SMED Report No 1 2026

Monitoring Sustainable Plastics Use: A Bottom-Up Review of Indicators and Flow-Mapping Initiatives

Linn Due, Alexandra Almasi (IVL)

Frida Green (SCB)

Agreement: NV – 007775-20

Commissioned by the Swedish Environmental Protection Agency

Publisher: Swedish Meteorological and Hydrological Institute

Address: SE-601 76 Norrköping, Sweden

Start year: 2006

ISSN: 1653-8102

SMED (Swedish Environmental Emissions Data), is a collaboration between IVL Swedish Environmental Research Institute, Statistics Sweden (SCB), Swedish University of Agricultural Sciences (SLU) and the Swedish Meteorological and Hydrological Institute (SMHI). The collaboration commenced in 2001 with the long-term aim of gathering and developing the competence in Sweden within emission statistics. SMED is, on behalf of the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management, heavily involved in the work related to Sweden's international reporting obligations on emissions within six subject areas (air, water, waste and hazardous substances). Environmental statistics is also produced for national and regional needs, where SMED compiles data for both milestone targets and environmental quality objectives. SMED also develops new methods and produces statistics for follow-up of Sweden's National Waste Plan and Waste Prevention Program. For more information, visit the SMED website www.smed.se (in Swedish).

Table of contents

SUMMARY **5**

1 INTRODUCTION AND AIM **6**

2 METHOD AND STRUCTURE OF THE REPORT **7**

3 DESCRIPTION OF THE INITIATIVES **8**

3.1. Initiatives which generate new data on a national level in Sweden 12

3.2. Initiatives which aim to harmonize data at international level 21

3.3. Initiatives which use existing data to model material flows 28

3.4. Initiatives which formulate sets of indicators to measure and analyse trends over time 32

4 ANALYSIS **42**

4.1. Scope of the initiatives 42

4.2. Level of maturity and updating schedule 43

4.3. General uncertainties and limitations 44

5 DISCUSSION AND CONCLUSIONS **45**

5.1. Conclusions 47

6 BIBLIOGRAPHY **48**

ANNEX 1 **50**

ANNEX 2 **51**

Summary

Based on a literature study this report reviews seven initiatives that map and monitor plastics flows. It covers three Swedish national efforts (Mapping of plastic flows in Sweden, indicators in the Swedish EPA's Roadmap for Sustainable Use of Plastics, and National plastics-related statistics reported to Eurostat), one Nordic initiative (Harmonization and development of plastic statistics in the Nordic countries), one EU initiative (the Plastic Product Mass Flow Model), and two global or EU-global initiatives (the Circularity Metrics Lab – Plastics Module and the UNEP/UNITAR statistical guideline for measuring flows of plastic). Each initiative was described using a common template covering target audience, development phase, available data, data-collection methods, and plans for update.

The report takes a bottom-up perspective. It begins with the Swedish context and then expands to Nordic, EU, and global initiatives to analyse and discuss how Swedish work connects to, complements, or could align with international frameworks. The comparison shows that initiatives differ in scope, methods, data sources, and maturity, and together provide a broad but not fully consistent picture of plastics use. Some are well established and updated regularly, while others are newer or still being developed.

Across initiatives, two overarching challenges stand out. First, datasets are often incomplete, inconsistent, or not fully transparent, partly because reporting practices vary. This leads to reliance on assumptions and estimates for parameters such as product weights, polymer types, plastic content, waste fractions, and treatment shares. Second, several initiatives simplify parts of the plastic life cycle to keep analyses manageable, for example by excluding reuse, certain recycling steps, trade flows, or by using indicator products. These choices reduce detail and can limit comparability, but they also enable a coherent system overview when data are lacking.

Looking ahead, the conclusions from this report highlight the need to balance indicator development with data generation and harmonised methods. Harmonisation efforts at Nordic and UN levels are essential for comparability over time and across countries, and their recommendations should be integrated into national work.

Keywords: Plastics, flows, indicators, data

1 Introduction and aim

Circular use of plastics is a priority in Sweden as well as internationally, as it is essential for moving towards a more resource-efficient and less waste-intensive economy. In recent years, several initiatives have been developed to map plastic flows and to create indicators that make it possible to monitor progress over time. These initiatives vary in purpose and approach: some compile and structure existing information to provide an overall picture of plastics in the economy, while others go further by refining methods and producing new data where gaps remain.

This report provides a structured description and analysis of some of the methods and indicators used to quantify plastic flows and support monitoring of sustainable plastics use. The report takes a bottom-up approach. It begins with the Swedish national context, reviewing the data sources and indicators currently used in Sweden. The perspective is then gradually widened to include the Nordic region, the EU, and global initiatives. This structure is then used to clarify how Swedish efforts are connected, or could be more closely connected, to international frameworks, and to highlight where alignment would improve comparability and usefulness of the results.

The review and analysis focus on the following seven initiatives:

- **Mapping of plastic flows in Sweden** – published by the Swedish Environmental Protection Agency (EPA)[1].
- **Indicators in the Roadmap for Sustainable Use of Plastics** – published by the Swedish EPA.
- **National plastics-related statistics -** reported by the Swedish EPA to Eurostat.
- **Harmonization and development of plastic statistics in the Nordics**– developed by the Nordic Council of Ministers.
- **Circularity Metrics Lab- Plastic Module** – developed by the European Environment Agency.

[1] Original name: Naturvårdsverket.

- **The Plastic Product Mass Flow Model** – developed by the EU Joint Research Centre.
- **Statistical guideline for measuring flows of plastic throughout the life cycle** – developed by United Nations Environmental Programme (UNEP) and United Nations Institute for Training and Research (UNITAR).

Together, these initiatives form a basis for understanding how plastics are produced, used, and managed, as well as monitor the transition towards more sustainable plastics use.

2 Method and structure of the report

The seven listed initiatives were reviewed in detail with the aim to answer the following questions:

- What is the target audience?
- What phase of development is the initiative in?
- Which data are available from the initiative?
- How were these data collected and with what purpose?
- Is there a plan for updating the data?

As a support for the reviewing process, a template was developed, see Annex 1. Each initiative was summarized according to the template.

The review was based on publicly available information, for example on websites or in reports. The available information varied depending on the type of initiative and the stage of development. Used references are presented in Table 1 below.

In Chapter 3 the initiatives are described. It should be noted that the review of *Delimitations of the results* and *Uncertainties of the study* (point 7 and 8 in the template in Annex 1) is based on the delimitations and uncertainties that the publishers of the initiatives highlight themselves.

In Chapter 4 the initiatives are analysed with a focus on similarities, differences and how data available on a national level relate to EU-level indicators. Moreover, an analysis of general delimitations and uncertainties

is presented. Chapter 5 includes a discussion and suggestions for the way forward. The report ends with some overall conclusions.

Table 1. Reviewed initiatives and corresponding references used.

Initiative Nr	Initiative name	References used
1.	**Mapping of plastic flows in Sweden** – published by the Swedish EPA	(Ljungkvist Nordin, et al., 2025)
2.	**Indicators in the Roadmap for Sustainable Use of Plastics** – published by Swedish EPA	(Naturvårdsverket, 2021) (Naturvårdsverket, 2022) (Naturvårdsverket, 2025)
3.	**National plastics-related statistics reported to Eurostat** - reported by the Swedish EPA to Eurostat.	(SMED, 2025a) (SMED, 2024) (SMED, 2025b)
4.	**Harmonization and development of plastic statistics in the Nordics** – developed by the Nordic Council of Ministers.	(Secretary of the Nordic Council of Ministers, Nordic Council of Ministers, 2024) (Nordic Council of Ministers , 2025)
5.	**Circularity Metrics Lab- Plastic Module** – developed by the European Environment Agency.	(zu Castell-Rudenhausen, et al., 2024), (European Environment Agency, u.d.), (European Environment Agency, 2024)
6.	**The Plastic Product Mass Flow Model 2.0** – developed by the EU Joint Research Centre.	(Souder, et al., 2024)
7.	**Statistical guideline for measuring flows of plastic throughout the life cycle** - developed by UNEP and UNITAR	(UNITAR, u.d.) (UNEP, 2025)

3 Description of the initiatives

This chapter describes the seven initiatives that have developed or structured data to illustrate production and/or use of plastics. Table 2 summarizes general information about the seven initiatives. As several of the initiatives have long names, a short name for each initiative is given in brackets. The short name is then used throughout the report.

