04*) but in the Icelandic system the EWC code is 08.1 for both items nos. "32" (16 01 06) and "33" (16 01 04*). This

means that instead of having to enter "08.1" or "08.12" and "hazardous" or "non-hazardous" into the csv-file, you only need to enter 32 or 33 and that translates into the correct EWCstat code (or sometimes the Eurobase codes, shorter/more expansive version of the EWCstat4 codes). It is also the case that some EWCStat codes were "broken up" into several Icelandic Item nos. to create the specific/earmarked MW codes that do not include industrial waste fractions, such as C&D wood waste. The EWCstat is 07.53 for both other wood wastes 17 02 01 (C&D) and other wood wastes 20 01 38 (MW). But these were broken up into four different Icelandic item nos. 26. (MW -non-hazardous), 27. (Industrial -hazardous), 28. (C&D -non-hazardous) and 29. (C&D -hazardous).

The waste actors, who categorize their waste data into List of waste codes, translate those into EWC-stat4 codes (and their respective Icelandic item no) according to official conversion tables provided on the Eurostat website or by the Environment agency of Iceland, before handing in the data to the waste data portal. It has been discussed if the portal should also be able to allow reporting using LoW codes and automatically convert it into the correct EWCstat4 or item no.

The Icelandic definitions of preparing for reuse and backfilling are exact translations from the Waste Framework Directive (WFD) 2008/98/EC. Other recovery (referred to in Eurostat reports as "other material recovery" code RCV_OTH), however, is not specifically defined in the WFD or in Icelandic waste law. This recovery option has been found to be hard to pair into the Eurostat reports. The list in Annex II of the WFD is difficult to use, both due to a lack of clarity and the fact that it is non-exhaustive. In many regards, "other recovery" has been used as a treatment option for processes where it is not considered disposal but does not fulfill criteria to be considered any of the following: preparing for reuse, composting and digestion, other recycling, backfilling or incineration with energy recovery. This has led to the treatment option "other recovery" (option no. 5) to include many various operations. An argument can be made about some of those operations that should rather be categorized as backfilling or even other recycling. However, views on this vary among advisors at the Icelandic EPA. The Icelandic EPA has asked Eurostat twice to advise/give clarification on certain treatment operations to help solve issues with treatment reporting. When waste is reported into the wrong treatment operation, it is mostly due to the waste actor's (reporter's) lack of knowledge on how to categorize specific waste operations, not a lack of knowledge on what becomes of the waste. This issue can be solved by offering more guidance. Today, the Icelandic EPA believes that it catches and corrects a vast majority of these errors in their quality checking of the data (inbuilt in the waste data portal as well as manual reviewing).

Table B2: Overview showing the compliance between Iceland's collected data on treatment options and the Icelandic conversion of this for the reporting to Eurostat.

Collected data on actual treated amounts of MW				Data reported to Eurostat	
R/D-codes		National code system		Categories	
R/D-codes	Description /Name	National code	Description in the national data system		
R5, R12		-	NA	<i>Preparing for reuse</i>	RECOVERY
R3, R4, R5	Other recycling	2	Other forms of recycling (excluding composting)	<i>Recycling -material (of which Metal recycling from incineration bottom ash)</i>	
R3	Composting	1	Composting and digestion	<i>Recycling composition and digestion (of which Separate collection and recycling of biowaste at source)</i>	
R1	Incineration with energy recovery	3	Incineration with energy recovery	<i>Energy recovery</i>	
	Other recovery	5	Recovery other than energy recovery – except backfilling	<i>Other recovery</i>	
R3, R10	Backfilling	4	Recovery other than energy recovery – backfilling	<i>Backfill</i>	
D10	Incineration without energy recovery	7	Incineration without energy recovery	<i>Incineration</i>	DISPOSAL
D1, D5	Landfilling	6	Landfill	<i>Landfill</i>	
D9		-	NA	<i>Other disposal</i>	

B.4.5 Quality assurance of the data

The Icelandic EPA collaborates with other public agencies like Customs and the Icelandic Recycling Fund to gather data for assuring the quality of reported waste data. The Icelandic EPA also uses the Icelandic Recycling Fund's data on the collected amounts of certain waste fractions for the annual Eurostat reports. The waste data portal includes automatic checks that flag significant variations in reported data, aiding reporters in reviewing their submissions. The Icelandic EPA's waste statistics team utilizes these checks for manual data review.

Exported waste data undergoes a quality check, comparing it with Customs data to detect discrepancies and ensure that waste exporters fulfill their reporting obligations. Though treatment facilities occasionally report incorrect treatment types, manual quality assurance usually rectifies these errors. To further ensure data quality, the Icelandic EPA communicates with individual waste actors if reported information appears questionable or lacks sufficient detail.

B.5 The Icelandic Delimitation of Municipal Waste

As described in the chapters regarding generated and treated MW, Iceland defines MW through EWCstat4 codes (also referred to as WStatR codes) corresponding to waste item numbers, where specific codes are categorized as MW in the Icelandic data system. The delimitation of MW is kept at this level. Thus, the Icelandic method does not differentiate between MW and non-MW covered by the same item number or EWCstat4 code. For instance, if unsold goods from supermarkets are sorted into fractions that are categorized within the EWCstat4 codes (marked as MW), the waste will be counted as MW.

The primary issues in order to differentiate in more detail are:

1. Difficulties with securing data on the origin of the waste, since the Icelandic EPA only collects data from the final waste actor
2. The waste actors who report do not use LoW codes but have their own system for categorizing waste which do not take into account to differentiate between municipal and non-MW
3. Lack of manpower/capacity to investigate how much waste comes from the household vs other sources, for both waste fractions that are included as MW and waste fractions that are excluded

There are examples for both waste fractions that are included as MW that include waste that should not be MW and excluded waste fractions that include waste that should be counted as MW

Therefore, the Icelandic EPA primarily focuses on the waste stream (in other words which EWCstat4 code the waste is covered by) *rather* than using the waste's origin to categorize if the waste is MW or not. Meaning Iceland assumes that all waste that is reported as certain EWCstat4 codes is always MW. Instead of relying on LoW codes, NACE or other origin data to determine if it is MW or non-MW.

The Icelandic EPA has tried to minimize this issue for waste streams that usually have a higher amount of non-MW by introducing more codes for the reporter in order to divide MW and non-MW from each other. However, this has also resulted in some errors, so this issue is still up to being solved in a more efficient manner.

Only non-hazardous waste from electrical and electronic equipment and batteries and accumulators are considered as MW in Iceland. There is no estimation of MW share in mixed waste from industry, no exclusion of non-target materials, exclusions of waste from wholesale etc.

B.5.1 The Icelandic Method for Calculating Municipal Waste from Other Sources

At this point the Icelandic methodology of calculating MW is not able to exclude non-MW from large commerce and industry. This implies that all waste collected from large commerce and industry are calculated as MW. Iceland therefore highly suspects that this results in an overestimation of municipal waste since there is a significant amount of waste from large commerce and industry, which should not be counted as MW.

B.6 The Icelandic Approach to the EU Methodology on Recycling

To calculate the recycling rate of MW in Iceland, the Icelandic EPA takes the total amount of the specific "earmarked" MW EWCstat4 codes reported as recycled to serve as the numerator. This is the sum of MW reported into (1) Composting and digestion and (2) Recycling – material (where the EPR waste fractions have been corrected for actual recycling and not just collected for recycling). This amount is then divided by the sum of all reported MW waste into all treatment options (denominator). To sum up, the recycling rate is calculated according to the following equation (the treated amount is the same as the generated amount, as described in [Section B.4.3](#)):

$$\text{Recycling rate for MW (\%)} = \frac{\text{Total amount of recycled MW} * 100}{\text{Total amount of treated MW}} = \frac{\text{Total amount of recycled MW} * 100\%}{\text{Total amount of generated MW}}$$

The addition in the denominator is mostly mixed MW going to landfill (or now increasingly being exported for incineration with energy recovery) along with recovery of separately collected fractions.