Table 2. Summary of the reviewed initiatives. Short names are given in brackets

Initiative	Publisher of the initiative	Phase of development	Targeted audience	Geographical area
Mapping of plastic flows in Sweden [National mapping of plastic flows]	Swedish EPA in collaboration with SMED.	The latest mapping was published in June 2025 (reference year 2023).	Broad audience including policymakers, researchers, and industry.	Sweden
Indicators in the Roadmap for Sustainable Use of Plastics [Roadmap indicators]	Swedish EPA.	First published in 2021 and serves as a strategic guide. Current and planned activities are published on the EPA's website. Updated in 2025.	National decision-makers, businesses, and public administration.	Sweden
National plastics-related statistics reported to Eurostat [Statistics reported to Eurostat]	Swedish EPA in collaboration with SMED. Reported to Eurostat.	Packaging Statistics for reference year 2024 are reported at the end of November 2025 and will also be published in a public report. Results for the SUPD[2] reporting 2024 will be delivered to the Swedish EPA during fall 2025; no public report is published.	Policymakers and agencies at national and EU level, such as the Swedish EPA, Eurostat, and the European Commission.	Sweden

[2] Single Use Plastics Directive

Initiative	Publisher of the initiative	Phase of development	Targeted audience	Geographical area
Harmonization and development of plastic statistics in the Nordics [Nordic statistic harmonization]	Nordic Council of Ministers.	Final report published in 2025.	National statistical bureaus, customs offices, and environmental authorities.	Nordic region: Denmark, Finland, Iceland, Norway, and Sweden.
Circularity Metrics Lab – Plastic Module [CML]	European Environmental Agency (EEA).	The plastics module has been online since 2024 and includes data for nine metrics (referring to 2022 or 2023).	Broad audience interested in circular economy and plastics data.	Varies by metric, summarized in Table 3.
The Plastic Product Mass Flow Model 2.0 [MFA 2.0]	European Commission – Joint Research Centre (JRC).	Completed. Study report published in 2024.	EU policymakers and industry stakeholders.	EU27[3]
Statistical guideline for measuring flows of plastic throughout the life cycle [UNEP/UNITAR guideline]	UNEP and UNITAR in collaboration with several organizations.	Global consultation completed. Official release planned for 2025, but no exact date has been presented.	National statistical offices and organizations producing statistics on plastics.	Global

[3] The 27 member states of the European Union

The seven initiatives presented in this report can be categorized into four overarching categories:

a. Initiatives which generate new data on a national level in Sweden.
b. Initiatives which aim to harmonize data at an international level.
c. Initiatives which use existing data to model material flows.
d. Initiatives which formulate sets of indicators to measure and analyse trends over time.

The seven initiatives which are presented in this report are categorised according to these four groups in Figure 1 below.

a. Generate new data on a national level in Sweden • Mapping of plastic flows in Sweden • National plastics-related statistics reported to Eurostat	**b. Harmonization methods** • Statistical guideline for measuring flows of plastic throughout the life cycle • Harmonization and development of plastic statistics in the Nordics
c. Modelling tool • The Plastic Product Mass Flow Model	**d. Indicators** • Indicators in the Roadmap for Sustainable Use of Plastics • Circularity Metrics Lab – Plastic Module

Figure 1. Division of the seven initiatives into four overarching categories.

In the following sub-chapters, the seven initiatives are described within the framework of the four categories in Figure 1.

3.1. Initiatives which generate new data on a national level in Sweden

Two of the initiatives generate new data:

- Mapping of plastic flows in Sweden
- National plastics-related statistics reported to Eurostat (Packaging Statistics and SUPD-reporting)

Both initiatives have a Swedish scope. There is some overlap between the initiatives, as the National mapping of plastic flows uses some of the Packaging Statistics and statistics used in the reporting required by the Single-use plastic Directive (SUPD). The Packaging Statistics and the SUPD reporting that the EPA reports to Eurostat are produced annually, and the national mapping of plastic flows is likely to be updated in a few years. The results and the methodology of producing the data in the National mapping of plastic flows and the Packaging Statistics are presented in publicly available reports. However, due to the risk of disclosing sensitive information, some data points have been omitted from the public publications. The SUPD- reporting data is not presented in a joint report, but partly published on the Swedish EPA's webpage and reported in total to Eurostat.

The two initiatives cover several plastic flows, compiled in *Table 3*. The national mapping of plastic flows includes some of the data produced in the Packaging Statistics and the SUPD-reporting. *Table 3* presents the initiatives that produce the original data for each plastic flow.

Table 3. Overview of Swedish plastic flows covered by the national plastics mapping and the Statistics reported to Eurostat.

Plastic flow	Initiative that produces these data
Plastic raw material put on the market, including import and export.	National mapping of plastic flows

Amount of plastic in a subset of product groups placed on the market[4]	National mapping of plastic flows
Plastic packaging placed on the market	Packaging Statistics
Cups for beverages and their lids placed on the market	SUPD reporting
Food containers and their lids placed on the market	SUPD reporting
Single-use plastic beverage bottles placed on the market, and data on recycled content	SUPD reporting
Fishing gear, placed on the market	SUPD reporting
Collected beverage bottles via deposit system, packaging collection and residual waste	SUPD reporting
Plastic waste generated from selected product flows	National mapping of plastic flows
Collected and treated plastic packaging waste	Packaging Statistics
Collected and treated fishing gear	SUPD reporting
Rotating reusable plastic packaging	Packaging Statistics
Plastic waste in untraceable waste flows	National mapping of plastic flows

[4] Including, but not limited to, building products, electrical and electronic equipment, vehicles, packaging, medical products, agricultural plastics, toys and sports- articles, furniture and home décor.

3.1.1 Mapping of plastic flows in Sweden

The mapping of plastic flows in Sweden is published as a report by the Swedish EPA and aims to provide an updated overview of national plastic flows. Its scope covers the full chain from raw materials through production, imports, consumption, waste generation, and material recovery. The most recent mapping uses 2023 as its reference year and represents the fourth iteration of plastic flow mapping in Sweden, following earlier studies for 2020, 2017, and 2010. Although it draws on previous mappings and in part applies the same methods, it should be read and interpreted as a standalone study[5].

3.1.1.1 Aim and objective of the initiative

The mapping aims to quantify and analyse plastic flows in Sweden for 2023. It provides a fact-based foundation to follow up the development of plastic flows in Sweden, identify where in the value chain losses occur and improve the knowledge base for the development of policy instruments and actions for a more circular use of plastics.

3.1.1.2 The available data/ insights from the initiative

The mapping includes the following data:

- The amount of plastic raw material put on the Swedish market, including import and export.
- The amount of plastic in a selected subset of product groups put on the market, including (but not limited to) building products, electrical and electronic equipment, vehicles, packaging, medical products, agricultural plastics, toys and sports- articles, furniture and home décor.
- The amount of plastic waste generated from the selected product flows, as well as the waste treatment methods.
- The amount of plastic in a selection of waste flows that cannot be traced to a specific product group, including waste from recycling centres (ÅVC), waste used as fuel in the cement industry, municipal residual wate, mixed commercial waste and waste that is imported and exported etc.

[5] (Ljungkvist Nordin, et al., 2025)

3.1.1.3 Methodology of the initiative

The study encompasses the full plastics life cycle, from raw material production through product use to waste management. It adopts a bottom-up approach, gathering product- and sector-specific data and aggregating these to estimate total plastic flows in Sweden. Flows are categorised into raw material flows, product flows, and waste flows, alongside plastic leakage into the environment and waste streams that could not be attributed to a specific product group.

The methodology varies depending on which plastic flow is being investigated; however, a shared overarching approach is used for all flows, building on the methods applied in the previous mapping.

First, the data sources and methods used in the previous mapping (reference year 2020) were compiled. Building on this compilation, newly published reports and potential additional data sources were reviewed. While comparability between years was sought, it was not prioritised over using the most robust and reliable data available. Consequently, some plastic flows were mapped using the same methods and sources as in the previous study, whereas others were mapped using revised or new methods; as a result, not all findings are directly comparable across years.

Given limited data on plastic content, certain product streams were estimated using indicator products. This approach was applied to medical products, toys and sports equipment, and to furniture and interior décor. The study also takes into account methodological recommendations and guidance for mapping plastic flows developed within the government-commissioned project “Rätt plast på rätt plats”[6].

3.1.1.4 Data sources utilized in the initiative

The mapping is mainly based on data from 2023. Where such data were unavailable, the most relevant and up-to-date information accessible was used instead. To address remaining gaps, these sources were supplemented with assumptions and expert judgement. the data sources differ across the flows analysed, but include the following:

[6] (Naturvårdsverket, 2024a)

- Consultations with data providers from the previous mapping and with other actors possessing expertise on the relevant product groups.
- Dialogue with industry organisations.
- Official statistics[7].
- Follow-up studies of the producer responsibility for packaging, single use plastics, electric and electronic equipment, and vehicles. Including the statistics presented in Chapter 3.1.2.
- Data from published reports and research articles, for example on plastic content in specific product groups.
- Information from the most recent Swedish waste statistics compilation, covering 2022[8].
- Import and export data for plastics from the Swedish Environmental Protection Agency (EPA).
- Snowball sampling, whereby one data provider identifies additional potential sources.

3.1.1.5 Delimitations of the results

The study does not provide complete coverage of all plastic flows in Sweden, since several product groups are excluded due to lack of data. The scope is limited to a selected set of product categories with substantial plastic volumes, while smaller categories with limited or insufficient data, such as household items like dish brushes, toothbrushes, and kitchen containers, are not included.

3.1.1.6 Uncertainties of the study

There are uncertainties and data gaps related to the covered product categories, leading to an underestimation of the volumes of plastics put on the market. These uncertainties are particularly significant for certain product streams and sectors, such as synthetic textiles and the healthcare sector, where quantities have been estimated only roughly. The main uncertainties of the initiative are related to the used data sources, such as:

[7] Original name: SCB:s statistikdatabas.

[8] Original name: Avfallstatistikproduktion (ASP)

- Challenges in determining the plastic content of multi-material products.
- Uncertainty in data reported by producer responsibility organisations, for example due to products entering the market without being reported.
- Uncertainty in assumptions about product weights and polymer composition.
- Data on private imports and exports of products in plastic packaging likely underestimate actual volumes.
- Substantial uncertainty for product groups quantified using indicator products.
- For plastic waste generation and treatment, uncertainty mainly stems from assumptions about plastic content in different waste fractions, especially for mixed commercial waste and post-sorting residues sent to energy recovery.
- Uncertainty regarding whether reported waste quantities reflect only the intended target material or also include moisture, contaminants, and mis-sorted materials.

3.1.1.7 Update of the initiative

The methodological approach used in these plastic mappings, where each new publication partly builds on the methods applied in the previous mapping, enables regular updates as new data become available and supports monitoring trends over time. Since earlier mappings of plastic flows in Sweden have been carried out at intervals of roughly three to four years, it is reasonable to expect a similar timeframe for a future update of this publication. However, the initiative does not specify a date or timeline for the next update.

3.1.2 National plastics-related statistics reported to Eurostat

The plastics statistics that the Swedish EPA reports to Eurostat include both the *Packaging Statistics* and the *Single-Use Plastics Directive reporting (SUPD reporting)*.

The Packaging Statistics are part of Sweden's official reporting under the Waste Framework Directive and describe packaging materials placed on the

market, collected, treated, and recycled; since 2022, these data have been compiled annually by SMED on behalf of the Swedish EPA[9].

The SUPD reporting relates to Sweden's implementation of the EU Single-Use Plastics Directive (2019/904). Since 2022, SMED has annually collected and analysed the relevant data for the Swedish EPA and reported it to Eurostat, with the aim of tracking flows of single-use plastic products and associated recycling levels[10].

3.1.2.1 Aim and objective of the initiative

The aim of the two statistical projects is to produce the data that the Swedish EPA must report to Eurostat, as described above.

3.1.2.2 The available data/ insights from the initiative

The Packaging Statistics include the following plastic flows:

- Plastic packaging placed on the market, divided by producer responsibility organization and material type.
- Collected and treated plastic packaging waste, including material recycling and energy recovery.
- Flows managed by re-use systems and market-driven recovery systems for packaging materials.

Aggregated data include:

- Quantities (tonnes) of plastic packaging placed on the market, collected, and treated.
- Material recycling rates and recovery proportions.
- Qualitative metadata on reporting methods and coverage.

SUPD reporting covers the following plastic flows:

- Cups for beverages and their lids (entirely or partly plastic).
- Food containers and lids (entirely or partly plastic).
- Single-use plastic beverage bottles (< 3 liters) placed on the market.

[9] (SMED, 2025a)

[10] (SMED, 2025b) (SMED, 2024)

- Collected beverage bottles via deposit system, packaging collection, and residual waste.
- Recycled content in plastic beverage bottles (PET and other plastics).
- Fishing gear containing plastic placed on the market and collected.

The available data includes:

- Quantities (number and weight) of single-use plastic products placed on the market.
- Collected and recycled quantities of bottles and fishing gear.
- Estimated recycled content of plastic bottles.
- Qualitative metadata on coverage, comparability, and limitations.

3.1.2.3 Methodology of the initiative

Packaging Statistics

In 2024 (reference year 2023), Sweden's packaging data was mainly gathered through surveys sent to producer responsibility organisations and re-use systems. In 2025 (reference year 2024), the system changed, and packaging producers now report their figures directly to the Swedish EPA through a digital reporting service. Packaging waste collected and treated is reported by companies which are registered as so-called *market-driven systems for material recycling*. The new system makes the statistics more detailed and reliable, since the data comes directly from the companies placing packaging on the market.

New EU rules on packaging have been adopted, but they will apply later (from August 2026) and do not affect how the 2024 statistics are collected.

SUPD reporting

The data is handled by combining information from several years and running automated checks to spot unusual or incorrect figures. Each year, the results are quality-checked by comparing company details with Statistics Sweden's business register and by contacting producers if something looks wrong.

Individual company data is kept strictly confidential, and only aggregated, anonymised results are published so that no single producer can be identified.

3.1.2.4 Data sources utilized in the initiative

Packaging Statistics

The Packaging Statistics are mainly based on information that packaging producers report digitally to the Swedish Environmental Protection Agency. They are also complemented by data from recycling companies that handle collected packaging.

SUPD reporting

Data mainly come from the same digital reporting system as Packaging Statistics at the Swedish Environmental Protection Agency. To get a fuller picture, complementary data from the following sources were used:

- the deposit return system for bottles and cans (Returpack),
- organisations that collect plastic packaging (Svensk Plaståtervinning),
- municipalities' analyses of household waste (Avfall Web), and
- collection points for discarded fishing gear (led by Sotenäs Marina ÅVC).

3.1.2.5 Delimitations of the results

All results are limited to a Swedish scope.

Packaging Statistics

Some details could not be published because company data was protected by confidentiality rules, so figures were sometimes only shown in aggregated form. In earlier years, the statistics had also been affected by low survey response rates, which made the results less complete and harder to publish due to confidentiality rules.

From 2024, this improved because producers were required to report directly to the EPA through a digital system, meaning far fewer figures were missing. However, since the reporting method changed, results for 2024 were not fully comparable with those from 2023.

3.1.2.6 Uncertainties of the study

Packaging Statistics

Data from different reporting systems were not always based on identical definitions, which could lead to minor differences in the totals. A small number of producers did not report through the EPA's digital system, meaning the overall quantities were likely slightly underestimated. Reporting errors could also occur, for example through incorrect material classification or confusion between weight and number of items.

SUPD reporting

For some product categories, reporting was incomplete, particularly for bottles sold outside the deposit system and for recycled-content data that was optional. There was also a risk of double counting when both producers and producer organizations submitted data for the same products. Reported weights for fishing gear sometimes referred to the total item rather than the plastic share. These factors may have resulted in a slight underestimation of total quantities, especially for smaller producers and less common products.

3.1.2.7 Update of the initiative

The statistical projects produce new statistics annually, which are reported to the Swedish EPA which in turn report it to Eurostat.

3.2. Initiatives which aim to harmonize data at international level

Two of the initiatives focus on harmonising methods to improve overall data quality by developing aligned data collection and classification systems. These are:

- Statistical guideline for measuring flows of plastic throughout the life cycle, developed by UNEP/UNITAR.
- Harmonisation and development of plastic statistics in the Nordics, developed by the Nordic Council of Ministers.

There are several interlinkages between the two initiatives. The Nordic statistic harmonization effort can be seen as a step towards implementing the UNEP/UNITAR guidelines in a Nordic context. In addition, both initiatives highlight the Plastic-KEYs developed by UNITAR. Plastic-KEYs are a classification system containing information on plastic content and

polymer composition for a wide range of products, intended to support clearer links between plastic consumption and waste management.

3.2.1 Statistical guideline for measuring flows of plastic throughout the life cycle developed by UNEP and UNITAR

The initiative is led by United Nations Environmental Programme (UNEP) and United Nations Institute for Training and Research (UNITAR) in partnership with several other organizations. The guideline addresses the lack of a detailed, globally agreed-upon statistical methodology for measuring flows of plastic at national, regional, and global levels.

The initiative is expected to be published at the end of 2025 but had not yet been published at the time this report was finalised in December 2025. Therefore, this summary is based on an introductory presentation from January 2025[11] and information available on UNITAR's website[12]. As a result, the amount of available information is limited, which is why this subchapter provides only a brief overview of the initiative.

The guideline is expected to propose core indicators and calculations, which will help capture the overall picture and the most essential aspects of plastic flows along the life cycle at the national level.

3.2.1.1 Aim and objective of the initiative

The guideline is intended to support policymaking by enabling plastic statistics that are comparable at national, regional, and global levels and relevant to work on responsible consumption, circular economy policies, and related areas. It provides guidance to data producers, such as statistical offices, waste authorities, international organizations, and researchers, on producing high-quality plastics statistics. More consistent data collection and classification methods are expected to improve datasets on plastic flows and their use in decisions on plastic production, use, waste management, and circularity.