Appendix C: Norway



C.1 Country Specific Remarks

In Norway, the Pollution Act states that the municipalities are responsible for collecting *household waste* (Forurensningsloven, 1981: ch. 5 § 30). *Household waste* is defined as the waste generated by the households (ibid., §27a.) and, in contrast to MW, includes C&D-waste when the households themselves do the demolition, building and renovation work. Collection of similar waste generated by public institutions such as nursing homes, kindergartens, etc. is not the municipalities' responsibility, neither is collecting waste similar to household waste from offices, stores or other businesses. These actors are responsible themselves for having the waste collected (ibid., §32).

Cross-financing between household waste and non-household waste (waste from public institutions, businesses, and enterprises) is prohibited in Norway by law (Forurensningsloven, 1981: ch. 5 § 34). However, whereas the municipalities are allowed to collect waste similar to household waste from these establishments, the municipalities are required to register amounts and associate finances separately between the two waste sectors. On the one hand, this provides an advantage when collecting statistics regarding household waste. On the other hand, since only some of the similar waste from other sources is collected together with the household waste, it does not provide sufficient statistics regarding waste similar versus household waste.

In addition, the waste classification standard, NS 9431:2011 applicable to Norway does not fully align with the LoW codes presented in the European legislation defining MW. This leads to challenges when it comes to determining what waste to include in the MW reporting and developing necessary adjustment methodology to be able to report according to this legislation.

A structural factor potentially impacting Norway's MW data is the significant geographical distances between business waste disposal sites in certain areas. This may lead businesses to use municipal collection sites. Additionally, the higher disposal fee for business waste at recycling centers might incentivize businesses to categorize their waste as household waste. This most commonly occurs among small crafting businesses, posing as household customers. However, measures have been implemented to prevent businesses from disposing of their waste at recycling centers as household waste, by registering the customers and controlling the amounts of waste received over time. The Norwegian EPA acknowledges this may have some impact on MW data but does not believe it alters it significantly.

In urban areas private companies are known to collect waste from households. Container rentals, big bags, and waste taxi services are known concepts. However, this activity is only permitted if the municipality has granted approval (Forurensningsloven, 1981: ch. 5 §30). Through the approval process companies are requested to report the waste fractions and amounts to the municipality which then includes this in the waste statistics reporting to Statistics Norway.

Despite this requirement, some companies have still been collecting waste without prior approval. A 2017 study estimated that up to 10% of household waste may have been collected illegally in this way (Amland et al., 2017). This would indicate an underestimation of the MW amounts from households. However, much of the waste collected in this way is known to be C&D-waste, which somewhat offsets the underreporting of household waste. Additionally, at the time, it was not common practice for companies to file applications for approval. Since 2017, measures have been introduced to address illegal waste collection. In 2021, the municipal employers' organization released templates for applications and regulations to support implementation and better enforcement of an approval process. While the current status of legal versus illegal waste collection is unclear, these measures are believed to have reduced the underreporting of household waste and thus also MW.

Although the structural premises described in the three previous sections impact the amounts of Norwegian MW, the impact and margin of error resulting from the methodology described in the upcoming paragraphs, used for preparing the Norwegian waste data to meet the criteria of the EU MW reporting, is assessed to be larger, but still within acceptable boundaries.

C.2 Waste Management in Norway

Source sorting of waste has been practiced for many years in Norway and the most common sorting scheme is curb side collection of food waste, plastic packaging, paper and cardboard (including beverage carton), glass- and metal packaging and residual waste. In addition, the municipalities operate recycling centres receiving sorted bulky waste in a number of fractions including electric and electronic equipment, batteries, and hazardous waste. In addition, producer responsibility finances return of electric and electronic equipment and batteries at the establishments where the products may be bought, at no cost for the customer. NGOs collect textiles at several sites near shops and at parking facilities around the municipalities.

Until January 2023, it was optional to sort out plastics and food waste, but most municipalities did it anyway. As of 1 January 2023, this became mandatory. As of January 2025, additional mandatory requirements were enforced on source sorting of textiles, paper and cardboard, glass- and metal packaging and park- and garden waste (Avfallsforskriften, 2004: Ch. 10a). This means that it will take a couple of years until source sorting is completely implemented in all of Norway.

Collection of hazardous waste from households is publicly financed up to a limit of 1,000 kg per year per household (ibid., §11-10), resulting in households potentially handing in their hazardous waste for free. This implies a high collection rate of the generated hazardous waste from households. The collection and treatment of hazardous waste from other sources is financed by the source generating the waste. Digital declaration of hazardous waste is mandatory, and the amounts are registered by source for non-households. This documentation may be requested during inspections, which encourages proper delivery of waste.

Hazardous waste from households is declared by the MW collectors, for each municipality.

Most waste is sorted and separated at the source, both household waste and waste similar to household waste from other sources. Some municipalities, on the other hand, have established mechanical sorting facilities, sorting residual waste using NIR-scanners (NIR= near infra-red) sorting out plastics by reading the waste composition at a molecular level, and sorting out non-magnetic and magnetic metals by means of eddy-current technology and band magnets. This is counted as a separate collection. These municipalities still source separate food waste, glass and metal packaging, including paper and cardboard, but leave plastic packaging in the residual waste. More sorting facilities like these are planned and under construction.

Handling of waste originating from other sources than households is the responsibility of the institution, firm or enterprise that generates the waste. They buy their services from private collectors, and in some municipalities, they are allowed to buy the services from the same service collecting the household waste and also use the municipal recycling centers. As described in [Section C.1](#), the finances from households and other sources are kept separate.

C.3 Producer Responsibility Schemes in Norway

Packaging, beverage packaging, batteries, electric and electronic equipment, wooden transport packaging, windows containing PCB, discarded vehicles, and tires are covered by EPR schemes in Norway.^[19] Only the first three waste categories are MW. The PROs that execute the EPR schemes collect fees from the producers and to some extent finance the collection and treatment of the waste through these funds. In the future there are plans to implement full financing of the waste treatment.

The PROs are private companies and registered at the Norwegian EPA's website. They report their results on collection, recycling rates and rates on the other treatment options to the Norwegian EPA. An EPR scheme regarding textiles and textile waste is also being discussed and will probably be established in the near future.

The reported amounts of metal, glass, plastic, and paper and cardboard all contain a share of packaging. Packaging is collected by the same waste collectors as other waste and to some extent alongside other waste of the same/similar material. For instance, paper and cardboard from households is collected and reported together. Also, the amounts from other sources are reported by material, not differing between e.g. packaging cardboard and office paper. The PROs provide details on the treatment results of all packaging. For reporting purposes, the collection of packaging is assumed to be a part of the other waste collected by the waste collectors. Although some might be collected separately, the extent of this is assumed to be limited. Hence, the packaging is reported according to the PROs reported results, and the rest of the respective materials are reported as non-packaging with the corresponding corrections due to treatment results, using ALRs.