[11] (UNEP, 2025)

[12] (UNITAR, u.d.)

3.2.1.2 The available data/ insights from the initiative

The available data has not been disclosed yet. However, the initiative lists classification systems that can be used to support plastic statistics. Specifically, Plastic-KEYs developed by UNITAR are mentioned.

3.2.1.3 Methodology of the initiative

The first draft of the initiative was published in 2023, after which consultations with scientists and statisticians took place. In 2024, a pilot testing of the guideline was carried out in Vietnam, global consultations were held, and a white cover version was published.

The published guidelines will propose core indicators and calculation methods, with the aim to capture the overall picture and the most essential aspects of plastic flows along the life cycle at national levels. However, as the guidelines have not yet been published, this information is not presented.

The initiative is based on international approaches, statistical standards and classifications, including[13]:

- UNEP/IUCN plastic hotspot analysis.
- Basel, Rotterdam and Stockholm Conventions secretariat (BRS) Practical guidance on the development of inventories of plastic waste.
- UNCTAD Plastics trade.

Countries that are starting to collect plastic statistics are encouraged to work on developing core indicators for the flows listed below:

- Plastic Production.
- Plastic Imports / Exports, excluding waste.
- Apparent Consumption of Plastic
- Plastic Waste Generated / Imported / Exported / Collected in the Economic Territory / Treated.
- National Plastic Recycling Rate.
- The Share of Secondary Plastic in Production.

[13] (UNEP, 2025)

- Plastic waste handled informally.
- Plastic leakages.

Countries with more experience with plastic statistics are encouraged to build *Physical supply and use tables* for plastics, including the flows in Figure 2.

1. Natural inputs
2. Products: Plastic in primary forms
3. Products: Semi-finished plastic products
4. Products: Total plastic in finished products
    a. Finished plastic products
    b. Plastic embedded in plastic containing products
5. Plastic waste

Figure 2. Physical supply and use table for plastics, to be used in the UNEP/UNITAR statistical guideline. Image based on (UNEP, 2025).

3.2.1.4 Delimitations of the initiative

A pilot application of the UNEP/UNITAR model was carried out using Nordic data[14] (initiative described in Chapter 3.2.2 below). The pilot shows the model can provide a harmonized baseline for estimating plastic put-on-market and waste generation but also notes limitations such as reliance on default plastic-content factors, variations in data quality, and limited product coverage. It reviews plastic share factors used in waste statistics and recommends: (1) validating input data, (2) adapting plastic-content factors to Nordic conditions, (3) increasing engagement from national agencies, and (4) establishing shared Nordic governance for the model's further development.

3.2.2 Harmonization and development of plastic statistics in the Nordics

Statistics on plastic flows are currently fragmented, incomplete or difficult to compare across countries. This initiative was launched to address these challenges. Under the coordination of the Nordic Council of Ministers it aimed to strengthen national plastic inventories in the Nordic region through improved statistical harmonization. The initiative has been implemented in

[14] (Nordic Council of Ministers, 2025)

two phases, with the first phase completed in 2024[15] and the second one in 2025[16].

3.2.2.1 Aim and objective of the initiative

The initiative aimed to support the harmonization of national plastic inventories in the Nordic countries.

The objectives were to:

- Identify the most important statistical information needed to create plastic inventories.
- Identify key knowledge gaps in data collection and quality.
- Share experiences among Nordic actors working with statistics.
- Highlight areas where improved coordination and harmonization are needed.

3.2.2.2 The available data/ insights from the initiative

The initiative does not generate any new quantitative data. Instead, it presents prioritized areas for improvement and a mapping of existing challenges.

Four key insights from phase 1 are presented in the report:

- Waste-related indicators stand out across all Nordic countries as shared priorities, with indicators such as collection of plastic waste and recycling being most established.
- Availability and comparability of data still vary greatly, some examples include trade, put-on-market, and even waste generation.
- Few data points are both high-impact and low-cost. There are not many so-called ‘quick wins’ when it comes to filling gaps in data across the Nordic regions. However, aligning existing reporting formats and definitions between the countries is seen as potentially cost-effective efforts.
- Production and trade data have a big potential to be used as critical inputs for modelling material flows. These data are already collected, so if plastic content can be reliably estimated, they can be

[15] (Secretary of the Nordic Council of Ministers, Nordic Council of Ministers, 2024)

[16] (Nordic Council of Ministers, 2025)

immediately used with less additional cost compared to new data collection initiatives.

3.2.2.3 Methodology of the initiative

The initiative was divided in several phases:

Phase 1 – Prioritisation of plastic data in the Nordics. This phase was in turn structured as a three-step approach:

- Data prioritisation – included a systemic mapping which resulted in a list with 37 prioritized data points with high relevance for the Nordic region.
- Data availability mapping – included an assessment of the availability, comparability and gaps for the 37 data points.
- Cost-benefit analysis – based on an evaluation of the costs and expected benefits of addressing the data gaps.

Phase 2 – This phased shifted from identifying gaps to actively closing them. In doing so, this phase was based in the results of the cost-benefit analysis conducted in phased 1 and focused on the actions which were identified as high-value and realistically to improve. The phase started with a Nordic workshop in March 2025.

3.2.2.4 Data sources utilized in the initiative

This is a harmonization initiative, and it does not include any data. However, it includes a cost-benefit analysis which resulted in a classification of efforts for plastic data development in three categories:

- *High value, medium effort needed:*
    - Harmonization of plastic waste recycling data.
- *High potential, higher effort needed:*
    - Align definitions and improve the accuracy of estimates for trade and production statistics.
    - Common definitions and methodologies for put-on-market data points.
    - Improving sector-specific waste flows.
- *Limited value or feasibility:*
    - Data points on intermediate use and in-use stock are characterized by vague definitions and methodological complexity. The initiative suggests that these should be deprioritized.

3.2.2.5 Delimitations of the results

The initiative provides a structured basis for identifying key data development opportunities in the Nordics, but its findings should be interpreted with certain limitations in mind. Time constraints and limited availability of key stakeholders, especially in Denmark and Finland, reduced the level of detail and left some indicators "unconfirmed". Moreover, the work relied on publicly available policy documents and stakeholder input that may not fully capture newly adopted policies or all relevant data sources. In addition, the cost-benefit analysis was a qualitative expert-based exercise rather than a full economic evaluation.

3.2.2.6 Uncertainties of the study

The uncertainties of the study relate to the delimitations described above.

3.2.2.7 Update of the initiative

The initiative does not have an update schedule but emphasizes the need for continued Nordic collaboration. The final report of the initiative includes seven recommendations divided into three areas which can contribute to robust and comparable plastic statistics across the Nordic region:

- Build a foundation for sustained collaboration:
    - Establish a Nordic coordination mechanism for plastic statistics.
    - Create frameworks that promote action and commitment.
- Start with the most feasible and policy-relevant data:
    - Launch a harmonisation pilot focused on plastic waste statistics.
    - Develop methods for sector-specific plastic waste flows
- Address key data gaps with scalable methods:
    - Develop a Nordic plastic statistics handbook.
    - Develop a methodology for estimating free-rider volumes in EPR schemes.
    - Pilot methods for estimating commercial (non-household) plastic waste.

Each recommendation is described in more detail in the final report[17].

[17] (Nordic Council of Ministers, 2025)

3.3. Initiatives which use existing data to model material flows

This section describes a modelling initiative that uses existing data to simulate plastic flows through the economy. The tool applies a detailed material flow analysis approach and requires specific modelling expertise to operate and interpret. Its input data draw on a combination of international statistics and reports, as well as data submissions from participating actors, some of which are not publicly available.

3.3.1 The Plastic Product Mass Flow Model 2.0

The *Plastic Product Mass Flow Model 2.0 (*MFA 2.0) is a modelling tool developed by the Joint Research Centre (JRC) to support and monitor the goals of the Circular Plastics Alliance (CPA), an initiative launched by the European Commission. The CPA's main objective was to ensure that 10 million tonnes of recycled plastics are used annually in new products in Europe by 2025 (from around 4.5 Mt in 2020). The CPA alliance includes companies from the entire plastics vale chain and who pledged to work together to achieve this target. In 2024, when the MFA 2.0 was published, the CPA included over 300 companies across Europe (also referred to as CPA signatories).

However, while the CPA continues as a functioning, Commission-backed alliance with most planned tools delivered, it did not appear to be as active in 2025 and no publicly stated final verdict on reaching 10 Mt is available.

The *Plastic Product Mass Flow Model 2.0* was designed to map the flows of plastic products and recycled plastic within the EU27[18] and was published in 2024 in its current form. The model builds on a previous version (MFA 1.0), developed in 2020. The target users are industry actors and EU policy-makers. The model uses a bottom-up approach to map out plastic flows at EU-, member state- and key product level, based on five sectors: packaging, construction, automotive, electronics, and agriculture.

3.3.1.1 Aim of the initiative

The aim of the model is to improve the quality of data and the modelling of plastic mass flows in Europe. It was built as an easily updatable modelling

[18] (Souder, et al., 2024)

structure, to ensure it could be used by a wide range of actors and be improved and updated over time. The initiative supports evidence-based decision-making.

3.3.1.2 The available data/ insights from the initiative

The model uses existing publicly available data and data collected from CPA signatories for reference year 2019. It provides EU- and country level (for countries in EU27) data sets visualized as Sankey diagrams, an example is presented in Annex 2.

EU-level model output

At EU level the Material Flow Analysis (MFA) visualizes the scale and direction of plastic use and recovery across the EU27, the associated Sankey diagram is presented in Annex 2. The diagram provides a visualisation of plastic flows showing how plastics move from production through use to end-of-life. It breaks down flows by sector and it also shows how plastics become waste and how much is recycled. In addition, it highlights the share of recycled plastics re-entering the economy.

A separate MFA for each of the five sectors (packaging, construction, automotive, electronics, agriculture) is also available as Sankey diagrams. The diagram for each sector shows the flow of plastics for the most widespread product categories in each sector. For each product category the diagram illustrates material demand, production, example of products, use, and post-consumer waste treatment.

The model also presents a plastic flow MFA breakdown by polymer type.

Country-level model output

Five separate MFA for one selected priority product in each CPA sector, showing a breakdown per country (excluding Austria). The selected priority product for each sector are: Packaging sector-PET trays; Construction sector-PVC window profiles; Automotive sector-PP Shredder fluff; Electronics sector-large household appliances; Agriculture sector- gardening films.

3.3.1.3 Methodology of the initiative

The model uses existing data and transfer coefficients[19], combined with assumptions regarding the share of plastics of a specific polymer type in different product categories.

The methodology for data collection was largely focused on building ways to automatically process the public data sets like Eurostat Prodcom[20] into the model's format. Moreover, a methodology was set up around comparing public data sets and model estimations with the values provided by CPA signatories. The modular structure of the model allows to add individual data points such annual public data.

The priority products used in the EU-level sector-specific MFAs are scoped based on 29 priority products selected by the CPA in its Design-for-recycling Work plan. These are defined as a combination of a market/sectorial application and a main plastic material. The country-level model only covers five priority products (one for each sector), selected by the JRC and CPA in the beginning of the project. The purpose was to explore how plastic flow modelling could be done at a higher level of national granularity and deliver insights based on the differences between countries.

3.3.1.4 Data sources utilized in the initiative

Data sources were chosen to be dynamic, meaning they are easy to update and improve when new data points from a specific country, sector or product become available. Key data sources include:

- Eurostat Prodcom data from 2019, showing production, import, export of products.
- Eurostat waste statistics, which estimate total waste generated and some treatment. As much of the data was unavailable for 2019, it was extrapolated from previous years.
- Transfer coefficients derived from literature were used, when available, to estimate how plastics flow in the model. The

[19] Transfer coefficients measure the percentage of production volumes that end up in a particular waste stream.

[20] Prodcom presents data on the production of manufactured goods by enterprises across EU member states, forming part of the European business statistics framework.

coefficients were only available for packaging flows. For the other flows, assumptions were used.

- Conversion factors, used to convert the units from the Eurostat Prodcom production data into kilo tonnes, to ensure all mass flows are comparable.
- CPA data submissions, however, CPA signatories shared data for only two products: PVC window profiles and doors and agricultural gardening films.
- Plastics Europe reports and other relevant industry and research publications.

3.3.1.5 Delimitations of the results

The results depend on several modelling assumptions such as conversion factors, transfer coefficients, estimated polymer shares, and waste-treatment efficiencies, which can affect the final outcomes. The model's "production and use" component does not account for existing re-use systems.

In addition, chemical recycling is represented in a simplified way. The model does not include a separate pre-treatment step for chemical-recycling feedstock, even though this step is usually required and involves material losses. Instead, it assumes that mechanical and chemical recycling split from the same point, with a predefined share of material directed to each pathway.

For some product groups, country-level Eurostat Prodcom production data are excluded due to confidentiality. This can create large mismatches between estimated production and waste amounts at national level. These confidentiality gaps do not affect results for the EU as a whole, since no sensitive country-specific data can be extracted at that scale.

3.3.1.6 Uncertainties of the study

Uncertainties connected to the data sources used in the model relate to the fact that public datasets can be incomplete and/or inconsistent, and industry data contributions were generally limited.

The methodology quantifies this by attributing each data source an "uncertainty score" for five dimensions (reliability, completeness, temporal correlation, geographic correlation, and other correlation), which is used when feeding the data into the model.

3.3.1.7 Update of the initiative

The model was intended to be dynamic and updated as new data became available, particularly through continued input from CPA signatories. Its modular structure would allow assumptions to be revised, new primary data to be added, and public and private datasets to be compared, with the report recommending third-party verification to ensure consistency and data quality.

However, since the CPA appeared less active in 2025 than in previous years, it is uncertain whether signatories will continue to supply data at the pace needed to maintain and develop the model. As a result, it remains unclear how and to what extent the model can or will be updated and used in the coming years.

3.4. Initiatives which formulate sets of indicators to measure and analyse trends over time

This section presents two initiatives that use existing data to develop indicators for plastics: the Circular Metrics Lab (CML) and the Swedish EPA's Roadmap for Sustainable Use of Plastics. Both initiatives aim to summarise key aspects of plastic flows, but they differ in how the indicators are applied and communicated. The CML publishes calculated indicator results and is updated regularly as new data become available. The EPA's Roadmap set out which indicators will be used to follow up development but provides limited information on the underlying data and does not present evaluated results.

3.4.1 Circularity Metrics Lab

The Circularity Metrics Lab (CML) is a tool created by the European Environment Agency (EEA). It is made up of several modules. One of these focuses on plastics and looks at the ways plastics are currently produced and used in Europe and globally. This plastics module was first published on the EEA website in 2024.

The module helps explain how circular the plastics economy is in Europe. It includes technical information that supports better decision-making by policymakers, researchers, and industry stakeholders. The tool uses nine

indicators (metrics) that capture different parts of a circular plastics economy, see Chapter 3.4.1.2.

Naming it a “Lab” highlights that the CML does not rely only on long-established datasets. It also explores important areas where data is still developing or not yet available over long time periods.

3.4.1.1 Aim and objective of the initiative

The initiative aims to support a circular economy by cutting plastic waste and pollution. It also seeks to help policymakers and industry develop effective policies and strategies that reduce plastic waste and strengthen long-term sustainability.

3.4.1.2 The available data/ insights from the initiative

The initiative presents the most recent data for the following nine indicators:

- Exports of plastic wastes outside the EU
- Total plastics consumption by end-users in the EU
- Unintentional release of microplastics
- Litter on EU beaches
- Global bio-based plastics production
- EU circularity of plastic materials
- GHG emissions from EU’s plastics value chain
- EU’s mechanical recycling capacity
- Average price of plastic scrap

3.4.1.3 Methodology of the initiative

The development of the CML plastics module began with a structured review of existing data sources and relevant publications, including technical and policy reports. This work produced an initial compilation of 82 metrics related to plastics circularity, with some degree of overlap. Through a screening process focused on relevance and the potential for robust data coverage, the list was narrowed to 22 priority metrics.

Following a detailed assessment to remove remaining overlaps and verify data availability and quality, 10 metrics were selected for in-depth data mining. These metrics were subsequently refined to improve

methodological robustness and clarity of communication. This iterative process resulted in a final set of nine metrics included in the module.

The resulting nine metrics are characterized based on data availability as either *indicator* or *signal*:

- Indicators: metrics that have well-established and rely on EU-wide datasets with long time series, for example provided by Eurostat.
- Signals: metrics that are informative but are based on less reliable data and/or do not have complete data available, for example scientific studies and surveys.

The applied methods and data sources used for metric quantification vary between the metrics and is summarized in Table 4.

Table 4. The applied methods and data sources used for metric quantification in Circularity Metrics Lab plastics module[21].