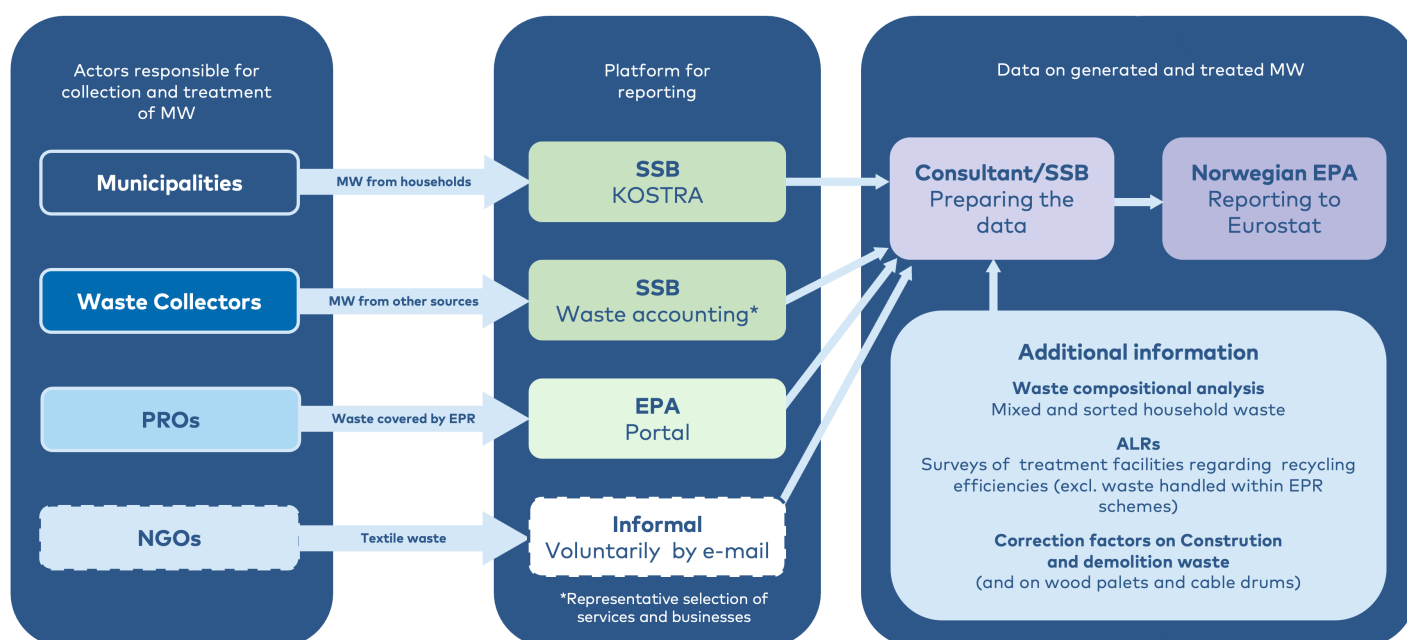
19. Miljødirektoratet (n.d)

C.4 Collection of Data on Municipal Waste in Norway

C.4.1 The Norwegian Waste Registers, the Norwegian Waste Data System and Waste Actors

In Norway, the MW statistics is a result of collaborative efforts involving several organizations and data sources. The Figure C1 below illustrates the organizations involved in the flow of waste data, and different platforms for reporting.

Figure C1: Overview of actors responsible in the chain of data reporting.



Note: The overview includes the waste collectors having the firsthand data, illustrating the platforms for reporting and the actors receiving this data, and finally the process of preparing the data for reporting, including the collection and use of supplementary data. Each entity involved in data collection and reporting is presented in different colors.

Statistics Norway (SSB) collects the data on both MW from households and on similar waste from other sources.

MW from households is reported by the municipalities to Statistics Norway in a digital form online. This is a full count of the collected waste, with two exceptions:

1. the amount of plastic beverage bottles covered by the deposit-refund system (DRS) is reported by the pledge organization (Infinitum) and added to the separate collected plastics; and
2. textiles which are not systematically collected by the municipalities yet, thus, the reported amounts are based on data from the NGOs who are collecting the textiles. The consultant assisting the Environment Agency in the reporting has so far collected data from the NGOs on the textiles.

The waste collectors report the waste from other sources. Statistics Norway organizes this data collection as a survey among a representative selection of actors within relevant service and business sectors through a web-platform (Altinn). The waste collectors report on their customer lists on the selected actors in excel/csv-formats, giving information about the number of employees. The waste data is reported in a template-spreadsheet (excel) specifying what waste to report, categorized by the waste codes and treatment codes, described in [C.4.3](#) and [C.4.4](#) respectively. Based on this reporting, the national MW amounts are estimated based on scaling up the reported data, as described in detail in [Section C.5](#).

The PROs report to the Norwegian Environment Agency. The agency also has its own designated portal for this purpose. The PROs report in an excel spread sheet template on collected and treated amounts of household packaging and packaging from other sources separately.

For 2020 and 2021, all the collected data, both from Statistics Norway and from the Norwegian Environment Agency, was handed over to the consultant assisting the agency with the reporting to Eurostat. The consultant prepared the data by performing the necessary assessments and adjustments required for the reporting, according to the new calculation point. This also includes the collection of additional data on waste composition and on recycling results at the treatment facilities needed for establishing correction factors and ALRs to do these adjustments by. Since 2024 (2022 amounts), Statistics Norway has been assisting the Norwegian Environment Agency in preparing the data for reporting, using the same methodology developed and handed over by the consultant. The consultant gives assistance and guidance where needed in order to maintain consistency in the reporting, and to obtain additional updated data as a basis for the adjustments.

C.4.2 Information collected for calculating the generated and treated amounts of municipal waste in Norway

The waste actors report the following information to the digital reporting systems:

Type of waste	Materials and fractions according to Norwegian standard codes NS 9431:2011
Quantity of waste	Weighed (primarily) or estimated in tons
Origin of waste	• Households • Other sources: • NACE-codes and • Companies' legal registration number and name
Type of waste treatment	Treatment options according to the Norwegian standard NS 9431:2011
Additional information (not reported to a digital platform, however, is used for calculating generated and treated MW)	Waste compositional analysis: mixed and sorted household waste. Regular survey of treatment facilities regarding recycling efficiencies (excl. waste handled within the EPR schemes) Correction factors on construction and demolition waste (and on wood pallets and cable drums) derived from compositional analyses.

In Norway the responsibility of collecting the MW from households and the MW from services and businesses are distinctively divided due to cross-financing being prohibited. Hence, the municipalities do not systematically collect MW from other sources. For this reason, the municipalities do not have complete data on waste from other sources, which explains the need for a separate methodology to collect data and to calculate the amount of MW from other sources and why this distinction is made when describing the Norwegian method.

Norway has two main data sources:

- Household waste: The data is reported by the municipalities
 - All the municipalities report to Statistics Norway
- Service and business sector: Data is reported by those who collect waste
 - Statistics Norway does yearly representative selections on which companies the reporting should be included for. Public institutions such as nursing homes, schools and kindergartens are a part of this sector.

As for MW from households, either the municipalities themselves or the inter-municipal companies administrating the collection of household waste report the collected amounts of waste directly to Statistics Norway. The reporting instructions entail reporting the different kinds of waste/materials intended for the various treatment options without withdrawal of losses. The municipalities have firsthand knowledge of the delivered waste, and it is therefore assessed that this kind of reporting will be as consistent as possible.

Information on MW from other sources than households is reported by waste collectors who report the collected amounts of waste, including the relevant data as described above in [Section C.4.1](#), based on the yearly representative selection of companies. The data is used to estimate the total amounts based on upscaling the amount of waste per employee by all the employees in the relevant NACE-sectors, cf. [Section C.5](#).

The data on packaging is reported by the PROs to the Norwegian EPA in an online form and contains information about origin (household/other sources), material, collected amounts and treated amounts.

The generated waste amounts are determined by weight-registers: The collected waste is weighed by material and waste code at the receiving facilities both when re-loaded and when it is delivered for treatment.

C.4.3 Specifications on Generated Municipal Waste

In Norway, the waste is classified according to a national standard NS 9431:2011. It consists of 16 waste series, each waste series describing several subcategories. The translating of the collected data from the national codes to MW and LoW codes involve both the waste collectors, Statistics Norway and the municipalities. The waste collectors register the waste and report the waste according to the reporting guidelines provided. The guidelines are provided by the Norwegian authorities, explaining which waste codes to include in the reporting, and the waste collectors assess the waste according to these. In addition, consolidations and adjustments are done to this data in several steps by the municipalities, Statistics Norway and the consultant assisting with the reporting, as described in more detail in [Section C.5](#). A comparison of the Norwegian coding system on categorizing waste with the LoW system is done in Table C1 below.

In Norway, waste data is primarily based on collected waste. At the first weighing, the origin of the waste is known, and all data is registered. When the waste has entered the waste facility it will be mixed with waste from other sources and the traceability is lost. Thus, the Eurostat reporting is based on data from separately collected waste, and the total of generated waste is the sum of the separately collected waste of each waste category.

Table C1: Overview showing the compliance between Norway's collected data and the LoW codes reported to Eurostat.

Collected data		Data reported to Eurostat / LoW codes	
National code	Description in the national data system	LoW code	Municipal waste
1411	Metal packaging ¹	15 01 04, 15 01 11*	Metals
1447	Pure magnetic metal	20 01 40	
1451	Pure non-magnetic metal		
1452	Mixed metals		
1499	Mixed metals with other materials		
1311	Clear glass packaging ¹	15 01 07	Glass
1312	Colored glass packaging ¹		
1321	Clear glass packaging with metal ¹		
1322	Colored glass packaging with metal ¹		
1351	Decorative and utility glass	20 01 02	
1399	Mixed glass		
1711	Folies and packaging	15 01 02	Plastics
1721	Rigid plastic packaging		
1712	Other folies	20 01 39	
1722	Other rigid plastic		
1729	Mixed plastics		
1799	Mixed plastics – non packaging		
1231	Packaging carton	15 01 01	
1241	Beverage carton		
1211	Newspapers and magazines	20 01 01	

1221	Brown paper		
1251	Office paper (printers, envelopes, etc.)		
1299	Mixed paper and cardboard		
1111	Kitchen and food waste from small and large households	20 01 08, 20 02 01	Bio-waste
1132	Park and garden waste	20 01 25	
1141	Untreated wood	20 01 38	Wood
1142	Treated wood		
1149	Mixed wood		
		20 01 37*	
-	N/A	15 01 03	
1911	Textiles and leather ²	20 01 10	Textiles
1912	Furniture and inventory	20 01 11	
-	N/A	15 01 09	
-		20 01 21*	Electrical and electronic equipment
-		20 01 23*	
1508	Lighting equipment ³	20 01 35*, 20 01 36	
1512	Electric and electronic tools ³		
1519	Audio and video equipment ³		
1520	Lightsources ³		
1599	Mixed electric and electronic waste ³		
2311	Batteries ³	20 01 34, 20 01 33*	Batteries
-	N/A	20 03 07	Bulky waste

9911	Mixed household waste	20 03 01	Mixed waste
9912	Mixed waste from businesses		
9913	Unsorted waste for incineration		
9914	Residues from sorting		
9915	Residues from sieving		
9916	Street sweepings ⁴		
-	N/A	15 01 06	
-	Other waste	20 01 13*, 20 01 14*, 20 01 15*, 20 01 17*, 20 01 19*, 20 01 21*, 20 01 23*, 20 01 26*, 20 01 27*, 20 01 28, 20 01 29*; 20 01 30, 20 01 21*, 20 01 32, 20 01 41, 20 01 99, 20 02 03, 20 03 02, 20 03 03, 20 03 99, 15 01 05, 15 01 10*	Other
7000	Hazardous waste		

¹ Glass and metal packaging, from both households and businesses are collected in the same bin. By sorting, the glass and metals are separated in different fractions. A key-figure from the PRO is used to separate between glass and metal for reporting to the Statistics Norway.

² Not regularly in use in Norway but will probably be implemented as new legislation regarding mandatory collection of textiles is entered into force.

³ Non-hazardous.

⁴ The municipalities are responsible for collection, but not the same division as MW, which results in this waste not being reported to the Statistics Norway as a separate fraction, but as a part of other residual waste. Estimated to weigh about 716 tons.

C.4.4 Specifications on Generated Municipal Waste

The waste collectors report waste treatment categories according to the same Norwegian standard NS 9431:2011, which is the same standard used for categorizing the waste. It describes 16 treatment options, seven of which are relevant to the MW reporting. They are presented and compared with the R/D-codes in [Table C2](#).

Table C2: Overview showing the compliance between the Norwegian waste treatment options (description and code) and the representative R/D-codes from the WFD. Only the national code system is used in Norway.

Collected data on actual treated amounts of MW				Data reported to Eurostat	
R/D-codes		National code system		Categories	
R/D-codes	Description /Name	National code	Description in the national data system		
R5, R12	-	0013	Reuse ¹	Preparing for reuse	RECOVERY
R2, R4, R5 R6, R9	-	0014	Recycling	Recycling -material (included Metal recycling from incineration bottom ash)	
R3	Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)	0009	Aerobic, biological treatment	Recycling, composting and digestion (including separate collection and composting of bio-waste at source)	
		0010	Anaerobic, biological treatment		
R1		0007	Incineration with utilization of energy ²	Energy recovery	
		-	NA	Other recovery	
D10	Incineration on land	0008	Incineration without utilization of energy	Incineration	DISPOSAL
D1	Deposit into or on to land (e.g. landfill, etc.)	0011	Landfill	Landfill	
D9		-	NA	Other disposal	

¹ The reported amounts of textiles are the sorted amounts sorted, sold and used in markets abroad.

² A handful of the Norwegian incineration plants do not meet the R1-requirements and are reported under "Other disposal".

The waste collectors report which treatments the waste undergoes according to their agreements, contracts and practice. For the collected waste, all the treatments are reported for each waste category in a similar manner as in the Eurostat reporting form. The waste collectors report the household waste to the municipalities, according to [Section C.5.1](#), and waste from other sources to Statistics Norway, according to [Section C.5.2](#).

Please note that Norway uses a category 0016 "Other treatment", which is not coherent with the category "Other recovery" from the Eurostat Joint Questionnaire. The waste registered in this "Other treatment" category is assessed and reported according to the material and the respective and most probable R/D-codes.

C.4.5 Quality Assurance of the Data

Statistics Norway performs an automated quality assurance on every reporting. This ensures that the same methodology is used every time. The data on waste from other sources than households is compared with earlier reported data and the amounts per employee are assessed. Outliers and reported data differing from reasonable expectations are kept out when scaling to the national levels, see the scaling procedure in [Section C.5](#).

A similar procedure is followed assuring the data on household waste; however, this reporting involves a full count and thus is not scaled. The party responsible for obviously flawed reporting is contacted to correct and redo the reporting.

If inexplicable changes in data compared to earlier years are identified during the preparations for the Eurostat reporting, attempts will be made to clarify a potential error in the data. Otherwise, there is no further quality assurance of the data at this stage.

The Norwegian EPA performs similar procedures for quality assurance on the EPR scheme data from the PROs.

C.5 The Norwegian Delimitation of Municipal Waste

As previously stated, Norway's waste management is based on origin and distinguishes between household waste and waste from businesses in accordance with the legislation on preventing cross-financing. Waste from both sources covers waste outside the scope of MW. In addition, the waste codes differ from the LoW codes, as described in [Section C.4](#). This necessitates an interpretation according to European legislation and reporting guidelines, which will be described in this section.

C.5.1 The Norwegian Delimitation of Municipal Waste from Households

Municipalities or inter-municipal companies manage the collection of household waste, collate the reports from waste collectors, and annually report the total collected amounts to Statistics Norway, focusing on materials rather than waste codes. The report is based on the weighting data from the waste collectors. Most of the material categories align with those included in the MW reporting, but some fractions, such as construction and demolition waste, are included in some of the household waste and need to be excluded through calculation before reporting to Eurostat. The subtraction is based on waste composition analyses giving information on the relative content of different kinds of wastes and impurities in the analyzed fraction. So far, the number of analyses of relevant waste is low, resulting in the quality of the data used to make the corrections being sub-optimal, in that the few existing analyzes are not statistically representative for all waste.

The wood fraction is one example containing both a large part of construction and demolition waste and some transport packaging like pallets and cable drums, mainly pallets. Only 13% of the collected wood waste is considered to be MW and included in the Eurostat reporting.

Glass- and metal packaging is collected together in the same bin, resulting in the need to divide this into separate fractions before reporting it. This joint collection is not regarded as a separate collection but is allowed under the exceptions laid out in the Directive (EU) 2018/851 Article 10(3). The municipalities divide the amounts between glass- and metal packaging according to national guidelines, 90% and 10%, respectively.