Metric name	Coverage (area, years)	Notes on methodology	Data source
Exports of plastic wastes outside the EU (indicator)	EU27. 2002-2023	-	Eurostat data (international goods trade).
Total plastics consumption by end-users in the EU (signal)	EU27+3[22]. 2018, 2020, 2022	Includes plastic packaging, plastic products, parts embedded in larger products as well as synthetic textiles put on the market for both private and industrial end-users.	Data for plastics put on the market (excluding textiles) is derived from Plastics Europe and supported by stakeholder interviews and data extrapolation methods. Data on textiles made of plastics is derived from Eurostat.
Unintentional release of microplastics (signal)	EU27. 2019-2022	-	Data from several studies, such as EEA's monitoring assessment, a brochure published by the DG Environment and a European Topic Centre report. The data includes several estimates.
Litter on EU beaches (signal)	4 European seas. 2013-2022	-	Marine litter watch (MLW) data; citizens, communities and NGOs collect data on litter along European beaches using EU guidelines. A

[21] (European Environment Agency, u.d.)

[22] The 27 member states of the European Union plus Norway, Switzerland and the United Kingdom

Metric name	Coverage (area, years)	Notes on methodology	Data source
			subset of MLW monitoring events were selected according to a set of conditions.
Global bio-based plastics production (signal)	Global. 2010-2023	Calculated as the production capacity for biobased non-biodegradable and biobased and biodegradable polymers, starch blends and cellulose films for a set of market segments, divided by the total global plastics production capacity.	Data originates from annually updated reports by European Bioplastics. Uses market data on production capacities for biobased non-biodegradable and biodegradable polymers for a set of market segments.
EU circularity of plastic materials (signal)	EU27+3. 2018-2022	Measures the share of secondary (recycled) plastics in total plastic materials consumed in the EU. Calculated as the amount of secondary plastics produced in the EU divided by "Total plastics consumption by end-users in the EU."	Data for used recyclates is based on Plastics Europe publication on the volume of secondary plastics produced/recycled in the EU.
GHG emissions from EU's plastics value chain (indicator)	EU27+3. 2014-2022	Estimated using a bottom-up approach, starting from plastic production, consumption and waste management data. For each lifecycle step, GHG emission factors are attributed to the main flows and processes.	The data is based on multiple data sources compiled in the Eionet Report ETC/WMGE 2021/3.

Metric name	Coverage (area, years)	Notes on methodology	Data source
EU's mechanical recycling capacity (signal)	EU27+3. 2017-2023	-	Data has been extracted from Plastic Recyclers Europe's annual publication *Plastics recycling industry figures. Mapping of installed capacities.*
Average price of plastic scrap (indicator)	EU27. 2012-2022	The ratio between the value and the quantities of related trade. Plastic scrap includes homogenous industrial plastic waste that is used as feedstock for secondary plastic production. Average price is calculated by dividing the total value of Extra and Intra-EU waste imports and Extra-EU exports by the corresponding quantities.	Based on values and quantities from Eurostat data (international trade in goods)

3.4.1.4 Data sources utilized in the initiative

Data sources vary depending on the metrics as specified in Table 4.

3.4.1.5 Delimitations of the results

The tool provides nine diverse metrics, and the reliability and completeness of the datasets vary, why some metrics are labelled as "indicators" and others as "signals". Moreover, the geographical and temporal coverage differ depending on the metric.

3.4.1.6 Uncertainties of the study

There are uncertainties associated with individual metrics. For example:

- The microplastics data relies on several different estimates, which reduces their overall reliability.
- For bioplastic production capacities, the market data are drawn from reports where the underlying data and methods are not always fully transparent.
- The metric on "EU circularity of plastic materials" does not take net EU trade in secondary plastics into account; as a result, it only reflects the share of secondary plastic materials produced within the EU relative to total plastic use in the EU.
- Finally, the metric on "GHG emissions from the EU's plastics value chain" involves uncertainties in terms of scope, since data are not collected in a consistent way across the EU and come from multiple sources.

3.4.1.7 Update of the initiative

The plastics module in the CML will be updated each year to reflect the most recent data as they become available.

3.4.2 Indicators in the Roadmap for Sustainable Use of Plastics

The Roadmap for Sustainable Use of Plastics[23], published by the Swedish EPA in 2021[24] and updated 2025[25], outlines a vision for sustainable use of

[23] Original name: Färdplan för hållbar plastanvändning

[24] (Naturvårdsverket, 2021)

[25] (Naturvårdsverket, 2025)

plastics by describing the shifts needed to achieve it, and the areas of development that will enable the transition. The roadmap is based on existing legislation, strategies, goals, and action plans at national, EU, and international levels. Four impact areas where efforts are needed are outlined:

1) Raw materials and production with minimal environmental impact;

2) Resource-smart use;

3) Reduced leakage of plastics into nature;

4) Significantly increased and high-quality material recycling.

The four outlined impact areas are closely related, and measures within one area can influence the others. Each area includes a set of indicators for monitoring progress, summarized in Table 5. In addition to these indicators, results from follow- ups of targets in existing legislation and in the environmental-target system[26] have also been used to assess progress.

Table 5. Impact areas outlined in the Roadmap for Sustainable Use of Plastics, description of the impact areas and indicators used for progress follow-up[27,28].

Impact area	Description	Indicators used for progress follow-up
Raw materials and production with minimal environmental impact	Products should be designed with consideration of environmental impact during production, use, and waste management.	• Territorial greenhouse gas emissions from incineration of waste, including plastics, in the electricity and district heating sector. • Estimated leakage of microplastics in Sweden (weight per year, broken down by source and pathway).
Resource-smart use	Plastic is used in a way that provides the greatest possible benefit per unit of plastic during its lifecycle.	• Use of certain single-use products. • Plastic use in Sweden, broken down by plastic flow. • Plastic waste in Sweden, broken down by plastic flow.
Reduced leakage of plastics into nature	Includes litter and microplastics that end up in nature, either through littering or	• Littering of items containing plastic (weight/year, broken down by product category).

[26] Original name: miljömålssystemet

[27] (Naturvårdsverket, 2021)

[28] (Naturvårdsverket, 2025)

Impact area	Description	Indicators used for progress follow-up
	more unintentional leakage from e.g. wear and tear. Illegal waste management is also included.	• Estimated total microplastic leakage in Sweden (weight/year, broken down by source and pathway).
Significantly increased and high-quality material recycling	Efforts are required across multiple parts of the value chain, from product design and collection to improved sorting and increased demand for recycled raw materials	• Recycled content in packaging (and for other product groups where legislation comes into place). • Material recycling rate, per plastic flow. • Territorial greenhouse gas emissions from incineration of waste, including plastics, in the electricity and district heating sector.

3.4.2.1 Aim and objective of the initiative

The initiative is intended to provide a comprehensive overview and a clear directional guide regarding the future path and the meaning of *sustainable plastics use*. It seeks to establish a shared understanding of the changes required and to identify the development areas that merit particular focus. Furthermore, the initiative is designed to outline common priorities for action, encourage progress, and support decision-making by serving as a basis for strategic work. It also aims to enable organizations to coordinate efforts and collaborate on challenges that cannot be effectively addressed by individual actors alone.

3.4.2.2 The available data/ insights from the initiative

The initiative does not present data. Instead, it defines and prioritizes the key areas that should be considered when assessing sustainable plastics use, and describes the indicators intended to monitor and follow up on progress over time.

3.4.2.3 Methodology of the initiative

The indicators used are building on existing statistics and reporting such as the climate reporting, the National mapping of plastic flows (described in Chapter 3.1.1) and the reporting to Eurostat (described in Chapter 3.1.2). The indicators that build on other existing statistics have been updated yearly, but the results have not been published.

3.4.2.4 Data sources utilized in the initiative

The initiative does not present all data sources used for evaluating the indicators. As seen in Table 5, some indicators build on data generated in the National mapping of plastic flows and other existing statistics.

3.4.2.5 Delimitations of the results

There aren't any stated delimitations in either of the reports used for mapping the initiative. General limitations that are described in Chapter 4.3 apply.

3.4.2.6 Uncertainties of the study

The initiative does not state any uncertainties. General limitations described in Chapter 4.3 apply, in particular those related to risks of not assessing complete and sufficient data to feed into the indicators.

3.4.2.7 Update of the initiative

The national plastic coordination makes a compilation of the indicators each year, but the data is not published.

4 Analysis

This chapter provides a brief analysis and comparison of the seven initiatives presented in the report. The analysis highlights key similarities and differences between the initiatives from a few perspectives, including their scope and coverage, methodological approaches, data sources, and planned updates. Lastly, some general uncertainties and limitations that several initiatives have in common are presented and analysed.

4.1. Scope of the initiatives

The seven initiatives described in this report differ in their geographic scope and can be divided into three distinct levels as illustrated in Figure 3 below. Two of the initiatives have a global scope, whereof one (Circular Metrics Lab) has a mix of global and EU perspectives, depending on the individual metrics. Two initiatives operate at an EU or Nordic level, focusing on regional coordination and comparability of data and methodologies among European and Nordic countries. The remaining three initiatives are national in scope and specific to Sweden, addressing domestic plastic flows, reporting obligations, and national indicators to track progress toward sustainable plastics use.