Mixed metal is reported without correction of construction and demolition waste as there is no waste composition analysis available on which to base the withdrawal.

When consolidating the waste-collectors' reports for reporting to Statistics Norway, the national treatment categories presented in [Section C.4.4](#) are used. This implies that MW sorted by the waste collectors under other treatment options is allocated to the relevant final treatment option used if it is known for the specific material. If not known, it is moved to the "Other treatment" category. However, this is not a significant issue as most waste is already categorized into one of the listed treatment options.

The reporting instructions for municipalities/inter-municipal companies are to report the different types of waste/materials intended for various treatment categories without subtracting losses. Municipalities have firsthand data on the collected waste, and by reporting this way the reporting methodology is thought to be as uniform as possible.

C.5.2 The Norwegian Method for Calculating Municipal Waste from Other Sources

The amounts of municipal waste from other sources (services, industry and businesses) are based on data reported by the waste collectors on their customers from the NACE-sectors (G (46 and 47), and H–S). The data consists of collected waste amounts per customer and their customer lists containing data on the number of employees. The reporting is a yearly survey among a selection of the customers. Statistics Norway performs a representative selection of services and businesses for which the waste collectors report the waste. The resulting data set is not a full count, but it is statistically representative. To calculate the national amounts, the waste per employee is calculated, and the generated amounts are scaled up by the number of employees within each NACE-sector on a national level, see [Figure C2](#).

The data from the NACE-sectors G–S is also used for reference to calculate the share MW from the NACE-sectors B–F, which is included in the MW from other sources. This calculation is also done by scaling up the waste per employee by the total number of employees in the respective sector. Only non-production waste is included in these MW calculations.

Figure C2: Illustration of the waste flow from services and businesses (other sources) and the data flow regarding the waste collected. Note: The data is collected by the Statistics Norway through surveys based on a representative selection of services and businesses within the NACE-sectors G–S.



The delimitation of MW from the total amounts of waste from other sources is done by Statistics Norway in multiple steps. Initially the relevant materials and waste categories are selected based on the waste collectors reporting. Statistics Norway uses the same procedures as the municipalities regarding translation from national waste codes to MW both concerning waste types and treatment options. Then, as for the household waste, the building and construction waste and the transportation packaging are calculated and subtracted.

Since Norway includes waste similar to household waste from the NACE-sectors B-S, this would include waste from some large commerce. Even though there is no clear definition of what large commerce is, some of the enterprises from the B and C sectors would probably sort under this category. As described in [Chapter 1](#) of the report the share of MW from other sources is high in the reported waste. The selection of which NACE codes to include in the scaling of the number may be one explanation for this, given the assumption that the amount of MW from other sources is over estimated.

C.6 The Norwegian Approach to the EU Methodology on Recycling

Collected waste is reported according to the type of material and designated treatment process. The recycled quantities are derived from the reported amounts of waste collected for recycling, composting, or digestion. To be able to report the recycled amounts, both shares of non-MW as C&D waste and transport packaging and process losses need to be removed. This is done by two correction factors (k_{CD} and ALR) established for the different materials individually according to the following equation:

$$\text{Recycled amount} = \text{Amount intended for recycling} \cdot (1 - k_{CD}) \cdot (1 - ALR)$$

k_{CD} - Correction factor to subtract construction and demolition waste (for wood also transport packaging)

ALR - Average loss rate relevant to the losses in the recycling process chain of the individual waste materials

The non-household waste is subtracted and kept out of the reporting and the losses are redistributed between incineration and landfill, depending on the loss content and treatment process for it.

This calculation is performed separately for household waste and MW from other sources separately.

The average loss rates have been developed, based on information from the treatment facilities regarding amounts, waste quality, treatment processes and results. The resulting loss rates are the weighted average based on the total amounts treated at the respective facilities. The correction factor regarding C&D-waste and transport packaging are as mentioned earlier based on waste composition analyses.

The following highlights the correction of the data collected before it is reported to Eurostat:

1. The Statistics Norway collects raw data on household waste and other sources, which include the type of materials and intended treatment methods
2. The data is adjusted to correctly identify MW. Non-MW, losses from treatment procedures, and non-target material are calculated and subtracted using waste composition analyses and average loss rates
3. The data undergoes the following correction steps before it is ready for Eurostat reporting:
 - Non-MW is removed based on waste analysis
 - Average loss rates are used to calculate the amounts undergoing recycling, composting, and digestion, which are based on treatment facility information
 - Packaging treatment results reported by PROs are used to calculate packaging waste losses.
 - Bottles collected through the pledge bottle-scheme are added to the other waste before reporting, as it is not included in the reporting from the waste collectors
 - NGOs collect textile treatment data, which replaces the data originating from municipalities and other sources and reported to Statistics Norway
 - The same average loss rates are applied to exported waste as for the waste treated in Norway.
4. Average loss rates do not apply to mixed waste and other waste. The share of the mixed waste, ending up in the bottom ash (except for the metals sorted out), is subtracted from the incinerated and added to the landfilled for reporting
5. The category "Other treatment" differs from the "Other recovery" category in the Joint Questionnaire. Assessments are made when preparing the data for Eurostat reporting to correctly categorize relevant treatments respective to the materials.

Appendix D: Sweden



D.1 Country specific remarks

According to the Swedish Miljöbalk (SFS nr 1998:808), the main rule in Sweden is that municipalities are responsible for collection and treatment of MW. An exception is made for MW covered by EPR schemes, for this waste the responsibility lies with the producer or the liable PRO.^[20]

Municipalities may work individually or in collaboration with other municipalities to manage their responsibility. Municipalities are free to decide if the waste is handled by municipal services, a local statutory joint municipal authority, a municipally owned company, or to outsource the task to a private contractor. In the latter case, the private contractor will compile data on collected waste and pass this data on to the municipalities. Municipalities are responsible for reporting on collected amounts of MW within their responsibility to the Swedish EPA.

20. Packaging waste, WEEE, battery-waste, car tires, end of live vehicles, medicines. Neither car tires nor end of live vehicles are classified as MW in Directive 2008/98/EC.

There are a total of 290 municipalities in Sweden which vary in population, from 2 300 to 989 000 inhabitants, and a population density varying from 0,2 to 6,441 inhabitant per square kilometer (Statistics Sweden, n.d.). Sweden is an elongated country with most of its population living in the southern parts, or along the coast in the north of Sweden, which influences waste management and the ability to treat waste efficiently due to long transportation to treatment facilities in some area.

The Swedish Avfallsförordning (SFS nr 2020:614) enforces obligations of source sorting for some MW-fractions (as well as non-MW) i.e. bio-waste, packaging waste, textile waste, hazardous waste, newspaper and other similar paper waste, WEEE and batteries.

D.1.1 Definition of Municipal Waste Affected the Responsibility for the Waste

The EU common definition of *MW* was implemented in national legislation in 2020, replacing the previous term *household waste*. The *MW* definition is broader than Sweden's previous interpretation of *household waste* also including similar waste from other sources and deviates from previous legal practices. This change expanded the municipalities' responsibility to include all waste falling within the definition of MW, except for MW handled within EPR schemes.

The new MW definition also affected the legal responsibility of waste management between private and public actors, including reporting obligations. Some private actors (not contracted by municipalities) may still handle MW from other sources, which is not reported as MW, leading to a potential underestimation of generated MW. Sweden is aware of this issue and is actively working on adjusting current waste legislation. Changes in waste collection and reporting responsibilities for MW are expected, likely to result in more MW from other sources being included in the reporting.

The situation in Sweden highlights the potential time lag in implementing new definitions and waste management in practice, and the relevance to keep this in mind when comparing data between countries. When some legal adjustments are expected in the future, actors may hold their investments until the legal framework has been clarified.

D.2 The Waste Management in Sweden

In addition to the above-mentioned changes regarding MW other major changes are also affecting the waste management in Sweden. As of 1 January 2024, the responsibilities of the municipalities changed to also include separate collection (but not treatment) of packaging waste from households. PROs are still responsible for the recycling, financing and reporting of data on all packaging

waste covered by the EPR, which is used for MW statistics and packaging statistics. Sorting requirements for textile and bio-waste have also been introduced.

Today, the collection of MW from households is mainly done by curbside collection for residual waste and food waste. Packaging waste, such as glass-, metal-, paper- and plastic packaging, and paper waste can be either collected via curbside collection or dropped off site, at unmanned recycling stations^[21] where they are collected in separate fractions. Curbside collection of packaging waste will be mandatory for all households from 2027. It is still possible for municipalities that do not yet offer a system to separately collect bio-waste to apply for a derogation from the requirements for a maximum of two years at a time, which means that the system is not fully implemented.

Bulky waste, textile waste, WEEE and hazardous waste are normally transported by households to manned recycling centers^[22] where waste is sorted in different fractions. The number of fractions differ depending on the municipality and most facilities offer a further-reaching collection system of bulky waste than what is required by law. In addition to collection at recycling centers, WEEE is also collected through retailer take-back programs (e.g., electronics stores), curbside collection in some municipalities, and specialized containers for small electronics, lamps, and batteries, all managed under producer responsibility for recycling and cost coverage. Leftover medicines are handed to pharmacies.

The collection of MW from other sources differs for several reasons. Residual waste, food waste and paper waste should be handled by the municipalities. The individual business is responsible for leaving packaging waste to PRO, which can be done by a contractor that collects packaging waste, or the business themselves can leave packaging waste at a collection site. Businesses close to households could join the municipality's collection scheme for packaging waste. Bulky waste and hazardous waste from businesses can also be left at manned recycling centers.

Since the municipalities decide how waste management should be organized in the municipality, the level of service varies. For example, some municipalities may offer curbside collection of more fractions or other types of collection schemes. Some municipalities collect waste from households in colored bags that are sorted at a sorting facility instead of separate bins. Even though the main system in Sweden is based on source separation, there is a couple of sorting NIR-scanner facilities (NIR= Near Infra-Red) for pre-sorting before incineration to further separate plastics and metals from residual waste.

21. Recycling stations are small, unmanned sites for recyclable packaging and newspapers, conveniently located across public areas. Sweden has a total of 5,800 recycling stations.

22. Recycling centers are municipal drop-off facilities, where individuals and businesses can leave of various types of waste. Approximately 600 recycling centers exist across Sweden.

D.3 Producer responsibility schemes in Sweden

Municipal packaging waste, WEEE and battery waste is covered by producer responsibility within EPR schemes. The reporting within the EPR schemes is used as a data source for producer responsibility-specific statistics, but also for MW reporting to EU. For some EPR schemes, there is one or several producer responsibility organizations (PROs). For the Swedish reporting of MW, it is important to note that the data source varies depending on whether the waste is covered by an EPR schemes or not.

D.4 Collection of data on municipal waste in Sweden

D.4.1 The Swedish Digital Registers, System and Actors

The Swedish EPA is the responsible authority for waste statistics including the reporting of MW to EU. As a part of the SMED consortium (Svenska MiljöEmissionsData), consultants from the Swedish Environmental Institute (IVL) and Statistics Sweden (SCB) produces MW statistics on behalf of the Swedish EPA. In Sweden, MW statistics is a result of collaborative efforts involving several organizations and data sources.

For MW not covered by an EPR scheme, municipalities report on the collected amounts of waste, split into different waste types and intended treatment. Additionally, they report results from compositional analyses of residual waste from households. The intended treatment is used for calculation of the treated amount, together with occasional surveys on average loss rates for a specific waste fraction (based on measurements of losses).

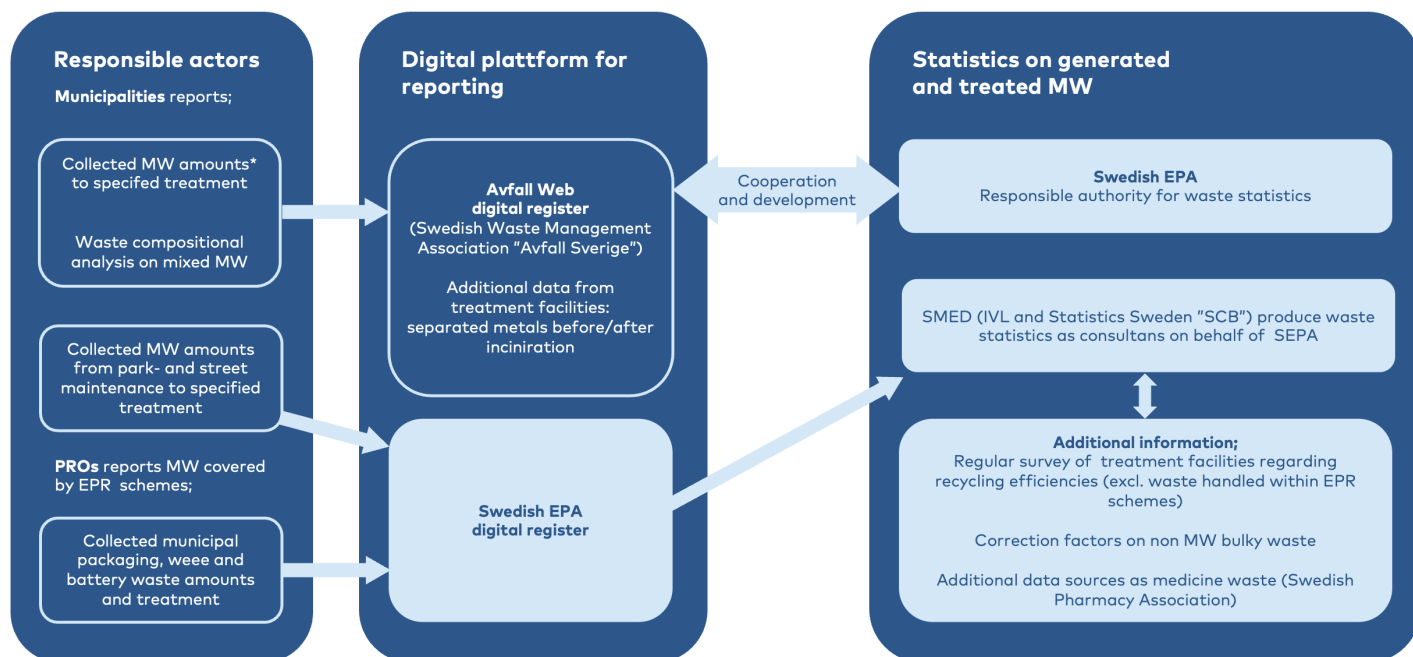
The branch organization Swedish Waste Management Association "Avfall Sverige", representing Swedish municipalities, has been collecting data for a number of years from municipalities in a digital register called Avfall Web. The Swedish EPA has a formal collaboration with Avfall Sverige so that the register can be used by the municipalities to fulfil their reporting obligation to the authority, to avoid a double reporting burden as well as to improve data collection.

The municipalities report MW for which they have collection and treatment responsibilities through the register. The MW amounts reported to Avfall Web consists of waste from households and other sources. Municipalities directly report MW from park maintenance and street cleaning activities to the EPA digital register.

For MW covered by EPR, PROs report the collected amounts of MW and final treated amounts of waste. MW-streams under producer responsibility schemes (packaging, WEEE, batteries) are reported digitally to EPA digital register. A transitional solution with a statistical survey has been used for packaging waste.

See [Figure D1](#) for an overview of the different reporting actors, digital reporting register, relevant actors and additional information that is gathered to produce Sweden's statistics on generated and treated MW.

Figure D1: Overview of the actors and data-portals relevant for data on MW in Sweden. Light blue boxes mean registers and surveys owned or implemented by the Swedish EPA.