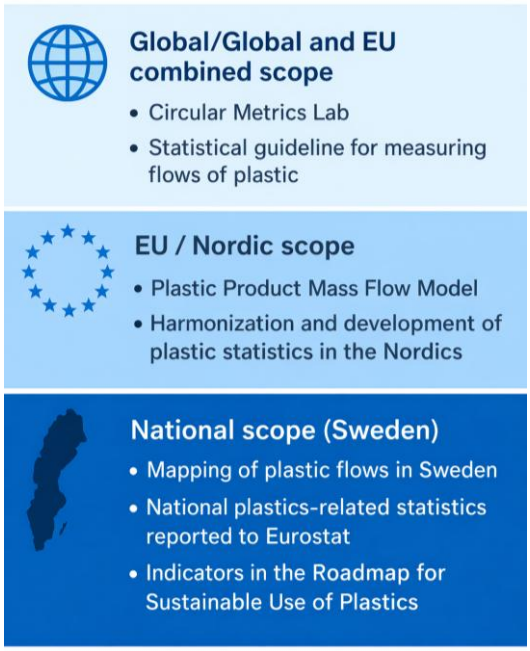


Figure 3. The geographical scope of the reviewed initiatives.

4.2. Level of maturity and updating schedule

The reviewed initiatives are at different stages of development. Some are already published and in active use, while others are still being developed. Figure 4 illustrates the sequence in which the initiatives have been produced and how long each initiative has been in place.

Name and scope of the initiatives	Years for launch and uppdate of the initiative							Expected update in future
	2012	2020	2021	2022	2023	2024	2025	
Global/ Global and EU combined scope								
Circularity Metrics Lab								X
Statistical guideline for measuring flows of plastic								
EU/ Nordic scope								
Plastic Product Mass Flow Model								X
Harmonization and development of plastic statistics in the Nordics								
National scope (Sweden)								
Mapping of plastic flows in Sweden								X
National plastics-related statistics reported to Eurostat								X
Indicators in the Roadmap for Sustainable Use of Plastics								X

Figure 4. Year of launch and update of each of the seven initiatives. The statistical guidelines for measuring flows of plastic by UNEP and UNITAR have not been published yet, but the planned time of publishing is by the end of 2025.

Updating practices also vary. The Mass Flow Model does not specify a fixed update schedule, but notes that annual updates are possible as new data become available. The Mapping of plastic flows in Sweden has no stated schedule either; however, based on how often similar mappings have been carried out in the past, it is likely to be updated within the next few years. For the Nordic statistics harmonization initiative and the Statistical guidelines for measuring flows of plastic developed by UNEP and UNITAR, no information is provided about future updates or next steps. In contrast, both the Statistics reported to Eurostat and the Circular Metrics Lab are set up for annual updates, ensuring that their results remain current over time.

4.3. General uncertainties and limitations

Uncertainties and limitations differ between the initiatives, and are, when available, described under each initiative in Chapter 3. Some overarching challenges apply to several initiatives: incomplete, inconsistent or lacking datasets, the need for using assumptions and the need for simplifying the scoped system in plastic flow analyses.

Most of the reviewed initiatives highlight challenges related to **incomplete, inconsistent or missing data**. Differences in reporting practices between different countries or organizations are mentioned as contributing factors. A lack of transparency in the methodology behind datasets also creates uncertainty, as it becomes difficult to verify how data have been collected and aggregated. In some cases, specific data are unavailable, for example data on polymer types or plastic content of certain product groups. This issue is also highlighted in the Nordic statistics harmonization initiative.

Because of data limitations, several initiatives rely on **assumptions and estimates**. These relate to parameters such as product weights, polymer types, plastic content within products and waste fractions, as well as transfer coefficients for the share of a waste stream treated in a particular way.

Given limited data and the need to narrow a complex system to a manageable scope, some initiatives **simplify parts of the analysed system**. For example, the MFA 2.0 excludes plastic reuse and pre-treatment steps required for chemical recycling, and the National mapping of plastic flows uses “indicator products” to represent broader material flows.

The listed challenges can reduce comparability between initiatives (for example if different assumptions are used) and lower confidence in the results. Assumptions about parameters introduce uncertainties, while simplifications risk overlooking certain dynamics and can lead to partial representations of the plastics system.

At the same time, such approaches are often necessary to make progress in a complex field where comprehensive data are not yet available. Assumptions allow initiatives to produce usable estimates rather than leaving major flows unquantified and simplifications help define a manageable and consistent scope. Although simplified representations cannot capture every flow or life-cycle stage, they enable a coherent system overview that can guide analysis and decision making.

5 Discussion and conclusions

Several of the reviewed initiatives address similar aspects of plastics use, yet they are not directly comparable due to differences in definitions, system boundaries or calculation methods. This chapter provides recommendations and discusses potential pathways going forward.

Balance indicators, data, and methods

Challenges related to incomplete, inconsistent or missing data underline the need for a balance between defining indicators and ensuring that data-generating initiatives are in place. The development of the CML metrics reflects this balance by distinguishing between two types of metrics: those for which data is already available (indicators) and those for which the data is not yet complete (signals), but which have potential to become an indicator. By explicitly including signals, the framework highlights where new datasets are needed and ensures that data gaps do not inhibit the forward development of indicators.

Harmonization is also crucial for enabling comparability across countries and over time. Without harmonized methodologies, datasets and indicator outcomes become difficult to compare. The conclusions and recommendations from the two initiatives focused on harmonizing methods (see Chapter 3.2) are therefore important to monitor and integrate into national data-generating efforts.

Overall, these findings point to the need for a balanced approach that aligns indicator development, data generation and harmonization of methods, as visualized in Figure 5.

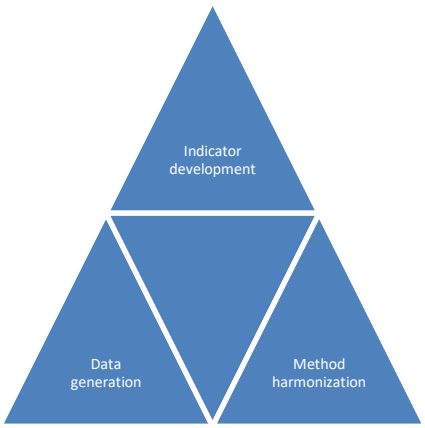


Figure 5. Visualization of the balance between indicator-development, data generation and harmonization of methods.

Focus on data-generating initiatives with several purposes

To improve both the usefulness and cost-efficiency of national data-generating initiatives, it is advisable to prioritise efforts that serve more than one purpose. Initiatives should, where possible, both fulfil reporting obligations and provide data that can be used to calculate indicators comparable with metrics at EU/international level. The Packaging Statistics are one example of such a dual-use approach: although they are collected primarily for reporting to Eurostat, they also provide input to the roadmap indicators and to the National mapping of plastic flows. These national indicators can, in turn, be compared with selected EU-level metrics in the CML.

Continue international cooperation and apply Nordic/global harmonization recommendations

Many of the Nordic harmonization initiative's final recommendations rely on stronger, more structured cooperation between key actors in the Nordic countries, particularly environmental protection agencies and statistical authorities. Swedish stakeholders participated with input to the initiative and are encouraged to remain actively engaged in this work and, where relevant, take a leading role in those initiatives that closely align national priorities. Similarly, the conclusions and recommendations of the Statistical guideline developed by UNEP and UNITAR should be monitored, and, where possible, integrated in national data generating efforts.

Align national indicators with international initiatives such as the CML

One possible way to concretize the coordination between national and international data-generating efforts is to structure national data collection so that it reflects the definitions, system boundaries, and calculation logic used for the indicators within the CML framework. By doing so, national datasets can be used to quantify indicators that are directly comparable to certain CML indicators, while still meeting domestic policy and monitoring needs. However, it should be noted that some CML indicators are expressed in absolute or relative terms (increase/decrease), rather than as shares, which limits direct comparability with national indicators.

A concrete example illustrates this: two of the CML indicators that are presented as shares are *Global bio-based plastics production* and *EU*

circularity of plastics materials (see Chapter 3.4.1). The latter is defined as the amount of secondary plastics produced/recycled, divided by the total plastics consumption by end users. The Mapping of plastic flows in Sweden provides data for the denominator. However, the amount of secondary plastics produced/recycled is currently not monitored on a Swedish level, and neither is the share of bio-based plastics production[29]. By expanding the national data generating initiatives to cover these two plastic flows, national indicators that comparable to CML indicators can be quantified.

5.1. Conclusions

In conclusion, a central message is the need to balance indicator development, data generation, and methodological harmonization. Indicators can only be as robust as the data and methods underpinning them. Approaches such as the Circular Metrics Lab, which distinguishes between fully quantifiable indicators and emerging "signals", illustrate how indicator frameworks can both use existing data and actively point to where new data are needed. Harmonization initiatives led at Nordic and UN level are important to monitor, as they provide practical guidance on how data should be collected and reported to ensure comparability between countries and over time.