*not covered by EPR schemes

D.4.2 Information Collected for Calculating the Generated and Treated Amounts of Municipal Waste in Sweden

Collected waste amounts (weight), both mixed and separate collected, is used for the calculation of generated amounts. The material breakdown of residual waste is updated annually based on the latest available results from compositional analyses performed by the municipalities, typically from the past two years.

The municipalities and PROs report the following information to the digital platforms as described above, after gathering the information needed from waste collectors and treatment facilities:

Type of waste	In Avfall Web specific "Input codes" are translated to LoW codes by the Swedish EPA or SMED. PROs report due to specific categories within EPR schemes. Results of the waste compositional analysis on mixed/residual waste.
Quantity of waste	Weighted or estimated in ton. Hazardous waste is reported in kg.
Origin of waste	Municipalities report data collected amounts within the municipality. PROs report national data on collected and treated amounts.
Type of waste treatment	Collected amounts are generally reported with the intended treatment. For the municipalities the categories are specified in Avfall Web. PROs report final treatment and shall follow the regulatory calculation point of recycling. PROs even report waste that is not recycled (including non-target material/losses).
Additional information (not reported to digital platform, but is used for calculating generated and treated MW)	Regular survey of treatment facilities regarding recycling efficiency (excl. waste handled within EPR schemes). Correction factors for the share of bulky waste that are not classified as MW. Additional data sources, for instance, medicine waste left by consumers in pharmacies.

D.4.3 Generated Municipal Waste

The reported data on generated amounts of MW is not reported by waste actors in LoW codes. Instead, municipalities use register-specific input codes in the digital register Avfall Web. There are about 33 different input codes relevant for MW in the register. The Swedish EPA categorizes the input codes within the accurate LoW code and give instructions to municipalities regarding how to report in Avfall Web. The aim is to allocate each input code to a component of MW, which is then reported to Eurostat.

Some register-specific input codes may cover several LoW codes. An exact match between LoW codes and their national equivalent is not required for accurate MW reporting as long as it covers LoW codes in the same component (for example, the code I43 covers 20 01 10 and 20 01 11, both under the component "textiles"). When collecting data from municipalities in the EPA digital register on green waste from park maintenance and street cleaning residues, LoW codes are given as instruction on what to be reported by the municipalities.

The same principle applies to waste within the EPR schemes, generally with EU-defined categories and waste treatment operations for packaging statistics or statistics on WEEE. Packaging waste respondents, i.e. PROs, are also asked to estimate and report the share of the total amount of packaging waste to be classified as MW. Actors collecting packaging waste from other sources than households will be subject to the same requirement, starting with the 2025-data collection.

[Table D1](#) below shows how the collected data corresponds to the data reported to Eurostat.

Table D1: Overview showing the compliance between Sweden's collected data and the reported data to Eurostat.

Collected data			Data reported to Eurostat / LoW codes	
National code	Description in the national data system	Comments	LoW code	Municipal waste
Avfall Web, code I16	Non-packaging metals (metal scrap)		20 01 40	Metals
EU categories	Metal from packaging waste classified as MW	EPA digital register	15 01 04	
	-	No national equivalent.	15 01 11	
Avfall Web, code I38.	-	Window-glass excluded as C&D.	20 01 02	Glass
EU categories	Municipal glass from packaging waste	EPA digital register	15 01 07	
Avfall Web, code I39	Non-packaging plastic "bulky plastic"		20 01 39	Plastics
EU categories	Plastic from packaging waste classified as MW	EPA digital register	15 01 02	
Avfall web, code I19	Paper waste		20 01 01	Paper and cardboard
EU categories	Paper from packaging waste classified as MW	EPA digital register	15 01 01	

Avfall web, code I1a, Å4, Å5, Å19, Å7	Separate collected food waste to composting, bio digestion, processed in WWTP and home composting.		20 01 08	Bio-waste
Avfall web, code Å33	Separate collected waste fat		20 01 25	
Avfall web, code S9	Waste fat from grease separator			
Avfall Web, codes: Å2, Å6, Å6a, and Å6b	Garden waste left at recycling centers to incinerate, bio digestion, pyrolysis and composting.		20 02 01	
20 02 01	Green waste from park maintenance	EPA digital register		
	-	Impregnated wood excluded as C&D	20 01 37*	Wood
Avfall Web, code I13	Wood waste (non-impregnated wood)		20 01 38	
	-	Wood pallets, excluded.	15 01 03	
Avfall Web, code I43	Textile waste for recycling	No distinction between clothes and other textile waste is made	20 01 10	Textiles
	Textile waste for recycling		20 01 11	
	-	No textile packaging is reported	15 01 09	
EU categories	Consumer electrical and electronic equipment	EPA digital register	20 01 21	Electrical and electronic equipment
			20 01 23	
			20 01 35	
			20 01 36	
EU categories		EPA digital register	20 01 33	Batteries
			20 01 34	
Avfall web, codes: I14, I42 and I53.	Bulky waste fractions not included in other fractions (	Combustible bulky waste and other bulky waste for material recycling or prepared for reuse.	20 03 07	Bulky waste

Avfall Web, code I1b	Mixed/residual waste (combustible)		20 03 01	Mixed waste
	-	No national equivalent.	15 01 06	
Avfall web, codes: F2, F3, F10, F23 and F24	Household chemicals, hazardous waste containing oils, other hazardous waste and water, solvent based paints.	No data available on 20 01 31* Cytotoxic drugs and chemotherapy	20 01 13*, 20 01 14*, 20 01 15*, 20 01 17*, 20 01 19*, 20 01 26*, 20 01 27*, 20 01 28, 20 01 29*, 20 01 30	Other – Hazardous waste
	Medicines	The Swedish Pharmacy Association	20 01 32	Other - medicines
	-	No national equivalent.	20 01 41	Other – waste from chimney sweeping
20 03 03		EPA digital register	20 03 03	Other – street-cleaning residues
	-	No national equivalent.	20 01 99, 20 03 99	
	-	Composite packaging is reported as separate materials. Hazardous packaging waste is reported as such.	15 01 05, 15 01 10*	

D.4.4 Treated Municipal Waste

The data available to calculate treated amount differs depending on whether it is waste that is managed and reported by the municipalities or within EPR schemes.

Waste covered by reporting from municipalities: The calculation is based on (a) the amount collected for different intended treatments, as reported by municipalities and (b) occasional survey of actors treating this waste, from which measurement-based average treatment rates are calculated. A typical waste fraction intended for recycling will be coupled with an average recycling efficiency (% effectively reaching the calculation point), as well as average treatment rates for different relevant treatment operations (% preparation for reuse, % incineration with energy recovery, % other recovery, % disposal, of which % landfilling). The term average treatment rates better reflect this approach than the more imprecise "average loss rates". For example, the estimated losses occurring during the pre-treatment and recycling of "non-packaging plastic intended for recycling" are reported as energy recovery.

Waste covered by EPR schemes: PROs and other producers covered by EPR schemes report treated amounts. Losses occurring before the calculation point are reported under the relevant treatment, often energy recovery, but other treatments such as other recovery or disposal/landfilling can occur.

The 15 disposal operation codes and 13 recovery operation codes in the WFD (also called R/D-codes) are not used in Sweden for reporting directly or indirectly related to MW. Sweden uses coarser categories than those in the WFD. Possible categories being often: recycling, preparing for reuse, energy recovery, other recovery, disposal (landfill is not reported separately). Some categories may be missing in some reporting. Still, the method described above is compatible with the treatment/operations used in the Joint Questionnaire or the material breakdown. The treatment/operations provided in the format for the reporting of data in Annex V(A) of Implementing Decision (EU) 2019/1004 are not referring either to R-codes. D-codes are only relevant for the Joint Questionnaire. The calculation of recycling is further elaborated in [Section D6](#).

Table D2: Overview showing the compliance between Sweden's collected data on collected amount and treatment options, the actual treated amounts and what is reported to Eurostat.