For Sweden, this implies prioritising data-generating initiatives that serve multiple purposes: meeting reporting obligations, supporting national policy development (e.g. för sustainable use of plastics), and enabling alignment with international-level metrics. Looking ahead, closer alignment of national mapping efforts with international frameworks, would enhance the value and cost-effectiveness of Swedish data in both domestic and international settings. Strengthening coherence and comparability across levels will increase the long-term usefulness of plastic-related indicators.

[29] (Ljungkvist Nordin, et al., 2025)

6 Bibliography

European Environment Agency. (2024, June 18). *New EEA monitoring tool reviews progress on plastics circularity in Europe*. Retrieved from https://www.eea.europa.eu/en/newsroom/news/new-eea-monitoring-tool-on-plastics-circularity

European Environment Agency. (n.d.). *Circularity Metrics Lab- Plastics*. Retrieved from https://www.eea.europa.eu/en/circularity/sectoral-modules/plastics

Ljungkvist Nordin, H., Unsbo, H., Ahlm, M., Due, L., Stenmark, C., Emilsson, E., . . . Lundmark von Essen, A. (2025). *Kartläggning av plastflöden i Sverige 2023.* Naturvårdsverket.

Naturvårdsverket. (2021). *Naturvårdsverkets Färdplan för hållbar plastanvändning.* Naturvårdsverket.

Naturvårdsverket. (2022). *Förutsättningar för hållbar plastanvändning Bakgrund till Naturvårdsverkets färdplan för hållbar plastanvändning.* Naturvårdsverket.

Naturvårdsverket. (2024). *Sveriges återvinning av förpackningar. Uppföljning av producentansvar för förpackningar 2023.* Naturvårdsverket.

Naturvårdsverket. (2024a). *Rätt plast på rätt plats- redovisning av regeringsuppdrag.* Naturvårdsverket.

Naturvårdsverket. (2025). *Naturvårdsverkets färdplan för hållbar plastanvändning, reviderad 2025.* Naturvårdsverket.

Nordic Council of Ministers . (2025). *Harmonisatins and development of plastic statistics in the Nordics.*

Nordic Council of Ministers. (2025). *Harmonisation and development of plastic statistics in the Nordics.* Nordic Council of Ministers.

Nordic Council of Ministers. (2025). *Nordic plastic statistics. Pilot application of the UNITAR model and review of plastic waste factors.* Nordic Council of Ministers.

Secretary of the Nordic Council of Ministers, Nordic Council of Ministers. (2024). *Better and harmonized statistics on plastic material flows.*

Secretary of the Nordic Council of Ministers, Nordic Council of Ministers.

SMED. (2024). Projekt-PM för SUP.

SMED. (2025a). Intern projektspecifikation, förpackningsstatistik.

SMED. (2025b). Intern arbetsdokumentation AR-07 SUP.

Souder, J., Kennedy, E., Xu, C., Gruber, B., Paes, C., Hu, R., . . . Amadei, A. (2024). *Modelling plastic product flows and recycling in the EU-The Plastic Product Mass Flow Model 2.0* . Joint Research Centre.

UNEP. (2025, januari 23). *Introduction of the Statistical Guideline for measuring flows of plastic throughout the life cycle*. Retrieved from https://wedocs.unep.org/handle/20.500.11822/47072

UNITAR. (n.d.). *Plastic monitoring with upcoming UNEP/UNITAR statistical guideline*. Retrieved from https://www.scycle.info/plastic-monitoring-with-upcoming-unep-unitar-statistical-guideline/?utm_source=chatgpt.com

zu Castell-Rudenhausen, M., Tenhunen-Lunkka, A., D'Amato, A., Almasi, A., Vanderreydt, I., Fogh Mortensen, L., & Nielsen, T. (2024). *Measuring Europe's plastics circularity – through the lenses of the EEA Circularity Metrics Lab.* European Topic Centre on Circular economy and resource use.

Annex 1

Template for reviewing initiatives

1. Summary of the initiative

2. General information about the initiative

2.1 Publisher of the initiative

The organization/authority/company responsible for the initiative.

2.2 Phase of development

Describe what phase of development of the initiative.

2.3 Targeted audience

Describe the targeted audience of the initiative.

2.4 Geographical area

Include the geographical area of the initiative.

3. Aim and objective of the initiative

Describe the aim and objective of the initiative.

4. The available data from the initiative

Describe the data available from the initiative.

5. Methodology of the initiative

Describe the methodology used within the initiative.

6. Data sources utilized in the initiative

Describe the main data sources utilized to receive the results of the initiative.

7. Delimitations of the results

Describe the delimitations of the initiative.

8. Uncertainties of the study

Describe the main uncertainties of the initiative.

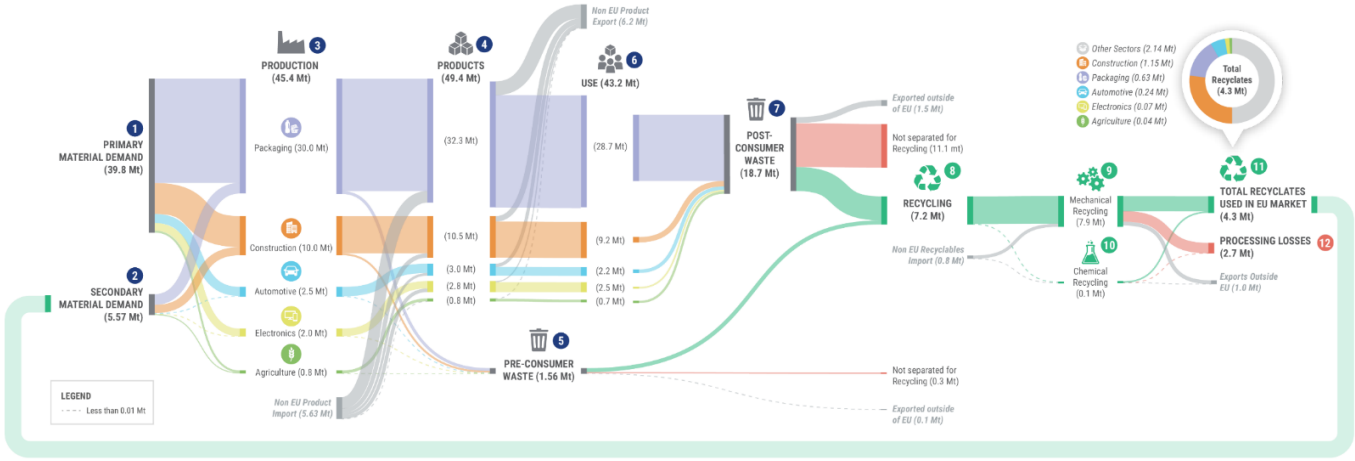
9. Update of the initiative

Describe the plan for updating the data in the initiative. Include information about the initiative is expected to continuously update (e.g., every year, every two years, or every three years).

Annex 2

EU-Level Sankey Diagrams

Plastic Flows MFA - EU27 (2019)



1. **Primary material demand** is the demand for virgin, non-recycled plastics for products produced in Europe
2. **Secondary material demand** is the demand for secondary, recycled plastics for products produced in Europe
3. **Production** is an aggregate of all plastics ending up in products produced in Europe for the five priority sectors, essentially summarizing inputs for European plastics converters
4. **Products** is an aggregate of plastics in Europe, taking into account production, imports, and exports
5. **Pre-consumer waste** is the waste generated in product manufacturing processes or commercial activities, before that material becomes a finished product
6. **Use aggregates** only plastics consumed in Europe, after accounting for trade flows
7. **Post-consumer** waste is the waste generated after use of the material as a finished product
8. **Recycling** is the material ultimately separated for recycling processes, whether that is source separated or not
9. **Mechanical recycling** is the material recycled through conventional, mechanical recycling processes
10. **Chemical recycling** is the material recycled through chemical recycling processes
11. **Total recyclates used in EU market** is the amount of recyclate that ends up in products made in the EU, as opposed to being exported for use in another country
12. **Processing losses** are the recycling losses from the recycling process. This includes both losses to the environment and losses due to process inefficiencies

Figure 15: Plastic flows for the EU-level model (2019) split by sector.

Description: *Material flow analysis showing plastic flows for five priority sectors in EU27 (2019). All results shown in the Sankey diagrams in this report are pulling from the "EU_Model" tab of the Plastic Flows 2.0 model, which does not account for individual point data from CPA signatories. The production and end-of-life stages described at the bottom of the graphic apply across all Sankey diagrams used in the report.*

EU-level Sankey Diagram from the Plastic Product Mass Flow Model 2.0, presented in Chapter 3.3.1. Reference: (Souder, et al., 2024).