Data on collected and treated amounts		Data reported to Eurostat		
Categories of collected amounts	Treatment	Categories of treatment	Comment	
Collected for preparing for reuse	The actual amount prepared for reuse. Losses during preparation for reuse are not reported as preparation for reuse and instead reported under relevant treatment.	Preparing for reuse	Equals 'actual amount prepared for reuse'	RECOVERY
Collected for recycling	Actual recycled amount. Losses occurring before the calculation point are not counted as recycled and instead reported under their relevant treatment (often incineration).	Recycling material	Equals 'actual recycled amount'	
		(of which Metal recycling after incineration)	Share of metals sorted out after incineration allocated to MW.	
		Recycling by composting and digestion	The amount of bio-waste 'actual recycled'	
		(of which recycling of bio-waste at source)	Number of notified home composting units (food waste only), in combination with an estimate of the amount per household.	
Collected for incineration	Actual incinerated amount, excluding waste sorted out of residual waste before incineration	Energy recovery	Equals 'actual incinerated amount' since all incineration facilities use energy recovery	

Collected for backfilling or other recovery	Actual backfilled amounts or actual amounts treated as other recovery.	Other recovery	Equals 'actual backfilled amount' or 'actual amounts treated as other recovery'	DISPOSAL
		Disposal – Incineration	Not reported and, to the best of our knowledge, not relevant in Sweden.	
Collected for landfill	Actual landfilled amount	Disposal – Landfilled	An estimate of 'actual landfilled amount'. Landfill is only ~1% of the total MW.	
Collected for other disposal	Technically: difference between amounts reported as disposal and estimated or reported landfilling, but the actual treatment is not known.	Disposal – Other disposal	Used as technical post. Small amounts.	

D.4.5 Quality Assurance of the Data

Municipalities and PROs are responsible for submitting information to the Swedish EPA and for ensuring that this information is correct. Verification processes, such as cross-checks, time-series checks, and audits are used to some extent, but the use varies between different components within the reporting. Automatic checks in Avfall Web indicate when the input value deviates more than 50% from the previous year's value by highlighting the input field in yellow. The accuracy of the data is also reviewed by Avfall Sverige.

D.5 The Swedish Delimitation of Municipal Waste

When delimiting what is MW and what is not, Sweden has based its assessment on the definition in the WFD and Recital 10 of Directive (EU) 2018/851. The Directive states, among other things, that waste from certain activities and waste that falls under certain chapters in the list of waste should be included. In some cases, Eurostat Guidance has been used including the special cases document.

D.5.1 The Swedish Method to calculate Municipal Waste from Other Sources

Since all MW should be collected by municipalities by law, except if handled within EPR schemes, Sweden does not use a method to estimate how much waste from industry, etc., which is "similar waste from other sources" and therefore should be included in the total MW. In addition, the Swedish EPA offers specific guidance on the EU common definition on MW, which further clarifies municipalities' responsibilities in Sweden, including reporting.

An unknown proportion of MW from other sources, under the responsibility of municipalities, is handled by contractors without any agreement with the municipality. This means no reporting of this waste is made as MW, which leads to underreporting. Due to the previous practice and the change of legislation, this is probably the case, to some extent, in most municipalities across the country. Further changes to the legislation are expected, and it is thought that some actors await these future changes before fully implementing the new responsibility for MW in Sweden. For the Swedish EPA, being responsible for waste statistics, there is no point in developing complicated estimates of non-reported waste from other sources, as the situation is transient. Private actors collecting MW are expected to be covered by reporting obligations in the future.

Also, PROs include MW from other sources within their reporting (WEEE, batteries and packaging). In the case of packaging waste, it is a rough estimate and underreporting is expected. New and clearer reporting obligations concerning packaging waste collected from other sources will take effect from 2025.

D.5.2 Estimates on Share from Construction and Demolition Waste

Bulky waste (e.g. non-packaging metals, plastics and wood waste) collected at recycling centers in Sweden is also usually gathered from small construction companies. C&D-waste, also from households, is not MW. Therefore, Sweden estimates the portion of C&D-waste based on waste compositional analyses and subtracts it from the total collected amounts of the relevant fractions.

D.6. The Swedish Approach to the EU Methodology on Recycling

When Sweden receives reports on collected amounts of MW from municipalities' average treatment rates are applied to the reported amounts to estimate recycled amounts and amounts for other operations. These rates are derived from occasional surveys of sorting and recycling plants. The PRO (i.e. packaging, WEEE and battery waste) reports the amount of waste actually recycled (i.e. excluding non-target material). It is systematically measured and reported by actors collecting or recycling waste within EPR schemes.

Next, Sweden calculates the amount of recycled MW for each specific "waste fraction" (e.g., plastic packaging and non-packaging plastic), then aggregates these amounts for each component (e.g., plastic) of the material breakdown, and then to the total amount of recycled MW. In the following section the method is elaborated.

D.6.1 Data from Municipalities (ALR)

To estimate the actual recycled amount for a specific waste fraction, data on losses from a subset of sorting and recycling plants is used to calculate a flow-weighted recycling efficiency. This is applied nationally to known separately collected amounts of each MW fraction to determine recycled quantities. A specific treatment for losses is also determined. The calculation is made according to the following equation:

$$\text{'recycling efficiency'} = \frac{\sum \text{'Inputs into sorting \& recycling facilities'} - \sum \text{'measured losses'}}{\sum \text{'Inputs into sorting \& recycling facilities'}}$$

'Recycling' refers to the amount of MW actually recycled, 'separately collected amount' to the waste separately collected by municipalities for recycling and 'measured losses' to the measured or estimated amounts of losses occurring at the pre-treatment, sorting and recycling facilities, until the calculation point. 'Inputs into sorting/recycling facilities' are the amounts of MW accepted at the

investigated sorting, pre-treatment, and recycling facilities up to the calculation point. The investigations aim to capture all possible losses from collection to the calculation point. Due to non-response, the flow-weighted average recycling efficiency of the waste may be measured on a subset of the waste stream.

The method applies for bio-waste (food waste and green waste from gardens and parks), plastic (non-packaging), metal (non-packaging), textiles, paper from newspaper, advertising and similar non-packaging papers, hazardous waste (other than WEEE and battery-waste), other bulky waste to recycle (unspecified) and waste collected for preparation for re-use.

D.6.2 Data from PROs (Recycled)

PROs obtain and report the amount of recycled waste (or average loss rates) from their business partners in charge of recycling waste (waste recyclers). The Swedish EPA generally does not have knowledge regarding which method is used by the different actors in order to estimate and exclude non-target material. Regarding packaging waste, actors are asked to exclude dirt and non-packaging waste that has been wrongly disposed in containers for packaging waste.

Reporters for packaging waste are also requested to provide specific data on municipal packaging waste, including collected amounts and treatment. The data is then used as the basis for MW reporting. The use of specific municipal packaging waste leads to a lower recycling rate in Sweden compared to if all packaging were reported as MW, as packaging waste from other sources may be underreported as well as it generally has a higher recycling rate. The distinction between municipal and total packaging waste is probably highly uncertain and an overly narrow interpretation of municipal packaging waste is most likely made.

To the extent of authorities' knowledge, actors reporting under EPR schemes do not estimate of ALRs based on compositional analysis. The reporting of treated amounts for WEEE nonetheless relies on a sampling of collected small EEE to estimate the share of different types of EEE in the total amount of small EEE collected (as different types of EEE undergo different treatments).

D.6.3 Exported waste

Waste treatment outside Sweden is also included in data from PROs, and in estimates on losses used for ALR on data from the municipalities. There is a legal requirement for PROs to report the country or area where the waste was treated. However, this applies only for waste within EPR, such as packaging waste, WEEE and battery waste. In these cases, it is the actors reporting to authorities which have the responsibility to obtain information about the effective recycling rates (or percentage of non-target material) and on the rate of energy recovery, other recovery and/or disposal.

About this publication

Municipal waste statistics inconsistencies

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